FINAL
ENVIRONMENTAL IMPACT STATEMENT

SMALL INTERCONTINENTAL
BALLISTIC MISSILE PROGRAM
MALMSTROM AIR FORCE BASE,
MONTANA

UNITED STATES AIR FORCE
DECEMBER 1987

Air Force
Environmental Planning Division
(HQ USAF/CEVP)

Room 5B269
1260 Air Force Pentagon
Washington, DC 20330-1260

16 JUL 93

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DEPARTMENT OF DEFENSE · UNITED STATES OF AMERICA

DEPARTMENT OF THE AIR FORCE
WASHINGTON, D.C. 20330-1000

OFFICE OF THE ASSISTANT SECRETARY

December 18, 1987

TO: ALL INTERESTED GOVERNMENT AGENCIES, PUBLIC GROUPS, AND INDIVIDUALS

We are pleased to provide you a copy of the Final Environmental Impact Statement (EIS) for the proposed Small Intercontinental Ballistic Missile deployment at Malmstrom AFB, Montana. The Final EIS consists of one volume which incorporates the revised Draft EIS (previously provided), summary, comments and replies. The document is provided in compliance with the Regulations of the President's Council on Environmental Quality.

This Final EIS describes the socioeconomic, biophysical and environmental effects expected to result from implementation of the proposed plan to deploy 200 Small ICBMs in Hard Mobile Launchers on 100 Minuteman launch facilities serviced by Malmstrom AFB, Montana. A decision on the proposal will not be made before January 25, 1988.

If further information is required, please contact:

Director of Environmental Planning
AFRCE-BMS/DEV
Norton AFB, California 92409-6448

Gary D. Vest
GARY D. VEST
Deputy Assistant Secretary of the Air Force
(Environment, Safety and Occupational Health)

1 Attachment
Final EIS

FINAL
ENVIRONMENTAL IMPACT STATEMENT

SMALL INTERCONTINENTAL BALLISTIC MISSILE PROGRAM

MALMSTROM AIR FORCE BASE, MONTANA

United States Air Force
December 1987

COVER SHEET
FINAL ENVIRONMENTAL IMPACT STATEMENT
SMALL INTERCONTINENTAL BALLISTIC MISSILE PROGRAM
MALMSTROM AIR FORCE BASE, MONTANA

a. Responsible Agency: U.S. Air Force

b. Proposed Action: Deployment of the Small Intercontinental Ballistic Missile (ICBM) at Malmstrom Air Force Base (AFB) in Montana.

c. For further information contact: Director of Environmental Planning, AFRCE-BMS/DEV, Norton AFB, California 92409-6448

d. Designation: Final Environmental Impact Statement (FEIS).

e. Abstract: The Air Force proposes to deploy 200 Small ICBMs within the 341st Strategic Missile Wing at Malmstrom AFB, Montana beginning in 1992. The missiles would be carried and protected by special vehicles called Hard Mobile Launchers (HMLs). The HMLs would be deployed within expanded fenced areas that surround existing Minuteman launch facilities. Currently, 200 launch facilities, located throughout an 8,500-square-mile area in north-central Montana, are supported by Malmstrom AFB. Some HMLs would also be located at Malmstrom AFB for training, maintenance, and repair purposes. Land would be acquired adjacent to existing launch facilities to accommodate expansions and adjacent to the base to accommodate new military family housing, some technical and personnel support facilities, and a HML vehicle operations training area. Existing explosive safety zones surrounding launch facilities would be expanded. To facilitate transportation of HMLs to and from deployment sites, the road system (including bridges and culverts) used for the Minuteman program may be improved where necessary to enhance vehicle clearance and weight-bearing capability. A Proposed Action, three alternatives, and the No Action Alternative are analyzed in this FEIS. The Proposed Action provides for the deployment of 200 HMLs in earth-covered igloos (arched shelters) at 100 launch facilities. Alternative 1 provides for the deployment of 200 HMLs at 100 launch facilities in pre-engineered buildings and assumes the minimum operations personnel requirement of all alternatives. Alternative 2 provides for the deployment of 250 HMLs at 125 launch facilities in a manner similar to the Proposed Action and represents the maximum manpower requirement of all alternatives analyzed. Alternative 3 provides for deployment of 200 HMLs at 200 launch facilities in pre-engineered buildings. Given considerations of the existing and projected military threat, operations requirements, and environmental consequences, the Air Force has determined that Alternative 1 is the preferred alternative. For the Proposed Action and each of the alternatives, two siting options for the provision of military family housing were analyzed. The onbase housing option provides military family housing on land to be acquired adjacent to Malmstrom AFB. With the offbase housing option, housing would be provided offbase by the private sector or through other federal programs. Potential environmental impacts associated with these actions are considered in the FEIS in the following environmental categories: socioeconomics, utilities, transportation, land use, recreation, visual resources, cultural and paleontological resources, biological resources and threatened and endangered species, water resources, geology and soils, air quality, and noise. Safety considerations are also discussed.

This site-specific FEIS follows the June 1987 publication of the Draft EIS (DEIS) for the Small ICBM program and incorporates responses to public comments received on the DEIS either in the text or in Chapter 6.0, Public Comments.

Preface

Minor modifications to the Small Intercontinental Ballistic Missile (ICBM) program, and a more precise definition of system requirements, have resulted in changes to the Draft Environmental Impact Statement (DEIS). Additionally, the DEIS has been modified in response to public comments as a result of additional field studies completed since the publication of the DEIS and to improve the quality and readability of the document.

Program modifications which have resulted in further analysis include the following:

- Specific sets of launch facilities associated with each alternative have been identified. The EIS now provides a better differentiation of impacts resulting from various alternatives. The text and tables showing differences among alternatives have been revised throughout the document.

- Options for accommodating military family housing needs have been revised. The expressed Air Force policy is to take full advantage of the private sector's ability to provide necessary housing for military personnel. The analysis in the DEIS indicated that the private sector can provide only a small portion of the military family housing needs. This resulted in unacceptable impacts on not only the local housing market (price escalation and competition for suitable housing), but on military personnel who may be forced to accept substandard or overpriced housing. The Air Force is, therefore, committed to seek: (1) onbase housing through the Military Construction Program or (2) offbase housing in Great Falls supplied by the private sector with funding obtained through such federal programs as Sections 801 and 802 of the Military Construction Act of 1984. These now constitute the two family housing options addressed in the EIS and have been analyzed for the Proposed Action, as well as for all alternatives. Changes to Chapter 4.0 (Environmental Consequences) text have been made for all affected resources.

- Land acquisition requirements for Malmstrom Air Force Base (AFB) have been revised. The amount of land to be acquired for the Hard Mobile Launcher (HML) vehicle operations training area has been reduced from 600 acres to 350 acres. Additionally, technical and personnel support facilities siting requirements have resulted in the need to acquire a 100-acre parcel of land north of the base. Modifications to resource analyses have been made in Chapter 4.0, as necessary, to reflect these changes.

- Changes have been made to Small ICBM facilities requirements. These changes are shown in revised Table 1.3.3-1 and Figure 1.3.3-2 (Chapter 1.0, Program Overview). Resource analyses affected by onbase activities have been revised, as necessary, in Chapter 4.0.

During the public review and comment period, over 100 documents including comment sheets and letters were received. In addition, public hearing testimony obtained at six locations in Montana was recorded. Chapter 6.0, Public Comments, summarizes all issues identified and Air Force responses to those issues. Some of the major issues have required modification of the text. These changes include the following:

- Tables showing construction- and operations-related fuel use have been added to Chapter 1.0 (Tables 1.5.2-1 and 1.5.2-2).

- A table showing construction employment by trade has been added to Section 4.1.2.1 (Table 4.1.2-2).

- Impacts on the Great Falls Public Schools system have been revised incorporating updated P.L. 874 funding estimates (Section 4.1.2.6).

- City and county property tax revenue projections have been revised as a result of the revised housing analysis (Section 4.1.2.6).

- A discussion of the Montana Department of Family Services as a human service agency, and its main function of protecting children and adults from abuse, has been added (Sections 3.1.3.5 and 4.1.2.5).

- Updated information on state government finances has been incorporated into the socioeconomic analysis (Section 3.1.3.6).

- The section on hazardous waste generation and disposal has been expanded (Section 4.2.2.3).

- Specific electrical demands for each rural electric cooperative for the Proposed Action and alternatives have been incorporated (Sections 4.2.2.4 and 4.2.3.4).

- Table 4.3.2-1 has been expanded to include peak-hour vehicle trips to Malmstrom AFB with the offbase housing option.

- Discussion of impacts on deployment area roads due to movement of operations vehicles and HML *transporter convoys has been expanded* (Section 4.3.2.1).

- Discussion of impacts on inhabited structures due to expanded explosive safety zones has been substantially revised. With the identification of sets of launch facilities for various alternatives, impacts on inhabited structures have been eliminated for the Proposed Action and Alternatives 1 and 2. Such impacts would occur only if Alternative 3 is chosen as the implementing action.

- A discussion of impacts on tourism has been added to the regional recreation section of the recreation resource (Sections 3.5.3.1 and 4.5.2.1).

- A revised Programmatic Agreement for cultural and historic resources has been included in this document (Appendix B.2).

- In the biological resources analysis, an additional mitigation measure has been added to the assumed mitigation section (Section 4.8.1.4). This measure describes the development, implementation, and monitoring of the reclamation and noxious weed control program.

- The air quality data base and analysis related to fugitive dust have been revised to incorporate the new U.S. Environmental Protection Agency standards promulgated July 1, 1987 (Sections 3.11.3.2, 3.11.3.3, and 4.11.2).

- Chapter 5.0, Safety Considerations, has been expanded to address varying wind conditions for the worst-case accident event and to provide more detail on radiological and toxic effects.

After identification of proposed launch facility sets for the Proposed Action and all alternatives, it was necessary to conduct additional selective field surveys to identify site-specific impacts more accurately. Modifications to the EIS text, as a result of these field verifications, are made in Chapter 4.0 in relevant resource analyses and are summarized in the following:

- Impacts on prehistoric resources have been revised on the basis of the field surveys of individual launch facilities and base expansion areas (Section 4.7.2.1).

- Impacts on paleontological resources have been revised to include new data from drilling logs and cut-and-fill plans (Section 4.7.2.4).

- Impacts on biological resources were revised based on a selective field survey of wetlands, wildlife, vegetation, and threatened and endangered species. The greatest changes occurred in the vegetation element and the threatened and endangered plant species subelement (Sections 4.8.2 and 4.8.3).

- The quality and importance of the habitats to wildlife survival, particularly with regard to big game species wintering habitats, were reexamined. The field surveys confirmed the data presented in the DEIS. Launch facility I-7 has been added to the threatened and endangered species discussion based on information supplied by the Montana Department of Fish, Wildlife, and Parks and the U.S. Fish and Wildlife Service (Sections 4.8.2.2 and 4.8.2.5).

- Field inspection of launch facilities located near perennial streams led to a revision of several site-specific impacts on surface water quality (Section 4.9.2.2).

- Refined photograph interpretation followed by field verification of proposed launch facilities resulted in a revision to the DEIS list of launch facilities whose expansion could intensify a local saline-seep problem (Section 4.9.2.3).

- More detailed historical data on municipal water use were obtained and used in revising the water use data slightly upward. The conclusions regarding level of impact and significance remain the same as presented in the DEIS (Sections 4.2.2.1 and 4.9.2.1).

- Observations made during field visits by geologists suggested that the predictive model used during the DEIS process overestimated impacts on soil mass movements. Adjustments have been made in this document (Section 4.10.2.1).

- Minor adjustments were made to impacts on oil and gas resources based on the availability of more accurate leasing data than that available for use in the DEIS analysis (Section 4.10.2.2).

- Field verification activities have resulted in the modification of soil erosion impacts at individual launch facilities, transporter/erector routes, and bridge upgrade locations (Section 4.10.2.3).

Some changes have been made to reduce the bulk and enhance the readability of the document. These include the following:

- Chapter 3.0, Affected Environment, has been substantially reduced by eliminating material which was useful but not totally germane to the impact analysis in Chapter 4.0. At the same time, new material has been added to Chapter 3.0 in some areas, such as public services, public finance, hazardous waste, energy, regional recreation, wetlands, wildlife, vegetation, oil and gas resources, soil erosion, and air quality.

- A new chapter summarizing public comments and providing Air Force responses has been added (Chapter 6.0).

- Chapter 4.0 sections dealing with potential mitigation measures have been revised to reflect the effectiveness of these measures to reduce significant impacts. Mitigation measures which were either too vague or were related to impacts not considered significant have been removed. A new appendix dealing with the full range of mitigation measures has been added (Appendix D, Mitigations).

- Appendix E, a separate volume, contains all public comments and responses, including copies of all comment documents received, a listing of all respondents, and public hearing transcripts.

- Nine Environmental Planning Technical Reports (EPTRs) have been published as supporting documents to this EIS. These background studies provide detail that was not provided in the EIS for reasons of brevity and readability of the EIS.

Limited copies of Appendix E and the EPTRs have been distributed to the office of the Governor of the State of Montana and public libraries in the study area. Information on how to obtain individual copies can be requested by writing to:

Director of Environmental Planning
AFRCE-BMS/DEV
Norton AFB, California 92409-6448

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EXECUTIVE SUMMARY

The President has selected the Small Intercontinental Ballistic Missile (ICBM) system to be deployed at Minuteman launch facilities within the 341st Strategic Missile Wing at Malmstrom Air Force Base (AFB) in Montana. This Environmental Impact Statement (EIS) has been prepared by the Air Force to aid decisions for such deployment. The EIS considers the Proposed Action of 200 missiles deployed in earth-covered igloos, reasonable alternatives, and the No Action Alternative. Mitigation measures to reduce potential adverse impacts are identified. All comments that were received at the public hearings on the Draft EIS or otherwise within the formal comment period are addressed.

PURPOSE AND NEED

In January 1983, President Reagan convened a bipartisan Commission on Strategic Forces (the Scowcroft Commission) to review the purpose, character, size, and composition of the strategic forces of the United States and make appropriate recommendations on ICBM modernization. The commission's report was issued in April 1983. Its findings and recommendations were later accepted by the President and Congress. Among its recommendations was that the United States immediately initiate engineering design of "... a single warhead ICBM weighing about fifteen tons ... [leading] ... to the initiation of full-scale development in 1987 and an initial operating capability in the early 1990s ... Hardened silos or shelters and hardened mobile launchers should be investigated now ..." (U.S. Commission on Strategic Forces 1983). In the 1984 Department of Defense (DOD) Authorization Act, Congress mandated start-up of the Small ICBM program at a pace that would permit full-scale engineering development to begin in fiscal year (FY) 1987. Congress recommended that the program be pursued as a matter of the highest national priority, with an Initial Operational Capability (IOC) by the end of 1992.

ENVIRONMENTAL IMPACT ANALYSIS PROCESS

The 1986 DOD Authorization Act directed the Air Force to prepare environmental documentation for the Small ICBM using a tiered Environmental Impact Analysis Process (EIAP). Tiering, which involves moving from general to specific environmental analyses as a program evolves, provides the balance and perspective appropriate for each stage of decision-making and is recommended by the Council on Environmental Quality regulations. The Small ICBM Legislative EIS, the first tier of the EIAP, was published in November 1986 and was provided to the President, the Secretary of Defense, appropriate congressional committees, the U.S. Environmental Protection Agency (EPA), and other interested parties. It provided information to support three decisions concerning the Small ICBM: (1) the selection of basing mode(s), (2) the selection of the areas where the system could be deployed, and (3) the decision to enter full-scale development of the weapon system. On December 19, 1986, the President announced the decision to proceed with full-scale development of the Small ICBM, and selected the Hard Mobile Launcher at Minuteman Facilities basing mode at Malmstrom AFB for IOC.

This EIS analyzes the potential environmental impacts of proposed deployment and peacetime operation of the Small ICBM in Montana, and constitutes the final tier of the EIAP for Malmstrom AFB. Within the EIS, program-related impacts are reported for 12 resource categories and 36 resource elements for the Proposed Action and each of the alternatives.

SYSTEM DESCRIPTION AND LOCATION

Small Intercontinental Ballistic Missile System Description

The Small ICBM will be effective against hardened military targets and will be small and light enough to facilitate basing in a mobile mode. The Small ICBM will be a three-stage, solid propellant, single reentry vehicle missile that will be approximately 53 feet long, 46 inches in diameter, and will weigh approximately 37,000 pounds. For comparison, the Peacekeeper, our most modern ICBM, is 71 feet long, 92 inches in diameter, and weighs 195,000 pounds.

The missiles will be carried and protected by special vehicles called Hard Mobile Launchers (HMLs) that are designed to enhance survivability. These HMLs will be about 105 feet long, 14 feet wide, and will weigh approximately 230,000 pounds, including the weight of the missile. The HMLs will be capable of traveling on paved, gravel, and dirt roads, and will have off-road capability.

The major facilities required for operation and support of the proposed system would be located at the main operating base and at Minuteman launch facilities (silos) associated with that base. The HMLs would be deployed within expanded fenced areas that surround existing launch facilities. Some HMLs would also be located at the main operating base for training, maintenance, and repair purposes.

Except for major maintenance at the main operating base (approximately once a year), the HMLs would remain at the launch facilities in a dash-ready configuration. Under warning of an attack, dispersal of HMLs from the launch facilities could be ordered. The geographically diffused arrangement of the launch facilities would enable the rapid dispersal of the HMLs over a large area. For peacetime transportation to and from launch facilities, the HMLs would be configured to ensure that loading on each axle is below 18,000 pounds.

Small Intercontinental Ballistic Missile Deployment Setting

Proposed deployment activities would be concentrated in the following areas:

- Malmstrom AFB,
- The existing Minuteman launch facilities, and
- The existing deployment area road network.

Malmstrom Air Force Base. Malmstrom AFB is a Strategic Air Command base that operates 150 Minuteman II and 50 Minuteman III launch facilities. It is located in north-central Montana, 1.5 miles east of Great Falls (Figure S1). Malmstrom AFB currently serves as the command, training, and operational and maintenance center for the 341st Strategic Missile Wing. Malmstrom AFB has 4,300 military and civilian personnel.

Minuteman Launch Facilities. Currently, 200 launch facilities and 20 launch control facilities are dispersed over an 8,500-square-mile deployment area (Figure S2). Minuteman launch facilities are unmanned and are generally situated in sparsely populated rural areas. Each launch facility is inside a fenced area occupying from 1 to 3.3 acres. Within this area are the silo, a service area, and various technical support facilities. Ten Minuteman launch facilities make up a missile flight. Each flight

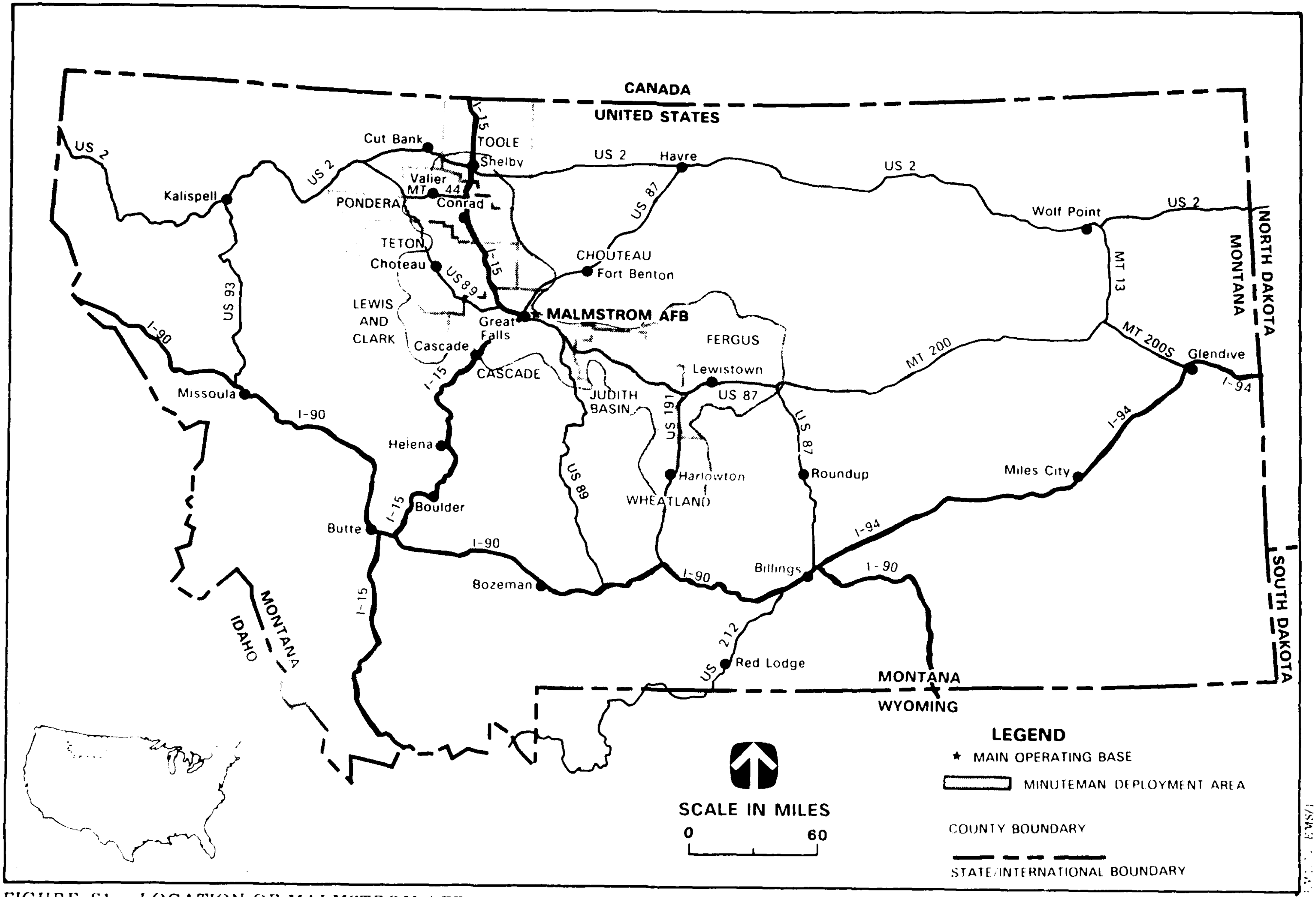

FIGURE S1 LOCATION OF MALMSTROM AFB AND MINUTEMAN DEPLOYMENT AREA IN MONTANA

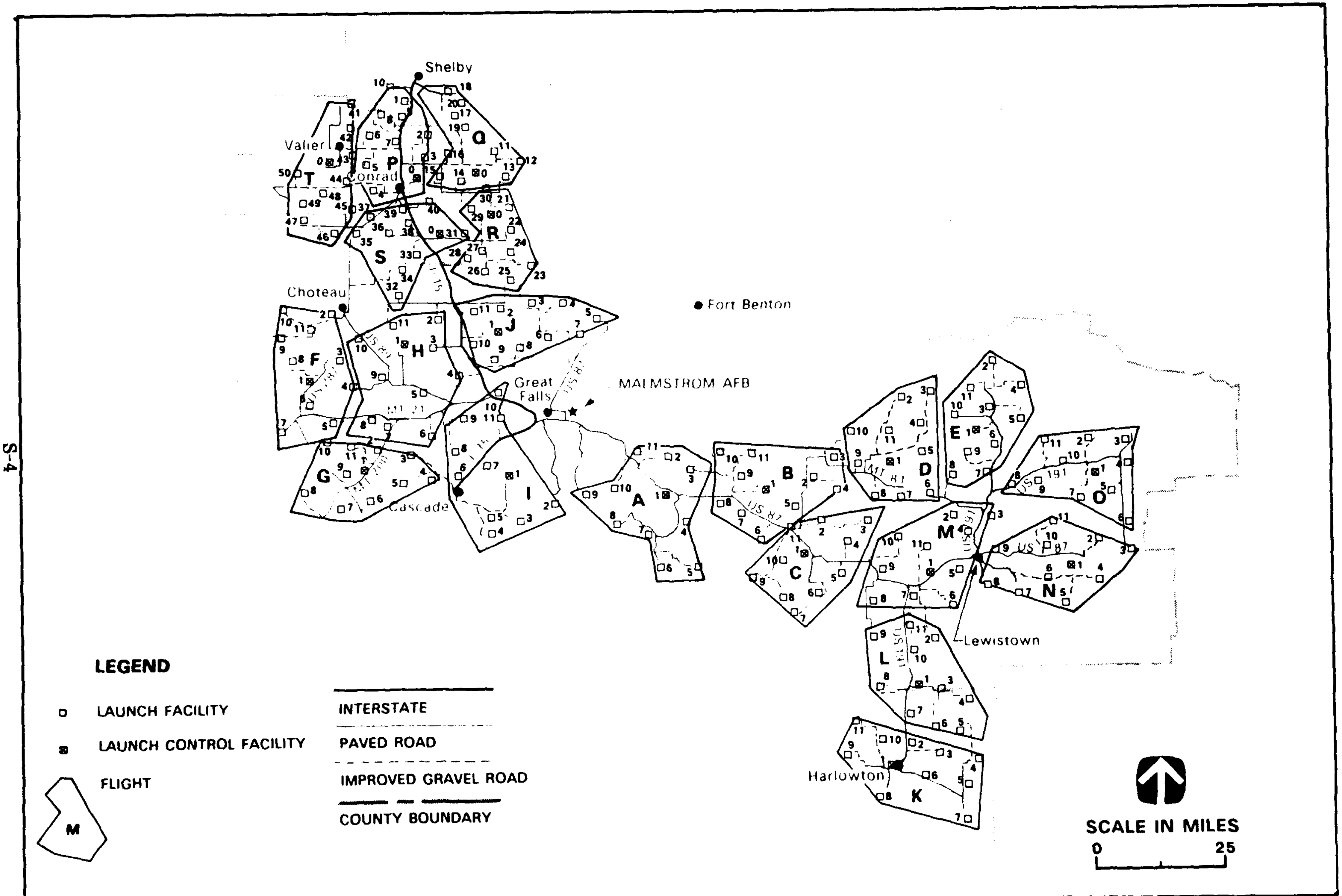

FIGURE S2 NETWORK OF PUBLIC ROADS USED BY TRANSPORTER-ERECTOR VEHICLES FOR ACCESS TO MALMSTROM AFB MINUTEMAN LAUNCH FACILITIES IN MONTANA receives primary support and control from a manned launch control facility. The 341st Strategic Missile Wing at Malmstrom AFB consists of 20 missile flights.

Deployment Area Roads. A system of designated roads in the deployment area is presently used to transport missile components to launch facilities using a transporter-erector vehicle (Figure S2). These designated transporter/erector (T/E) routes are also used by security patrols and missile maintenance teams. There are 1,707 miles of T/E routes and 315 bridges in the deployment area. Of the 1,707 miles of deployment area roads in the T/E route network, 609 miles are state-owned roads, another 1,090 miles are county roads, and there are 8 miles of city streets.

Summary of the Proposed Action and Alternatives

In developing the Proposed Action and its alternatives, a variety of system variables were considered. These variables included the total number of HMLs to be deployed throughout the Minuteman Wing (200 or 250), the number and location of launch facilities, the number of HMLs to be deployed at each launch facility (1 or 2), the type of HML enclosures to be constructed at the launch facilities (earth-covered igloos or pre-engineered metal buildings), and the number of operations personnel required. Evaluation of combinations of these factors led to the identification of the Proposed Action and three alternatives for analysis, which represent the range of anticipated environmental impacts regardless of the combination of variables finally selected (Table S1).

The Proposed Action provides for the deployment of 200 HMLs in earth-covered igloos (arched shelters) at 100 launch facilities in Montana. Alternative 1 provides for the deployment of 200 HMLs at 100 launch facilities in pre-engineered buildings and represents the minimum manpower requirement of all alternatives. Alternative 2 provides for the deployment of 250 HMLs at 125 launch facilities in a manner similar to the Proposed Action and represents the maximum manpower requirement of all alternatives analyzed. Alternative 3 provides for deployment of 200 HMLs at 200 launch facilities in pre-engineered buildings and has manpower requirements similar to the Proposed Action. With the No Action Alternative, no Small ICBMs would be deployed at Malmstrom AFB.

All 200 launch facilities in the Malmstrom AFB Minuteman Wing are considered to be viable siting candidates for the Small ICBM program. For the Proposed Action and Alternative 1, a total of 100 launch facilities would be modified to accommodate HML enclosures. For Alternative 2, a total of 125 launch facilities would be modified, and for Alternative 3, all 200 launch facilities would be modified to accommodate HML enclosures. The proposed set of launch facilities for each alternative was determined through consideration of operational effectiveness, cost of upgrade, cost of access, security, environmental consequences including impacts on sensitive vegetation and species as well as inhabited facilities, and cost of operations and maintenance. These sets of launch facilities for the Proposed Action and the three alternatives are shown in Figures S3, S4, S5, and S6, respectively.

In addition, two housing options, onbase and offbase, for the Proposed Action and each alternative were analyzed to cover the range of environmental impacts. The onbase housing option provides military family housing on land to be acquired adjacent to Malmstrom AFB. For the offbase housing option, housing would be provided in the Great Falls urban area by the private sector or through other federal programs that encourage private entrepreneurs to construct housing. Final selection may include some combination of on and offbase housing.

Table S1

Summary of the Proposed Action and Alternatives
for the Small ICBM Program at Malmstrom AFB, Montana

	No. of Launch Facilities	No. of HMLs Deployed	No. of HMLs per Launch Facility	HML Enclosures	Explosive Safety Zone (feet from HML Enclosure)	Peak-Year Construction Personnel (1990)	Operations Personnel	Maximum Military Family Housing Provided units (acres)
Proposed Action	100	200	2	Earth-Covered Igloos	1,250	1,090	2,190-3,100[1]	1,746 (330)[2]
Alternative 1	100	200	2	Pre-engineered Buildings	1,795	1,080	2,190[1]-3,100	1,230 (232)[3]
Alternative 2	125	250	2	Earth-Covered Igloos	1,250	1,120	2,620-3,760[1]	2,000 (380)
Alternative 3	200	200	1	Pre-engineered Buildings	1,425	1,090	3,100	1,746 (330)
No Action Alternative	0	0	0	-	-	0	0	0 (0)

Notes:

[1] Selected for environmental analysis (will depend on the number of personnel stationed at each launch facility).

[2] For the Proposed Action and each of the alternatives, two housing options are analyzed: housing provided onbase through the Military Construction Program and housing provided offbase by the private sector or through other federal programs.

[3] The designation of only 1,230 military family housing units for Alternative 1 is intended only to provide an alternative number of housing units for purposes of comparative analysis. In fact, the Proposed Action and Alternatives 1 and 3 could be chosen with 1,746 units, 1,230 units, or some number in between, depending on the ability of the local housing market to meet the housing needs of military families and the availability of funds for military family housing or for other federally supported housing construction programs.

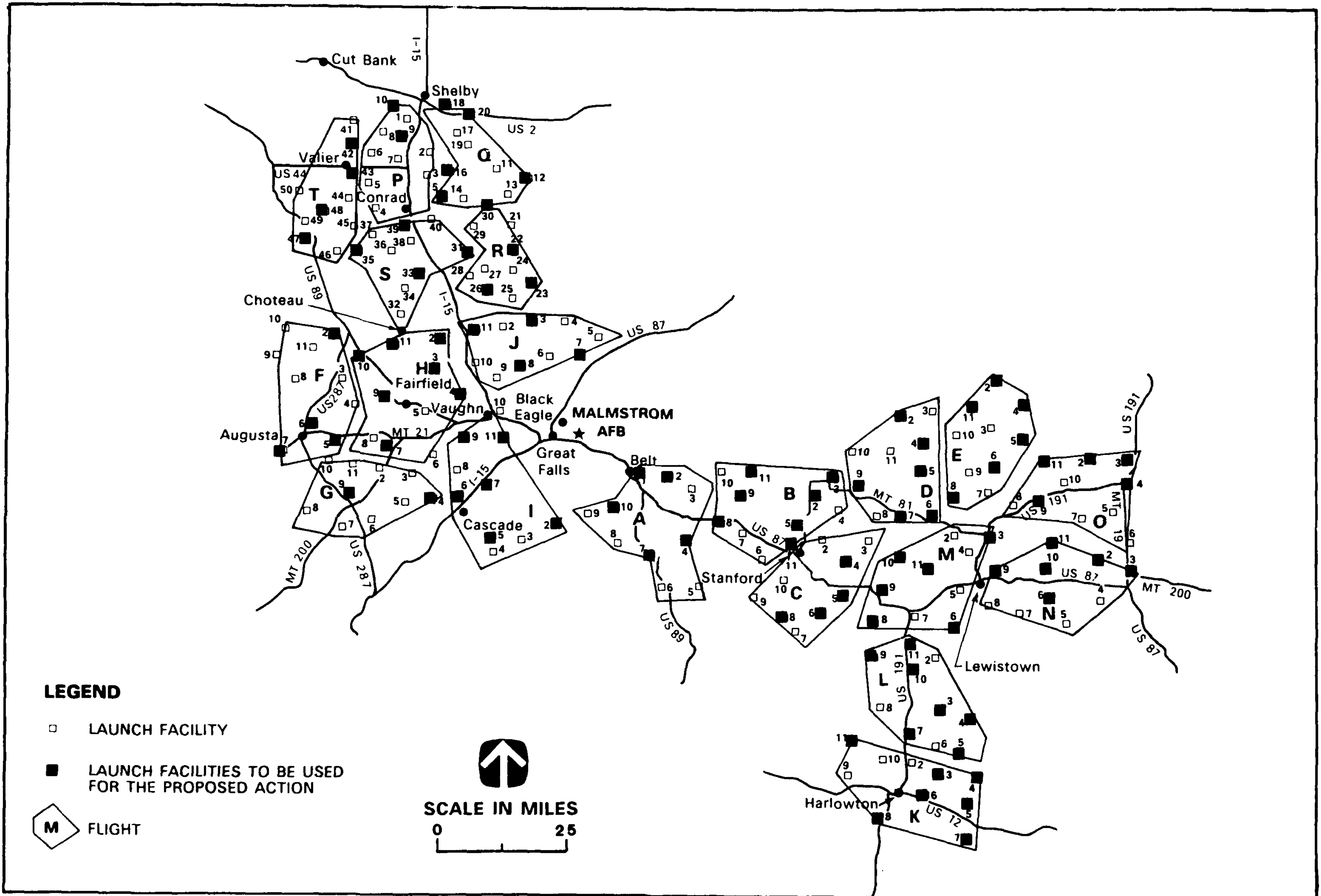

FIGURE S3 PROPOSED SET OF LAUNCH FACILITIES FOR THE PROPOSED ACTION

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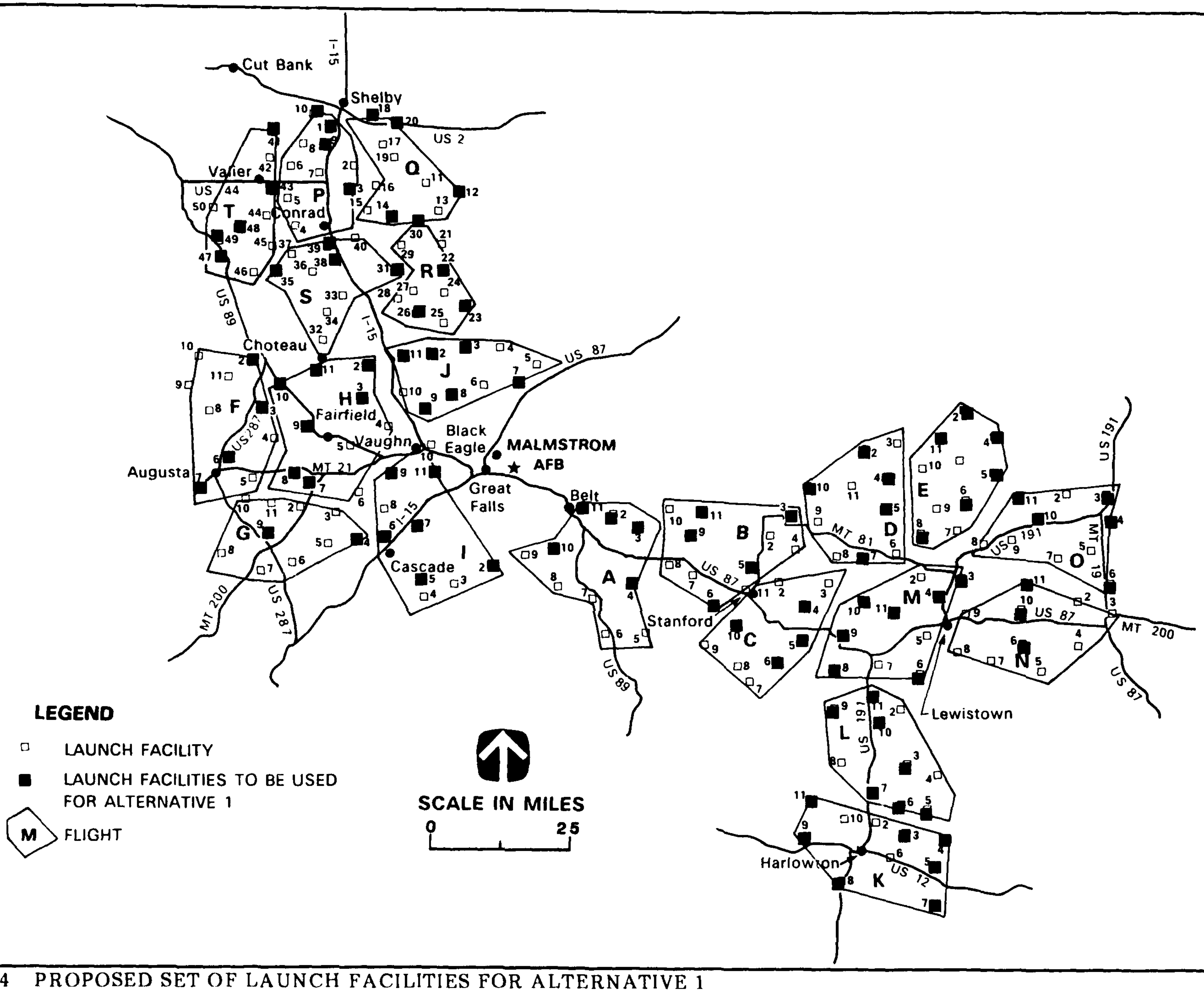

FIGURE S4 PROPOSED SET OF LAUNCH FACILITIES FOR ALTERNATIVE 1

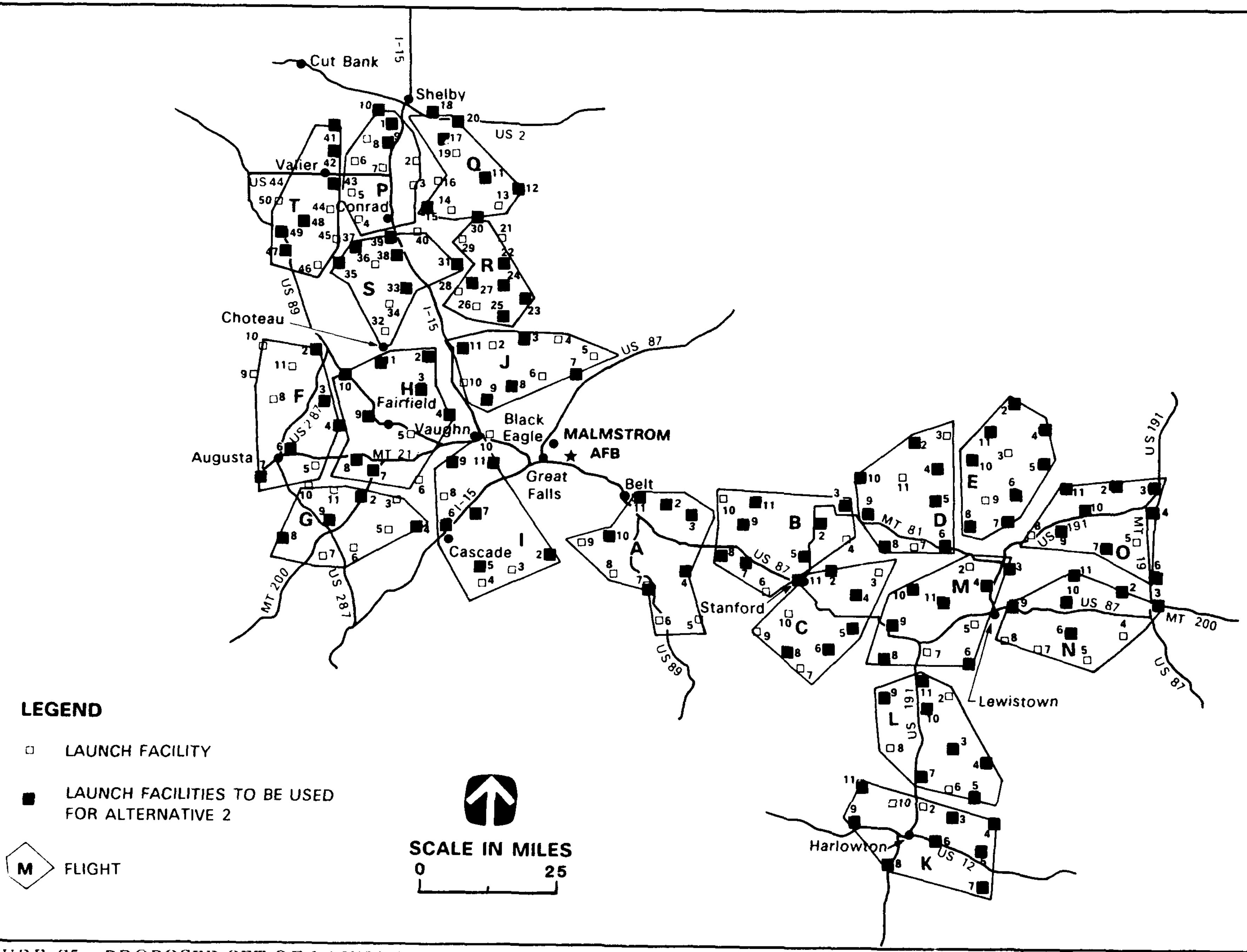

FIGURE S5 PROPOSED SET OF LAUNCH FACILITIES FOR ALTERNATIVE 2

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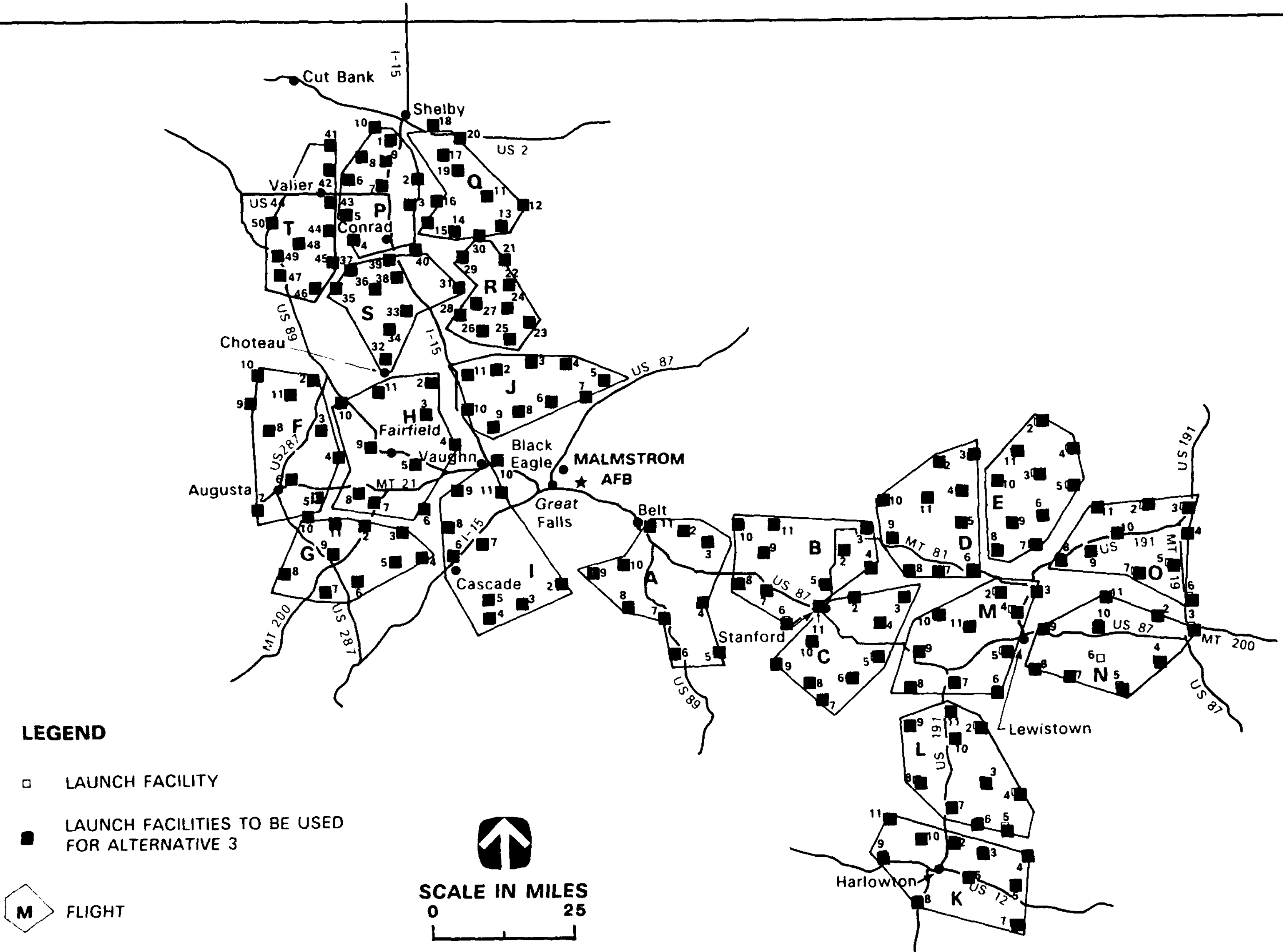

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FIGURE S6 PROPOSED SET OF LAUNCH FACILITIES FOR ALTERNATIVE 3

Proposed Action

Malmstrom Air Force Base. For the Proposed Action and for each alternative except the No Action Alternative, facilities containing approximately 3.2 million square feet (sq ft) of new floor space would be constructed over a 6-year period at the base to support Small ICBM operations; some existing floor space would require additions and/or modifications to provide an additional 67,000 sq ft. Various roads, utilities, and other support construction would also be required. Up to 800 acres of land adjacent to the base may have to be acquired to accommodate these facilities and additional activities. This includes up to 330 acres of possible acquisition, if military family housing is provided onbase.

The majority of Small ICBM technical facilities (Figure S7) would be constructed between 1990 and 1992 on the southeast side of the Malmstrom AFB runway, within or adjacent to the existing Minuteman Weapons Storage Areas (WSA). The WSA would be expanded to accommodate Small ICBM weapon assembly and storage facilities. The HML vehicle operations training area would be constructed outside of the explosive safety zones required by the expanded WSA, resulting in a 350-acre expansion of the base.

Personnel support facilities would be sited on the northwest side of the airfield and be integrated within the existing support complex, with the exception of military family housing and some technical and personnel support facilities, which would require acquisition of additional land north of the base. Construction of personnel support facilities planned for the base would start in 1991 and be completed by 1995.

Base road improvements include widening Goddard Avenue from the main gate to the perimeter road near the central heat plant, modifying connections from the personnel support area to the perimeter road leading to the WSA, and improving the roads on the east side of the base from the WSA to their connection with U.S. 87/89 east of Great Falls. Local streets connecting Great Falls with the main gate on Goddard Avenue may require improvements, and the county road leading to the north gate may require relocation to make room for the additional onbase military family housing. Specific information on housing is provided in the section on housing options.

Minuteman Launch Facilities. Small ICBM construction activities at existing Minuteman launch facilities in Montana would begin in the spring of 1991 and be completed in 1996. Two earth-covered igloos with adjacent crew quarters would be constructed near the selected Minuteman launch facilities. The 100 launch facilities used for the Proposed Action would be enlarged and the existing security fence would be relocated and extended to enclose this area (Figure S8). Launch facility expansion would vary with location, typically ranging from 0.1 to 1.6 acres. A total of approximately 115 acres of land would be acquired in fee simple in order to accommodate the igloos at all 100 sites. Existing explosive safety zones that prohibit inhabited structures within 1,200 feet of Minuteman silos would be expanded to a distance of 1,250 feet from the igloos. This would require an average of 34 acres per launch facility or a total of 3,400 additional acres in restrictive easements. In addition, a total of approximately 300 acres within the deployment area may be disturbed during construction. This disturbance would occur adjacent to existing launch facilities and within the expanded restrictive easement.

Deployment Area Roads. To facilitate transportation of HMLs to and from launch facilities, the road system (including bridges and culverts) used for the Minuteman program would be improved where necessary to enhance vehicle clearance and weight-bearing capability. Prior to construction, a formal process involving the Federal

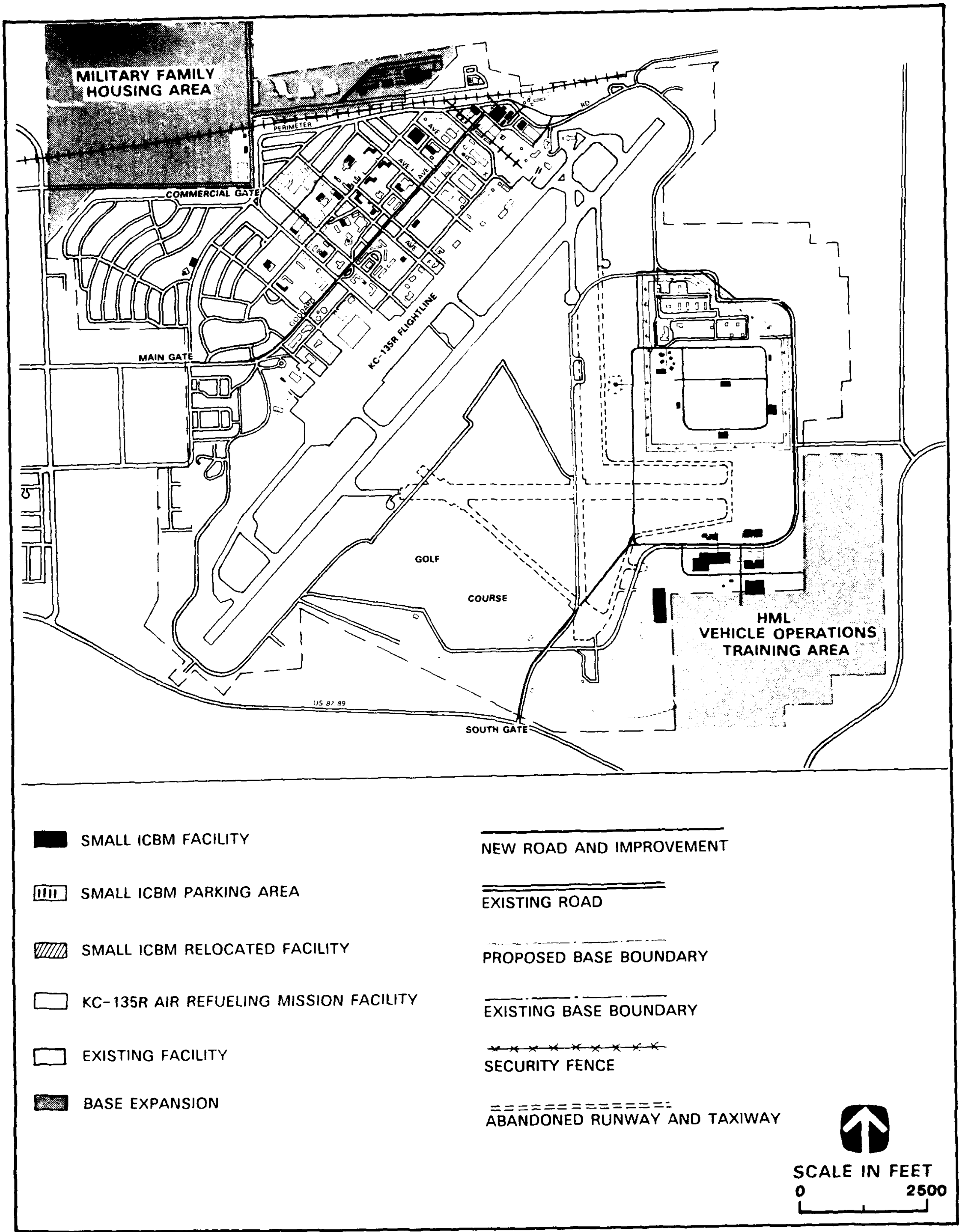
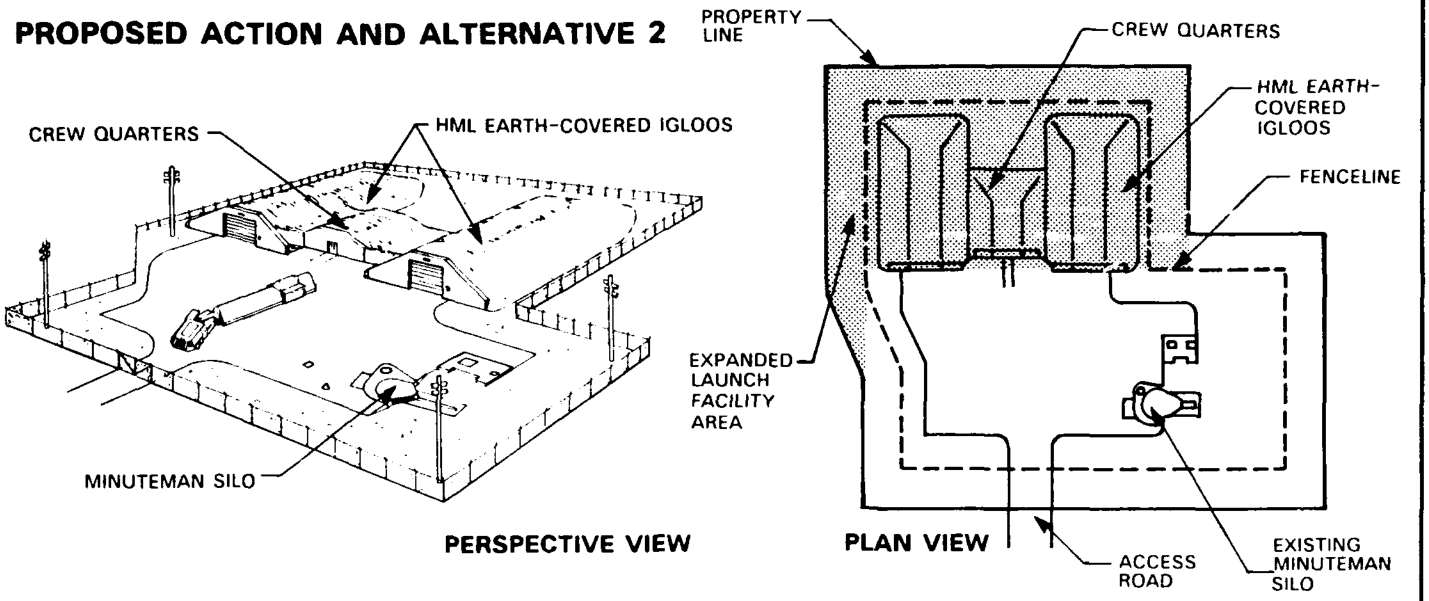
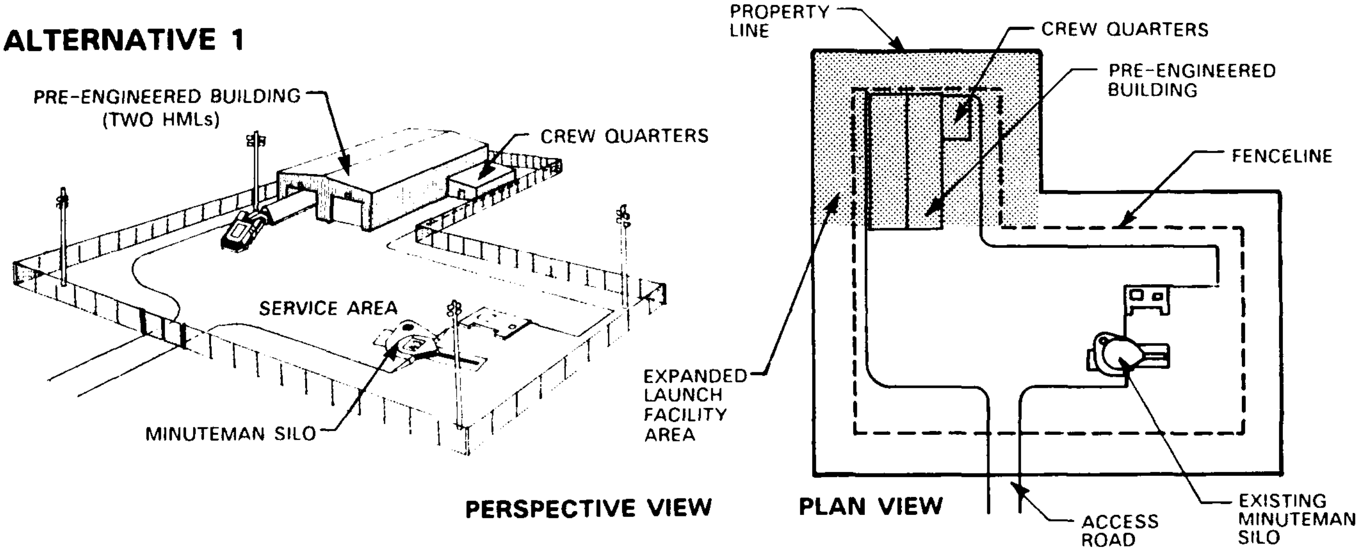


FIGURE S7 PROPOSED SMALL ICBM FACILITIES AT MALMSTROM AFB, MONTANA

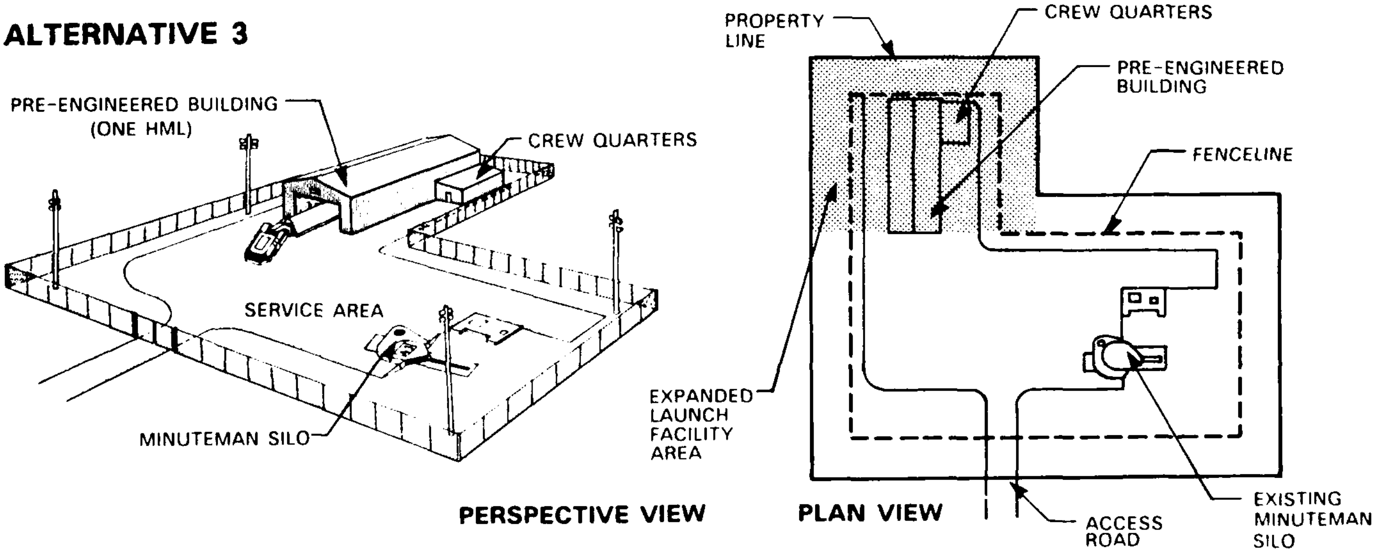
PROPOSED ACTION AND ALTERNATIVE 2



ALTERNATIVE 1



ALTERNATIVE 3



HMS/4

FIGURE S8 LAUNCH FACILITY MODIFICATION CONCEPT FOR THE SMALL ICBM

Highway Administration, state and local transportation agencies, Military Traffic Management Command, and the Air Force would determine specific road improvements and locations. In the interim, estimates have been made regarding anticipated changes required to accommodate the Small ICBM program. Road improvements are scheduled to begin in the spring of 1990 and be completed by the fall of 1994.

The actual number of bridges to be modified would depend on the decisions made through the formal process previously mentioned. There are 315 bridges throughout the T/E route network. For purposes of analysis, it was assumed that as many as 124 bridges may require modification or replacement to support the HML. In addition to bridge improvements, about 310 culverts and 240 intersections throughout the T/E route network may be improved.

Alternative 1

Malmstrom Air Force Base. The reduction of the number of operations-phase personnel needed for the Proposed Action would result in reduced housing requirements. Specific information on housing is described in the section on housing options. All other facility requirements on the base remain generally the same as those for the Proposed Action.

Minuteman Launch Facilities. The same number of launch facilities (100) used for the Proposed Action would be used for Alternative 1. However, pre-engineered buildings would be erected to house the HMLs rather than the earth-covered igloos (Figure S8). A total of approximately 81 acres of land would be acquired in fee simple in order to accommodate the pre-engineered buildings at 100 launch facilities. Use of these buildings would require expansion of the explosive safety zone to 1,795 feet from the enclosure, resulting in the acquisition of 134 acres per launch facility (a total of 13,400 acres for all 100 launch facilities) for additional restrictive easements.

Deployment Area Roads. The T/E route network upgrade requirements are similar to those for the Proposed Action.

Alternative 2

Malmstrom Air Force Base. The increase in the number of operations-phase personnel compared to the Proposed Action would raise the housing requirements. Specific information on housing is described in the section on housing options. All other facility requirements on the base remain generally the same as the Proposed Action.

Minuteman Launch Facilities. Twenty-five additional launch facilities would be used for Alternative 2, for a total of 125 launch facilities. The same type of HML enclosure (Figure S8) would be used as in the Proposed Action. A total of approximately 145 acres of land would be acquired in fee simple in order to accommodate the igloos at all 125 sites. Explosive safety zones would be expanded to a distance of 1,250 feet from the igloos. This would require an average of 34 acres per launch facility or a total of 4,200 additional acres in restrictive easements.

Deployment Area Roads. The T/E route network upgrade requirements are similar to those for the Proposed Action.

Alternative 3

Malmstrom Air Force Base. No changes from the Proposed Action are expected as a result of implementing Alternative 3.

Minuteman Launch Facilities. For Alternative 3, each of the 200 Minuteman launch facilities may be used to accommodate one pre-engineered building. The amount of land to be acquired in fee simple would total approximately 95 acres for all 200 launch facilities. The explosive safety zone would be expanded to 1,425 feet from the enclosure instead of 1,250 feet as in the Proposed Action. This would require an average of 47 acres per launch facility or a total of 9,400 additional acres in restrictive easements.

Deployment Area Roads. Although all 200 launch facilities could be used, the T/E route network upgrade requirements would be generally the same as for the Proposed Action.

No Action Alternative

With the No Action Alternative, the Small ICBM would not be deployed at Malmstrom AFB. The Air Force would maintain existing Minuteman ICBMs and support the new KC-135R air refueling mission at the base. The scope of such activities would not cause changes in currently projected future conditions in the area.

Preferred Alternative

Taking into consideration the existing and projected military threat, operations requirements, and environmental consequences, the Air Force has determined that Alternative 1 is the preferred alternative.

Housing Options

For the Small ICBM program, the Air Force is committed to using locally available housing and new private-sector development to the greatest extent possible. If the private sector is not able to provide adequate housing for all military personnel, the Air Force would provide the required housing either offbase, through the use of federal programs which may encourage private entrepreneurs to construct additional housing in the Great Falls community, or onbase, through the Military Construction Program (MCP).

Although a combination of these approaches for the provision of housing will most likely be used, two housing options were evaluated to demonstrate the full range of potential impacts. The onbase housing option assumes full funding of military family housing through the MCP. This housing would be built on newly acquired land adjacent to Malmstrom AFB, and would tend to concentrate Air Force families in this area. The offbase housing option would depend on the private sector, both with and without federal subsidies, to provide necessary program housing, and its implementation could disperse Air Force families throughout the community.

These housing options influence the socioeconomic and other consequences of the program. Therefore, the consequences of both housing options were evaluated for the Proposed Action as well as all other alternatives. For the onbase housing option, the Proposed Action and Alternative 3 include a provision for approximately 1,750 additional military family housing units to be constructed in an expanded area of Malmstrom AFB. These units would require the purchase of approximately 330 acres of land next to the existing family housing on the northwest corner of the base (Figure S7). For Alternatives 1 and 2, the number of housing units to be provided onbase would be 1,230 and 2,000 units, respectively, with proportional changes in land requirements. For the offbase housing option for all alternatives, these units would be constructed privately on developable residential land in the Great Falls urban area.

OTHER AIR FORCE PROGRAMS AT MALMSTROM AIR FORCE BASE

Two other major programs at Malmstrom AFB are considered in this EIS. They are the deployment of an air refueling wing and the potential deployment of the Peacekeeper in Rail Garrison ICBM system.

Sixteen KC-135R aircraft will be located on existing aircraft parking space and will use renovated and newly constructed aircraft operation and maintenance facilities at Malmstrom AFB. An environmental assessment of the KC-135R air refueling mission was prepared and published by the Air Force; therefore, the impacts of that program are not presented separately in this EIS. However, the facilities and manpower requirements were considered in the evaluation of baseline conditions for Small ICBM deployment at Malmstrom AFB. For example, the housing analysis considers how much of the currently available housing in Great Falls would be used by the additional 700 KC-135R personnel. Accordingly, the consequences of deployment of the KC-135R air refueling wing are included in the baseline conditions for this EIS.

If Malmstrom AFB is selected as a deployment location for the Peacekeeper in Rail Garrison basing mode, up to four train enclosures would be constructed within a fenced area occupying 125 acres in the southeast area of the base (Figure S9). Personnel support facilities and other technical facilities could occupy about 285,000 sq ft of floorspace elsewhere on the base. Under normal peacetime conditions, the Peacekeeper missiles would be maintained in a continuous strategic alert status within the garrison enclosures. A separate EIS will be prepared for the entire Peacekeeper in Rail Garrison program at a later date. Therefore, for the purpose of the analysis, only the cumulative environmental consequences of the Small ICBM and Peacekeeper in Rail Garrison programs at Malmstrom AFB are discussed.

ENVIRONMENTAL CONSEQUENCES

The Proposed Action and each of the alternatives were analyzed similarly to determine the environmental impacts associated with Small ICBM deployment. The textual discussions for the Proposed Action are generally lengthier than those for the alternatives because they appear first within each resource category. For brevity, the impact discussions common to the Proposed Action and the alternatives are not repeated for the alternatives. The impact discussions for the alternatives focus on the important differences between the impacts of the Proposed Action and those of the respective alternatives. This approach allows the impacts of the Proposed Action to be compared with those of each of the alternatives.

The environmental consequences of the proposed Small ICBM program at Malmstrom AFB have been evaluated in terms of the magnitude and significance of impacts. Magnitude is a measure of the numbers and kinds of environmental consequences of the program as compared to existing and future baseline conditions. It is defined by the level of impact (LOI), which can be negligible, low, moderate, or high. Significance includes consideration of both the context and the intensity of impacts. Context includes consideration of whether the setting of an impact is site, local, or regional, and whether it is of short or long duration, whereas intensity refers to the severity of an impact.

For the Small ICBM program at Malmstrom AFB, site-level impacts would occur as a result of construction disturbance at the base, at launch facilities, and along the T/E route network. Local-level impacts would occur in the City of Great Falls and other communities where program inmigrants would reside. Regional-level impacts would occur in basins, or airsheds, or county or multiple-county areas from which construction

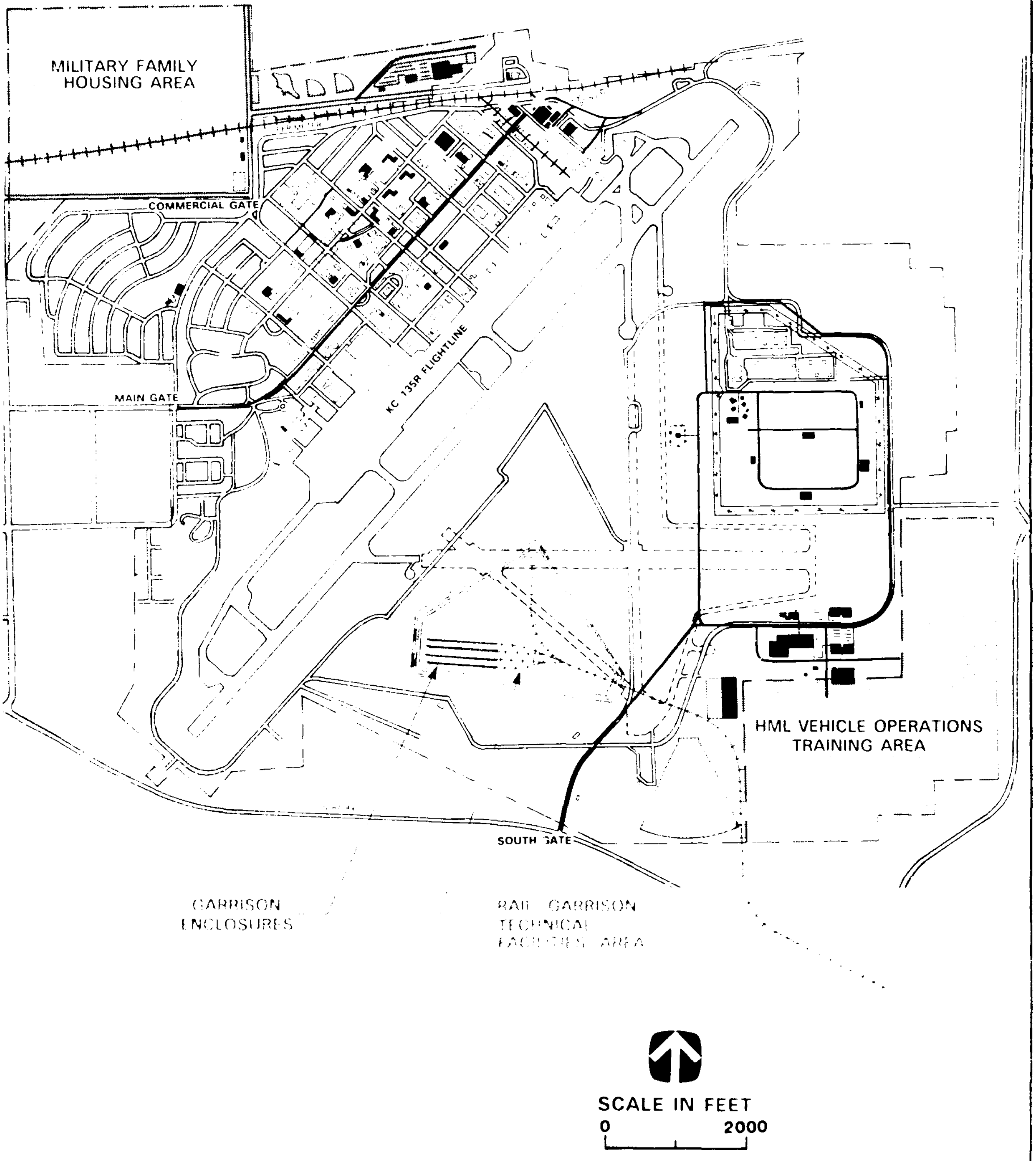


FIGURE S9 APPROXIMATE LOCATION OF POTENTIAL PEACEKEEPER IN RAIL GARRISON TECHNICAL FACILITIES AT MALMSTROM AFB, MONTANA resources would be extracted. The collective effects of site-level impacts would vary with the launch facilities identified, whereas the collective effects of local- and regional-level impacts generally would not.

The level and significance of short- and long-duration impacts were evaluated separately. Short-duration impacts are transitory effects of the proposed program that are generally caused by construction activities or operations start-up. Long-duration impacts would occur over an extended period of time, whether they start during the construction or operations phases. Most impacts from the operations phase are expected to be of long duration since program operations essentially represent a steady-state condition (i.e., impacts result from actions that occur repeatedly over a long period of time). However, long-duration impacts can also be caused by construction activities if a resource is destroyed or irreparably damaged, or if the recovery rate of the resource is very slow.

Figure S10 presents a summary of the level and significance of environmental impacts for the Small ICBM program. Both short- and long-duration impacts of the Proposed Action and its alternatives are shown. Figure S11 provides a summary of the LOI and significance of site-level impacts at launch facilities. The assessments of site-level impacts are based on the Proposed Action, which would locate two HMLs at each identified launch facility in earth-covered igloos. The same conclusions are generally expected for each of the alternatives except for rural land use impacts. These rural land use impacts depend on the size of the explosive safety zones which in turn depends on the type of HML enclosure (igloo or pre-engineered building) and the number of HMLs (1 or 2) at each launch facility. Figure S12 provides a collective assessment of site-level impacts along road segments and bridges, compiled by county. These impacts would generally be the same for all alternatives, since the same T/E route network would be used for all alternatives.

Impacts of the Proposed Action

Socioeconomics. In 1990, the peak-construction year, a total of 1,100 direct jobs and 1,250 secondary jobs would be created by the program, with over 80 percent estimated to be filled by the local labor force. The regional unemployment rate from 1990 through 1992 is projected to decline about 1 percentage point to 5.1 percent because of this increase in job opportunities. The greatest total employment effect (due to concurrent construction and operations activities) would occur in 1996 when 3,430 direct jobs and 1,350 secondary jobs would be required, with about 30 percent filled by the local labor force. Sustained operations employment is projected to be 4,350 jobs (3,100 direct and 1,250 secondary) starting in 1999. Since the number of military dependents projected to be added to the labor force slightly exceeds the number of civilian jobs created by the program, long-duration unemployment rates for the region are expected to be about 0.2 percentage point above a projected baseline rate of 6 percent. During the construction years (1990-1996), the Air Force would spend over $700 million in the region. After Full Operational Capability is achieved (post-1999), program-related Air Force spending in the region would approach $63 million per year throughout the life of the program. Short-duration economic base impacts would be moderate due to a 30-percent increase in construction-sector employment in Cascade County. This impact would not be significant because of the availability of construction labor from other Montana counties.

Long-duration impacts would be moderate due to an increase in the unemployment rate from 6 percent to 6.2 percent during the operations phase of the program. This is because the number of jobs created by the program during the operations phase would be less than the number of military dependents added to the labor force. This impact would not be significant because the resulting rate would remain well below historical unemployment rates. Beneficial effects for the state and the counties within the deployment area would occur as a result of increased employment and income during both construction and operations of the Small ICBM program.

Most of the population growth associated with the proposed program would occur in Cascade County, particularly in the Great Falls urban area. The number of new, program-related, full-time residents in Great Falls would start at about 770 in 1990, build to a peak of 8,120 in 1996, and stabilize at 7,580 by 1999. Two other communities, Lewistown and Conrad, are expected to experience gains in population of 100 persons or less during periods when deployment area construction is centered around Fergus and Pondera counties. During program operations, the population increase of 7,580 persons would be primarily composed of Air Force personnel and their dependents, raising the total of active-duty military workers and families in Great Falls from 10,700 to 18,210 persons. This military population in 1999 would represent 23.6 percent of Great Falls community population in that year. Military inmigrants would differ considerably from the current population in Great Falls in such demographic characteristics as age, marital status, geographic origin, income, and length of residency. Consequently, these long-duration impacts on demographics are considered moderate because the military population is measurably above the prior peak. These impacts would be significant since the differences between the local and inmigrating population would complicate the process of community assimilation.

Short-duration impacts on the permanent housing market would be moderate because vacancy rates would approach historical lows. This impact would not be significant because the local housing market would be able to meet program-related housing demand in every year. During construction, both hotel/motel accommodations and rental housing would be required by program workers. Business and property owners would benefit from increased occupancy and income. During the operations years, housing required for military inmigrants which exceeds the private-sector supply would be provided by the Air Force either onbase through the MCP and/or offbase through other federal programs. The long-duration impacts on housing would be low and not significant for both housing options since no housing shortages would be experienced because of the federally sponsored housing construction.

Program-related enrollment in the Great Falls Public Schools (GFPS) system is projected to be 120 students in the 1990-91 school year, increasing to a peak of 1,300 students in 1996-97, and then declining to about 1,210 pupils during the operations years. In the year 2000, program-related enrollments in the GFPS system would represent an increase of 9.1 percent above the projected baseline enrollment of 13,300 students. Other public and private schools are expected to have slight increases in enrollment. The GFPS system has a tradition of minimizing the busing of elementary school children (K-6) by having them attend neighborhood schools. The Proposed Action with the onbase housing option would tend to concentrate school children of military personnel near the base. As a result, approximately 590 out of a projected 660 elementary pupils associated with the Small ICBM program would be within the boundaries of Loy Elementary School, located just west of the base. This gain in enrollment would be of long duration and would increase the pupil-to-teacher ratio in this school far above local standards. Consequently, impacts on education would be high and would continue for the life of the program. Impacts would also be significant because the projected pupil-to-teacher ratios would exceed state standards. For the offbase housing option, the student-to-teacher ratio would increase up to 30-to-1 in five elementary schools located west and southwest of the base. This ratio is above local standards. Consequently, this long-duration impact would be high. This impact would be significant because the projected pupil-to-teacher ratios would exceed state standards.

LEVEL OF IMPACT	SIGNIFICANCE	
Adverse Impacts	Not Significant	Significant
Negligible	□	
Low	◦	•
Moderate	○	●
High	◯	⬤
Beneficial Effects	▨	

Note: Some resource elements may have both beneficial effects and adverse impacts.

PROGRAM IMPACTS

RESOURCE/ELEMENT	SHORT DURATION								LONG DURATION							
	PROP. ACTION		ALT. 1		ALT. 2		ALT. 3		PROP. ACTION		ALT. 1		ALT. 2		ALT. 3	
	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING
SOCIOECONOMICS																
ECONOMIC BASE	▨ ○	▨ ○	▨ ○	▨ ○	▨ ○	▨ ○	▨ ○	▨ ○	▨ ○	▨ ○	▨ ○	▨ ○	▨ ○	▨ ○	▨ ○	▨ ○
DEMOGRAPHICS									●	●	●	●	⬤	⬤	●	●
HOUSING	▨ ○	▨ ○	▨ ○	▨ ○	▨ ◦	▨ ◦	▨ ○	▨ ○	▨ ◦	▨ ◦	▨ ◦	▨ ◦	▨ ◦	▨ ◦	▨ ◦	▨ ◦
EDUCATION									⬤	⬤	⬤	⬤	⬤	⬤	⬤	⬤
PUBLIC SERVICES	○	○	○	○	○	○	○	○	●	●	•	•	⬤	⬤	●	●
PUBLIC FINANCE	●	○	●	○	●	○	●	○	●	●	●	●	●	●	●	●
UTILITIES																
POTABLE WATER									◦	◦	◦	◦	◦	◦	◦	◦
WASTEWATER									◦	◦	◦	◦	◦	◦	◦	◦
SOLID WASTE									◦	◦	◦	◦	◦	◦	◦	◦
ENERGY	◦	◦	◦	◦	◦	◦	◦	◦	▨ ◦	▨ ◦	▨ ◦	▨ ◦	▨ ◦	▨ ◦	▨ ◦	▨ ◦
TRANSPORTATION																
ROADS	⬤	⬤	⬤	⬤	⬤	⬤	⬤	⬤	▨ •	▨ ⬤	▨ •	▨ ⬤	▨ ●	▨ ⬤	▨ •	▨ ⬤
PUBLIC TRANSPORTATION																
RAILROADS																
AIRPORTS																
LAND USE																
URBAN										◦		◦		○		◦
RURAL	◦	◦	◦	◦	◦	◦			◦	◦	◦	◦	◦	◦	●	●
RECREATION																
REGIONAL									◦	◦	◦	◦	◦	◦	◦	◦
LOCAL									●	●	●	●	●	●	●	●
WATER RESOURCES																
SURFACE WATER	◦	◦	◦	◦	◦	◦	◦	◦	◦	◦	◦	◦	◦	◦	◦	◦

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FIGURE S10 COLLECTIVE SUMMARY OF ENVIRONMENTAL IMPACTS ASSOCIATED WITH THE PROPOSED SMALL ICBM PROGRAM IN MONTANA

LEVEL OF IMPACT	SIGNIFICANCE	
Adverse Impacts	Not Significant	Significant
Negligible	☐	
Low	◦	•
Moderate	○	●
High	◯	⬤
Beneficial Effects	░	

Note: Some resource elements may have both beneficial effects and adverse impacts.

PROGRAM IMPACTS

RESOURCE/ELEMENT	SHORT DURATION				LONG DURATION			
	PROPOSED ACTION	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	PROPOSED ACTION	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3
VISUAL RESOURCES								
CULTURAL AND PALEONTOLOGICAL RESOURCES								
PREHISTORIC RESOURCES					░ •	░ •	░ •	░ •
HISTORIC AND ARCHITECTURAL					•	•	•	•
NATIVE AMERICAN					•	•	•	•
PALEONTOLOGICAL RESOURCES					●	●	●	●
BIOLOGICAL RESOURCES								
VEGETATION	◦	◦	◦	◦	◦	◦	◦	◦
WILDLIFE	◦	◦	◦	○	◦	◦	◦	◦
AQUATIC HABITATS	○	○	○	○	◦	◦	◦	◦
UNIQUE AND SENSITIVE HABITATS								
THREATENED AND ENDANGERED SPECIES	◦	◦	◦	○	◦	◦	◦	○
WATER RESOURCES								
WATER USE	◦	◦	◦	◦	◦	◦	◦	◦
GROUNDWATER	◦	◦	◦	◦				
GEOLOGY AND SOILS								
GEOLOGIC HAZARDS	◦	◦	◦	◦	◦	◦	◦	◦
GEOLOGIC RESOURCES (AGGREGATE)	⬤	⬤	⬤	⬤	○	○	○	○
SOIL EROSION	◯	◯	◯	◯	◦	◦	◦	◦
AIR QUALITY	◦	◦	◦	◦				
NOISE								

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FIGURE S10 CONTINUED

PROGRAM IMPACTS	PROPOSED ACTION														ALTERNATIVE 1													
	NUMBER OF LAUNCH FACILITIES														NUMBER OF LAUNCH FACILITIES													
	SHORT DURATION							LONG DURATION							SHORT DURATION							LONG DURATION						
	NOT SIGNIFICANT				SIGNIFICANT			NOT SIGNIFICANT				SIGNIFICANT			NOT SIGNIFICANT				SIGNIFICANT			NOT SIGNIFICANT				SIGNIFICANT		
	NEGLIGIBLE	LOW	MODERATE	HIGH	LOW	MODERATE	HIGH	NEGLIGIBLE	LOW	MODERATE	HIGH	LOW	MODERATE	HIGH	NEGLIGIBLE	LOW	MODERATE	HIGH	LOW	MODERATE	HIGH	NEGLIGIBLE	LOW	MODERATE	HIGH	LOW	MODERATE	HIGH
LAND USE																												
RURAL	23	74	3					23	74	3					22	76	2					22	76	2				
VISUAL RESOURCES	87		13					87	13						89	11						100						
CULTURAL AND PALEONTOLOGICAL RESOURCES																												
PREHISTORIC RESOURCES												30	53	17												30	52	18
HISTORIC AND ARCHITECTURAL								91				8	1									92				7	1	
NATIVE AMERICAN								93				6	1									94				5	1	
PALEONTOLOGICAL								45	29			3	23									47	27			3	23	
BIOLOGICAL RESOURCES AND THREATENED AND ENDANGERED SPECIES																												
VEGETATION	48	44			8			48	48			4			50	42			8			50	48			2		
WILDLIFE	67	15	18					68	32						67	17	16					68	32					
AQUATIC HABITATS	78	16	2	1	2	1		95	5						74	19	2	1	3	1		94	6					
UNIQUE AND SENSITIVE HABITATS	100							100							100							100						
THREATENED AND ENDANGERED SPECIES	90	10						90	10						90	10						90	10					
WATER RESOURCES																												
SURFACE WATER	80	18	1	1				100							80	16	2	2				100						
GEOLOGY AND SOILS																												
GEOLOGIC HAZARDS	95	2	3					95	2	3					94	3	3					94	3	3				
GEOLOGIC RESOURCES (ENERGY)	100							71	29						100							70	30					
SOIL EROSION		83	2	15				100								86	2	12				100						
NOISE	93		7					100							100							100						

Note: All cultural and paleontological resource impacts are assumed to be of long duration.

FIGURE S11 SUMMARY OF SITE IMPACTS ASSOCIATED WITH PROPOSED SMALL ICBM CONSTRUCTION AND OPERATIONS AT LAUNCH FACILITIES IN MONTANA

Page 1 of 2

PROGRAM IMPACTS	ALTERNATIVE 2														ALTERNATIVE 3													
	NUMBER OF LAUNCH FACILITIES														NUMBER OF LAUNCH FACILITIES													
	SHORT DURATION							LONG DURATION							SHORT DURATION							LONG DURATION						
	NOT SIGNIFICANT				SIGNIFICANT			NOT SIGNIFICANT				SIGNIFICANT			NOT SIGNIFICANT				SIGNIFICANT			NOT SIGNIFICANT				SIGNIFICANT		
	NEGLIGIBLE	LOW	MODERATE	HIGH	LOW	MODERATE	HIGH	NEGLIGIBLE	LOW	MODERATE	HIGH	LOW	MODERATE	HIGH	NEGLIGIBLE	LOW	MODERATE	HIGH	LOW	MODERATE	HIGH	NEGLIGIBLE	LOW	MODERATE	HIGH	LOW	MODERATE	HIGH
LAND USE																												
RURAL	29	92	4					29	92	4					55	136	9					50	127	8		12	1	2
VISUAL RESOURCES	108		17					108	17						179	20	1					199		1				
CULTURAL AND PALEONTOLOGICAL RESOURCES																												
PREHISTORIC RESOURCES												40	63	22												61	101	38
HISTORIC AND ARCHITECTURAL								117				7	1									185				11	4	
NATIVE AMERICAN								117				6	2									186				11	2	1
PALEONTOLOGICAL								56	40			3	26									76	69			5	49	1
BIOLOGICAL RESOURCES AND THREATENED AND ENDANGERED SPECIES																												
VEGETATION	62	52			11			62	58			5			101	77			22			101	87			12		
WILDLIFE	83	20	22					84	41						124	39	37					124	76					
AQUATIC HABITATS	93	25	2	1	3	1		118	7						152	33	4	1	7	1	2	185	13	2				
UNIQUE AND SENSITIVE HABITATS	125							125							200							200						
THREATENED AND ENDANGERED SPECIES	115	10						115	10						181	18					1	181	18					1
WATER RESOURCES																												
SURFACE WATER	104	18	2	1				125							160	30	6	4				200						
GEOLOGY AND SOILS																												
GEOLOGIC HAZARDS	120	2	3					120	2	3					191	5	4					191	5	4				
GEOLOGIC RESOURCES (ENERGY)	125							90	35						200							142	58					
SOIL EROSION		106	2	17				125								166	3	31				200						
NOISE	116		9					125							176		24					200						

Note: All cultural and paleontological resource impacts are assumed to be of long duration.

FIGURE S11 CONTINUED

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LEVEL OF IMPACT	SIGNIFICANCE	
Adverse Impacts	Not Significant	Significant
Negligible	☐	
Low	○	•
Moderate	◯	●
High	⭘	⬤
Beneficial Effects	▨	

Note: Some resource elements may have both beneficial effects and adverse impacts.

RESOURCE	IMPACTS FROM ROAD IMPROVEMENTS																					
	SHORT DURATION									LONG DURATION												
		BIOLOGICAL						GEOLOGY			CULTURAL				BIOLOGICAL						GEOLOGY	
COUNTY	LAND USE (RURAL)	VEGETATION	WILDLIFE	AQUATICS	UNIQUE SENSITIVE	THREATENED & ENDANGERED	SURFACE WATER SEDIMENTATION	GEOLOGIC HAZARDS	SOIL EROSION	LAND USE (RURAL)	PREHISTORIC	HISTORIC	NATIVE AMERICAN	PALEONTOLOGICAL	VEGETATION	WILDLIFE	AQUATICS	UNIQUE SENSITIVE	THREATENED & ENDANGERED	SURFACE WATER SEDIMENTATION	GEOLOGIC HAZARDS	SOIL EROSION
CASCADE	○	○	◯	●		•	⭘	○	⭘		• ▨	•		○	○	○	○		•		○	
CHOUTEAU	○	○	○			○			⭘		○ ▨			○	○	○			○			
FERGUS	○	○	◯	●		○	◯	○	⭘		• ▨	•		●	○	○	○		○		○	
JUDITH BASIN	○	○	◯	○		○	○		⭘		● ▨			●	○	○	○		○			
LEWIS AND CLARK	○	○	◯	●		•	◯		⭘		• ▨	•		●	○	○	○		•		○	
PONDERA	○	○	◯	○		○			⭘		• ▨	•		○	○	○	○		○			
TETON	○	○	◯	●		•	○		⭘		• ▨	⬤		●	○	○	○		•		○	
TOOLE	○	○	○			○			⭘		○ ▨			○	○	○			○			
WHEATLAND	○	○	○	○		○	○		⭘		⬤ ▨			●	○	○	○		○		○	

Note: All cultural resource impacts are assumed to be of long duration.

FIGURE S12 COLLECTIVE SUMMARY OF IMPACTS ASSOCIATED WITH ROAD AND BRIDGE IMPROVEMENTS FOR THE PROPOSED SMALL ICBM PROGRAM IN MONTANA

Construction activity in the deployment area is expected to result in increases in health and emergency services demand of about 9 percent in Cascade County and 5 percent in Fergus County during the early years of the program. There is also expected to be an increase in demand for some of the programs offered by human service agencies in the Great Falls area. Because of the increase in demand for some public services of up to 9 percent, overall short-duration impacts would be moderate. These impacts would not be significant because the local agencies have the facilities to accommodate this additional demand. In the long duration, population inmigration would cause calls for service to the Great Falls Police Department and Cascade County Sheriff's Department to increase by up to 10 percent over baseline levels, requiring some increase in personnel. Overall long-duration impacts on public services would therefore be moderate. Most of the local facilities needed for public safety, fire protection, and health and human services have sufficient capacity to accommodate the additional population generated by the program. An exception is the Cascade County jail, which is used by both Cascade County and the City of Great Falls. This facility was built in 1914 and has been used beyond its design capacity for several years; it cannot be expected to absorb further growth. Therefore, long-duration impacts would be significant due to the inadequate jail facility and the unavailability of any funds to build a new facility.

Public finance impacts for the Proposed Action with the onbase housing option are of both short and long duration. Short-duration impacts would stem from temporary revenue shortfalls peaking in FY 1992 of approximately $670,000 in the GFPS system. These impacts would be moderate because the shortfalls are less than those historically experienced by the districts. The impacts would be significant because the shortfalls would reduce the districts' general fund balances to below historical levels by FY 1992 for the elementary district and by FY 1996 for the high school district. The long-duration impacts would occur because of persistent revenue shortfalls of approximately $300,000 per year for the Cascade County government. The impact would be moderate because these shortfalls are less than those historically experienced by the county. The impact would be significant because the shortfalls would reduce the fund balances of the county to below historical levels by FY 1994. Offbase housing option impacts are of short and long duration. Short-duration impacts would stem from temporary revenue shortfalls of under $100,000 estimated for the City of Great Falls. This impact would be moderate and not significant because the shortfalls are less than those historically experienced by the city and would not reduce the fund balances of the city to below historical levels. The long-duration impacts are the result of persistent revenue shortfalls estimated for the county government and the two school districts. Annual shortfalls of $120,000 for Cascade County and $270,000 for the two school districts, which would persist over the operational life of the program, would be moderate because the annual shortfalls would be less than those historically experienced by these jurisdictions. The impact would be significant because the cumulative effect of the shortfalls would reduce the general and other fund balances of the jurisdictions to below historical levels over the FY 1992-1994 period.

Utilities. Potable water and wastewater treatment systems operated by the City of Great Falls provide service to Malmstrom AFB. These systems currently have adequate capacity to meet the increased Malmstrom AFB and city demands that are associated with the Proposed Action. Solid waste disposal service is provided to the Great Falls urban area by the city and Greens Disposal Company. The existing landfill sites have adequate capacity to dispose of the additional solid waste associated with the program. Hazardous waste generated at the base would be disposed at facilities approved by EPA. During the construction phase, energy utilities impacts would be primarily associated with the increased use of diesel fuel for construction vehicles. During the operations phase, demands for all energy resources would increase, but would be met from existing or programmed supplies. Short- and long-duration impacts on all utilities would be negligible or low and not significant since adequate capacity is available to meet the increased demands without any additional cost or deterioration in the level of service. Beneficial effects to natural gas are anticipated since the Great Falls Gas Company would recover lost sales as a result of increases in onbase natural gas use.

Transportation. Impacts on transportation would occur primarily from workers commuting on roads during the peak-traffic hours and from local delays experienced along some segments of the T/E route network associated with periodic transportation of the HMLs to Malmstrom AFB for maintenance. The HMLs would cause delays on the T/E routes because of their slower speeds and large dimensions. Short-duration, high impacts on roads in Great Falls are expected due to increased congestion and delay along the 15th Street bridge and U.S. 87 Bypass, and increased queuing and delay at the entrance gates to Malmstrom AFB. These impacts would be significant because of the further aggravation of service on roads already at degraded levels such as 10th Avenue South. Long-duration impacts on streets in Great Falls and in the deployment area would be significant because of the queuing and delays that would be experienced on 10th Avenue South and on some sections of rural two-lane highways during the HML movements to and from launch facilities. Program-related road and bridge improvements and increased road maintenance on T/E routes would provide greater safety and convenience for the road users and therefore represent a beneficial effect to the region. No significant adverse impacts are expected on public transportation, railroads, and airports.

Land Use. The overall short- and long-duration impacts of the Proposed Action on rural land use would be low and not significant. The existing Minuteman silos are currently surrounded by explosive safety zones having a radius of 1,200 feet. The 100 launch facilities identified for the Proposed Action contain no inhabited structures within the expanded 1,250-foot explosive safety zones. The expanded safety zones would require the acquisition of approximately 34 acres of restrictive easements around each launch facility. Expanded easements would have no effect on the continued agricultural use of this land. A total of approximately 115 acres (0.1-1.6 acres per launch facility) of land would be acquired in fee simple to expand launch facilities in order to accommodate the igloos at all 100 sites. The impacts on urban land use would not be significant since only 375 acres of the approximately 3,200 acres of developable land in Great Falls would be required to support program-related new housing requirements.

Recreation. North-central Montana offers many outdoor recreation opportunities and tourist attractions primarily associated with the forested mountain ranges, lakes, rivers, and streams in the region. Recreation use in the region would increase as a result of program-induced population growth. The increased use may contribute to the crowding of some recreation areas during holiday and seasonal weekends. However, recreation areas in the region would generally be able to absorb the increased use, and the long-duration impacts are expected to be low and not significant. Most of the increased use is expected to occur in the Lewis and Clark National Forest.

Great Falls has a well-developed park and recreation system which provides recreation facilities and programs for the city's residents. Program-induced population growth in Great Falls would increase the demand for recreation programs and facilities. Regardless of the housing option selected, the increased demand would result in or contribute to facility shortages within the local recreation system, particularly for softball and golf. Facility shortages may cause a noticeable decline in the level of service provided by the local system resulting in moderate impacts. Impacts would be significant because the development of new facilities and parkland may require extensive institutional response in the form of capital expenditures. Impacts on local recreation are considered to be of long duration. The existing recreation facilities and programs in Lewistown and Conrad are adequate to accommodate the program-induced demand for recreation services.

Visual Resources. The overall short- and long-duration impacts of the Proposed Action on visual resources would be negligible. Only 13 launch facilities are located near scenic and heavily traveled highways (minimum 1,000 average annual daily traffic). The earth-covered igloos at these sites would tend to blend with most of the form, line, color, and texture of the various features of the north-central Montana landscape. Other deployment area actions such as construction at Malmstrom AFB and road and bridge improvements would also have negligible impacts. The onbase construction proposed for Malmstrom AFB would be greater than 0.75 mile from U.S. 87/89, and with intervening topography, would have low visibility.

Cultural and Paleontological Resources. The proposed program is likely to have adverse impacts on prehistoric, historic, and paleontological resources, primarily as a result of construction-related ground disturbance. All impacts on these resources are considered to be of long duration. Impacts would be significant because of the potential for affecting sites having historic, scientific, or cultural importance. Overall impacts would be low for most resources because the number of sites likely to be affected is small relative to the regional resource base, but the possibility of a high impact at a specific site exists. The LOIs would be the same regardless of the housing option selected. Moderate and significant impacts on paleontological resources are anticipated.

Prehistoric sites are most likely to exist where prominent landscape features (e.g., bluffs and buttes) coincide with water sources (e.g., lakes, springs, and rivers). The most sensitive areas would be along major drainages where previous studies have recorded up to two sites per river mile. Therefore, sites are most likely to be affected by road and bridge construction at river crossings. One historic bridge eligible for listing in the National Register of Historic Places and six potentially eligible bridges would also be affected. Other impacts on historic resources are limited mainly to the indirect effects of increased vandalism to vacant historic structures in the deployment area.

A variety of Native American groups have historic connections to the north-central Montana region, and some of these groups responded to a request for a statement of concerns; however, no sacred sites or areas are expected to be affected by the Proposed Action.

Internationally known paleontological resources occur in the Willow Creek Anticline area of the Two Medicine Formation found north and east, respectively, of Great Falls, and in the Bear Gulch Limestone found east of Lewistown. Fossils similar to those reported from these two localities occur elsewhere in the study area, but the materials appear to be less concentrated, less well preserved, and therefore, less important. Impacts on these fossil localities would constitute a loss of scientific research potential, but their limited areal extent suggests avoidance is possible.

Biological Resources and Threatened and Endangered Species. Construction of new facilities onbase (including expansion to lands adjacent to the existing base boundaries) and use of the HML vehicle operations training area would not have a significant impact on native vegetation, wildlife, aquatic habitats, or unique and sensitive habitats. Most of the undeveloped portion of Malmstrom AFB has been seeded with grasses and the developed portion has been planted with various trees and shrubs. The area surrounding the base consists of agricultural lands. Several small wetlands onbase may be eliminated, but these areas do not support major local populations of wetland species.

Overall impacts on vegetation, wildlife, aquatic habitats, and unique and sensitive habitats in the deployment area are not expected to be significant. No ecosystem-level (local or regional) impacts from disturbances at multiple sites are expected. Approximately 45 percent of the area along T/E routes in the deployment area supports native vegetation and most of the remaining area is under agricultural development. Sensitive vegetation types that may be disturbed include small areas of forest, riparian habitat, and native grassland. Some temporary disturbance of wildlife is probable at 50 launch facilities that occur in sensitive wildlife habitat (e.g., general wintering habitat and severe wintering habitat). These impacts are expected to be minor because only small, ealized areas would be affected. Overall species populations and the affected individuals should recover quickly from the disturbance and return to the area at densities close to predisturbance levels. Construction at launch facilities and along T/E routes (especially at bridge upgrades) may have some short-duration impacts on fisheries and wetlands. Long-duration impacts on rivers, streams, and lakes are expected to be very low. No unique and sensitive habitats should be directly disturbed by the program.

Program-induced growth in Great Falls would cause increased hunting and fishing pressure in the area. The primary areas that would be affected are the Belt and Highwood mountains, the Benton Lake National Wildlife Refuge, and along the Missouri River. These population-related impacts on biological resources should not significantly affect the biota in the area because much of the wildlife can withstand the increased hunting and fishing. Furthermore, the hunting and fishing of sensitive wildlife is regulated by permit or management systems.

No threatened and endangered species occur on Malmstrom AFB and there is no suitable habitat onbase to support any of the sensitive species that are known to occur in the region. Four federally listed animal species (grizzly bear, gray wolf, peregrine falcon, and black-footed ferret) may exist in the deployment area. One endangered species, the bald eagle, does occur in the deployment area and one nest occurs within 2.5 to 3 miles of launch facility I-7. Although several launch facilities and potential road improvement sites occur in the general habitat of some of these species, actual disturbance levels and loss of habitat are expected to be minor. Eight federal-candidate and five Montana-recognized animal species also exist in the deployment area. Disturbances to these species are also expected to be minor. One federal-candidate plant species exists in the deployment area, but it is unlikely that this species would be affected by the program. Eleven Montana-recognized plant species exist in the deployment area but would not be affected by the Proposed Action. Program-induced population growth should not lead to any loss of threatened and endangered species habitat or increased mortality in species populations. Therefore, the short- and long-duration impacts on threatened and endangered species are not expected to be significant.

Water Resources. The Proposed Action would have no significant impacts on the water resources of the region. Depending on the housing option selected, total program-induced water use during the construction phase would range from approximately 4,700 to 5,200 acre-feet (acre-ft), (or an average annual use of 780 to 870 acre-feet per year [acre-ft/yr]). During the operations phase, total annual water use would range from approximately 1,400 to 1,600 acre-ft/yr. Over 90 percent of the program-induced water demand would occur at the three urban areas most affected by the program: Great Falls, Lewistown, and Conrad. The water sources supplying all three cities would be adequate to meet program needs. Considerably less water would be used in the rural portions of the deployment area for program construction and operations. Total program-related water use in all rural areas would not exceed 100 acre-ft/yr. Therefore, the overall impact on surface or groundwater resources or on existing water users would be low.

Temporary declines in water quality would occur in some streams because of bridge replacements, launch facility modifications, and upgrades of portions of the T/E routes. These streams include the Ross Fork of the Judith River, Careless Creek in the Musselshell drainage, and several tributaries to the Sun, Teton, and Marias rivers. Some of these impacts may be moderate to high. The declines in water quality would be of short duration only. Construction at the launch facilities would result in one site-level, high impact and one site-level, moderate impact on surface water quality. Expansion of the launch facilities may contribute to long-duration saline-seep problems at up to 20 sites. Finally, local stormwater runoff from Malmstrom AFB would increase by up to 17 percent for the onbase housing option, following construction of new facilities at the base. Development downstream from the base is minimal and no increase in flood damage is expected to result. None of these site-specific impacts would be significant.

Geology and Soils. Aggregate requirements for construction are estimated at approximately 3 million tons regardless of the housing option selected. Regional aggregate resources are sufficient to satisfy program demand for road materials and concrete. However, the program demand for aggregate during the construction phase is not likely to be satisfied without local production shortages and high impacts in the Lewistown supply area. In addition, existing commercial reserves in all supply areas would be temporarily depleted as a result of program demand and would result in short-duration, significant impacts. Long-duration impacts would be moderate and not significant because adequate supply and production capacity could be developed to respond to any foreseeable long-duration demand.

Impacts as a result of launch facility expansion and road and bridge improvements, as well as facility construction and operations at Malmstrom AFB, are expected to affect the geologic hazards and soils elements of the geology and soils resource. These effects are primarily of short duration, occurring during the construction phase, with few long-duration impacts. Site-level, significant impacts are expected to soil resources at the proposed HML vehicle operations training area because of the appreciable amount of soil erosion resulting from HML training activities. These impacts are expected to be high because program-induced soil erosion would exceed the maximum tolerable soil loss. A number of launch facilities have soils that are moderately to highly susceptible to mass movements and erosion. In addition, several launch facilities have active oil, gas, and coal leases adjacent to them which would be affected by program-related land acquisition. Overall short- and long-duration impacts on mass movements would be low due to the potential for the program to accelerate or initiate mass movements. Long-duration, low impacts are expected on energy resources because the program may interfere with existing energy resource leases, with short-duration, negligible impacts. Some short-duration, high impacts would occur on soil resources due to construction activities at launch facilities and road and bridge upgrade sites. Long-duration impacts on soil resources in the deployment area would be negligible. Impacts would be dependent on the launch facilities identified, and none of the impacts would be considered significant.

Air Quality. Increased fugitive dust during the construction phase would cause short-duration, low, and not significant impacts. Vehicle exhaust emissions (particularly carbon monoxide) associated with construction and operations activities of the Small ICBM either at Malmstrom AFB or within the deployment area would have no significant impact on air quality. No degradation of regional visibility resulting from fugitive dust emissions was predicted at the nearest Prevention of Significant Deterioration Class I area (Gates of the Mountains Wilderness). The overall long-duration air quality impacts of the Small ICBM program would be negligible. Fugitive dust impacts would be low and not significant regardless of the housing option selected.

Noise. Long-duration noise impacts due to vehicular traffic during the operations phase of the Small ICBM program would be negligible in the Great Falls traffic corridors and in the deployment area. Temporary impacts from construction noise would occur within the immediate vicinity of the construction sites, mainly at Malmstrom AFB and at launch facilities. Anticipated construction noise at Malmstrom AFB is considered negligible; however, there are residences in proximity to seven launch facilities from which moderate construction noise impacts would cause a temporary annoyance. Measurable short-duration impacts (moderate and not significant) would occur only at those site-specific launch facilities where inhabited structures exist within a 1,600-foot zone of the facility.

Impacts of Alternative 1

For Alternative 1, all 200 HMLs would be deployed in pre-engineered buildings at 100 launch facilities. The potential range of site-level impacts associated with direct disturbance from launch facility modifications and road and bridge improvements would be similar to the Proposed Action. An exception to this would be rural land use impacts associated with expanded explosive safety zones, which are larger for pre-engineered buildings than for earth-covered igloos. Impacts related to the inmigrating population would generally be lower than the Proposed Action since the number of operations personnel would be lower. Some differences in the impacts of this alternative as compared to the Proposed Action are discussed in the following.

The direct employment requirements of Alternative 1 would increase from 1,100 jobs in 1990 to 2,520 jobs in 1996, before leveling off at 2,200 in 1997. These requirements are about 900 less than the Proposed Action during program operations. Total employment, income, and spending would be comparably reduced. Effects on the construction sector for this alternative would be smaller as would the potential increase in the unemployment rate due to the addition of fewer military dependents to the labor force. Short- and long-duration economic base impacts would remain moderate and not significant, and the beneficial effects of additional jobs and income would be enjoyed by the state and counties in the deployment area. Total population change in the Great Falls area would peak at 5,890 in 1996 and then stabilize during program operations at 5,360 persons, 2,200 below the Proposed Action. Projected total military population is estimated to be 21.3 percent of the Great Falls community population; demographic impacts would remain moderate and significant because of the inmigration of a large number of people with differing demographic characteristics. For housing, impacts would be the same as for the Proposed Action (short duration, moderate, and not significant and long duration, low, and not significant). For education, long-duration impacts would be the same as the Proposed Action (high and significant), though school enrollments would be about 350 students lower. Public services long-duration impacts would be low primarily because of the lack of capacity in the Cascade County jail. Service demands would be somewhat reduced, but would remain significant. Public finance impacts would remain the same as the Proposed Action.

The short- and long-duration impacts of Alternative 1 on rural land use would be low and not significant. With Alternative 1, the Air Force plans to use a pre-engineered building to enclose two HMLs at each of 100 launch facilities, which would require an explosive safety zone extending 1,795 feet from the enclosures. This alternative would require the acquisition of 134 acres of additional restrictive easements at each launch facility. There are no inhabited structures located within the expanded explosive safety zones.

Short-duration impacts on roads in Great Falls would remain significant though program-related traffic would be between 5 percent and 10 percent smaller than that of the Proposed Action. Program-related commuting during the construction phase is still expected to increase congestion, queuing, and delays on the 15th Street bridge, U.S. 87 Bypass, 10th Avenue South, and the entrance gates to Malmstrom AFB. In the deployment area, significant impacts are also expected because of the queuing and delays that would be experienced by the road users traveling behind the relatively slow-moving HML transporter convoy as it goes to and from the base. The long-duration, beneficial effects of road and bridge improvements and the increased road maintenance would remain. No significant adverse impacts are expected on public transportation, railroads, and airports.

Alternative 1 would require the least amount of water. Depending on the housing option selected, total construction-phase water use would range from about 3,900 to 4,300 acre-ft (or an average annual use of 650 to 720 acre-ft/yr). Operations-phase water use would range from 1,000 to 1,100 acre-ft/yr. The greatest majority of this use would be at Great Falls, which has ample water supply to meet program needs. Water resource impacts in the deployment area would be essentially the same as the Proposed Action. Overall short- and long-duration impacts on surface and groundwater resources and on regional water users would remain low and not significant. Long-duration impacts on groundwater would remain negligible.

For Alternative 1, long-duration noise impacts resulting from vehicular traffic during the operations phase of the Small ICBM program would be negligible in both the Great Falls traffic corridors and in the deployment area. Temporary impacts from construction noise would occur within the immediate vicinity of the construction sites, mainly at Malmstrom AFB and at launch facilities. Anticipated construction noise at Malmstrom AFB would be negligible. Since there are no inhabited structures within the 1,600-foot zone of the launch facilities, construction noise impacts would be negligible.

Impacts of Alternative 2

For Alternative 2, 250 HMLs would be deployed in earth-covered igloos at 125 launch facilities. The potential range of site-level impacts associated with launch facility modifications and road and bridge improvements would be similar to the Proposed Action, except that an additional 25 launch facilities would be modified. Expansion of explosive safety zones at identified launch facilities would be the same as the Proposed Action (1,250 ft from the HML enclosure), except that an additional 25 launch facilities would be involved. Impacts related to the inmigrating population would generally be somewhat higher than the Proposed Action since the number of operations personnel would be higher. Important differences in the impacts of this alternative as compared to the Proposed Action are discussed in the following.

The direct employment requirements of Alternative 2 would increase from 1,140 jobs in 1990 to 4,010 jobs in 1997 before leveling off at 3,760 in 1997. These requirements are about 660 personnel larger than the Proposed Action during program operations. Total employment, income, and spending would be comparably increased. Effects on the construction sector for this alternative would be greater as would the potential increase in the unemployment rate due to the greater number of military dependents added to the labor force. Short- and long-duration economic base impacts would remain moderate and not significant, and the beneficial effects of additional jobs and income would be enjoyed by the state and counties included in the deployment area. Total population change in the Great Falls area would peak at 9,620 in 1997 and then stabilize during program operations at 9,200 persons, 1,620 above the Proposed Action. Projected total military population is estimated to be 25.1 percent of the Great Falls community population compared to a baseline proportion of 13.7 percent. Demographic impacts would be high because of the large number of inmigrants with differing demographic characteristics. In addition, the military population is projected to be measurably different from the historical peak. These impacts would be significant because of the complications of the community assimilation process. For both housing options, long-duration housing impacts would be the same as the Proposed Action (low and not significant); however, short-duration impacts would be low and not significant compared to moderate and not significant for the Proposed Action. For education, long-duration impacts would be the same as for the Proposed Action (high and significant), though school enrollments would increase by about 260 students. Public service long-duration impacts would be high because service demands would be somewhat greater and would remain significant due to the lack of capacity in the Cascade County jail. Public finance impacts would remain the same as for the Proposed Action.

The additional 50 HMLs above the 200 in the Proposed Action would result in proportionately more local delays experienced along some segments of the T/E route network associated with the periodic transportation of the relatively slow-moving and large HMLs to Malmstrom AFB for maintenance. Short-duration impacts on roads in Great Falls would be significant because program-generated traffic would be between 5 to 9 percent greater than that of the Proposed Action. Program-related commuting during the construction phase is expected to increase congestion, queuing, and delays on the 15th Street bridge, U.S. 87 Bypass, 10th Avenue South, and the entrance gates to Malmstrom AFB. With the onbase family housing option, commuting by operations personnel would result in 430 peak-hour trips (compared to 265 for the Proposed Action with the onbase housing option), causing long-duration, moderate, and significant impacts on the urban road system. If housing is provided offbase, Alternative 2 would result in 2,250 peak-hour commuter trips (compared to 1,855 for the Proposed Action with the offbase housing option), causing long-duration, high, and significant impacts. In either case, no significant adverse impacts are expected on public transportation, railroads, and airports.

The overall impacts of Alternative 2 on rural land use are the same as those for the Proposed Action. The difference between the two is that Alternative 2 requires the acquisition of more land in both fee simple and restrictive easements because an additional 25 launch facilities would be used.

Alternative 2 has the highest program water requirements. Depending on the housing option selected, the total construction-phase water use would range from approximately 4,800 to 5,400 acre-ft (or an average annual use of 800 to 900 acre-ft/yr). Operations-phase water use would range from 1,300 to 1,900 acre-ft/yr. Nearly all of this increase in water use would be experienced in Great Falls. The city has an ample water supply to meet this demand. Water resource impacts in the deployment area would be essentially the same as the Proposed Action. The overall short- and long-duration impact on water use and on surface and groundwater resources would remain low and not significant. Long-duration impacts on groundwater would remain negligible.

For Alternative 2, long-duration noise impacts resulting from vehicular traffic during the operations phase of the Small ICBM program would be negligible in both the Great Falls traffic corridors and the deployment area. Temporary impacts from construction noise would occur within the immediate vicinity of the construction sites, mainly at Malmstrom AFB and at launch facilities. Anticipated construction noise at Malmstrom AFB would be negligible; however, there are residences in proximity to nine launch facilities from which moderate construction noise impacts would cause a temporary annoyance. Measurable short-duration impacts (moderate and not significant) would occur only at those site-specific launch facilities where inhabited structures exist within a 1,600-foot zone of the facility.

Impacts of Alternative 3

For Alternative 3, 200 HMLs would be deployed in pre-engineered buildings at all 200 launch facilities. The impacts related to population inmigration would be almost the same as the Proposed Action, since Alternative 3 has the same operations personnel requirements. Although twice as many launch facilities would be modified as compared to the Proposed Action, surface disturbance at individual launch facilities would be less. However, since all 200 launch facilities would be used, there is no possibility of avoiding launch facilities in sensitive areas. Important differences between the impacts of this alternative and those of the Proposed Action are discussed in the following.

The deployment of 200 HMLs at all 200 launch facilities would increase the length of trips and the amount of time the HML transporter convoy would be on the T/E routes. Impacts on deployment area roads would remain low because traffic volumes are low, but they would be significant because of the substantial queuing and delays that road users would experience when traveling behind the relatively slow-moving HML transporter convoy.

The expanded restrictive easements for Alternative 3 would extend 1,425 feet from the HML enclosure as compared to 1,250 feet for the Proposed Action. Thirty-five inhabited structures would be affected at 15 launch facilities. The Air Force would buy the structures at fair market value and move the residents elsewhere, unless the owners requested and obtained from the Secretary of the Air Force a discretionary waiver of the restrictive easement requirement. The amount of land to be acquired in fee simple necessary for the expansion of the launch facilities for Alternative 3 would total approximately 95 acres for all 200 launch facilities. Additionally, about 9,500 acres of land would be acquired for restrictive easements. With the potential relocation of 35 inhabited structures, the long-duration impacts on rural land use would be moderate because there are over ten houses that would be relocated. These impacts would be significant because there are inhabited structures within the explosive safety zones. Impacts on urban areas would be the same as those described for the Proposed Action and would not be significant.

This alternative would have somewhat higher impacts on cultural and paleontological resources than would the Proposed Action. Nevertheless, impacts on prehistoric and historic resources, while significant, would remain low because relatively few sites would be affected, compared with the number of resources expected to occur in the area. The impacts would be the same with either housing option. These impacts are expected to be significant because it is likely that resources eligible for the National Register of Historic Places would be disturbed. Two known burial grounds and one Native American sacred area occur in the general vicinity of launch facilities which would be used for this alternative. Direct physical disturbances resulting from construction are not anticipated in these areas, but the potential exists for visual and auditory intrusions. Overall impacts would remain low and significant. Two launch facilities occur on geological formations expected to contain highly sensitive paleontological deposits; one is the Bear Gulch Limestone and the other is the Two Medicine Formation near the fossil deposit known as Egg Mountain in the extreme western portion of the deployment area. Impacts on paleontological resources would remain moderate and significant.

Because all launch facilities would be used for Alternative 3, it would be impossible to avoid sensitive habitats at some launch facilities. Increased impacts would occur for vegetation because of the use of launch facilities with forested and riparian vegetation. Sensitive wildlife habitat such as severe wintering habitat would be affected to a minor degree. Several of the launch facilities are adjacent to important fisheries streams and wetlands that would be disturbed with this alternative. Although the overall impacts on biological resources would be somewhat greater than the Proposed Action, the total amount of disturbance would be small when compared to the resource base as a whole. Therefore, overall short- and long-duration impacts on vegetation, wildlife, aquatic habitats, and unique and sensitive habits would not be significant.

It would not be possible to avoid several sensitive threatened and endangered species habitats with this alternative. Although disturbances at these sensitive sites are unlikely to jeopardize the existence of the species of concern, additional effort would be required to reduce disturbance to individuals and more mitigation measures may be required than with the Proposed Action. The overall disturbance to threatened and endangered species with Alternative 3 is expected to be somewhat higher than with the Proposed Action; however, the short- and long-duration impacts would not be significant.

Water use with Alternative 3 would be virtually the same as the Proposed Action. However, additional impacts on water quality in the deployment area would result due to construction disturbance at all 200 launch facilities. Additional road and bridge upgrades would result in short-duration water quality declines in the Dry Fork of Belt Creek and in Sand Coulee Creek, south of Great Falls. Site-level, high impacts on water quality would result from construction at four launch facilities while moderate impacts would occur at an additional six launch facilities. These latter impacts would be of short duration and not significant. Existing saline seeps lie in the vicinity of 30 launch facilities and could be intensified. However, regional water effects would not change substantially from those of the Proposed Action: short- and long-duration, low, and not significant impacts. Overall long-duration groundwater impacts would be negligible. For Alternative 3, increased fugitive dust during the construction phase would cause short-duration, low, and not significant impacts.

For Alternative 3, long-duration noise impacts resulting from vehicular traffic during the operations phase of the Small ICBM program would be negligible in both the Great Falls traffic corridors and in the deployment area. Temporary impacts from construction noise would occur within the immediate vicinity of the construction sites, mainly at Malmstrom AFB and at launch facilities. Anticipated construction noise at Malmstrom AFB would be negligible; however, there are residences in proximity to 24 launch facilities from which moderate construction noise impacts would cause a temporary annoyance. Measurable short-duration impacts (moderate and not significant) would occur only at those site-specific launch facilities where inhabited structures exist within a 1,600-foot zone of the facility.

Cumulative Impacts of the Small Intercontinental Ballistic Missile and Peacekeeper in Rail Garrison Programs

The cumulative impacts of the Small ICBM and potential Peacekeeper in Rail Garrison programs would primarily occur in the Great Falls area. Long-duration water use would be 11 percent higher than the Proposed Action alone. All of this additional use would occur at Great Falls, which has an ample source of water to meet the demand. No additional site disturbance would occur at launch facilities or along the T/E routes. Additional surface disturbance would occur at Malmstrom AFB; however, no important cultural or biological resources are expected to be disturbed. The number of additional personnel associated with the Peacekeeper in Rail Garrison program would be combined with the Small ICBM program and have some socioeconomic consequences in Great Falls.

Deploying the Peacekeeper in Rail Garrison system at Malmstrom AFB would add another 700 people to the population of the Great Falls area. Cascade County employment and income benefits would be larger than for the Proposed Action. Construction-sector effects from 1991 through 1993 would be somewhat higher than the Proposed Action, but still would be only moderate and not significant. Total jobs created by the Small ICBM and Peacekeeper in Rail Garrison programs combined would be 4,720 by the year 2000 (3,400 direct and 1,320 secondary). This is 370 jobs above the requirements of the Proposed Action.

For the potential Peacekeeper in Rail Garrison program, 160 new family housing units would be built either onbase (MCP funding) or offbase (federal housing program). It is not expected that additional new offbase housing construction would occur within the Great Falls urban area. An additional 30 military households are expected to live offbase in existing units, decreasing the support community's vacancy rate by 0.1 percentage point during the operations phase. This would cause long-duration impacts to be moderate as compared to low for the Proposed Action. The impacts would remain not significant. The demand for onbase dormitory modules would increase by 50 units to accommodate about 110 Peacekeeper in Rail Garrison personnel. These facilities would be provided onbase. The demand for temporary offbase units is not expected to change, and there would be no additional impacts on housing in the Great Falls area.

This increase in population associated with Peacekeeper in Rail Garrison program, above the effects of the Proposed Action, would create the need for two additional government employees for both the City of Great Falls and Cascade County. No measurable effects are expected to be felt in the other areas of study. The number of projected long-duration enrollments in Great Falls schools is expected to increase by 120 students, 66 of which are estimated to be elementary pupils. Program-induced revenues and expenditures of the city, county, and school districts would increase approximately 9 to 10 percent over levels estimated for the Proposed Action. Because of the small effect onbase development would have on the tax base of the jurisdictions and the relatively small employment increases associated with the Peacekeeper in Rail Garrison program relative to the Proposed Action, a small increase in revenue shortfalls could occur.

No Action Alternative

With the No Action Alternative, Air Force activities associated with maintenance of the current Minuteman force and other missions would continue indefinitely at Malmstrom AFB. These activities include the new KC-135R air refueling mission, which will be added in 1988.

Employment and population in north-central Montana are projected to increase gradually through the year 2000 without the Proposed Action or alternatives. Most of this growth would be concentrated in Great Falls and Helena, with little growth or modest declines expected in the rural counties. Unemployment rates should decrease to a regional average of 6 percent. The military population (active-duty personnel plus dependents) of the Great Falls area should be at about 10,500 persons, or 15.2 percent of total community population. Some anticipatory growth, followed by decline, is likely if individuals and businesses speculate on the likelihood that the program would be implemented.

Throughout the deployment area, population growth would lead to some increased disturbance of cultural resources and sensitive biological habitats. Water use may increase slightly in the region. Some increased crowding of recreational areas may occur, and the level of service along some roads is expected to decrease.

SAFETY CONSIDERATIONS

The Small ICBM system safety program extends from concept development, to system design, through deployment and operations. In the 25-year operating history of the Minuteman ICBM systems, the Air Force has never experienced a mishap leading to a fire or explosion. In addition, the technical advances to the components and operating procedures for the Small ICBM system ensure that the proposed system would operate safely.

Two extremely unlikely assumptions, that a mishap involving a HML occurs and that it results in the release of the maximum amount of available propellant and warhead materials, are the basis for the safety analysis. Given these unlikely assumptions, the predicted environmental impacts would be significant only within the immediate mishap vicinity for biology, human health and safety, water, and soils. Impacts on air quality would be distributed farther, but the resulting impacts would be of short duration.

MITIGATION MEASURES

Mitigation measures are undertaken to minimize the adverse environmental impacts of a given program. For the Small ICBM, efforts would be made to avoid environmentally sensitive areas and thereby eliminate or reduce program impacts. In addition, other mitigative programs may be employed to rehabilitate or restore the affected environment or to reduce or eliminate impacts through preservation procedures or compensation. Environmental impacts of the Small ICBM program will be mitigated by commonly practiced construction methods. These assumed construction practices and other assumed mitigation measures are discussed for each resource in the EIS. The Air Force will implement these assumed mitigations. Potential mitigation measures have also been identified. The Air Force will encourage and facilitate adoption of these potential mitigation measures, as appropriate, by those responsible for them. However, implementation of these potential mitigation measures may be constrained by budget limitations and mission requirements of the agencies involved, as well as the Air Force.

1.0 PROGRAM OVERVIEW

In the 1984 Department of Defense (DOD) Authorization Act, the Congress of the United States directed the Air Force to develop a new, Small Intercontinental Ballistic Missile (ICBM) in accordance with the recommendations of a bipartisan commission on strategic forces (Scowcroft Commission). The commission recommended that this missile be smaller and lighter than previous ICBMs, be compatible with both mobile and fixed basing modes, and meet modern performance and survivability goals. The total number of Small ICBMs to be deployed could range up to 1,000, with 500 missiles used for ongoing weapon system planning and budgeting. The Air Force proposes to deploy the first 200 missiles within the 341st Strategic Missile Wing at Malmstrom Air Force Base (AFB) in Montana beginning in 1992. This Environmental Impact Statement (EIS) describes the environmental impacts of the Proposed Action and its alternatives as well as potential mitigation measures that could be undertaken to reduce or eliminate program impacts.

1.1 Purpose and Need

American strategic forces exist to deter attacks on the United States and its allies and to prevent the coercion that could arise if the public or decision-makers believed that the United States could be attacked successfully. Such a policy of deterrence, like the security policy of the West itself, is essentially defensive and is based on a balance of mutually supportive forces. The strategic triad of the United States consists of submarine-launched ballistic missiles, bombers, and land-based ICBMs. In the past, the ICBM component of the triad relied on Titan (now decommissioned) and Minuteman missiles. The increasing accuracy of Soviet missiles has placed the future of silo-based ICBMs at risk, while the hardening of the Soviet strategic targets has made the Soviet systems less vulnerable to the present arsenal of United States weapons. As missile technology has advanced, a need has developed for the United States to deploy newer, more accurate, and more survivable missiles to complement the existing forces. The Small ICBM is being deployed at Malmstrom AFB to partially meet this need.

In January 1983, President Reagan convened a bipartisan Commission on Strategic Forces (the Scowcroft Commission) to review the purpose, character, size, and composition of the strategic forces of the United States and make appropriate recommendations on ICBM modernization. The commission's report was issued in April 1983 with its findings and recommendations accepted by the President and Congress. Among its recommendations was that the United States immediately initiate engineering design of ". . . a single warhead ICBM weighing about fifteen tons . . . [leading] . . .to the initiation of full-scale development in 1987 and an initial operating capability in the early 1990s . . . Hardened silos or shelters and hardened mobile launchers should be investigated now . . ." (U.S. Commission on Strategic Forces 1983). In the 1984 DOD Authorization Act, Congress authorized start-up of the Small ICBM program at a pace that would permit full-scale engineering development to begin in fiscal year 1987. Congress recommended that the program be pursued as a matter of the highest national priority, with Initial Operational Capability (IOC) by the end of 1992.

1.2 Environmental Impact Analysis Process

The 1986 DOD Authorization Act directed the Air Force to prepare environmental documentation for the Small ICBM using a tiered Environmental Impact Analysis Process (EIAP). Tiering, which involves moving from general to specific environmental analyses as a program evolves, provides the balance and perspective appropriate for each stage of decision-making and is recommended by the Council on Environmental Quality (CEQ) regulations. The Small ICBM Legislative EIS, the first tier of the EIAP, was published in

November 1986 and was provided to the President, the Secretary of Defense, appropriate congressional committees, the U.S. Environmental Protection Agency, and other interested parties. It provided information to support three decisions concerning the Small ICBM: (1) the selection of basing mode(s), (2) the selection of the areas where the system can be deployed, and (3) the decision to enter full-scale development of the weapon system. On December 19, 1986, the President announced the decision to proceed with full-scale development of the Small ICBM, and selected the Hard Mobile Launcher at Minuteman Facilities basing mode at Malmstrom AFB for IOC. This EIS analyzes the potential environmental impacts of proposed deployment and peacetime operation of the Small ICBM in Montana, and constitutes the final tier of the EIAP for Malmstrom AFB. This document has been prepared to meet the requirements of the National Environmental Policy Act (NEPA) of 1969 and its implementing CEQ regulations. As other areas are selected for additional Small ICBM deployment, additional site-specific EISs will be prepared.

1.2.1 Structure of the Environmental Impact Statement

The environmental issues addressed in this EIS were identified through the public scoping process, through consultations with federal and state agencies, and by Air Force and contractor personnel who have experience with programs of similar scope. For discussion and analysis, the issues are grouped into 12 resource categories: socioeconomics, utilities, transportation, land use, recreation, visual resources, cultural and paleontological resources, biological resources and threatened and endangered species, water resources, geology and soils, air quality, and noise. The potential program-induced impacts are summarized and compared in Chapter 2.0 (Comparison of the Proposed Action and Alternatives). The current environmental conditions and projected future conditions without the program are described in Chapter 3.0 (Affected Environment) for each resource category. Detailed descriptions of environmental impacts are presented in Chapter 4.0 (Environmental Consequences). Chapter 5.0 (Safety Considerations) presents a discussion of system safety. Chapter 6.0 (Public Comments) contains a listing of comments received on the Draft EIS (DEIS) and responses to those comments. Chapters 7.0 through 12.0 consist of the following supporting information: Authorizing Actions, List of Preparers, List of Recipients, Bibliography, Glossary of Terms and Acronyms, and Index. Appendix A provides a detailed listing of the existing environmental conditions at the launch facilities. Appendix B presents the programmatic agreements on data recovery for historic and cultural properties potentially affected by the Small ICBM program. Appendix C provides the concurrence of the U.S. Fish and Wildlife Service on the finding of no significant impact on threatened and endangered species. Appendix D summarizes the specific mitigation measures and their effectiveness in reducing the impacts identified in this document. Appendix E, which is a separate volume and is available on request, contains all public hearing transcripts, complete copies of comment letters received during the DEIS comment period, and responses to those comments, which also appear in Chapter 6.0.

1.3 System Description and Location

This section describes the following aspects of the Small ICBM system: the missile and the Hard Mobile Launcher (HML), the operations concept, the deployment setting, the alternatives and siting options, the Proposed Action, the alternatives to the Proposed Action, and the No Action Alternative. The discussion of the Proposed Action and all alternatives considers the three major areas where construction activities would be concentrated: Malmstrom AFB, the existing Minuteman launch facilities, and the associated deployment area road network.

1.3.1 Small Intercontinental Ballistic Missile and the Hard Mobile Launcher

The Small ICBM (Figure 1.3.1-1) will be effective against hardened military targets and will be small and light enough to facilitate basing in a mobile mode. The Small ICBM will be a three-stage, solid propellant, single reentry vehicle missile that will be approximately 53 feet long, 46 inches in diameter, and weigh approximately 37,000 pounds. For comparison, the Peacekeeper, our most modern ICBM, is 71 feet long, 92 inches in diameter, and weighs 195,000 pounds.

The missiles will be carried and protected by HMLs that are designed to enhance survivability. These HMLs (Figure 1.3.1-2) will be about 105 feet long, 14 feet wide, and weigh approximately 230,000 pounds, including the weight of the missile. The HMLs will be capable of traveling on paved, gravel, and dirt roads, and will have off-road capability. For peacetime transportation to and from launch facilities, the HMLs will be reconfigured (fitted with temporary load-bearing wheels) to ensure that loading on each axle is below 18,000 pounds.

A HML convoy will normally consist of a U.S. federal marshall vehicle, two Air Force escort vehicles, and the HML transporter. The federal marshall's vehicle will lead the convoy for traffic control. One escort vehicle will lead the transporter and one will follow. The escort vehicles will be sedans or pick-up trucks with flashing amber warning lights and will have "Wide Load Follows" or "Wide Load Ahead" signs as appropriate. All vehicles will have their headlights on when moving.

The interface of the convoy with public traffic will vary by the type of road being traveled. On county gravel roads, traffic will be blocked by the federal marshal to allow the transporter free passage. On two-lane paved roads, the convoy will maintain a nominal traffic speed and passing by public vehicles, in either direction, will be allowed. During periods of heavy traffic, the convoy will utilize turnouts to allow vehicles queued behind the HML to safely pass. On four-lane and interstate-type roads, the convoy will maintain a nominal traffic speed in the right-hand lane and passing by public vehicles in either direction will be allowed.

1.3.2 Operations Concept

Operations activities are those required to maintain the Small ICBM system in a secure, alert condition. These activities include system status monitoring and control, and operational vehicle movements for maintenance and repair, training, supply, and security (Table 1.3.2-1). Operations activities would occur at the main operating base (Malmstrom AFB) and in the deployment area.

The main operating base would provide the principal command, maintenance, logistics, and personnel support functions for the system. Some existing facilities would be used for the Small ICBM program because of similarities between the Minuteman and Small ICBM missions. A fixed launch control center at the main operating base, manned continuously, would provide primary peacetime control of all HMLs within the Minuteman Wing. Strategic Air Command (SAC) airborne launch control centers and ground mobile launch control centers would provide survivable and enduring trans- and post-attack control.

The HMLs would be placed in enclosures in a dash-ready configuration within expanded fenced areas that surround existing launch facilities. Except for major maintenance at Malmstrom AFB approximately once a year, they would remain at the launch facilities unless ordered to disperse. Such dispersal would not occur in peacetime. Service and all

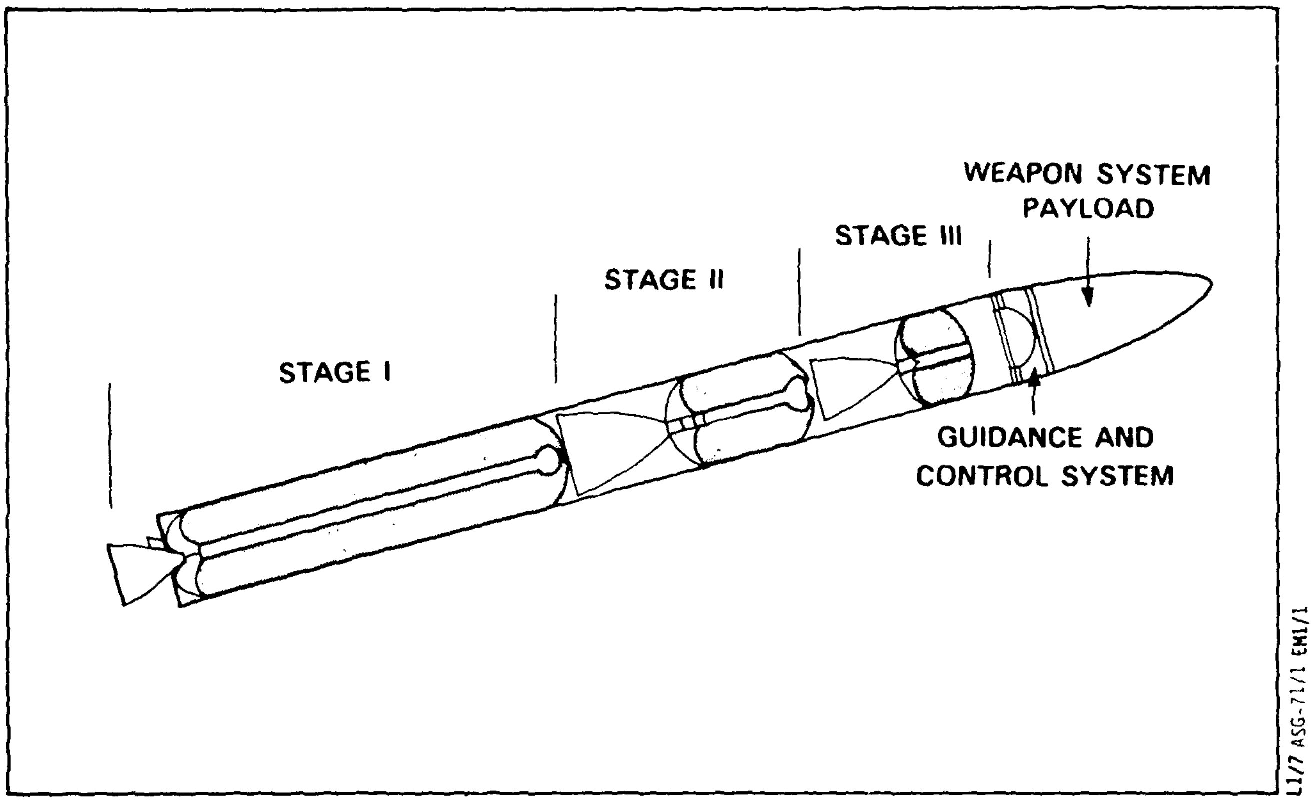

FIGURE 1.3.1-1 SMALL ICBM

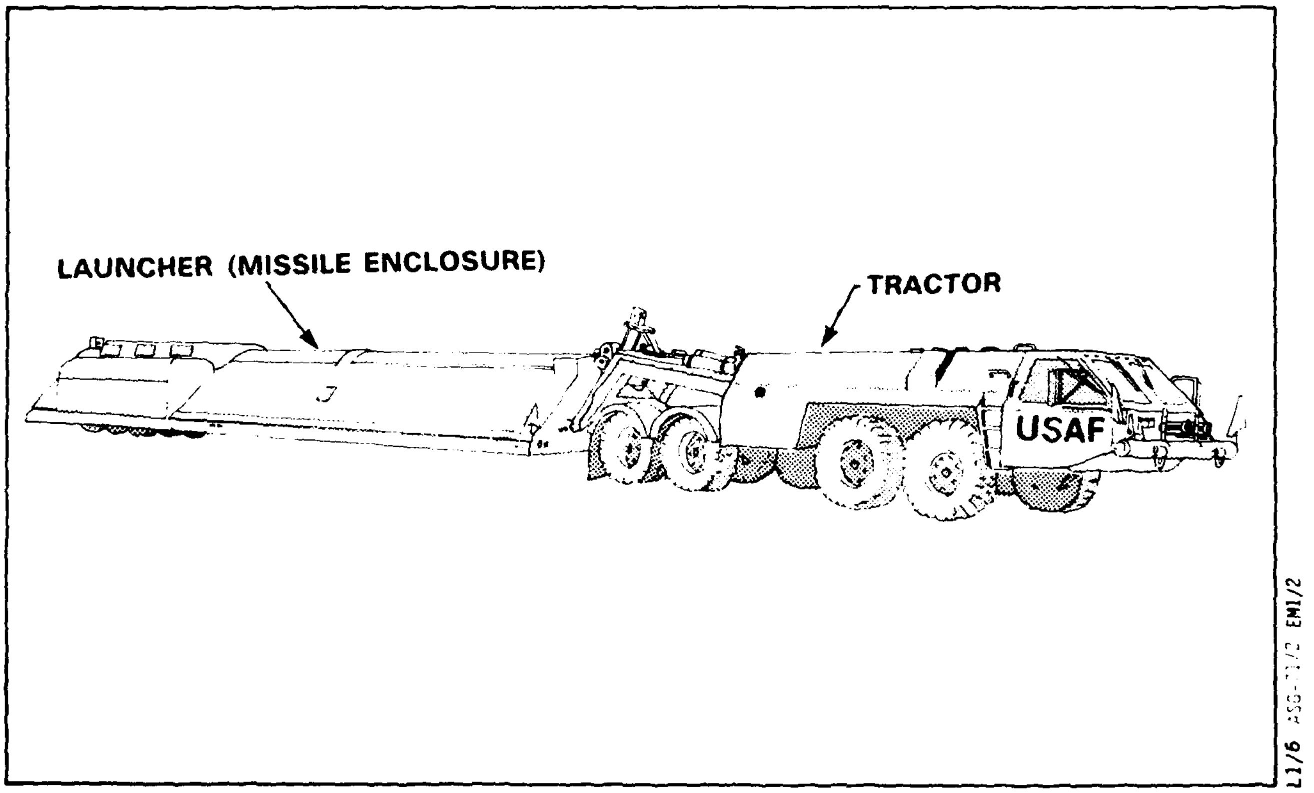

FIGURE 1.3.1-2 HARD MOBILE LAUNCHER IN DEPLOYED CONFIGURATION (CONCEPTUAL)

Table 1.3.2-1

Vehicle Usage During the Small ICBM Operations Phase

Small ICBM Vehicle	Vehicle Type	Vehicle Description		Trip Frequency
		Axles	Weight	
HML Convoy	Tractor-Trailer	N/A[1]	18,000 lb Max/Axle	1 round trip from launch facility to base per year per HML
Safety Vehicle	1/2- to 1-Ton Truck	2	3,000 lb to 8,000 lb Total	1 round trip from launch facility to base per year per HML
Nonmilitary Police Patrol	Police Sedan or Pick-up	2	3,000 lb to 5,000 lb Total	1 round trip from launch facility to base per year per HML
Support and Maintenance	Maintenance Van (5 to 10 Ton)	2/3	18,000 lb Max/Axle	5 round trips from base to launch facility per year per HML
Refueling Vehicle	Tanker (5 to 10 Ton)	2/3	18,000 lb Max/Axle	2 round trips per year to launch facility/launch control facility (from fuel-dispensing location)
Crew Replacement Vehicles	4-Wheel Drive Crew Truck	2	5,000 lb to 8,000 lb Total	1 round trip per day from Malmstrom AFB to each launch facility/launch control facility
Security Vehicles	Armored Personnel Carrier or 1-Ton Convoy Vehicle	2	5,000 lb to 15,000 lb Total	12-26 visits per year per launch facility from the base or launch control facility
Water and Wastewater Transport Vehicles	Commercial Tank Trucks	N/A	N/A	1 trip per week between launch facility and local utility sources

Note: [1] N/A = Not available.

feasible HML repairs would be performed at the launch facilities. Under warning of an attack (a circumstance not covered in this EIS), dispersal of HMLs from the launch facilities could be ordered. The geographically diffused arrangement of the launch facilities would enable rapid dispersal of the HMLs over a large area.

The HML security system would be integrated with the existing Minuteman system. At present, Minuteman launch facilities are unmanned, but are equipped with intrusion alarms and are frequently checked by roving patrols. The presence of onsite HML crews would increase security for the Minuteman system. Security teams would respond to alarms from the Minuteman system, the HML, or the HML crew. When HMLs are transported on public roads between the launch facilities and the main operating base, they would be escorted by security teams and would be under security response force coverage. Safety escorts would be provided while on public roads during peacetime operations.

Command, control, and communications would be provided by the intra-wing data radio (a secure communications system). The HML would have a tractor-launcher communications link to transfer status and control signals. The tractors would be equipped with voice radios to support dispersal, maintenance, and security operations. *The drivers are neither required* nor capable of initiating a launch. No additional intersite cables linking the launch facilities would be required for the Small ICBM.

The HML vehicle operations training area at Malmstrom AFB would be used daily, in both daylight and darkness, under all weather conditions. As many as six training vehicles may be operated at the same time. The vehicles would operate on a variety of surfaces and terrains, and would achieve speeds up to 50 miles per hour on a training track. An off-road area would be used for HML emplacements (the "digging-in" operation by which HMLs harden against attack). The training area would be used for approximately 240 days per year. In addition, the HML *training area may be used for road testing* following HML maintenance.

1.3.3 Small ICBM Deployment Setting

Proposed deployment activities would be concentrated in the following areas:

- Malmstrom AFB;
- The existing Minuteman launch facilities; and
- The existing deployment area road network.

1.3.3.1 Malmstrom Air Force Base

Malmstrom AFB is a SAC base which operates 150 Minuteman II and 50 Minuteman III launch facilities. Malmstrom AFB is located in north-central Montana, 1.5 miles east of Great Falls (Figure 1.3.3-1). It currently serves as the command, training, and operational and maintenance center for the Wing and provides centralized facilities for missile component storage, assembly, and maintenance. An estimated 4,300 military and civilian personnel are employed at Malmstrom AFB.

1.3.3.2 Minuteman Launch Facilities

Currently, 200 Minuteman launch facilities and 20 launch control facilities are dispersed over an 8,500-square-mile deployment area. These launch facilities are unmanned missile sites, which are generally situated in sparsely populated rural areas. Each launch

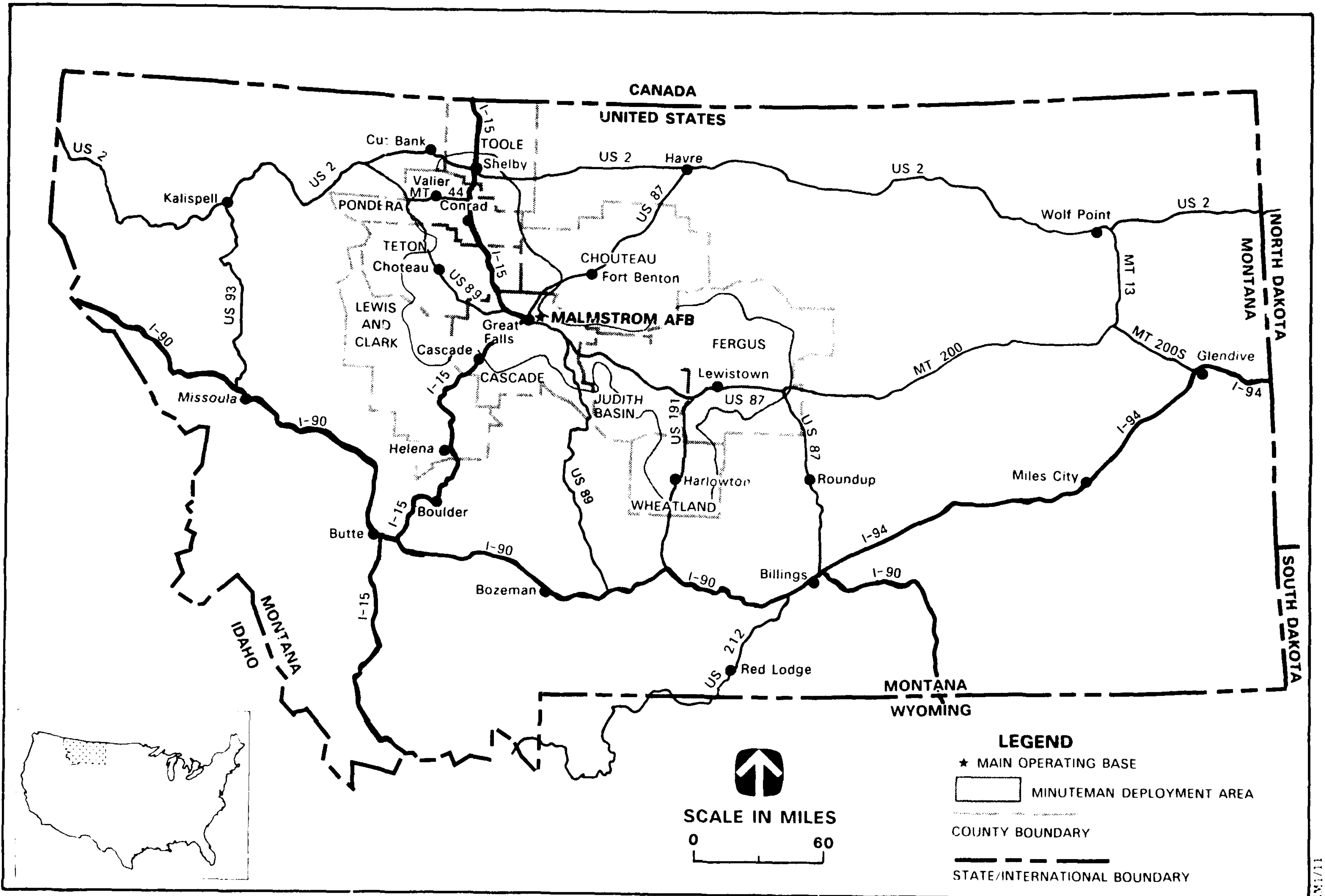

FIGURE 1.3.3-1 LOCATION OF MALMSTROM AFB AND MINUTEMAN DEPLOYMENT AREA IN MONTANA

facility is inside a fenced area occupying from 1 to 3.3 acres. Within this area are the silo, four security antennas, a UHF antenna, an underground launcher support building, and a service area. The silo includes the launch tube, the launcher closure, dual-level equipment room, and provisions for personnel access. The site is also provided with access roads and vehicle maneuvering areas. A gravel-covered service area surrounding the silo and launcher support building is used primarily for maintenance, vehicle maneuvering, and parking.

Ten unmanned Minuteman launch facilities make up a missile flight. Each flight receives primary support and control from a manned launch control facility. Each launch control facility contains a buried launch control center (which is hardened against attack) and aboveground support buildings. Each launch control facility is within a fenced 5-acre site and includes parking for a number of trucks and vehicles, including limited space for larger maintenance vans and Minuteman transporter-erector vehicles.

1.3.3.3 Deployment Area Roads

A system of designated roads in the deployment area is presently used to transport Minuteman missile components to launch facilities (Figure 1.3.3-2). These designated transporter/erector (T/E) routes are also used by roving security patrols and missile maintenance teams. The T/E routes include state-owned interstate and primary and secondary roads, county roads, and city streets. Of the 1,707 miles of the T/E route network, 609 miles are state roads, another 1,090 miles are county roads, and there are 8 miles of city streets. Most roads in the state system are paved, two-lane highways at least 24 feet in width, whereas only about 22 percent of the county roads are paved. All city streets are paved.

1.3.4 Alternatives and Siting Options

1.3.4.1 Alternatives

In developing the Proposed Action and its alternatives, a variety of system variables were considered. These variables included the total number of HMLs to be deployed throughout the Minuteman Wing (200 or 250), the number of HMLs to be deployed at each launch facility (1 or 2), the type of HML enclosures to be constructed at the launch facilities (earth-covered igloos or pre-engineered metal buildings), and the number of operations personnel required (which will depend on the number of personnel at each launch facility). Evaluation of combinations of these factors led to the selection of the Proposed Action and three alternatives for analysis which represent the range of anticipated environmental impacts (Table 1.3.4-1).

The alternatives were analyzed to identify the range of expected environmental consequences of the Small ICBM program at Malmstrom AFB. The Proposed Action and other alternatives that can be generated from various combinations of the system variables under consideration would have resource requirements that are generally greater than that of Alternative 1 and less than Alternative 2. Alternative 3 would have the largest amount of surface disturbance in the deployment area, with all 200 launch facilities requiring modification. Further review of the existing and projected military threat, operations requirements, and environmental considerations has resulted in the Air Force identifying Alternative 1 as the preferred alternative.

1.3.4.2 Siting Options

Siting options provide alternative locations where various Small ICBM facilities can be located. Siting options for two types of facilities are analyzed in this EIS: launch facility locations and the military family housing locations.

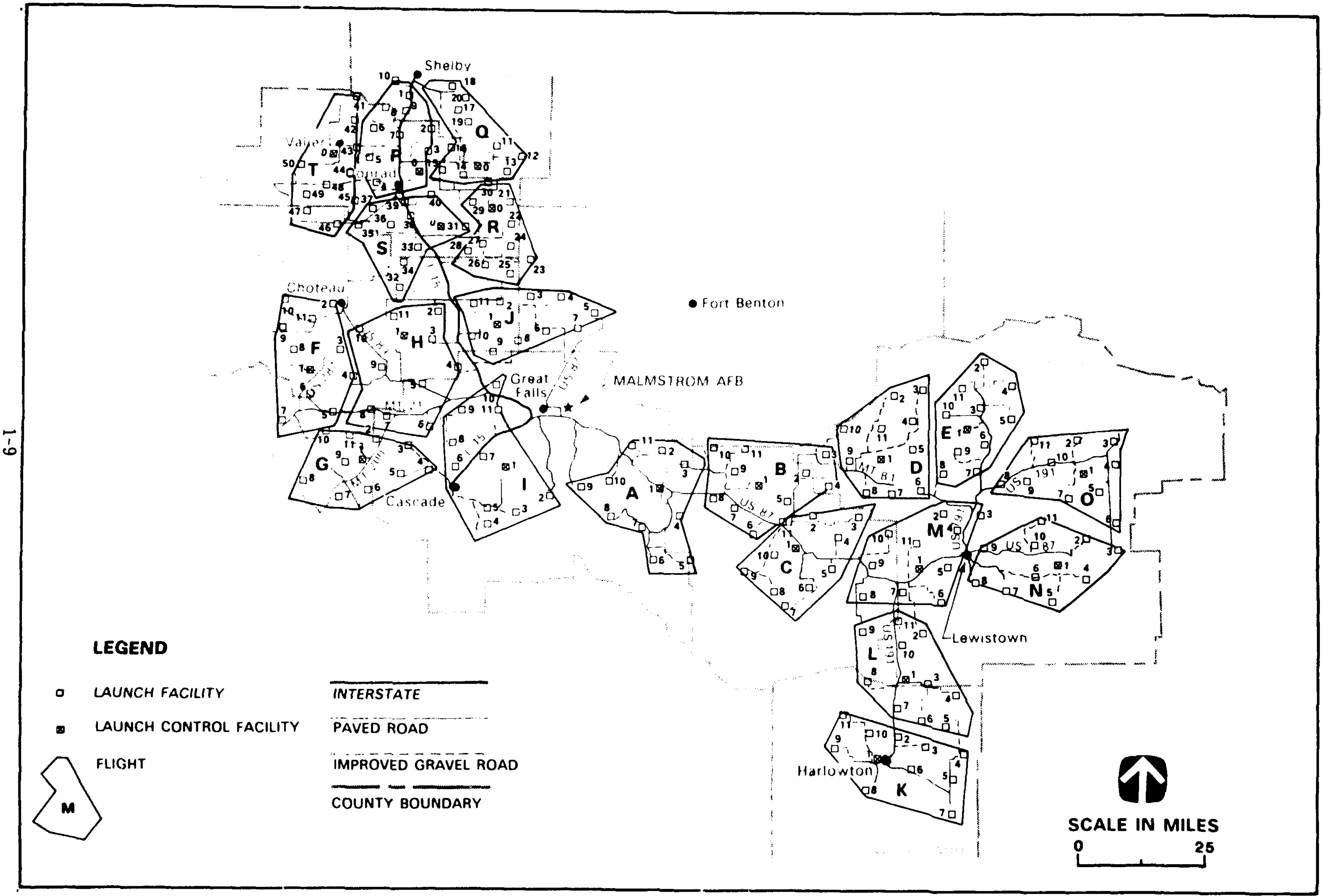

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FIGURE 1.3.3-2 NETWORK OF PUBLIC ROADS USED BY TRANSPORTER-ERECTOR VEHICLES FOR ACCESS TO MALMSTROM AFB MINUTEMAN LAUNCH FACILITIES IN MONTANA

Table 1.3.4-1

Summary of the Proposed Action and Alternatives for the Small ICBM Program at Malmstrom AFB, Montana

	No. of Launch Facilities	No. of HMLs Deployed	No. of HMLs per Launch Facility	HML Enclosures	Explosive Safety Zone (feet from HML Enclosure)	Peak-Year Construction Personnel (1990)	Operations Personnel	Maximum Military Family Housing Provided units (acres)
Proposed Action	100	200	2	Earth-Covered Igloos	1,250	1,090	2,190-3,100[1]	1,746 (330)[2]
Alternative 1	100	200	2	Pre-engineered Buildings	1,795	1,080	2,190[1]-3,100	1,230 (232)[3]
Alternative 2	125	250	2	Earth-Covered Igloos	1,250	1,120	2,620-3,760[1]	2,000 (380)
Alternative 3	200	200	1	Pre-engineered Buildings	1,425	1,090	3,100	1,746 (330)
No Action Alternative	0	0	0	-	-	0	0	0 (0)

Notes:

[1] Selected for environmental analysis (will depend on the number of personnel stationed at each launch facility).

[2] For the Proposed Action and each of the alternatives, two housing options are analyzed: housing provided onbase through the Military Construction Program and housing provided offbase by the private sector or through other federal programs.

[3] The designation of only 1,230 military family housing units for Alternative 1 is intended only to provide an alternative number of housing units for purposes of comparative analysis. In fact, the Proposed Action and Alternatives 1 and 3 could be chosen with 1,746 units, 1,230 units, or some number in between depending on the ability of the local housing market to meet the housing needs of military families and the availability of funds for military family housing or for other federally supported housing construction programs.

Launch Facility Locations. All 200 launch facilities in the Malmstrom AFB Minuteman Wing are considered to be viable siting candidates for the Small ICBM program. For the Proposed Action and Alternative 1, a total of 100 launch facilities would be modified to accommodate HML enclosures. For Alternative 2, a total of 125 launch facilities would be modified, and for Alternative 3, all 200 launch facilities would be modified to accommodate HML enclosures. The proposed set of launch facilities for each alternative was determined through consideration of operational effectiveness, cost of upgrade, cost of access, security, environmental consequences including impacts on sensitive vegetation and species as well as inhabited facilities, and cost of operations and maintenance. These sets of launch facilities for the Proposed Action and the three alternatives are shown in Figures 1.3.4-1, 1.3.4-2, 1.3.4-3, and 1.3.4-4, respectively.

Housing Locations. For the Small ICBM program, the Air Force is committed to using locally available housing and new private-sector development to the greatest extent possible. If the private sector is not able to provide adequate housing for all military personnel, the Air Force would provide the required housing either offbase, through the use of federal programs which may encourage private entrepreneurs to construct additional housing in the Great Falls community, or onbase, through the Military Construction Program (MCP).

Although a combination of these approaches for the provision of housing will most likely be used at the time of program construction, two housing options were evaluated to demonstrate the full range of potential impacts. The onbase housing option assumes full funding of military family housing through the MCP. This housing would be built on newly acquired land adjacent to Malmstrom AFB, and would tend to concentrate Air Force families in this area. The offbase housing option would depend on the private sector, both with and without federal subsidies, to provide necessary program housing. New developments would be located in many neighborhoods in the Great Falls area and would disperse Air Force families throughout the community.

These housing options would have an influence on the socioeconomic and other consequences of the program. Therefore, the consequences of both housing options were evaluated for the Proposed Action as well as all other alternatives. For the onbase housing option, the Proposed Action and Alternative 3 include a provision for approximately 1,750 additional military family housing units to be constructed in an expanded area of Malmstrom AFB. These units would require the purchase of approximately 330 acres of land next to the existing family housing on the northwest corner of the base. For Alternatives 1 and 2, the number of housing units to be provided onbase would be 1,230 and 2,000 units, respectively, with proportional changes in land requirements. For the offbase housing option for all alternatives, these units would be constructed privately on developable residential land in the Great Falls urban area.

1.3.5 Proposed Action

The total number of HMLs to be deployed would depend on a number of factors including progress reached on international arms control agreements. The major facilities required for system operation and support of the initial 200 HMLs would be located at Malmstrom AFB, the main operating base, and its associated existing Minuteman launch facilities. For the Proposed Action, two HMLs would be located in earth-covered igloos (arched enclosures, Figure 1.3.5-1) at each of 100 launch facilities. The HML drivers would be on alert at all times at each launch facility. The total budgeted cost of the MCP for Small ICBM deployment on and around Malmstrom AFB is approximately $1 billion (then-year dollars).

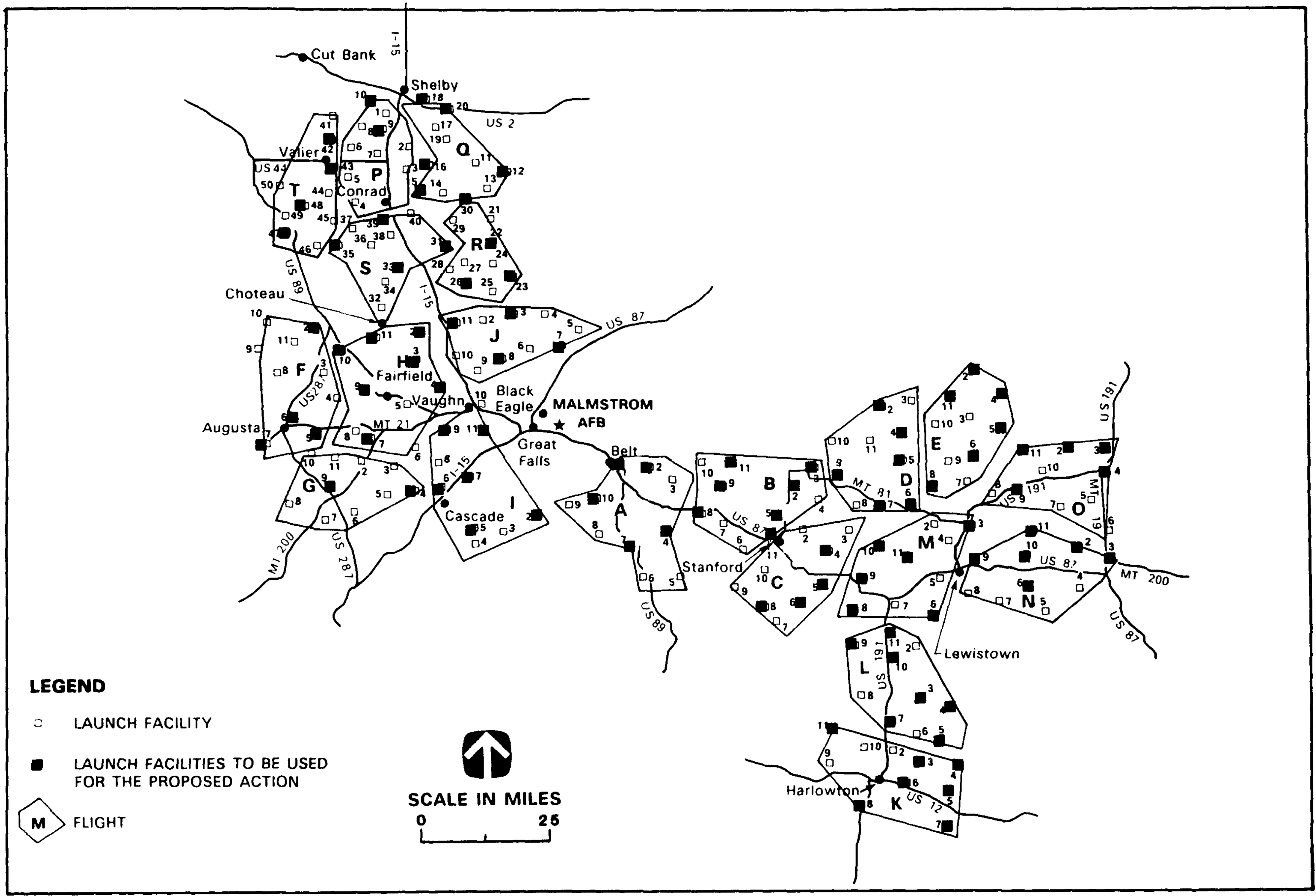

FIGURE 1.3.4-1 PROPOSED SET OF LAUNCH FACILITIES FOR THE PROPOSED ACTION

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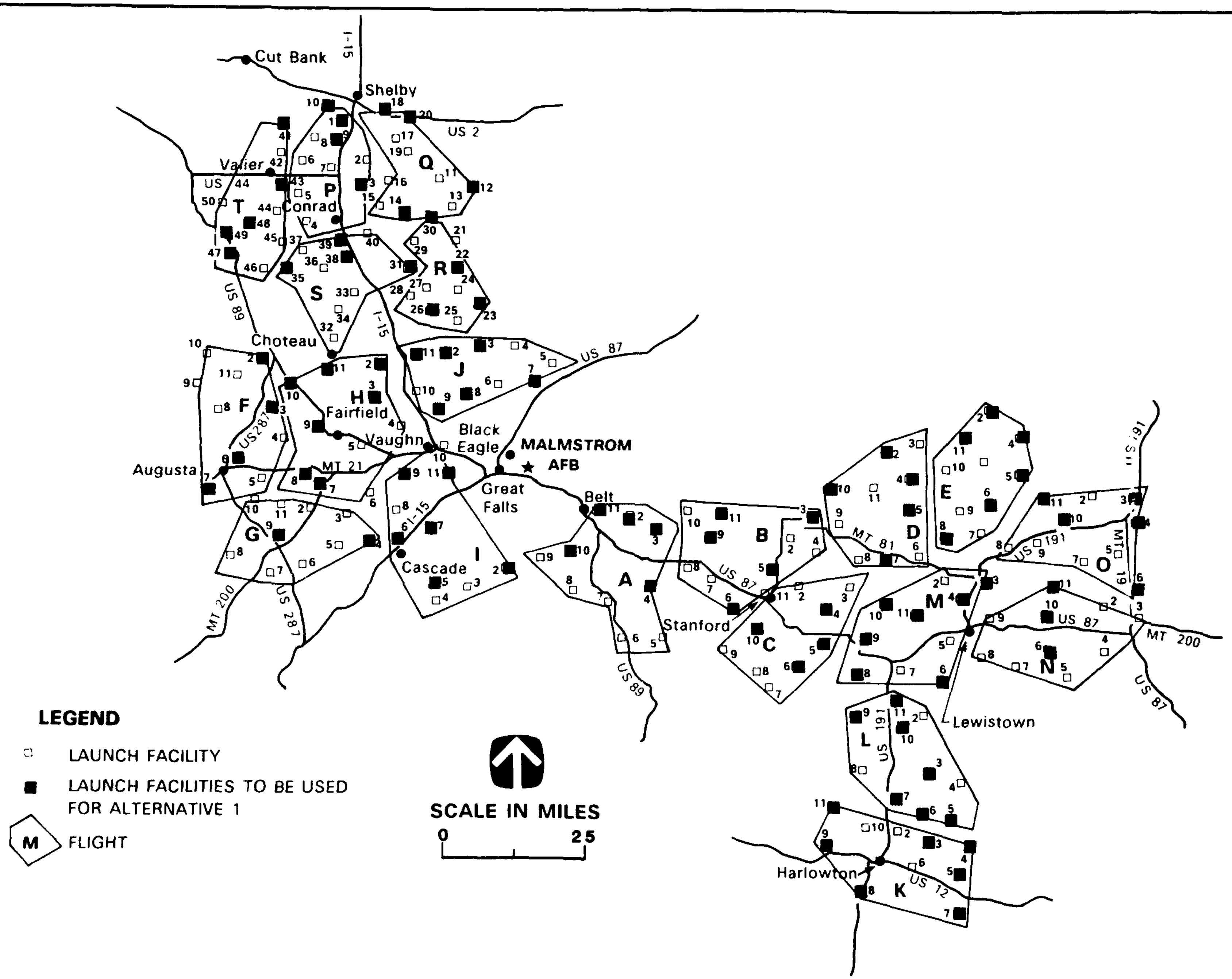

FIGURE 1.3.4-2 PROPOSED SET OF LAUNCH FACILITIES FOR ALTERNATIVE 1

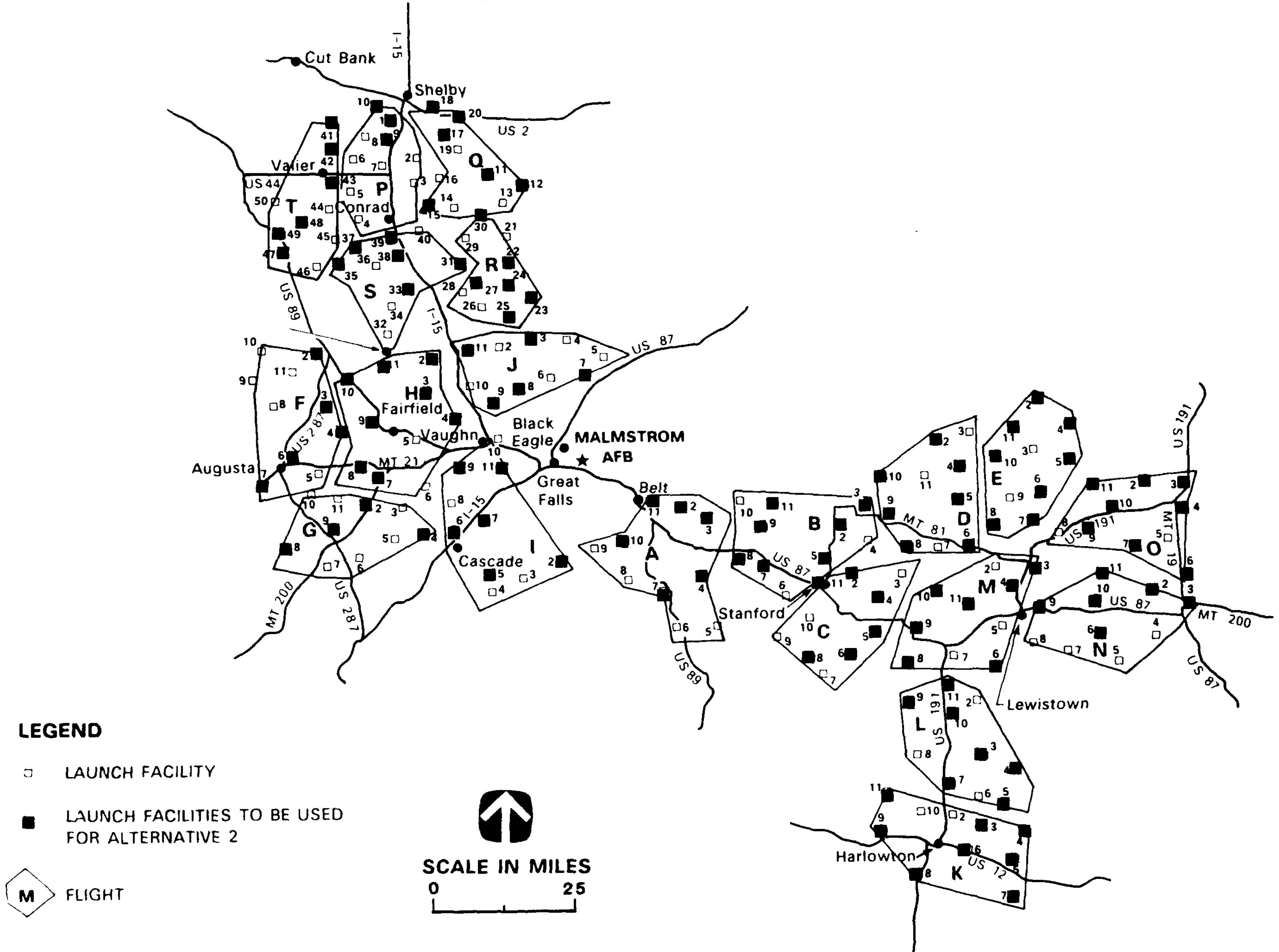

FIGURE 1.3.4-3 PROPOSED SET OF LAUNCH FACILITIES FOR ALTERNATIVE 2

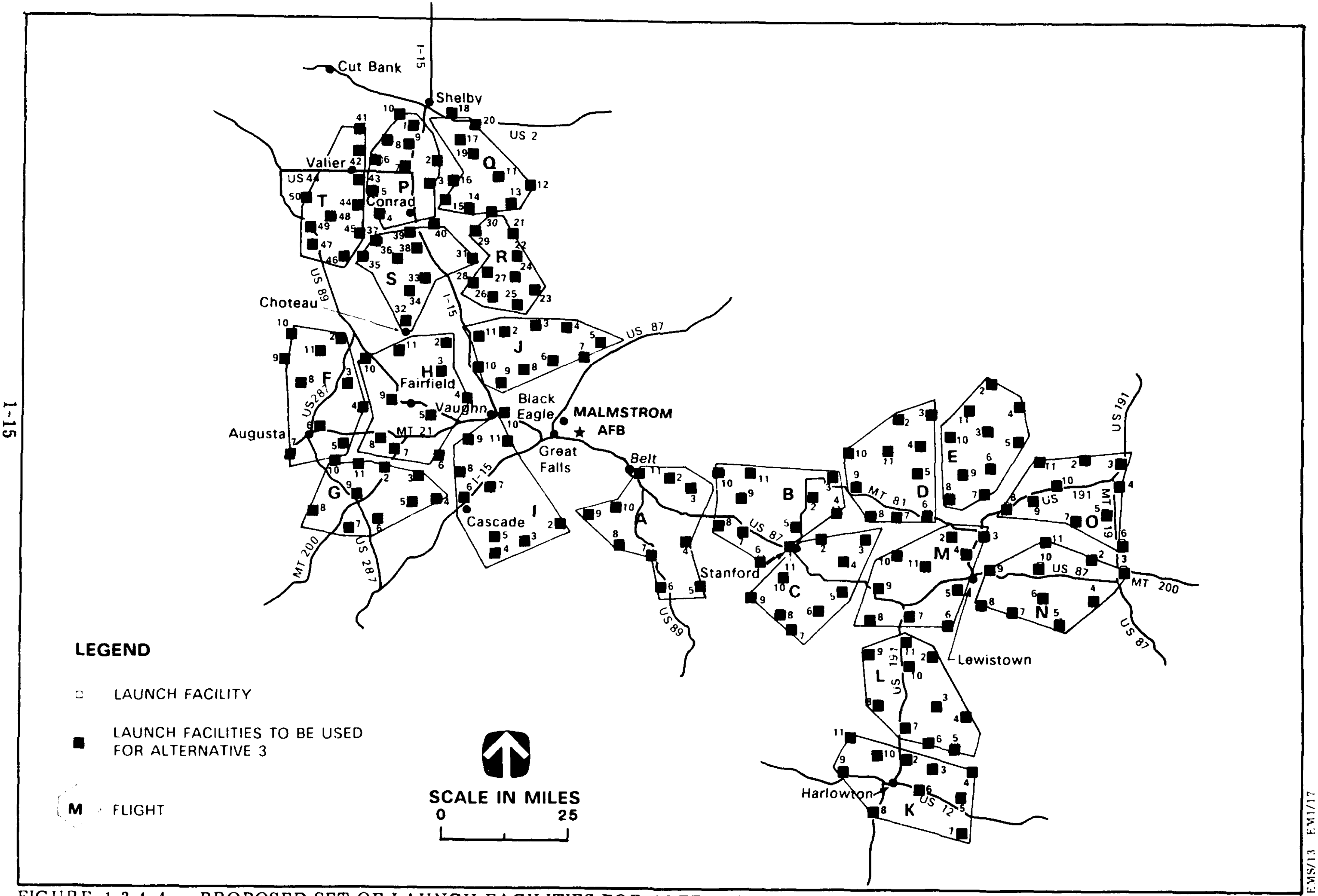

FIGURE 1.3.4-4 PROPOSED SET OF LAUNCH FACILITIES FOR ALTERNATIVE 3

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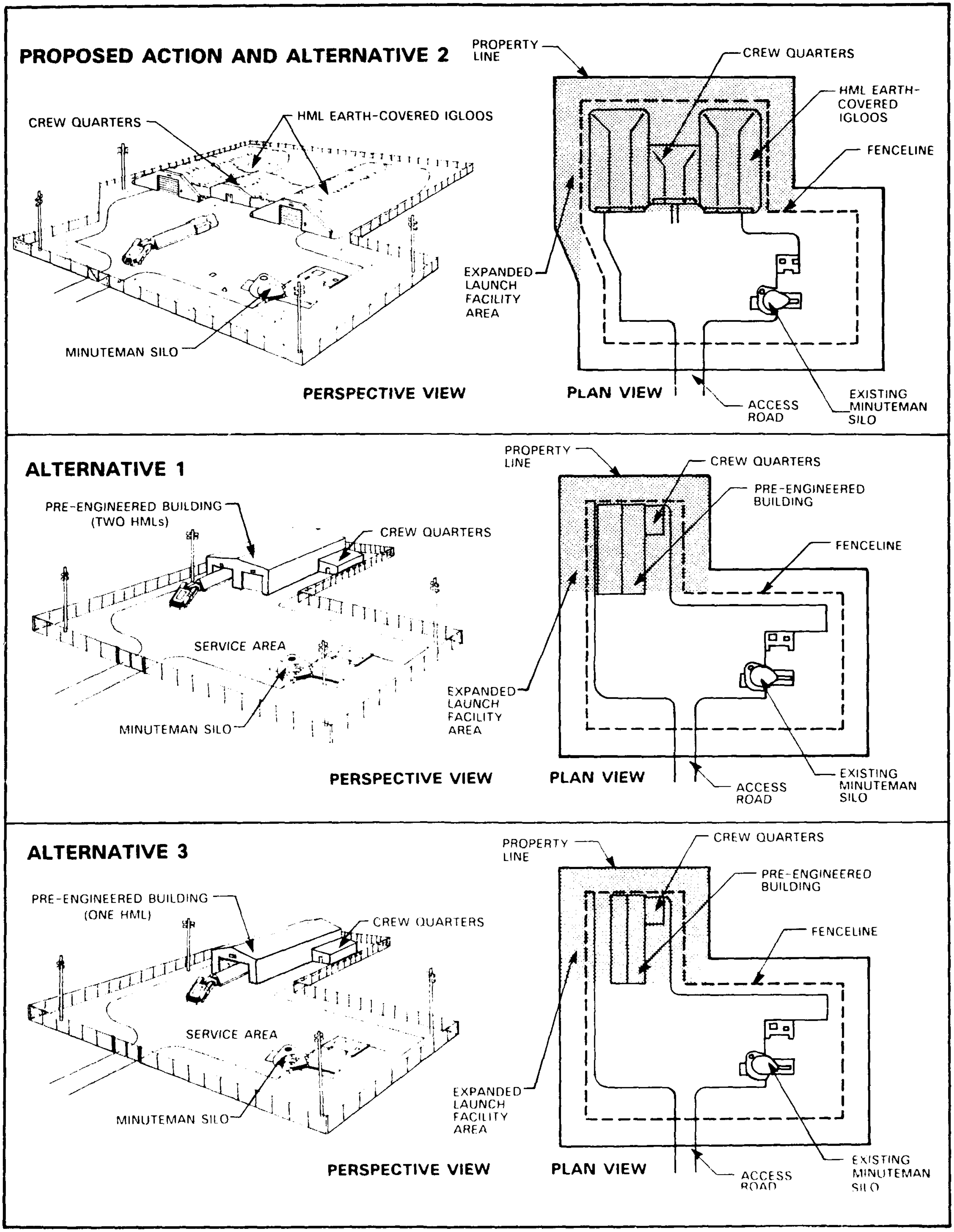

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FIGURE 1.3.5-1 LAUNCH FACILITY MODIFICATION CONCEPT FOR THE SMALL ICBM

Malmstrom AFB is connected to the Minuteman launch facilities by a network of public roads that are designated for use in transporting Minuteman missile components. During peacetime operation, transportation of HMLs would be restricted to these deployment area roads. It is estimated that, on the average, each HML would be transported to Malmstrom AFB once each year.

Modifications would be required to portions of the deployment area road network and at the launch facilities identified for deployment. Launch facility modifications would include expansion outside the fence and construction of HML enclosures and crew housing. Existing explosive safety zones, which prohibit the construction of inhabited structures within 1,200 feet of a launch facility, would expand to 1,250 feet. Residential or other occupied structures falling in the expanded safety zone would have to be acquired by the Air Force, unless the requirement is waived at the owner's request. Additional temporary restrictive easements for construction activities may be required. Minor improvements to some launch facility access roads may also be necessary.

Proposed construction activities would be concentrated in the following areas:

- Malmstrom AFB;
- The launch facilities; and
- The deployment area road network.

Discussions of the proposed facility requirements in each of these areas are provided in the following sections.

1.3.5.1 Malmstrom Air Force Base

For the Proposed Action, facilities containing approximately 3.2 million square feet (sq ft) of new floor space would be constructed at the base to support Small ICBM operations, and existing floor space would require additions and/or modifications to provide an additional 67,000 sq ft. Various roads, utilities, and other support construction would also be required. In addition, approximately 150,000 sq ft of floor space will be added between 1987 and 1989 to support the new KC-135R air refueling mission.

Throughout the siting process, a variety of locations and improvement configurations were considered for onbase facilities. The siting of Small ICBM facilities is based on functional relationships, land use compatibility, and environmental factors. Siting considerations include relationships between Small ICBM, KC-135R aircraft, and Minuteman functions; security; availability of existing facilities; on and offbase land uses; and explosive safety criteria. After considering these factors, an optimal onbase siting plan was developed.

Table 1.3.5-1 provides a list of Small ICBM proposed technical and personnel support facilities. The proposed locations of these facilities are shown in Figure 1.3.5-2. Most of the facilities would be built within the existing boundaries of the base. Some technical and personnel support facilities, including new base housing, would be constructed on newly acquired land on the north side of the base while expansion on the east side would be used for the HML vehicle operations training area. The proposed general locations for the facilities in the expanded area of the base are illustrated in Figure 1.3.5-2.

Table 1.3.5-1

Proposed Small ICBM Facilities at Malmstrom AFB, Montana

Map Location (see Figure 1.3.5-2)	Facility	Size	Completion Date
	TECHNICAL FACILITIES		
	Operation and Maintenance Facilities		
1	Canisterized Booster Storage Facility	6,500 sq ft	1992
	Electrical Distribution System	LS[1]	1991
	Facility Storm Drains	LS	1991
2	Fuel Storage	4,500 bbl[2]	1992
	Gas Distribution System	LS	1991
3	Integrated Maintenance Complex	145,000 sq ft	1991
4	Integrated Support Complex	110,000 sq ft	1991
5	Maintenance Training Facility	65,000 sq ft	1991
6	Open Storage	75,600 sq ft	1992
7	Operational Support Center	73,000 sq ft	1991
	Roads	2.5 mi	1991
	Sanitation System	LS	1991
8	HML Vehicle Operations Training Area	350 acres	1992
	Water Supply System	LS	1991
	Weapons Storage Area Facilities		
	Area Lighting	30 each	1991
9	Assembly, Surveillance, and Inspection	18,000 sq ft	1991
	Electrical Distribution System	LS	1991
10	Entry Control	1,000 sq ft	1992
	Gas Distribution System	LS	1991
11	HML Checkout Pad (2)	7,400 sq ft	1992
12	Munitions Supply/Inert Storage	6,100 sq ft	1992
13	Propulsion Equipment Module Assembly	1,100 sq ft	1992
	Roads	1 mi	1991
14	Reentry Vehicle/Shroud Reentry Vehicle Payload Module Assembly Storage Facility	2,500 sq ft	1992
	Sanitation System	LS	1991
	Security Fencing	9,600 ft	1991
	Security Lighting	24 each	1991
15	Security Response Master Surveillance Facility	4,000 sq ft	1992
16	Standby Power Facility	1,000 sq ft	1991
17	Storage Magazine	1,200 sq ft	1992
18	Vehicle & Canister Integration (3 bldgs.)	84,000 sq ft	1992
	Water Supply System	LS	1991

Table 1.3.5-1 Continued, Page 2 of 3

Map Location (see Figure 1.3.5-2)	Facility	Size	Completion Date
	PERSONNEL SUPPORT FACILITIES		
19	Airmen Dorm	199,092 sq ft	1992-1995
20	Arts & Crafts Center (Addition/Alteration)	2,000 sq ft	1995
21	Auto Hobby Shop (Addition/Alteration)	3,500 sq ft	1995
22	Base Cold Storage (Addition/Alteration)	9,000 sq ft	1993
23	Base Civil Engineer Administration (Addition/Alteration)	3,100 sq ft	1992
24	Bowling Center	6,600 sq ft	1994
25	Clothing Sales Store (Addition/Alteration)	2,100 sq ft	1993
26	Chapel (Addition/Alteration)	8,000 sq ft	1993
27	Child Development Center (Addition/Alteration)	5,000 sq ft	1993
28	Consolidated Administration Facility	40,000 sq ft	1992
	Electrical Distribution System	LS	1991-1992
29	Education Center (Addition/Alteration)	4,300 sq ft	
30	Exchange Branch	7,000 sq ft	1995
31	Family Housing (1,746 Units at 1,100 sq ft)	1,920,600 sq ft	1992-1995
32	Fire Station	3,200 sq ft	1993
	Gas Distribution System	LS	1991-1992
33	Gate House	150 sq ft	1992
34	Gym Complex (Addition/Alteration)	LS	1994
35	Heat Plant/Distribution (Addition/Alteration)	LS	1991-1992
36	Housing Supply/Storage	4,800 sq ft	1992
37	Information Processing Center/TCC (Addition/Alteration)	10,000 sq ft	1993
38	Morale, Welfare, and Recreation Supply Component	13,000 sq ft	1995
39	Open Mess, Noncommissioned Officer (Addition/Alteration)	24,000 sq ft	1992
40	Open Mess, Officer (Addition/Alteration)	9,000 sq ft	1992
41	Open Storage, Freight/Traffic	6,500 sq ft	1991
42	Open Storage, Base Supply	15,000 sq ft	1991
43	Personnel Support Facility	36,000 sq ft	1992
44	Petroleum, Oil, and Lubrication Operations	2,750 sq ft	1993
45	Recreation Center (Alteration)	11,000 sq ft	1993
46	Recreation Library (Addition/Alteration)	2,000 sq ft	1995
	Roads/Streets	13 mi	1991-1992
	Sanitation System	LS	1991-1992
47	Small Arms Range	LS	1992
48A	Security Police Consolidated Group Facility	50,000 sq ft	1991
48B	Security Armory (Part of 48A)		1991
49	Security Police Kennel/Training Building	2,280 sq ft	1992
50	Store, Commissary	30,000 sq ft	1992
	Storm Drain System	LS	1991-1992

Table 1.3.5-1 Continued, Page 3 of 3

Map Location (see Figure 1.3.5-2)	Facility	Size	Completion Date
	PERSONNEL SUPPORT FACILITIES		
51	Traffic Management Facility	20,000 sq ft	1991
52	Unaccompanied Officers' Quarters	12,000 sq ft	1995
53	Visiting Airmen Quarters	10,000 sq ft	1993
54	Vehicle Heated Storage	20,000 sq ft	1992
55	Vehicle Maintenance Shop	36,555 sq ft	1992
56	Vehicle Operations Parking Shed	24,200 sq ft	1992
57	Vehicle Refueling Station (Military) (Addition/Alteration)	LS	1994
	Water Distribution System	LS	1991-1992
58	Warehouse Forms and Publication, Base	3,000 sq ft	1993
59	Warehouse Supply and Equipment, Base	45,000 sq ft	1992
60	Youth Center	18,000 sq ft	1993

Notes: [1] LS = A lump-sum value given where square footage is not applicable to the facility being planned.

[2] bbl = barrel.

The majority of the technical facilities would be constructed between 1990 and 1992 on the southeast side of the Malmstrom AFB runway, within or adjacent to the existing Minuteman Weapons Storage Area (WSA). The WSA would be expanded to accommodate Small ICBM weapon assembly and storage facilities. The HML vehicle operations training area would be constructed outside of the WSA and outside of the explosive safety zones generated by the expanded WSA. Technical facilities located on the west side of the runway would not require HML access.

The HML vehicle operations training area would occupy about 350 acres on the southeast side of Malmstrom AFB and would require an expansion of the base near the WSA. The HML vehicle operations training area would consist of training roads, HML maneuver areas, classrooms, and enclosures for the HML training vehicles. The major elements of the training facility include a driver training track, off-road maneuver areas consisting of varied slope transitions and terrain obstacles, simulated launch facility/launch control facility access roads and HML enclosures, and realistic operational dash roads. Buildings constructed within the training area would contain classrooms, training administration space, and HML trainer vehicle garages.

Most of the personnel support facilities would be sited on the northwest side of the airfield and would be integrated within the existing support complex. If military family housing is provided onbase, approximately 1,750 units would be built and would require additional land next to and north of the existing Capehart family housing area. Construction of personnel support facilities planned for the base would start in 1991 and would be completed by 1995. Some facility requirements would be satisfied by adding to or altering existing facilities while other requirements would be met by the construction of new facilities.

Infrastructure improvements for technical and personnel support facilities would begin in 1990 and would be completed by 1994. Upgrades and extensions to utility distribution systems would involve electrical, natural gas, water, sewage, and high temperature hot water. The base coal-fired central heat plant would receive an additional boiler in 1992.

Base road improvements include widening Goddard Avenue from the main gate to the perimeter road near the central heat plant, modifying connections from the personnel support area to the perimeter road leading to the WSA, and improving the roads on the east side of the base from the WSA to their connection with U.S. 87/89 east of Great Falls. Local streets connecting Great Falls with the main gate on Goddard Avenue may require improvements, and the county road leading to the industrial north gate may require relocation to make room for the additional military family housing.

1.3.5.2 Minuteman Launch Facilities

Small ICBM construction activities at existing Minuteman launch facilities in Montana would begin in the spring of 1991 when nine launch facilities are scheduled for site improvements. Initial construction at each launch facility would involve cut-and-fill operations to prepare the launch facilities for the addition of two earth-covered igloos and a crew support facility. In addition, some launch facility access roads would be widened to provide for HML movements. Improvements would also be made to the site and to the commercial electrical power distribution system from the utility connection point to the new facilities. Security teams would be present during launch facility modifications. The schedule for launch facility modifications is provided in Table 1.3.5-2.

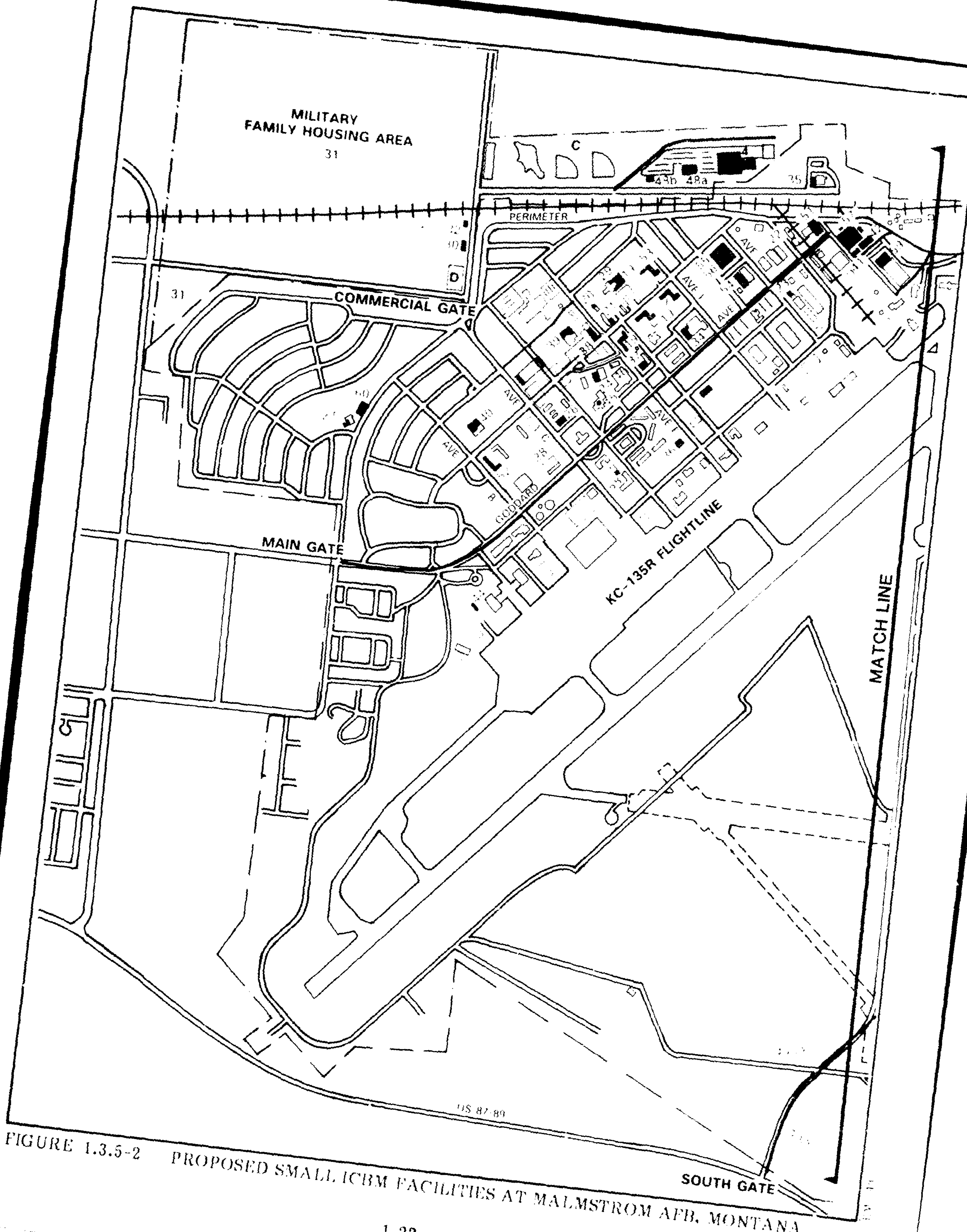

FIGURE 1.3.5-2 PROPOSED SMALL ICBM FACILITIES AT MALMSTROM AFB, MONTANA

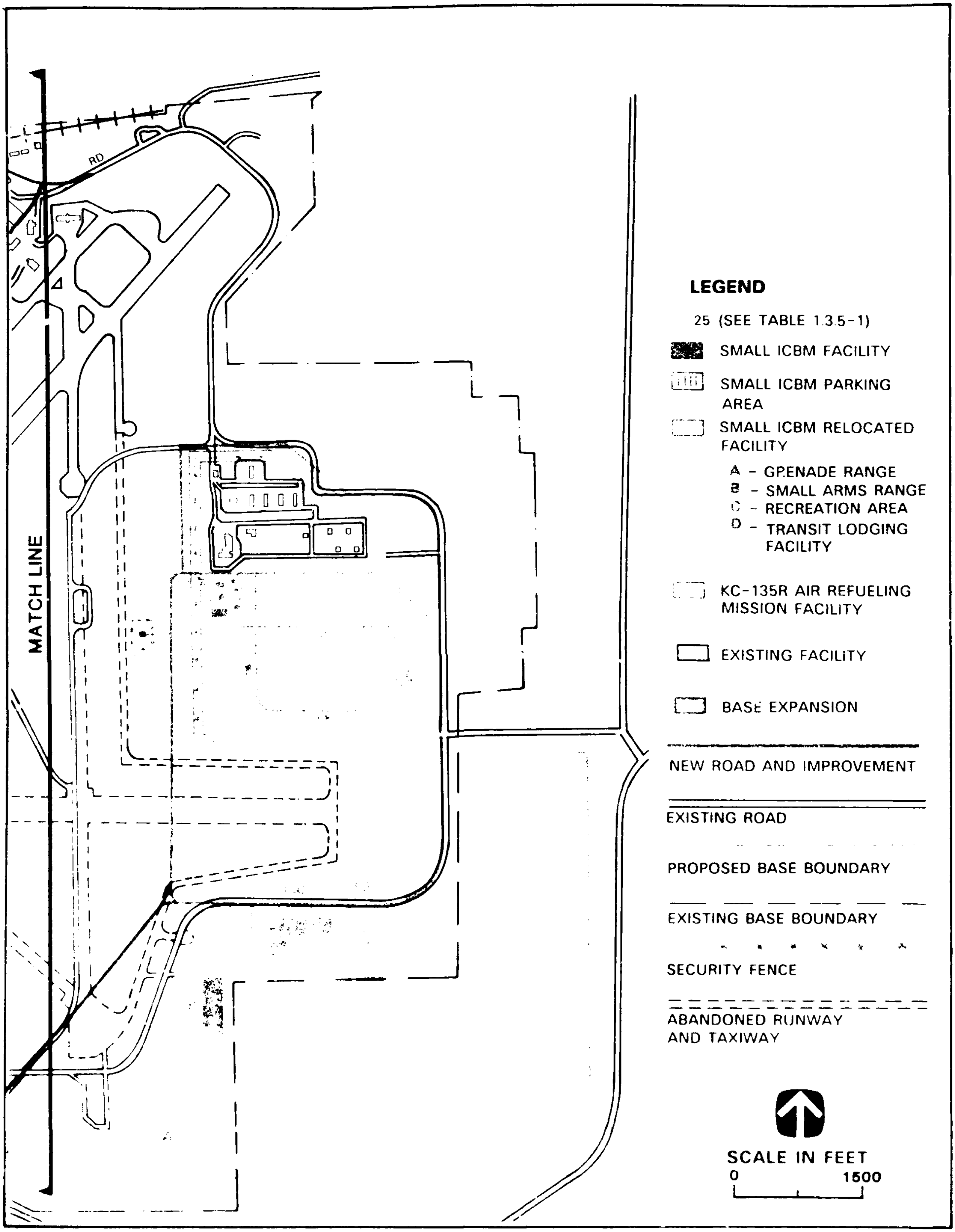

FIGURE 1.3.5-2 CONTINUED

Table 1.3.5-2

Schedule of Launch Facility Modifications in Montana for the Proposed Action

	No. of Launch Facilities			
Year	Started	Completed	Under Construction	Total Completed
1990				
1991	9	0	9	
1992	16	9	25	9
1993	25	16	41	25
1994	30	25	55	50
1995	20	30	50	80
1996		20	20	100
1997				

Two earth-covered igloos would be constructed near the existing Minuteman launch facility (Figure 1.3.5-1). A concrete masonry unit crew quarters including air conditioning, water, and sanitation facilities would be constructed near the earth-covered igloos. Each launch facility would be enlarged and the existing security fence would be relocated and extended to enclose this area. Launch facility expansion would vary with location, typically ranging from 0.1 to 1.6 acres. A total of approximately 115 acres of land would be acquired in fee simple to accommodate the igloos at all 100 sites (Table 1.3.5-3).

Existing explosive safety zones that prohibit inhabited structures within 1,200 feet of Minuteman silos would be expanded to a distance of 1,250 feet from the igloos. This would require an average of 34 acres per launch facility or a total of 3,400 additional acres in restrictive easements.

1.3.5.3 Deployment Area Roads

Public road improvements within the deployment area to support Small ICBM traffic would be limited to the T/E routes. Prior to construction, a formal process involving the Federal Highway Administration, state and local transportation agencies, Military Traffic Management Command, and the Air Force would determine specific road improvements, locations, and resources. In the interim, estimates have been made regarding anticipated changes required to accommodate the Small ICBM mission. Some intersections along the routes may require widening and some cattle guards and culverts may be replaced. Road improvements are scheduled to begin in the spring of 1990 along the roads leading to the first launch facilities that would receive HMLs. Public road improvement activities would increase in 1991, peak in 1993, and be complete by the fall of 1994.

There are 315 bridges throughout the T/E route network. Of these bridges, as many as 124 may require modification or replacement to support the HML. Bridge work would begin in the spring of 1990 on those bridges leading to the first launch facilities scheduled for modification. Bridge replacement activities would increase in 1991

Table 1.3.5-3

Small ICBM Additional Fee Simple Land and Restrictive Easement Requirements

	Additional Fee Simple Requirements (acres)	Additional Restrictive Easement Requirements (acres)
Proposed Action (100 Launch Facilities)	115	3,400
Alternative 1 (100 Launch Facilities)	80	13,400
Alternative 2 (125 Launch Facilities)	145	4,200
Alternative 3 (200 Launch Facilities)	95	9,400

and 1992, and peak in 1993. Construction work on bridges would be completed by the fall of 1994. In addition to bridge improvements, a number of culverts throughout the T/E route network may be reinforced or replaced.

Individual bridge replacement may require interruptions to daily traffic. These interruptions would be minimized through the use of detours or by alternating direction of traffic via a single, open lane. Alternate routes would be used where available. In some instances, temporary detour roads with temporary bridges would be built near the bridge construction site to accommodate daily traffic during bridge replacement. Road and bridge construction would require some temporary disturbances along the public right-of-way. Temporary disturbance areas averaging 0.5 acre would be required for the storage of construction equipment and material stockpiles. These areas may also include small onsite construction offices. Minor operational equipment maintenance would be accomplished on these sites. Used engine oils, equipment hydraulic fluids, and other maintenance debris generated at these sites would be contained and transported to approved disposal locations.

Electrical power upgrade may be required for high-voltage lines and distribution lines throughout the Minuteman deployment area. In addition, transformers and substations may be added throughout the electrical distribution system.

1.3.6 Alternative 1

1.3.6.1 Malmstrom Air Force Base

The reduction of the number of operations-phase personnel needed for the Proposed Action would result in reduced housing requirements. Specific information on housing is described in Section 1.3.4.2. All other facility requirements on the base remain generally the same as those for the Proposed Action.

1.3.6.2 Minuteman Launch Facilities

The same number of launch facilities (100) used for the Proposed Action would be used for Alternative 1. However, pre-engineered buildings would be erected to house the HMLs rather than the earth-covered igloos (Section 1.3.5, Figure 1.3.5-1). A total of approximately 80 acres of land would be acquired in fee simple in order to accommodate the pre-engineered buildings at 100 launch facilities. Use of these buildings would require expansion of the explosive safety zone to 1,795 feet from the enclosure, resulting in the acquisition of 134 acres per launch facility (a total of 13,400 acres for all 100 launch facilities) for additional restrictive easements.

1.3.6.3 Deployment Area Roads

The T/E route network upgrade requirements are similar to those for the Proposed Action.

1.3.7 Alternative 2

1.3.7.1 Malmstrom Air Force Base

The increase in the number of operations-phase personnel compared to the Proposed Action would raise the housing requirements. Specific information on housing is described in Section 1.3.4.2. All other facility requirements on the base remain generally the same as the Proposed Action.

1.3.7.2 Minuteman Launch Facilities

Twenty-five additional launch facilities would be used for Alternative 2, for a total of 125 launch facilities. The same type of HML enclosure (Section 1.3.5, Figure 1.3.5-1) would be used as in the Proposed Action. A total of approximately 145 acres of land would be acquired in fee simple in order to accommodate the igloos at all 125 sites. Explosive safety zones would be expanded to a distance of 1,250 feet from the igloos. This would require an average of 34 acres per launch facility or a total of 4,200 additional acres in restrictive easements.

1.3.7.3 Deployment Area Roads

The T/E route network upgrade requirements are similar to those for the Proposed Action.

1.3.8 Alternative 3

1.3.8.1 Malmstrom Air Force Base

No changes from the Proposed Action are expected as a result of implementing Alternative 3.

1.3.8.2 Minuteman Launch Facilities

For Alternative 3, each of the 200 Minuteman launch facilities may be used to accommodate one pre-engineered building. The amount of land to be acquired in fee simple would total approximately 95 acres for all 200 launch facilities. The explosive safety zone would be expanded to 1,425 feet from the enclosure instead of 1,250 feet as in the Proposed Action. This would require an average of 47 acres per launch facility or a total of 9,400 additional acres in restrictive easements.

1.3.8.3 Deployment Area Roads

Although all 200 launch facilities would be used, the T/E route network upgrade requirements would be generally the same as for the Proposed Action.

1.3.9 No Action Alternative

For the No Action Alternative, the Small ICBM would not be deployed at Malmstrom AFB. The Air Force would maintain the existing Minuteman ICBMs and the new KC-135R air refueling mission at the base. The scope of such activities would not cause changes in currently projected future conditions in the area under consideration for basing the Small ICBM. The environmental consequences of the No Action Alternative are discussed in Chapter 4.0 (Environmental Consequences) and summarized in Chapter 2.0 (Comparison of the Proposed Action and Alternatives).

1.3.10 Preferred Alternative

Taking into consideration the existing and projected military threat, operations requirements, and environmental consequences, the Air Force has determined that Alternative 1 is the preferred alternative.

1.4 Other Future Air Force Programs at Malmstrom Air Force Base

An air refueling wing, consisting of 16 four-engine KC-135R aircraft, will be deployed at Malmstrom AFB prior to Small ICBM deployment. In addition, Malmstrom AFB is a candidate garrison location for the Peacekeeper in Rail Garrison basing mode. (A garrison is a permanent secure military facility where railroad trains carrying Peacekeeper missiles would be housed during peacetime operation.)

1.4.1 The KC-135R Air Refueling Mission

The Air Force will deploy a KC-135R air refueling wing with its operational, maintenance, and associated support organizations at Malmstrom AFB in the last quarter of 1988. Sixteen KC-135R aircraft will be located on existing aircraft parking space and will use renovated and newly constructed aircraft operation and maintenance facilities at Malmstrom AFB. Facility renovation and modification work on these flightline facilities and the former Directional Control Center will be required. To support the proposed KC-135R air refueling mission, a new aircraft corrosion control maintenance hanger, consolidated aircraft maintenance shops, and heated vehicle storage facilities will also be required (Section 1.3.5.1, Figure 1.3.5-2). Additions to the existing base fire station and vehicle maintenance shops will be required to accommodate the new, larger flightline crash/firefighting equipment and the additional assigned vehicles required to support the KC-135R air refueling mission. Building alterations and renovation work are required in six existing flightline facilities to support operational and maintenance activities of the KC-135R air refueling mission. The aircraft hydrant refueling system and associated bulk petroleum product storage will be upgraded to satisfy the KC-135R aircraft operational requirements.

An environmental assessment of the KC-135R air refueling program at Malmstrom AFB was prepared and published by the Air Force; therefore, no further consideration of these environmental impacts is provided. However, the facilities and manpower requirements were considered in the evaluation of future baseline conditions for the Small ICBM at Malmstrom AFB. For example, the housing analysis includes a consideration of how much of the currently available housing in Great Falls could be used by personnel associated with KC-135R deployment.

1.4.2 Peacekeeper in Rail Garrison

Malmstrom AFB is 1 of 11 Air Force bases being considered as a deployment location for the Peacekeeper in Rail Garrison basing mode. If Malmstrom AFB is selected as a rail garrison location, four train enclosures would be constructed within a fenced area occupying 125 acres in the southeast portion of the base (Figure 1.4.2-1). Personnel support facilities and other technical facilities would occupy about 285,000 sq ft of floorspace elsewhere on the base. Under normal peacetime conditions, the Peacekeeper missiles would be maintained in a continuous strategic alert status within the garrison enclosures. On strategic warning, the missiles could be dispersed over the existing nationwide commercial rail network. Approximately 320 military and civilian personnel would be required to support the garrison at Malmstrom AFB. The budgeted cost for construction of the Peacekeeper in Rail Garrison program at Malmstrom AFB is estimated at $124 million.

A separate EIS will be prepared for the entire Peacekeeper in Rail Garrison program at a later date. For the purposes of the present analysis, the cumulative environmental consequences of the Small ICBM and Peacekeeper in Rail Garrison programs at Malmstrom AFB are discussed in Chapter 4.0 (Environmental Consequences). For example, after housing requirements for the Small ICBM program are analyzed, the added effect of Peacekeeper in Rail Garrison personnel was evaluated.

1.5 Deployment Activities and Requirements

This section describes the following deployment activities and requirements: program schedule, facility construction, assembly and checkout, and program resource requirements.

1.5.1 Program Schedule

The Small ICBM program would require approximately 6 years of construction activities in the deployment area, followed by 20 or more years of operations. Key elements of the program schedule for the Proposed Action are identified in Table 1.5.1-1. Alternative 1 would have a schedule similar to the Proposed Action. The schedule for Alternative 2 would also be similar, but the completion dates for some activities would be later.

A detailed phasing schedule for launch facility modifications and road improvements will be developed as part of the deployment effort as the program progresses. For the purposes of environmental analysis, it was assumed that road and launch facility construction closest to the base would be accomplished first. Construction activities would then move to missile flights in the northwest portion of the deployment area and finally to the flights in the southeast portion.

1.5.2 Facility Construction

Small ICBM system facilities would be specified by the Air Force and designed and constructed by the U.S. Army Corps of Engineers (COE). Some facilities essential for initial deployment would have special requirements and their construction must begin early. This effort would occur at Malmstrom AFB and the associated deployment area. Early efforts at the base and in the deployment area may also include construction of access roads and utilities where these are nonexistent or inadequate. Personnel support facilities at the base would be phased to provide accommodations for operations personnel. Offbase construction efforts would consist of modification of launch facilities including commercial power upgrade to accommodate HMLs, and roadway improvements

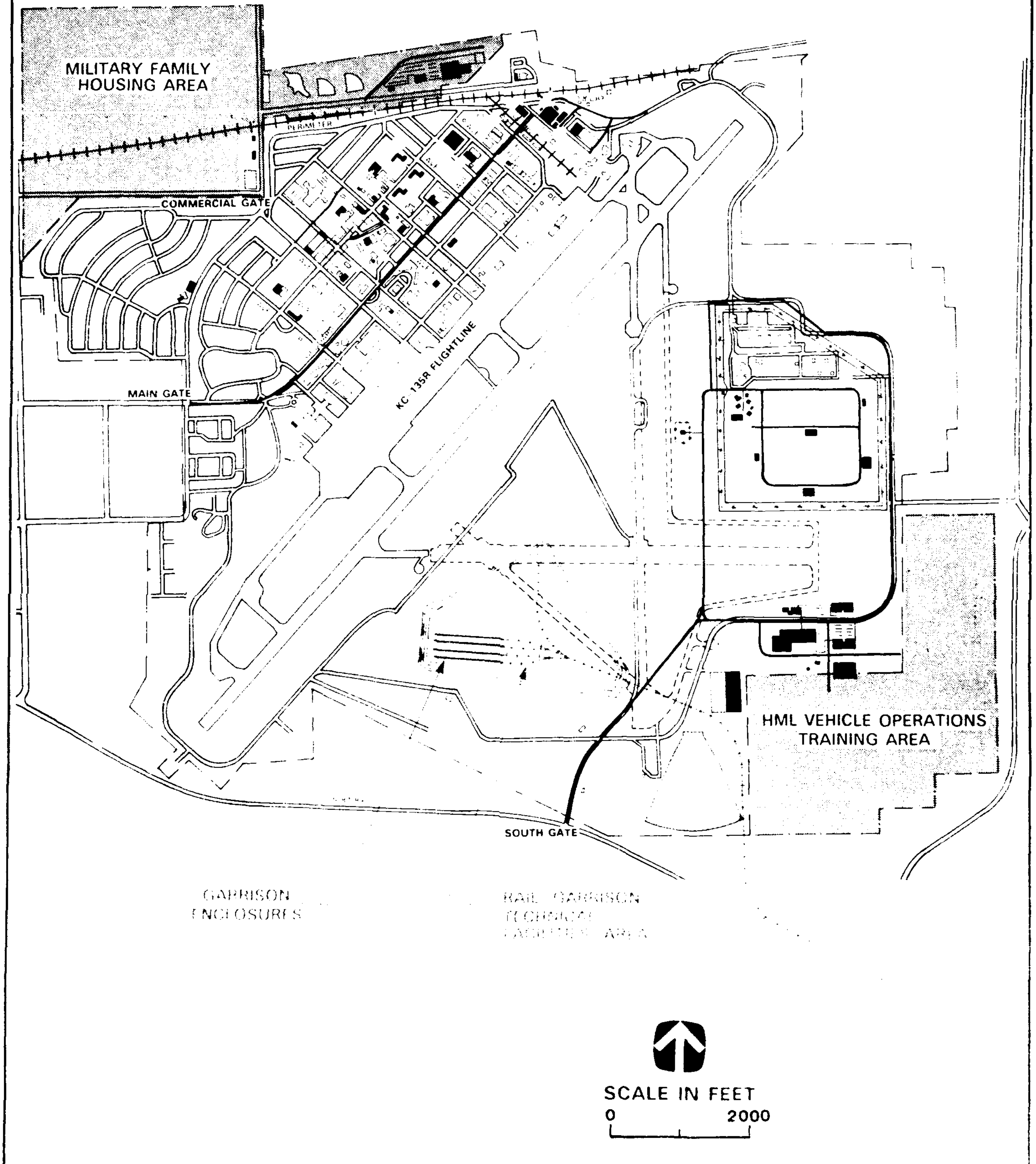

FIGURE 1.4.2-1 APPROXIMATE LOCATION OF POTENTIAL PEACEKEEPER IN RAIL GARRISON TECHNICAL FACILITIES AT MALMSTROM AFB, MONTANA

Table 1.5.1-1

Schedule of Small ICBM Activities in Montana for the Proposed Action

Activity	Schedule	
	Begin	End
Technical Facility Construction at Malmstrom AFB	Spring 1990	Fall 1992
Personnel Support Facility Construction at Malmstrom AFB	Spring 1990	Fall 1995
Launch Facility Modifications	Spring 1991	Fall 1996
Road and Bridge Improvements	Spring 1990	Fall 1994
First 10 Missiles Operational (Initial Operational Capability)	Summer 1992	Late 1992
Final 10 Missiles Operational	Early 1997	Spring 1997

necessary for base-to-launch facility HML movements. These activities would involve a small number of launch facilities at any one time and would require a stable level of effort until the system is fully deployed. Estimates of heavy construction traffic and fuel use for construction activities is provided in Table 1.5.2-1. Table 1.5.2-2 provides operations-related fuel use estimates.

1.5.3 Assembly and Checkout

Assembly and checkout is managed by the Air Force and conducted with contractor support. The process begins with receipt of hardware items which are inspected and then assembled or installed as appropriate. Completed items are then integrated into the system and further checked for proper performance. After final acceptance tests, operationally ready missiles are turned over to SAC.

Assembly and checkout at each launch facility would be supported from Malmstrom AFB. Materials and personnel would be transported to and from the launch facility with commercially available transport vehicles. Personnel, maintenance, retrieval, and security vehicles would be used to support the initial HML demonstration (to verify that vehicles meet design and performance specifications) and delivery of the missile system. Demonstration and delivery would be performed in 1992 for the first five HMLs.

1.5.4 Program Resource Requirements

Small ICBM construction and operations would cause environmental impacts which would include disturbance of the earth's surface, consumption of materials such as water and aggregate, and inmigration of workers. This section identifies the estimated program requirements used in this environmental analysis.

Table 1.5.2-1

Heavy Construction Traffic and Fuel Use for the Small ICBM Program Proposed Action and Alternatives

	1990	1991	1992	1993	1994	1995
Proposed Action						
Malmstrom AFB						
Haul Trucks	32	72	24	24	24	--
Construction Equipment per Day	175	141	112	104	48	--
Fuel Consumption (gal/day)	1,418	1,322	908	861	464	--
Deployment Area						
Haul Trucks	184	208	152	152	96	16
Construction Equipment per Day	197	246	273	214	108	19
Fuel Consumption (gal/day)	2,327	2,779	2,657	2,258	1,253	216
Alternative 1						
Malmstrom AFB						
Haul Trucks	32	72	24	24	24	--
Construction Equipment per Day	175	141	112	104	48	--
Fuel Consumption (gal/day)	1,418	1,322	908	861	464	--
Deployment Area						
Haul Trucks	184	208	152	152	96	16
Construction Equipment per Day	104	154	211	168	78	16
Fuel Consumption (gal/day)	1,673	2,143	2,227	1,937	1,045	196
Alternative 2						
Malmstrom AFB						
Haul Trucks	32	72	24	32	32	--
Construction Equipment per Day	176	152	128	121	55	--
Fuel Consumption (gal/day)	1,417	1,419	1,038	998	526	--
Deployment Area						
Haul Trucks	192	208	152	160	104	16
Construction Equipment per Day	147	234	307	285	171	44
Fuel Consumption (gal/day)	1,983	2,688	2,909	2,777	1,705	405
Alternative 3						
Malmstrom AFB						
Haul Trucks	32	72	24	24	24	--
Construction Equipment per Day	175	141	112	104	48	--
Fuel Consumption (gal/day)	1,418	1,322	908	861	464	--
Deployment Area						
Haul Trucks	184	208	152	152	96	16
Construction Equipment per Day	197	246	273	214	108	19
Fuel Consumption (gal/day)	4,420	5,280	5,048	4,290	2,380	410

Table 1.5.2-2

Estimated Annual Fuel Consumption During Small ICBM Operations (gallons)

Vehicle	Fuel Type	Proposed Action	Alternative 1	Alternative 2	Alternative 3
HML Convoy	Diesel	4,260	4,180	5,320	8,100
Safety Vehicle	Gasoline	6,810	6,700	8,520	12,970
Nonmilitary Police Patrol	Gasoline	2,270	2,230	2,840	4,320
Support and Maintenance	Diesel	21,300	20,920	26,620	40,520
Refueling Vehicle	Diesel	8,520	8,370	10,650	16,210
Crew Replacement Vehicle	Gasoline	414,590	407,210	518,240	788,830
Security Vehicle	Gasoline	44,300	43,510	55,370	84,290
Water/Wastewater Transport	Diesel	221,490	217,550	276,870	421,430
TOTAL Gasoline Consumption:		467,970	459,650	584,970	890,410
TOTAL Diesel Consumption:		255,570	251,020	319,460	486,260

Annual direct employment estimates for the Proposed Action and Alternatives 1, 2, and 3 are presented in Table 1.5.4-1. Activities shown include construction, assembly and checkout, site activation, and operations. Construction workers would be civilian, whereas operations workers would be military. Assembly and checkout workers would be mostly civilian, whereas the Site Activation Task Force would be primarily military. The employment estimates are based on Army COE and Air Force experience on similar programs. Total projected population growth in the deployment area resulting from direct employment is presented in Chapter 4.0 (Environmental Consequences).

Road, bridge, and launch facility modifications would require water and coarse and fine aggregate from sources within the deployment area. Water and aggregate would also be required for onbase construction. Water would be required for construction, compaction, concrete, dust control, and revegetation. Aggregate pit locations would be selected from known aggregate sources within a reasonable haul distance of each construction site. Water sources would be identified by construction contractors and haul distances would be minimized. Known aggregate and surface and subsurface water sources are identified in Chapter 3.0 (Affected Environment). Construction resources for facilities at Malmstrom AFB and in the deployment area are summarized in Table 1.5.4-2.

Approximate areas of disturbance during construction are identified in Table 1.5.4-3 for Malmstrom AFB, the launch facilities, and the deployment area roads for the Proposed Action. The area disturbed by Alternative 1 would be slightly less than the Proposed Action; the areas disturbed by Alternatives 2 and 3 would be slightly greater than the Proposed Action. Surfaces that would be covered by impervious materials or kept in a cleared condition to accommodate buildings, parking lots, roads, training areas, and security zones are considered permanently disturbed. Surfaces disturbed during construction, but later regraded or revegetated, or those able to return to a natural state during the operations phase of the program, are considered to be temporarily disturbed. In the calculation of surface area disturbance, it was assumed that launch facility expansions would require approximately 3 acres of temporary disturbance for two-HML deployment (Proposed Action and Alternatives 1 and 2), and 2 acres of temporary disturbance for one-HML deployment (Alternative 3). It was also assumed that improvements would be made to some road segments within the T/E route network. For this analysis, these road improvements were considered to involve up to 3 feet of permanent disturbance and 20 feet of temporary disturbance along one side of the road or the other.

The two housing options under consideration would affect the area of disturbance. The onbase housing option would permanently disturb 330 acres at Malmstrom AFB. If the offbase housing option is selected, this disturbance at Malmstrom AFB would be avoided but additional disturbance would occur in the Great Falls community.

The Air Force continues to refine its plans for deploying the Small ICBM at Malmstrom AFB. Minor changes may be made in the list of facilities needed, the type and timing of construction, and operating procedures. In addition, seasonal variations in weather, start-up and phase-down activities of individual contractors, and changes in authorized funding levels could cause implementation of the program to deviate from current Air Force plans. Such changes could influence the magnitude and composition of the resource requirements and disturbed areas shown in Tables 1.5.4-1 through 1.5.4-3. However, these changes are not expected to be large enough to affect the conclusions reached in this EIS regarding the level and significance of environmental impacts.

Table 1.5.4-1

Total Estimated Annual Direct Employment, Military and Civilian, for the Small ICBM Program in the Malmstrom AFB Area By Calendar Year (Full-Time Equivalent Jobs)

	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
PROPOSED ACTION													
Malmstrom AFB													
Site Activation	10	20	20	60	80	100	100	100	100	60	10	0	0
Construction	0	0	840	470	490	460	90	0	0	0	0	0	0
Assembly & Checkout	0	0	0	0	310	190	280	310	230	100	0	0	0
Operations	0	0	0	250	1,100	1,630	1,940	2,440	3,100	3,100	3,100	3,100	3,100
Minuteman Deployment Area													
Construction	0	0	240	340	320	330	150	20	0	0	0	0	0
TOTAL:	10	20	1,100	1,120	2,300	2,710	2,560	2,870	3,430	3,260	3,110	3,100	3,100
ALTERNATIVE 1													
Malmstrom AFB													
Site Activation	10	20	20	60	80	100	100	100	100	60	10	0	0
Construction	0	0	830	440	420	380	80	0	0	0	0	0	0
Assembly & Checkout	0	0	0	0	310	190	280	310	230	100	0	0	0
Operations	0	0	0	250	970	1,300	1,500	1,780	2,190	2,190	2,190	2,190	2,190
Minuteman Deployment Area													
Construction	0	0	250	360	370	350	160	30	0	0	0	0	0
TOTAL:	10	20	1,100	1,110	2,150	2,320	2,120	2,220	2,520	2,350	2,200	2,190	2,190
ALTERNATIVE 2													
Malmstrom AFB													
Site Activation	10	20	20	60	80	100	100	100	80	100	100	60	10
Construction	0	0	860	500	570	530	100	0	0	0	0	0	0
Assembly & Checkout	0	0	0	0	310	190	240	210	170	160	150	80	0
Operations	0	0	0	250	1,100	1,640	1,970	2,550	3,580	3,760	3,760	3,760	3,760
Minuteman Deployment Area													
Construction	0	0	260	380	430	440	300	70	0	0	0	0	0
TOTAL:	10	20	1,140	1,190	2,490	2,900	2,710	2,930	3,830	4,020	4,010	3,900	3,770
ALTERNATIVE 3													
Malmstrom AFB													
Site Activation	10	20	20	60	80	100	100	100	100	60	10	0	0
Construction	0	0	840	470	490	460	90	0	0	0	0	0	0
Assembly & Checkout	0	0	0	0	310	190	280	310	230	100	0	0	0
Operations	0	0	0	250	1,100	1,630	1,940	2,440	3,100	3,100	3,100	3,100	3,100
Minuteman Deployment Area													
Construction	0	0	320	360	480	410	250	70	0	0	0	0	0
TOTAL:	10	20	1,180	1,140	2,460	2,790	2,660	2,920	3,430	3,260	3,110	3,100	3,100

Table 1.5.4-2

Montana Small ICBM Program Construction Resource Requirements

	1990	1991	1992	1993	1994	1995	Total
Proposed Action							
Cement, 1,000 tons	12	18	9	9	7	0	50
Aggregate, 1,000 tons	659	841	522	544	384	53	3,000
Asphalt, tons	1,385	2,560	47	2,817	2,734	1	9,550
Roofing, 1,000 rolls	13	1	19	7	0	0	50
Plywood, 1,000 sq ft	760	631	3,366	1,944	62	4	6,750
Lumber, 1,000 board ft	1,405	2,444	8,342	2,011	60	12	14,250
Concrete Block, 1,000 sq ft	1,089	180	274	48	25	5	1,600
Structural Steel, tons	8,197	4,993	8,231	1,612	129	6	23,150
Reinforcing Steel, tons	2,330	3,298	1,750	1,781	1,361	87	10,600
Metal Siding, 1,000 sq ft	930	132	204	20	13	2	1,300
Misc. Metal, tons	799	429	325	416	110	6	2,100
Pipe, 1,000 linear ft	357	107	1,533	2,125	22	2	4,150
Wiring, 1,000 linear ft	1,217	3,430	1,384	6,490	42	4	12,550
Water, acre-ft	92	114	82	85	49	8	450
Alternative 1							
Cement, 1,000 tons	11	16	8	8	7	0	50
Aggregate, 1,000 tons	651	818	509	531	372	54	2,950
Asphalt, tons	1,378	2,472	137	2,582	2,445	34	9,050
Roofing, 1,000 rolls	12	2	18	7	1	0	50
Plywood, 1,000 sq ft	746	593	2,876	1,656	64	4	5,950
Lumber, 1,000 board ft	1,359	2,078	6,907	1,674	71	12	12,100
Concrete Block, 1,000 sq ft	1,147	365	234	48	25	5	1,850
Structural Steel, tons	3,580	1,325	1,793	148	240	6	7,100
Reinforcing Steel, tons	2,150	3,031	1,585	1,638	1,247	87	9,750
Metal Siding, 1,000 sq ft	1,003	312	449	20	54	2	1,850
Misc. Metal, tons	668	342	255	332	90	6	1,700
Pipe, 1,000 linear ft	353	126	1,307	1,779	30	2	3,600
Wiring, 1,000 linear ft	1,350	3,036	1,325	5,566	79	10	11,350
Water, acre-ft	74	92	73	70	38	6	350

Table 1.5.4-2 Continued, Page 2 of 2

	1990	1991	1992	1993	1994	1995	Total
Alternative 2							
Cement, 1,000 tons	12	19	11	10	9	1	50
Aggregate, 1,000 tons	661	849	535	556	396	58	3,050
Asphalt, tons	1,367	2,451	48	3,132	3,027	4	10,050
Roofing, 1,000 rolls	12	1	22	9	0	0	50
Plywood, 1,000 sq ft	797	657	3,781	2,213	85	25	7,550
Lumber, 1,000 board ft	1,383	2,772	9,624	2,345	111	56	16,300
Concrete Block, 1,000 sq ft	982	215	342	47	53	15	1,650
Structural Steel, tons	7,254	5,022	8,910	8,953	686	42	30,850
Reinforcing Steel, tons	2,309	3,427	1,940	1,943	1,539	174	11,350
Metal Siding, 1,000 sq ft	974	145	253	17	26	11	1,450
Misc. Metal, tons	726	378	334	466	205	27	2,150
Pipe, 1,000 linear ft	372	97	1,764	2,452	21	15	4,700
Wiring, 1,000 linear ft	1,280	3,881	1,584	7,468	57	18	14,300
Water, acre-ft	87	109	92	90	59	17	450
Alternative 3							
Cement, 1,000 tons	12	16	10	9	7	1	50
Aggregate, 1,000 tons	660	703	633	497	359	123	2,950
Asphalt, tons	1,378	2,524	195	2,785	2,696	69	9,650
Roofing, 1,000 rolls	13	2	21	9	1	0	50
Plywood, 1,000 sq ft	822	602	3,264	2,018	135	23	6,850
Lumber, 1,000 board ft	1,474	2,472	8,459	2,126	80	50	14,650
Concrete Block, 1,000 sq ft	1,157	488	226	59	40	12	1,850
Structural Steel, tons	4,298	1,521	1,703	882	98	46	8,550
Reinforcing Steel, tons	2,298	2,962	1,846	1,711	1,359	271	10,450
Metal Siding, 1,000 sq ft	1,178	344	468	174	17	9	2,200
Misc. Metal, tons	686	349	242	313	145	21	1,750
Pipe, 1,000 linear ft	383	133	1,583	2,184	36	14	4,350
Wiring, 1,000 linear ft	1,492	3,605	1,631	6,696	171	16	13,600
Water, acre-ft	74	92	73	70	38	6	350

Table 1.5.4-3

Approximate Areas Disturbed by Small ICBM Facility Construction in Montana (acres)

Alternative	Temporary	Permanent	Total
Proposed Action			
Malmstrom AFB	321	839	1,160
Launch Facilities	140	160	300
Deployment Area Roads	880	228	1,108
TOTAL:	1,341	1,227	2,568
Alternative 1			
Malmstrom AFB	271	789	1,060
Launch Facilities	140	160	300
Deployment Area Roads	880	228	1,108
TOTAL:	1,291	1,177	2,468
Alternative 2			
Malmstrom AFB	348	878	1,226
Launch Facilities	175	200	375
Deployment Area Roads	880	228	1,108
TOTAL:	1,403	1,306	2,709
Alternative 3			
Malmstrom AFB	321	839	1,160
Launch Facilities	200	200	400
Deployment Area Roads	880	228	1,108
TOTAL:	1,401	1,267	2,668

1.6 Decommissioning

It is difficult to predict how the Small ICBM system would be decommissioned. The relevant laws and procedures are likely to change substantially in the 20 or more years the system would be in use. Moreover, techniques for handling the disposal of obsolete missile fuel and the reclamation or disposal of the nuclear material contained in the warheads may well change during the period the Small ICBM is actively deployed. Consequently, the Air Force has focused this EIS on the issues realistically susceptible to analysis at this level of environmental review. When the decision is made to decommission the Small ICBM system, the Air Force will analyze the environmental consequences associated with that decision and, at that time, invite appropriate public participation in the analysis process. At a minimum, the Air Force would follow all relevant laws at the time of decommissioning. The practice in the recently completed Titan decommissioning program was to remove the missiles from the silos and place them in storage for use as space boosters. It is possible that the same would be done for the Small ICBM. If they are not used in this manner, the missile fuel may be burned off or otherwise disposed. The warheads may be removed and reused or returned to the Department of Energy for reclamation. The details of this process are presently classified.

Facilities on the missile sites would be dismantled and the ground regraded and replanted. If the Minuteman silo is also removed at the same time, the headworks would be dismantled and the silo filled in with earth and replanted. The fence and other equipment would be removed. Under current procedures, the site is declared excess property and is released to the General Services Administration for sale. Legislation currently pending in Congress and supported by the Air Force would provide for the Air Force to return the site to the surrounding landowner if the highest and best use of the property is agricultural. The restrictive easement around the site is extinguished after 1 year of disuse in accordance with the terms of the easement agreement, thereby releasing the encumbrance on the property. None of these actions is likely to have any significant environmental impact, so far as can be foreseen today. Other disposal alternatives may be developed in the future, but presently, none are foreseen.

1.7 Public Scoping and Hearing Processes

The CEQ regulations for implementation of NEPA require an early and open process for determining the scope of issues related to the Proposed Action. Further, the DEIS must be circulated for review and comment by the public and appropriate federal, state, and local agencies.

1.7.1 Scoping

In accordance with the CEQ regulations, public scoping meetings were conducted in Great Falls, Lewistown, Conrad, and Helena, Montana in March and April of 1987. A wide range of issues relating to the physical and social environment and safety concerns were identified through the scoping process. For purposes of analysis, these issues were grouped into 12 resource categories which are discussed in Chapter 4.0 (Environmental Consequences). Safety issues were considered important enough that a separate chapter (Chapter 5.0, Safety Considerations) was devoted to these concerns.

At the scoping meetings, a number of requests were made for an analysis of issues that are outside the scope of the EIS. These included effects of Small ICBM deployment on arms control agreements, wartime effects of the system, the morality of building nuclear weapons, and the psychological effects of the system on local residents. After careful consideration it was determined that it is not the purpose of this EIS to discuss morality, military tactics, or general societal issues. Congress, in Section 209(c)(4) of the 1986 DOD Authorization Act, directed the Air Force to analyze the environmental effects of "deployment and peacetime operation." Therefore, issues beyond the direction of the Congress are not analyzed in this EIS.

1.7.2 Public Hearings and Comments

A DEIS was published and distributed for public review in late June 1987. Public hearings on the DEIS were conducted during the period 20 to 25 July 1987 at Lewistown, Harlowton, Great Falls, Conrad, Augusta, and Helena, Montana. In addition, the federal, state, and local agencies as well as individuals and organizations were invited to submit their written comments to the Air Force by 21 August 1987. All comments received by the first week of September were analyzed for incorporation in this document. Many issues addressed during the public comment period led to further analysis, reanalysis, or verification of data. Such comments have been responded to by modifying the text. A number of comments were related to issues which are outside the scope of this document or which require individual responses. These comments and their responses as well as those which are responded to in the text appear in Chapter 6.0 (Public Comments) of this document.

A complete list of respondents and all documents received during the public comment period are reproduced in Appendix E of the EIS, which is a separate volume. This appendix also includes the public hearing transcripts.

1.8 Authorizing Actions/Procedures

Certain program facilities and activities would require a variety of authorizing actions; that is, permits, approvals, and consultations. Permits for discharges to air and water and disposal of solid and hazardous waste would be obtained in accordance with applicable federal laws. A list of such authorizing actions and the agencies involved, along with corresponding descriptions of the relevant facilities or activities, is presented in Chapter 7.0, Authorizing Actions.

1.9 Mitigation Measures

Mitigation measures are undertaken to minimize the adverse environmental impacts of a given program. For the Small ICBM program, efforts will be made to avoid environmentally sensitive areas and thereby eliminate or reduce adverse program impacts. In addition, other mitigative programs may be employed to rehabilitate or restore the affected environment or to reduce or eliminate impacts through preservation procedures or compensation.

Adverse environmental impacts of the Proposed Action and its alternatives will be mitigated by commonly practiced construction methods or by standard Air Force and Army COE procedures. To the extent practical in consideration of operational requirements, schedule, and budget, standard construction practices that help reduce or eliminate environmental impacts were taken into account as part of the program. These assumed construction practices and other assumed mitigation measures are discussed for each resource in Chapter 4.0 (Environmental Consequences) and in Appendix D. The Air Force expects to implement these assumed mitigations. Additionally, potential mitigation measures to further reduce impacts and the agencies involved in their implementation can also be found in Chapter 4.0 and Appendix D. Implementation of these potential mitigation measures may be constrained by budget limitations and mission requirements.

2.0 COMPARISON OF THE PROPOSED ACTION AND ALTERNATIVES

This chapter presents a comparison of the impacts of the Proposed Action, the three alternatives, and the No Action Alternative. The cumulative impacts of basing the Small Intercontinental Ballistic Missile (ICBM) and the potential Peacekeeper in Rail Garrison programs at Malmstrom Air Force Base (AFB) are also presented.

The environmental consequences of the proposed Small ICBM program at Malmstrom AFB have been evaluated in terms of the magnitude and significance of impacts. Magnitude is a measure of the numbers and kinds of environmental consequences of the program as compared to existing and future baseline conditions, which include the deployment of the new KC-135R air refueling mission. Magnitude is defined by the level of impact (LOI), which can be negligible, low, moderate, or high. Significance requires consideration of both the context and the intensity of impacts. Context includes consideration of whether the setting of an impact is site, local, or regional, and whether it is of short or long duration. Intensity refers to the severity of an impact, which includes consideration of its magnitude.

In this Environmental Impact Statement (EIS), site-level impacts are considered as those that occur in the immediate vicinity of the program activity. Generally, site-level impacts would result from construction- and operations-related disturbances at the base (including the base expansions for family housing and the Hard Mobile Launcher [HML] vehicle operations training area), at launch facilities, and along the transporter/erector (T/E) route network. Local-level impacts are considered as those that affect an area which extends beyond the immediate vicinity of the program activity site. Local-level impacts would generally take place in communities where program inmigrants reside or at locations adjacent to or nearby construction sites or operations-related activities. Regional-level impacts are considered as those that affect a broad area, usually countywide or larger. Regional settings generally apply to air or watersheds, utility or transportation networks, and regional recreation facilities. Settings that affect resources involving national interests, such as historic resources, threatened and endangered species, and national parks, are also considered as regional. For each resource discussed in this chapter, the setting(s) are specifically defined in relationship to the characteristic of that resource.

The LOI and significance of short- and long-duration effects were evaluated separately. Short-duration impacts are transitory effects of the proposed program that are generally caused by construction activities or operations start-up. Long-duration impacts would occur over an extended period or time, whether they begin in the construction or operations phases. Most impacts from the operations phase are expected to be of long duration since program operations essentially represent a steady-state condition (i.e., impacts result from actions that occur repeatedly over a long period of time). However, long-duration impacts can also be caused by construction activities if a resource is destroyed or irreparably damaged, or if the recovery rate of the resource is very slow.

A collective summary of LOI and significance was prepared for each resource element. In preparing these assessments, the collective effects of all individual site- or local-level impacts have been considered for the program as a whole. It is possible to identify high impacts at some sites and have an overall regional assessment of low or moderate. For the Proposed Action and Alternatives 1 and 2, not all launch facilities would be used; therefore, it is possible to have an overall range of LOI that would depend on the site-level impacts at launch facilities selected for Small ICBM deployment.

Figure 2.0-1 presents a summary of the collective LOI and significance of environmental impacts for the Small ICBM program. Both short- and long-duration impacts for the Proposed Action and its alternatives are shown. Figure 2.0-2 provides a summary of the

LEVEL OF IMPACT	SIGNIFICANCE	
Adverse Impacts	Not Significant	Significant
Negligible	☐	
Low	◦	•
Moderate	○	●
High	◯	⬤
Beneficial Effects	▨	

Note: Some resource elements may have both beneficial effects and adverse impacts.

PROGRAM IMPACTS

RESOURCE/ELEMENT	SHORT DURATION								LONG DURATION							
	PROP. ACTION		ALT. 1		ALT. 2		ALT. 3		PROP. ACTION		ALT. 1		ALT. 2		ALT. 3	
	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING
SOCIOECONOMICS																
ECONOMIC BASE	▨ ○	▨ ○	▨ ○	▨ ○	▨ ○	▨ ○	▨ ○	▨ ○	▨ ○	▨ ○	▨ ○	▨ ○	▨ ○	▨ ○	▨ ○	▨ ○
DEMOGRAPHICS									●	●	●	●	⬤	⬤	●	●
HOUSING	▨ ○	▨ ○	▨ ○	▨ ○	▨ ◦	▨ ◦	▨ ○	▨ ○	▨ ◦	▨ ◦	▨ ◦	▨ ◦	▨ ◦	▨ ◦	▨ ◦	▨ ◦
EDUCATION									⬤	⬤	⬤	⬤	⬤	⬤	⬤	⬤
PUBLIC SERVICES	○	○	○	○	○	○	○	○	●	●	•	•	⬤	⬤	●	●
PUBLIC FINANCE	●	○	●	○	●	○	●	○	●	●	●	●	●	●	●	●
UTILITIES																
POTABLE WATER									◦	◦	◦	◦	◦	◦	◦	◦
WASTEWATER									◦	◦	◦	◦	◦	◦	◦	◦
SOLID WASTE									◦	◦	◦	◦	◦	◦	◦	◦
ENERGY	◦	◦	◦	◦	◦	◦	◦	◦	▨ ◦	▨ ◦	▨ ◦	▨ ◦	▨ ◦	▨ ◦	▨ ◦	▨ ◦
TRANSPORTATION																
ROADS	⬤	⬤	⬤	⬤	⬤	⬤	⬤	⬤	▨ •	▨ ⬤	▨ •	▨ ⬤	▨ ●	▨ ⬤	▨ •	▨ ⬤
PUBLIC TRANSPORTATION																
RAILROADS																
AIRPORTS																
LAND USE																
URBAN										◦		◦		○		◦
RURAL	◦	◦	◦	◦	◦	◦			◦	◦	◦	◦	◦	◦	●	●
RECREATION																
REGIONAL									◦	◦	◦	◦	◦	◦	◦	◦
LOCAL									●	●	●	●	●	●	●	●
WATER RESOURCES																
SURFACE WATER	◦	◦	◦	◦	◦	◦	◦	◦	◦	◦	◦	◦	◦	◦	◦	◦

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EM2 1

FIGURE 2.0-1 COLLECTIVE SUMMARY OF ENVIRONMENTAL IMPACTS ASSOCIATED WITH THE PROPOSED SMALL ICBM PROGRAM IN MONTANA

LEVEL OF IMPACT	SIGNIFICANCE	
Adverse Impacts	Not Significant	Significant
Negligible	☐	
Low	∘	•
Moderate	○	●
High	◯	⬤
Beneficial Effects	▨	

Note: Some resource elements may have both beneficial effects and adverse impacts.

PROGRAM IMPACTS

RESOURCE/ELEMENT	SHORT DURATION				LONG DURATION			
	PROPOSED ACTION	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	PROPOSED ACTION	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3
VISUAL RESOURCES								
CULTURAL AND PALEONTOLOGICAL RESOURCES								
PREHISTORIC RESOURCES					▨ •	▨ •	▨ •	▨ •
HISTORIC AND ARCHITECTURAL					•	•	•	•
NATIVE AMERICAN					•	•	•	•
PALEONTOLOGICAL RESOURCES					●	●	●	●
BIOLOGICAL RESOURCES								
VEGETATION	∘	∘	∘	∘	∘	∘	∘	∘
WILDLIFE	∘	∘	∘	○	∘	∘	∘	∘
AQUATIC HABITATS	○	○	○	○	∘	∘	∘	∘
UNIQUE AND SENSITIVE HABITATS								
THREATENED AND ENDANGERED SPECIES	∘	∘	∘	○	∘	∘	∘	○
WATER RESOURCES								
WATER USE	∘	∘	∘	∘	∘	∘	∘	∘
GROUNDWATER	∘	∘	∘	∘				
GEOLOGY AND SOILS								
GEOLOGIC HAZARDS	∘	∘	∘	∘	∘	∘	∘	∘
GEOLOGIC RESOURCES (AGGREGATE)	⬤	⬤	⬤	⬤	○	○	○	○
SOIL EROSION	◯	◯	◯	◯	∘	∘	∘	∘
AIR QUALITY	∘	∘	∘	∘				
NOISE								

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FIGURE 2.0-1 CONTINUED

PROGRAM IMPACTS	PROPOSED ACTION														ALTERNATIVE 1													
	NUMBER OF LAUNCH FACILITIES														NUMBER OF LAUNCH FACILITIES													
	SHORT DURATION							LONG DURATION							SHORT DURATION							LONG DURATION						
	NOT SIGNIFICANT				SIGNIFICANT			NOT SIGNIFICANT				SIGNIFICANT			NOT SIGNIFICANT				SIGNIFICANT			NOT SIGNIFICANT				SIGNIFICANT		
	NEGLIGIBLE	LOW	MODERATE	HIGH	LOW	MODERATE	HIGH	NEGLIGIBLE	LOW	MODERATE	HIGH	LOW	MODERATE	HIGH	NEGLIGIBLE	LOW	MODERATE	HIGH	LOW	MODERATE	HIGH	NEGLIGIBLE	LOW	MODERATE	HIGH	LOW	MODERATE	HIGH
LAND USE																												
RURAL	23	74	3					23	74	3					22	76	2					22	76	2				
VISUAL RESOURCES	87		13					87	13						89	11						100						
CULTURAL AND PALEONTOLOGICAL RESOURCES																												
PREHISTORIC RESOURCES												30	53	17												30	52	18
HISTORIC AND ARCHITECTURAL								91				8	1									92				7	1	
NATIVE AMERICAN								93				6	1									94				5	1	
PALEONTOLOGICAL								45	29			3	23									47	27			3	23	
BIOLOGICAL RESOURCES AND THREATENED AND ENDANGERED SPECIES																												
VEGETATION	48	44			8			48	48			4			50	42			8			50	48			2		
WILDLIFE	67	15	18					68	32						67	17	16					68	32					
AQUATIC HABITATS	78	16	2	1	2	1		95	5						74	19	2	1	3	1		94	6					
UNIQUE AND SENSITIVE HABITATS	100							100							100							100						
THREATENED AND ENDANGERED SPECIES	90	10						90	10						90	10						90	10					
WATER RESOURCES																												
SURFACE WATER	80	18	1	1				100							80	16	2	2				100						
GEOLOGY AND SOILS																												
GEOLOGIC HAZARDS	95	2	3					95	2	3					94	3	3					94	3	3				
GEOLOGIC RESOURCES (ENERGY)	100							71	29						100							70	30					
SOIL EROSION		83	2	15				100								86	2	12				100						
NOISE	93		7					100							100							100						

Note: All cultural and paleontological resource impacts are assumed to be of long duration.

FIGURE 2.0-2 SUMMARY OF SITE IMPACTS ASSOCIATED WITH PROPOSED SMALL ICBM CONSTRUCTION AND OPERATIONS AT LAUNCH FACILITIES IN MONTANA

Page 1 of 2

EM2/2

PROGRAM IMPACTS	ALTERNATIVE 2													
	NUMBER OF LAUNCH FACILITIES													
	SHORT DURATION							LONG DURATION						
	NOT SIGNIFICANT				SIGNIFICANT			NOT SIGNIFICANT				SIGNIFICANT		
	NEGLIGIBLE	LOW	MODERATE	HIGH	LOW	MODERATE	HIGH	NEGLIGIBLE	LOW	MODERATE	HIGH	LOW	MODERATE	HIGH
LAND USE														
RURAL	29	92	4					29	92	4				
VISUAL RESOURCES	108		17					108	17					
CULTURAL AND PALEONTOLOGICAL RESOURCES														
PREHISTORIC RESOURCES												40	63	22
HISTORIC AND ARCHITECTURAL								117				7	1	
NATIVE AMERICAN								117				6	2	
PALEONTOLOGICAL								56	40			3	26	
BIOLOGICAL RESOURCES AND THREATENED AND ENDANGERED SPECIES														
VEGETATION	62	52			11			62	58			5		
WILDLIFE	83	20	22					84	41					
AQUATIC HABITATS	93	25	2	1	3	1		118	7					
UNIQUE AND SENSITIVE HABITATS	125							125						
THREATENED AND ENDANGERED SPECIES	115	10						115	10					
WATER RESOURCES														
SURFACE WATER	104	18	2	1				125						
GEOLOGY AND SOILS														
GEOLOGIC HAZARDS	120	2	3					120	2	3				
GEOLOGIC RESOURCES (ENERGY)	125							90	35					
SOIL EROSION		106	2	17				125						
NOISE	116		9					125						

PROGRAM IMPACTS	ALTERNATIVE 3													
	NUMBER OF LAUNCH FACILITIES													
	SHORT DURATION							LONG DURATION						
	NOT SIGNIFICANT				SIGNIFICANT			NOT SIGNIFICANT				SIGNIFICANT		
	NEGLIGIBLE	LOW	MODERATE	HIGH	LOW	MODERATE	HIGH	NEGLIGIBLE	LOW	MODERATE	HIGH	LOW	MODERATE	HIGH
LAND USE														
RURAL	55	136	9					50	127	8		12	1	2
VISUAL RESOURCES	179	20	1					199		1				
CULTURAL AND PALEONTOLOGICAL RESOURCES														
PREHISTORIC RESOURCES												61	101	38
HISTORIC AND ARCHITECTURAL								185				11	4	
NATIVE AMERICAN								186				11	2	1
PALEONTOLOGICAL								76	69			5	49	1
BIOLOGICAL RESOURCES AND THREATENED AND ENDANGERED SPECIES														
VEGETATION	101	77			22			101	87			12		
WILDLIFE	124	39	37					124	76					
AQUATIC HABITATS	152	33	4	1	7	1	2	185	13	2				
UNIQUE AND SENSITIVE HABITATS	200							200						
THREATENED AND ENDANGERED SPECIES	181	18					1	181	18					1
WATER RESOURCES														
SURFACE WATER	160	30	6	4				200						
GEOLOGY AND SOILS														
GEOLOGIC HAZARDS	191	5	4					191	5	4				
GEOLOGIC RESOURCES (ENERGY)	200							142	58					
SOIL EROSION		166	3	31				200						
NOISE	176		24					200						

Note: All cultural and paleontological resource impacts are assumed to be of long duration.

FIGURE 2.0-2 CONTINUED

LOI and significance of site-level impacts at launch facilities for the Proposed Action and each of the alternatives. Figure 2.0-3 presents a collective assessment of site-level impacts along road segments and bridges, compiled by county. This figure represents the maximum impacts for the entire T/E route network though portions of the network may not be used by different alternatives.

If the No Action Alternative is selected, Air Force activities associated with maintenance of the current Minuteman force and other missions would continue indefinitely at Malmstrom AFB. These activities include the new KC-135R air refueling mission, which will be added in 1988.

Employment and population in north-central Montana are projected to increase gradually through the year 2000 without the Proposed Action or alternatives. Most of this growth will be concentrated in Great Falls and Helena, with little growth or modest declines expected in the rural counties. Unemployment rates should decrease to a regional average of 6 percent. The military population (active-duty personnel plus dependents) of the Great Falls area should be at about 10,500 persons, or 15.2 percent of total community population. Some anticipatory growth, followed by decline, is likely if individuals and businesses speculate on the likelihood that the program will be implemented.

Throughout the deployment area, baseline population growth will lead to some increased disturbance of cultural resources and sensitive biological habitats. Water use may increase slightly in the region. Some increased crowding of recreational areas may occur, and the level of service along some roads is expected to decrease.

The Proposed Action and the three alternatives were selected to represent the range of anticipated environmental impacts that would result from the Small ICBM program at Malmstrom AFB. Comparison of all alternatives with the Proposed Action was performed for two options for the provision of military family housing. One option (onbase housing) provides for the required new military family housing onbase; the other (offbase housing) assumes that all housing would be provided by the private sector in the Great Falls urban area.

Impacts on each resource and resource element associated with the Proposed Action and the three alternatives are summarized and compared in the following sections. Cumulative impacts of the proposed Small ICBM and the potential Peacekeeper in Rail Garrison programs are also discussed. The Proposed Action and the alternatives are described in Section 1.3 of Chapter 1.0 (Program Overview). The Peacekeeper in Rail Garrison program is described in Section 1.4.2. The resources and their elements are defined at the beginning of each resource section in Chapter 3.0 (Affected Environment). Chapter 4.0 (Environmental Consequences) presents a complete discussion of program impacts on each resource and resource element.

2.1 Socioeconomics

The socioeconomics resource includes six major elements: economic base, demographics, housing, education, public services, and public finance. Short-duration socioeconomic impacts would be those that are transitory, generally occurring during the construction phase. However, most socioeconomic impacts would be of long duration and would result from the steady build up of construction and operations personnel.

LEVEL OF IMPACT	SIGNIFICANCE	
Adverse Impacts	Not Significant	Significant
Negligible		
Low	∘	•
Moderate	○	●
High	◯	⬤
Beneficial Effects	▨	

Note: Some resource elements may have both beneficial effects and adverse impacts.

COUNTY / RESOURCE	IMPACTS FROM ROAD IMPROVEMENTS																					
	SHORT DURATION									LONG DURATION												
		BIOLOGICAL						GEOLOGY			CULTURAL				BIOLOGICAL						GEOLOGY	
	LAND USE (RURAL)	VEGETATION	WILDLIFE	AQUATICS	UNIQUE/SENSITIVE	THREATENED & ENDANGERED	SURFACE WATER SEDIMENTATION	GEOLOGIC HAZARDS	SOIL EROSION	LAND USE (RURAL)	PREHISTORIC	HISTORIC	NATIVE AMERICAN	PALEONTOLOGICAL	VEGETATION	WILDLIFE	AQUATICS	UNIQUE/SENSITIVE	THREATENED & ENDANGERED	SURFACE WATER SEDIMENTATION	GEOLOGIC HAZARDS	SOIL EROSION
CASCADE	∘	∘	○	●		•	◯	∘	◯		▨ •	•		∘	∘	∘	∘		•		∘	
CHOUTEAU	∘	∘	∘			∘			◯		▨ ∘			∘	∘	∘			∘			
FERGUS	∘	∘	○	●		∘	○	∘	◯		▨ •	•		●	∘	∘	∘		∘		∘	
JUDITH BASIN	∘	∘	○	∘		∘	∘		◯		▨ ●			●	∘	∘	∘		∘			
LEWIS AND CLARK	∘	∘	○	●		•	○		◯		▨ •	•		●	∘	∘	∘		•		∘	
PONDERA	∘	∘	○	∘		∘			◯		▨ •	•		∘	∘	∘	∘		∘			
TETON	∘	∘	○	●		•	∘		◯		▨ •	⬤		●	∘	∘	∘		•		∘	
TOOLE	∘	∘	∘			∘			◯		▨ ∘			∘	∘	∘			∘			
WHEATLAND	∘	∘	∘	∘		∘	∘		◯		▨ ⬤			●	∘	∘	∘		∘		∘	

Note: All cultural resource impacts are assumed to be of long duration.

FIGURE 2.0-3 COLLECTIVE SUMMARY OF IMPACTS ASSOCIATED WITH ROAD AND BRIDGE IMPROVEMENTS FOR THE PROPOSED SMALL ICBM PROGRAM IN MONTANA

2.1.1 Economic Base

For the Proposed Action, with both onbase and offbase housing options, short-duration economic base impacts would be moderate due to a 30-percent increase in employment in the construction sector of Cascade County in 1990 and 1991. These impacts would not be significant because the availability of construction labor from other Montana counties should provide an adequate workforce. Beginning in 1995 and continuing for the life of the Small ICBM program, the unemployment rate in Cascade County is projected to increase from 6 percent to 6.2 percent because the number of jobs created by the program during the operations phase would be less than the number of military dependents added to the labor force. Consequently, the long-duration impact would be moderate. This impact would not be significant because the resulting rate would remain well below historical levels. The creation of additional jobs and income in the construction sector would have short-duration, beneficial effects. Increases in local spending for both program procurement and personal consumption would provide beneficial effects throughout the life of the program.

The short- and long-duration impacts of all three alternatives for both housing options would be rated the same as those of the Proposed Action, moderate and not significant. The beneficial effects associated with increased jobs and income would also occur for these alternatives but at slightly different levels. Although the impacts are rated the same, Alternative 1 has a lower operations personnel requirement and would actually have less effect on the economic base than the Proposed Action. Alternative 2, with a larger personnel requirement, would have a somewhat greater effect; the effect of Alternative 3 would be the same as that of the Proposed Action.

The concurrent deployment of the Small ICBM and Peacekeeper in Rail Garrison programs at Malmstrom AFB would slightly increase overall labor and materials requirements. However, the cumulative short- and long-duration impacts would remain moderate and not significant.

2.1.2 Demographics

For the Proposed Action, with both housing options, measurable long-duration demographic impacts would occur. No short-duration impacts were identified. Impacts would be moderate due to the military population increase in Cascade County from 10,700, which includes the KC-135R air refueling mission, to 18,210. The projected total military population would represent approximately 23.6 percent of the Great Falls urban area population compared to an historical peak of 20.4 percent in 1972. In addition, new military inmigrants would differ greatly in demographic characteristics such as average age, marital status, income, and length of residency from the current population in the Great Falls area. This impact would be significant since the differences between the local and inmigrating populations would complicate the process of community assimilation.

For Alternative 1, with both housing options, long-duration impacts would be moderate because of increases in the military population of Cascade County of about 50 percent. Impacts would be significant because the difference between the local and inmigrating populations would complicate the process of community assimilation. No short-duration impacts were identified. For Alternative 2, with both housing options, long-duration impacts would be high in Cascade County because the military population is projected to increase from 10,700 to 19,810. Impacts would be significant because the differences between the local and inmigrating populations would complicate the process of community assimilation. Alternative 3 impacts are almost identical to those of the Proposed Action.

Long-duration impacts of the concurrent deployment of the Small ICBM and Peacekeeper in Rail Garrison programs at Malmstrom AFB would remain moderate and significant. No short-duration impacts were identified.

2.1.3 Housing

For housing, all short- and long-duration impacts are identical for either the onbase or offbase housing option. For the Proposed Action, both adverse impacts and beneficial effects would be experienced. Short-duration impacts would be moderate because vacancy rates (1.4%) would approach the recent historical minimum rate (1.3%). With this lower vacancy rate, renters and buyers in the Great Falls urban area may experience some difficulty in finding appropriate and affordable housing. The long-duration impacts would be low because decreased vacancy rates (1.5%) would exceed the historical minimum rate (1.3%). These impacts would not be significant because no housing shortages would be experienced in the Great Falls area. Landlords and other property owners would experience both short- and long-duration, beneficial effects because of the increased occupancy rates for temporary accommodations during the construction phase and permanent housing units during the operations phase.

For Alternative 1, short-duration impacts would be moderate because vacancy rates (1.4%) would approach the recent historical minimum (1.3%) in 1996. Short-duration impacts for Alternative 2 would be low because vacancies would only be slightly reduced in 1996. For Alternatives 1 and 2, long-duration impacts on the permanent housing market would be low because vacancy rates would fall slightly. These impacts would not be significant because the local housing market would be able to meet the housing demand in every year. Both short- and long-duration impacts would be beneficial to landlords and property owners since the number of vacant units would be reduced. Short-duration, beneficial effects on temporary housing units would occur because of the income generated through the use of otherwise vacant facilities. Alternative 3 impacts would be the same as those of the Proposed Action.

The concurrent deployment of the Small ICBM and Peacekeeper in Rail Garrison programs at Malmstrom AFB would cause a slight increase in the demand for permanent offbase housing in Great Falls. Cumulative short-duration impacts would be low, while long-duration impacts would be moderate because vacancy rates are projected to approach the historical minimum rate in 1996 but settle at a more acceptable rate from 1997 thereafter. These impacts would not be significant since the program-related demand is expected to be offset by the use of community assets and both private and Air Force provided new housing units. Short- and long-duration, beneficial effects would occur for landlords and other property owners because of increased occupancy rates. Short-duration, beneficial effects would occur for the temporary housing market.

2.1.4 Education

For the Proposed Action, with both housing options, long-duration impacts for the education element would be high due to the projected increase of approximately 1,210 students in the Great Falls Public Schools (GFPS) system over the projected baseline enrollment of 13,300 in the year 2000. No short-duration impacts were identified. The projected pupil-to-teacher ratio would be higher than the GFPS system's historical local standard of 23-to-1. These impacts would be significant since the projected number of pupils per classroom would be greater than the state maximum standard of 28-to-1. Impacts on all other school systems would be negligible.

For Alternative 1, with both housing options, long-duration impacts would be the same as those of the Proposed Action, high and significant, though increases in school enrollments would be less. No short-duration impacts were identified. Impacts of the onbase housing option would mainly be centered on Loy Elementary School, while offbase housing option impacts would center on five elementary schools. For Alternative 2, with both housing options, long-duration impacts would be high and significant, though increases in school enrollments would be greater than the Proposed Action. The long-duration impacts would be high because the projected pupil-to-teacher ratios exceed the local standards. Impacts would be significant because the projected pupil-to-teacher ratios exceed the state standards. Impacts of the onbase housing option would mainly be centered on Loy Elementary School while offbase housing option impacts would center on five elementary schools. Alternative 3 impacts would be the same as those of the Proposed Action.

The concurrent deployment of the Small ICBM and Peacekeeper in Rail Garrison programs at Malmstrom AFB would cause less than a 1-percent increase in total enrollment for the GFPS system. Cumulative long-duration impacts for education would remain high and significant. No short-duration impacts were identified.

2.1.5 Public Services

For the Proposed Action, with both housing options, short-duration impacts for the public services element would be moderate because demands for health and emergency services in Cascade County during the construction phase would increase approximately 9 percent. The overall long-duration impacts on public services, for both housing options, would be moderate due to increases in calls for service per officer of up to 10 percent for the Great Falls Police Department and Cascade County Sheriff's Department. These impacts would be significant due to the lack of capacity in the Cascade County jail and lack of funding for a new facility.

For Alternative 1, with both housing options, short-duration impacts would remain moderate due to increases in calls for emergency services of up to 9 percent. Impacts would not be significant because the existing facilities can handle the additional demand. For Alternative 1, with both housing options, long-duration impacts would be low due to increases in calls for service per officer of up to 6 percent for the Cascade County Sheriff's Department and Great Falls Police Department. These impacts would be significant due to the additional demands placed on the already overcrowded county jail and the unavailability of funds to alleviate this problem. For Alternative 2, with both housing options, short-duration impacts would remain moderate and not significant due to increases in calls for emergency services of up to 9 percent and the ability of current facilities to accommodate this increase in demand. For Alternative 2, with both housing options, long-duration impacts would be high due to increases in calls for service per officer of greater than 10 percent for the Cascade County Sheriff's Department. These impacts would be significant due to the overcrowded jail and lack of funding for additional capacity. Alternative 3 impacts would be the same as those of the Proposed Action.

The concurrent deployment of the Small ICBM and Peacekeeper in Rail Garrison programs at Malmstrom AFB would cause a small increase in the demand for public services. Cumulative short-duration impacts would remain moderate and not significant, and long-duration impacts would be moderate and significant.

2.1.6 Public Finance

Public finance impacts for the Proposed Action, with the onbase housing option, are of both short and long duration. The short-duration impacts stem from temporary revenue shortfalls peaking in fiscal year (FY) 1992 of approximately $670,000 in the GFPS system. These impacts would be moderate because the shortfalls would be less than historically experienced by the districts. The impacts would be significant because the shortfalls would reduce the districts' fund balances to below historical levels by FY 1992 for the elementary district and by FY 1996 for the high school district. The long-duration impacts result from persistent revenue shortfalls of approximately $300,000 estimated for the Cascade County government. The impact would be moderate because these shortfalls would be less than historically experienced by the county. The impact would be significant because the shortfalls would reduce the fund balances of the county to below historical levels by FY 1994. With the offbase housing option, short- and long-duration impacts would occur. The short-duration impacts stem from temporary revenue shortfalls of under $100,000 estimated for the City of Great Falls. This impact would be moderate and not significant because the shortfalls would be less than historically experienced by the city and would not reduce the fund balances of the city to below historical levels. The long-duration impacts would result from persistent revenue shortfalls estimated for the county government and the two school districts. Annual shortfalls of $120,000 for Cascade County and $270,000 for the two school districts would be moderate because the shortfalls would be less than historically experienced by these jurisdictions. The impact would be significant because the cumulative effect of the shortfalls would reduce the fund balances of the jurisdictions to below historical levels over the FY 1992 to 1994 period.

The impacts on public finance of all three alternatives, with each housing option, would remain the same as those of the Proposed Action. For Alternative 1, program-induced revenues and expenditures of the jurisdictions in Cascade County would be approximately one-third less than those estimated for the Proposed Action with both housing options. Revenue shortfalls would also decrease by similar levels, but not to levels that would change the LOI and significance. For Alternative 2, with both housing options, program-induced revenues and expenditures would be approximately 20 percent greater than those estimated for the Proposed Action. Revenue shortfalls would also increase by similar levels, but not to levels that would change the LOI and significance. Alternative 3 impacts would be the same as those of the Proposed Action.

The concurrent deployment of the Small ICBM and Peacekeeper in Rail Garrison programs would slightly increase both expenditures and revenues for Cascade County, the City of Great Falls, and the two Great Falls school districts. Impacts would remain moderate and significant due to adverse impacts on Cascade County and the Great Falls school districts.

2.2 Utilities

Utilities analyzed in this EIS include potable water treatment and distribution, wastewater, solid waste including hazardous waste, and energy utilities. Energy utilities include electricity, natural gas, and liquid fuels. Some long-duration impacts are expected in the Great Falls urban area. No impacts of strictly short duration are expected in Great Falls except for energy utilities. All short-duration impacts on Lewistown and Conrad utility systems are considered negligible.

2.2.1 Potable Water Treatment and Distribution, Wastewater, and Solid Waste

Long-duration impacts on the potable water, wastewater, and solid waste systems (including hazardous waste) in Great Falls would be low and not significant for the two Proposed Action housing options, and for all three alternatives, because existing treatment, collection, and disposal facilities would be able to service new demands without any additional cost since no additional capital investments would be required. Deterioration in the level of service is not expected since excess plant capacity is available to meet new demands. Short-duration impacts on potable water, wastewater, and solid waste systems in Lewistown and Conrad are expected to be negligible because of increases of less than 2.3 percent in demands during the construction phase.

When considering the cumulative impacts of the Small ICBM and Peacekeeper in Rail Garrison programs, the long-duration impacts would be the same: low and not significant. Cumulative impacts would be about 1 percent greater than the Proposed Action; however, adequate capacity is available to meet the increased demands. No short-duration impacts were identified on the systems servicing Great Falls.

2.2.2 Energy Utilities

For the Proposed Action, including the housing options, short- and long-duration impacts on energy utilities would be low and not significant. Short-duration impacts would be low because of the 25.5-percent increase in diesel fuel use during program construction. The impact would not be significant since the demand represents only a 0.5-percent increase to the state's total diesel fuel use. Short-duration impacts on all other energy systems would be negligible. Long-duration impacts would be low because the increased loads to rural electric cooperatives serving the launch facilities would use only a portion of the system capacity and not affect the reliability of service. Long-duration impacts are also considered beneficial for the Proposed Action and all three alternatives because the Great Falls Gas Company would be able to recover a portion of its natural gas sales. Increased onbase residential use would replace sales that were lost with the operation of the new coal-fired heat plant at Malmstrom AFB.

Energy requirements for Alternative 1 would be 1 to 4 percent less than the Proposed Action as a result of fewer operations personnel and less program-related inmigration. Short- and long-duration impacts would be low and not significant since overall adequate capacity is available to meet program demands. Energy requirements for Alternative 2 would be 0.5 to 2 percent greater than the Proposed Action. Use of additional launch facilities and greater program-related inmigration would result in greater demands. However, since adequate capacity is available within the region, impacts would be the same as the Proposed Action. Short- and long-duration impacts for Alternative 3 would be the same as those of the Proposed Action, though energy requirements at all launch facilities and Malmstrom AFB would increase demands by less than 1 percent.

The cumulative impacts of Small ICBM and the Peacekeeper in Rail Garrison programs would be the same as those for the Proposed Action alone, though the overall energy requirements would slightly increase as a result of increased demands in Great Falls and at Malmstrom AFB.

2.3 Transportation

The transportation resource includes four elements: roads, public transportation, railroads, and commercial airports. Short-duration impacts on transportation were considered to be those occurring during the construction phase. Long-duration impacts were considered to be those that continue throughout the life of the program, beginning in either the construction or the operations phase.

2.3.1 Roads

For the Proposed Action, short-duration impacts on roads in Great Falls would be high for both housing options because of increased congestion and delay including the further aggravation of service levels along roads already providing degraded service. Long-duration impacts on urban roads in Great Falls would remain high for the offbase housing option because of operations personnel commuting to the base but would be negligible for the Proposed Action with the onbase housing option because only a few operations personnel would reside in the community. Both short- and long-duration impacts on urban roads in Great Falls would be significant because service levels would be reduced below accepted highway design standards and would continue indefinitely. Both short- and long-duration impacts on roads in Lewistown and Conrad would be negligible. Short-duration impacts on deployment area roads would be low and not significant because projected baseline traffic volume is low and the level of service would not be reduced below minimum desirable standards. Long-duration impacts on deployment area roads would be low because traffic volumes would be low. These impacts would be significant because of the queuing, increased delay, and inconvenience that motorists would experience when traveling behind the slow-moving HML transporter convoy. The overall short-duration impacts on roads would be high because of the reduction in service levels along urban roads in Great Falls. These impacts would be significant because of the further aggravation of service along 10th Avenue South, which is already congested for both housing options. Long-duration impacts would also be high and significant for the offbase housing option for the same reason. For the Proposed Action, with the onbase housing option, long-duration impacts would be low because traffic on deployment area roads would be low. Impacts would be significant because of the queuing and delays caused by the HML transporter convoy. The improvement of road sections and bridges and the increased level of maintenance work needed to accommodate the HML and its support vehicles would result in long-duration, beneficial effects in the region.

For Alternatives 1, 2, and 3, short-duration impacts on roads in Great Falls would remain high and significant, though program-generated traffic for Alternative 1 would be somewhat smaller than that of the Proposed Action. For the onbase housing option, long-duration impacts on urban roads in Great Falls would be negligible for Alternatives 1 and 3, but would be moderate for Alternative 2 because program-generated traffic would be somewhat greater than that of the Proposed Action with the onbase housing option. These impacts would be significant because of the queuing and delays caused by the HML transporter convoy. If no housing is provided onbase for any alternative, the long-duration impacts on urban streets in Great Falls would be similar to the Proposed Action with the offbase housing option (high and significant). Both short- and long-duration impacts on roads in Lewistown and Conrad would remain negligible. Impacts on deployment area roads for all alternatives would be the same as the Proposed Action. Overall short-duration impacts on roads would be high because of the impact on 10th Avenue South for all alternatives. Overall long-duration impacts on roads for the onbase housing option would be low because additional traffic volumes would be low for Alternatives 1 and 3, but impacts would be moderate for Alternative 2 because of greater additional operations personnel residing offbase. For the offbase housing option, overall long-duration impacts on roads would be high for all alternatives because of the further aggravation in service along 10th Avenue South. All impacts would be significant because of the queuing and delays caused by the HML transporter convoy. Long-duration, beneficial effects would occur for all alternatives because of road and bridge improvements and increased road maintenance.

The cumulative short-duration impacts of concurrent basing of the Small ICBM and Peacekeeper in Rail Garrison programs would be high and significant. Long-duration impacts would be moderate and significant for roads in Great Falls because of the additional program-generated traffic induced by Peacekeeper in Rail Garrison personnel. Both short- and long-duration impacts on roads in Lewistown and Conrad and on deployment area roads would remain the same as those of the Proposed Action. The overall short-duration impacts on roads would be high and significant; long-duration impacts would be moderate and significant. Beneficial, long-duration effects would also occur as the result of proposed road and bridge improvements.

2.3.2 Public Transportation, Railroads, and Airports

For the Proposed Action and the three alternatives, including both housing options, short- and long-duration impacts on public transportation, railroads, and airports would be negligible. The bus and taxi service in Great Falls, railroads, and area airports are expected to absorb any additional program-induced demand with no schedule modifications, additional personnel, terminal or control facilities, or rolling stock required.

The cumulative short- and long-duration impacts of concurrent deployment of the Small ICBM and Peacekeeper in Rail Garrison programs would be negligible for public transportation, railroads, and airports, though program-generated demand would be somewhat greater than that of the Proposed Action. If Malmstrom AFB is selected as a Peacekeeper in Rail Garrison location, a separate environmental assessment would be prepared and impacts on railroads would be considered specifically.

2.4 Land Use

The land use resource includes two elements: urban land use and rural land use. The analysis of urban land use focused on the cities of Great Falls, Lewistown, and Conrad. Program impacts that cause permanent changes in urban land use patterns were considered to be of long duration. Short-duration impacts are not expected. The rural land use analysis considered land uses immediately adjacent to launch facilities and inhabited structures within the explosive safety zones of the launch facilities as well as the nonresidential expansion areas of Malmstrom AFB.

2.4.1 Urban Land Use

There would be no short-duration impacts for urban land use because program-related impacts would involve construction on vacant developable land.

For the onbase housing option of the Proposed Action, long-duration urban land use impacts would be negligible since only a small amount of vacant developable land within the Great Falls planning jurisdictions would be used for residential purposes. The offbase housing option may lead to the private-sector development of about 291 acres of vacant developable land; however, the long-duration impacts would remain low and not significant since there would not be a substantial reduction of the supply of vacant developable land (9% reduction).

Long-duration impacts would be negligible for Alternatives 1, 2, and 3 with the onbase housing option. For Alternatives 1 and 3, the long-duration impacts of the offbase housing option are the same as the offbase housing option of the Proposed Action, low and not significant (6% and 9% reduction of vacant developable land). For Alternative 2, long-duration impacts of the offbase housing option would be moderate and not significant because 380 acres (10%) of vacant developable land would be used.

The cumulative long-duration impacts of the Small ICBM and Peacekeeper in Rail Garrison programs would remain negligible because the additional onbase housing required by the Peacekeeper in Rail Garrison program would be small. There would be no short-duration impacts for urban land use. Little vacant developable land under the Great Falls planning jurisdiction would be used for residential purposes (onbase housing option).

2.4.2 Rural Land Use

For the Proposed Action, overall short- and long-duration rural land use impacts would be low and not significant. One hundred launch facilities are proposed for deployment with two HMLs per site. New restrictive easements would be purchased to accommodate expanded explosive safety zones (1,250 ft from HML enclosures as compared to 1,200 ft from the existing Minuteman silos). The 100 launch facilities identified for the Proposed Action contain no inhabited structures within their 1,250-foot explosive safety zones. The land use around 97 of the 100 launch facilities consists of dry-farmed cropland/rangeland; irrigated croplands are present at 2 launch facilities, and 1 launch facility is in a forest. The HML vehicle operations training area would be constructed on 350 acres of land located adjacent to Malmstrom AFB. This land is presently devoted to dry-farmed cropland and contains no inhabited structures. An additional 100 acres of land adjacent to Malmstrom AFB would be used for expansion of base facilities (including recreational facilities). This area has no inhabited structures and is devoted to dry-farmed agricultural use. The overall short- and long-duration rural land use impacts would be low and not significant because less than 1,000 acres of dry-farmed cropland/rangeland would be used without any relocation of residences.

Alternatives 1 and 2 have essentially the same overall rural land use impacts as the Proposed Action. The only major difference is that Alternative 2 would use 125 launch facilities. This difference results in the short-duration use of 51 additional acres of dry-farmed cropland, 18 acres of rangeland, and 3 acres of irrigated cropland; and the long-duration use of 27.2 acres of dry-farmed cropland. The other short- and long-duration impacts of Alternative 2 are essentially the same as the Proposed Action. There are no inhabited structures in explosive safety zones for either Alternatives 1 or 2; and the amount of land used to expand Malmstrom AFB for the HML vehicle operations training area, recreational facilities, and other nonresidential facilities is the same as the Proposed Action. The overall short- and long-duration rural land use impacts of Alternatives 1 and 2 would be the same as those of the Proposed Action because less than 1,000 acres of dry-farmed cropland/rangeland would be used and there are no inhabited structures within the explosive safety zones.

For Alternative 3, the proposed program would include all 200 launch facilities, with one HML at each facility in a pre-engineered building. The expanded explosive safety zone for this alternative would be 1,425 feet from the HML enclosure, and 35 inhabited structures would be affected at 15 launch facilities; the other 185 launch facilities have no inhabited structures. The long-duration impacts would be moderate because more than ten inhabited structures would be relocated. Impacts would be significant since inhabited structures would be within the explosive safety zones. Nine of the launch facilities have one inhabited structure in the 1,425-foot explosive safety zone (including a school), three sites have two structures, one site has three structures, one site has six structures, and one site has ten structures. All other short- and long-uration impacts would not exceed the LOI and significance of the Proposed Action and other alternatives. As a mitigation measure, the Air Force will consider placing HMLs at 185 launch facilities only, or placing 200 HMLs at 185 launch facilities to avoid 15 launch facilities which would contain inhabited structures within their expanded explosive safety zones.

The cumulative short- and long-duration impacts on rural land use resulting from the Peacekeeper in Rail Garrison program would be negligible because construction would occur onbase. In addition, the restrictive easements located offbase would not adversely affect the dry-farmed cropland since agricultural production is a permitted use within these easements and no disturbance would occur.

2.5 Recreation

The recreation resource consists of regional and local recreation. Long-duration impacts would result from the increase in program personnel throughout the construction phase, reaching a steady state during the operations phase. Short-duration impacts are not expected for either regional or local recreation.

2.5.1 Regional Recreation

For the Proposed Action, regardless of the housing option, long-duration impacts on regional recreation would be low and not significant. Impacts would be low because overall use at most recreation areas within approximately 150 miles of Great Falls is generally high only during peak-use periods (e.g., holiday and seasonal weekends). Program-induced use by the inmigrant population would contribute to the crowding of some recreation areas during these periods, resulting in a noticeable decline in the quality of the recreational experience.

For Alternative 1, program-induced recreation use would be approximately 30 percent less than for the Proposed Action because of lower program-related inmigration, but long-duration impacts on regional recreation would remain low and not significant because program-induced use would contribute to the crowding of some recreation areas during peak-use periods. However, the smaller increase in use may reduce the potential for a decline in the quality of the recreational experience. Program-induced use would be approximately 20 percent greater for Alternative 2 than for the Proposed Action because program-related inmigration would be higher; however, long-duration impacts would remain low and not significant. For Alternative 3, program-induced recreation use would be similar to that of the Proposed Action; therefore, the impacts would be the same.

If both the Small ICBM and Peacekeeper in Rail Garrison programs are implemented concurrently, the cumulative increase in use would be slightly greater than for the Small ICBM program alone (program-related inmigration would be higher), but long-duration impacts would remain low and not significant.

2.5.2 Local Recreation

Long-duration impacts on local recreation for the Proposed Action would be moderate regardless of the housing option selected, because program-induced population growth in Great Falls would result in facility shortages (particularly for softball and golf) and potential parkland deficiencies in the local recreation system. If the offbase housing option is selected, development of additional neighborhood parkland may be required depending on the location of new housing in the community. Long-duration impacts would be significant because the development of additional facilities and parkland may require an extensive institutional response in the form of capital expenditures. The facility shortages would occur even without the program but would be exacerbated with the program-induced population increases resulting in a noticeable decline in the level of service unless additional facilities are provided.

For Alternative 1, though program-induced inmigration would be lower than for the Proposed Action, long-duration impacts on local recreation would remain moderate and significant because facility shortages would still occur. Program-induced growth for Alternative 2 would be higher than for the Proposed Action, but long-duration impacts would remain moderate and significant. Program-induced population growth for Alternative 3 would be similar to that of the Proposed Action; therefore, the impacts would be the same.

If both the Small ICBM and Peacekeeper in Rail Garrison programs are implemented concurrently, the cumulative growth in population would be higher than for the Proposed Action alone, but long-duration impacts would remain moderate and significant.

2.6 Visual Resources

Overall short- and long-duration impacts of the Proposed Action on visual resources would be negligible. For the Proposed Action, construction of the earth-covered igloos would have short-duration, moderate, and not significant impacts at 13 launch facility sites and negligible impacts at the remaining 87 launch facility sites. Long-duration impacts at the same 13 sites would be low and not significant, and impacts at the remaining 87 sites would be negligible. These impacts would result from the contrasts among form, line, color, and texture that would occur because of the presence of the earth-covered igloos. The remaining 87 launch facilities are categorized as infrequently seen, except from a few local residences, and would therefore have negligible impacts. Thirty-four occupied residences are located between 1,250 feet and 2,000 feet of 23 existing launch facilities proposed for use. The visual impacts on these 34 residences would depend on intervening topography and perception of the residents. Impacts are not expected to be significant.

Overall short- and long-duration impacts of Alternatives 1, 2, and 3 would also be negligible. Although short- and long-duration impacts would be low and moderate at some of the launch facility sites for each of the alternatives, the great majority of the sites would have only negligible impacts. For each alternative, short-duration impacts would be greater than long-duration impacts because of the added effect of construction equipment, area clearing, and fugitive dust. The pre-engineered buildings proposed for use with Alternatives 1 and 3 would be more compatible with the north-central Montana visual environment than the earth-covered igloos because of their similarity to the many agricultural buildings in the area.

Because of their low profile and distance from U.S. 87/89, which is located along the southern side of the base, short- and long-duration impacts on program facilities at Malmstrom AFB would be negligible for the Proposed Action as well as each of the alternatives. Similarly, short- and long-duration impacts related to road improvements would be negligible.

The cumulative short- and long-duration impacts on visual resources from the Small ICBM and Peacekeeper in Rail Garrison programs would remain negligible because the earth-covered train enclosures would not be noticeable to viewers on U.S. 87/89, which is over 2,500 feet away. The intervening topography would hide facilities from most locations along the highway.

2.7 Cultural and Paleontological Resources

Cultural and paleontological resources include four elements: prehistoric resources, historic and architectural resources, Native American resources, and paleontological resources. Impacts on these resources would occur mainly as a result of ground disturbance associated with construction activities, such as expansion of the base and launch facilities, and road and bridge improvements. All impacts on cultural and paleontological resources are considered to be of long duration because they would cause irreversible changes to nonrenewable resources.

2.7.1 Prehistoric Resources

Overall long-duration impacts of the Proposed Action on prehistoric resources are estimated to be low regardless of the housing option selected. Most impacts would occur in areas expected to contain few important sites. However, site-level impacts at individual launch facilities may range from low to high. Impacts would be significant because some affected sites are likely to have the potential to yield important scientific information. The most sensitive areas are along drainages where road and bridge construction is most likely to affect intact buried deposits. The data syntheses and predictive modeling used to project baseline conditions are considered to be beneficial to the archaeological community. Nevertheless, the collective effects on these nonrenewable resources would be adverse.

Impacts of Alternative 1 are expected to be the same as those of the Proposed Action, and the LOI and significance ratings would not change. Alternative 2 involves the use of 125 launch facilities compared to 100 for Alternative 1. As a result, it would be more difficult to avoid sensitive prehistoric resource zones, and impacts are likely to be slightly higher than those of the Proposed Action. However, overall long-duration impacts are still expected to be low and significant. Alternative 3 would have the highest site-level impacts because all 200 launch facilities would be used and no locations in resource sensitive areas would be avoided. However, only 19 percent of the launch facilities occur in high sensitivity resource zones, and overall long-duration impacts would still be low and significant.

If deployment of the Small ICBM program is concurrent with deployment of the Peacekeeper in Rail Garrison program, only a slight increase in the housing expansion acreage would be required. Because of the limited expansion of the disturbed area, no other increases in impacts are anticipated, and impacts would be the same as those of the Proposed Action.

2.7.2 Historic and Architectural Resources

For the Proposed Action, long-duration impacts would be low regardless of the housing option selected, because few resources are expected to be affected. Most impacts would occur along deployment area roads, where historic bridges would be upgraded or where vacant structures would experience indirect effects. Impacts are considered significant because some of these types of sites are expected to be eligible for the National Register of Historic Places.

Impacts for Alternative 1 are identical to those projected for the Proposed Action. For Alternative 2, impacts would be slightly higher than those of the Proposed Action because more launch facilities would be used. However, long-duration impacts would still be low and significant. Long-duration impacts of Alternative 3 would be higher than those of the Proposed Action or of other alternatives but would still be low and significant because few resources are likely to be affected in relation to the regional resource base.

Cumulative impacts resulting from the concurrent deployment of the Small ICBM and Peacekeeper in Rail Garrison programs are not expected to increase perceptibly over impacts identified for the Proposed Action. Additional impacts would occur only at Malmstrom AFB where few historic resources are expected to occur.

2.7.3 Native American Resources

Long-duration impacts of the Proposed Action on Native American resources would be low and significant regardless of the housing option selected. Most known and projected sacred and traditional use areas occur near drainages or on high prominences and would not be subject to program effects. Impacts that do occur would be significant because they would disturb sacred areas important to Native Americans. However, most launch facilities have been evaluated by a Native American consultant who concluded that construction is not likely to directly affect any sacred areas. Concern still exists over the potential to disturb burials during construction, but the chances of affecting such remains are low overall. If they do occur, impacts would most likely be at bridge crossings over rivers.

Impacts for Alternatives 1 and 2 would be the same as for the Proposed Action. For Alternative 3, site-level impacts would be slightly higher than those of the Proposed Action or any of other alternatives, but overall impacts would be the same as the Proposed Action. Because all launch facilities would be used, no projected sensitive areas could be avoided. Most impact areas have been evaluated by a Native American consultant and no adverse impacts have been identified. Impacts would be low and significant in recognition of the potential to affect resources in impact areas not yet studied.

The cumulative effects of the concurrent deployment of the Small ICBM and Peacekeeper in Rail Garrison programs would not cause any additional impacts on Native American resources. Additional impacts would occur only at Malmstrom AFB and the effects would be the same as those of the Proposed Action.

2.7.4 Paleontological Resources

Long-duration impacts resulting from the Proposed Action are predicted to be moderate because most impacts would occur on geologic units in which fossil localities are widely dispersed. Internationally important paleontological localities with dense concentrations of well-preserved fossils are located in only 1 percent of the deployment area. Most impacts would occur on formations in which similar fossils may be found; however, specimens are dispersed within the formation and may or may not be encountered during program activities. Impacts would be significant because the research potential of fossil materials important to the scientific community would be reduced.

For Alternatives 1 and 2, impacts would be identical to those identified for the Proposed Action. Long-duration impacts for Alternative 3 would still be moderate and significant, though impacts would be slightly higher because two high sensitivity areas would not be avoided.

If the Small ICBM and Peacekeeper in Rail Garrison programs are based concurrently, the cumulative impacts on paleontological resources would not increase. Additional impacts would occur only at Malmstrom AFB, an area of low paleontological sensitivity.

2.8 Biological Resources and Threatened and Endangered Species

Biological resources and threatened and endangered species include five elements: vegetation, wildlife, aquatic habitats, unique and sensitive habitats, and threatened and endangered species. Short-duration impacts on biological resources were considered to be those occurring during the construction phase and recovering within several seasons. Long-duration impacts were considered to be those possibly extending throughout or beyond the life of the program, beginning in either the construction or the operations phase. No ecosystem-level (local or regional) impacts are expected to result from disturbances at multiple sites for the Proposed Action or alternatives. For the Proposed Action and all alternatives, disturbance of land onbase for the housing and HML vehicle operations training area options have been considered. However, the lands planned for these uses support active agricultural practices making them marginal natural habitat. Program use of these lands would not severely affect biological resources nor would effects differ by quantities of land disturbed; therefore, these options were not discussed independently under the element summaries that follow. Other currently undeveloped parcels of land on Malmstrom AFB also represent only marginal biological habitat. Disturbance of these lands is not expected to substantially affect any elements of biological resources and threatened and endangered species. All alternatives are expected to use a large portion of the T/E route system and there would be few differences in impacts among the alternatives because of road and bridge upgrades.

2.8.1 Vegetation

Short- and long-duration impacts on vegetation from the Proposed Action, including direct mortality of plants, loss of plant cover, crushing of plants, soil compaction, and some soil erosion, would be low and not significant because much of the area has been previously disturbed and only a small amount of native vegetation in the deployment area would be disturbed overall. On a site-level basis, 8 launch facilities would have short-duration, low, and significant impacts; 44 would have short-duration, low, and not significant impacts; and 48 would have negligible impacts, depending on their proximity to high-value native vegetation communities and their potential for revegetation. A generally low quantity of disturbance is expected at each facility. Disturbances at four launch facilities would have long-duration, low, and significant impacts because they are located near forest or woody riparian community types that are slow to recover from disturbance. Long-duration impacts at the remaining 96 launch facilities are rated as either negligible or low and not significant for the reasons previously described and because vegetation disturbance during operations is expected to be minimal. The potential disturbance by HML vehicle training operations to onbase vegetation is substantial, but most of the training would occur on already disturbed lands. Impacts as a result of off-road HML vehicle training operations onbase include soil compaction, crushing of plants, and plant mortality and would occur where the HML makes repeated passes or where substantial soil moisture is present and ruts form. Site-level impacts at launch facilities including loss of plants and plant habitat would remain low even if the most sensitive areas are disturbed, and would not be affected by impacts along T/E routes and onbase.

Alternative 1 would result in essentially the same amount and type of disturbance as the Proposed Action. Many of the T/E routes that would be used for this alternative are expected to be the same as those used for the Proposed Action. The majority of short- and long-duration impacts at launch facilities would not be significant (short duration: 50 negligible and 42 low; long duration: 50 negligible and 48 low). Short-duration impacts would be low and significant at eight launch facilities where herbaceous and/or shrubby riparian vegetation or forest would be disturbed because these are regionally important habitats. Only two launch facilities would receive long-duration, low, and significant impacts. These facilities have woody riparian or forest vegetation which are slower to recover from disturbance. The overall short- and long-duration impacts on vegetation would be low and not significant for Alternative 1.

Alternatives 2 and 3 would result in an accumulation of additional site-level disturbances of 75 and 100 acres of vegetation, respectively, at launch facilities. Alternative 2 would result in impacts that are mostly not significant at launch facilities (short duration: 62 negligible and 52 low; long duration: 62 negligible and 58 low). Short-duration impacts would be low and significant at 11 launch facilities where more sensitive vegetation types, including riparian and forest types, would be affected. Five launch facilities where woody riparian and/or forest vegetation occur would experience long-duration, low, and significant impacts. More T/E routes are likely to be used for this alternative than the Proposed Action, but overall, no large additional impacts are expected. Overall short- and long-duration impacts on vegetation would be low and not significant for Alternative 2.

For Alternative 3, all launch facilities would be used and therefore would result in the largest number of impact ratings higher than negligible, though most of these impacts would not be significant (short duration: 101 negligible and 77 low; long duration: 101 negligible and 87 low). Riparian or forest vegetation would be disturbed at 22 launch facilities resulting in short-duration, low, and significant impacts. Long-duration impacts would be low and significant at 12 launch facilities where important woody riparian or forest vegetation would be disturbed and would require a substantially long recovery period. All T/E routes would also be used, but overall, no additional major impacts beyond those of the Proposed Action are expected. These overall short- and long-duration impacts on vegetation would be low and not significant for Alternative 3.

The cumulative short- and long-duration impacts on vegetation resulting from the concurrent deployment of the Small ICBM and Peacekeeper in Rail Garrison programs at Malmstrom AFB would be the same as the Proposed Action alone (low and not significant) because the amount of vegetation removed by facilities would be small and the area now supports primarily introduced species.

2.8.2 Wildlife

The Proposed Action would affect some wildlife habitat, but would not affect the overall capacity of the habitat to support wildlife in the deployment area or disturb any specific wildlife populations. There are 33 launch facilities where short-duration impacts (e.g., behavioral disruption and displacement) may range from low to moderate (the remaining 67 would be negligible) depending on proximity to big game wintering habitat. These impacts would not be significant because of the temporary nature of the impacts, the small amounts of habitat involved, and its marginal value due to existing habitat disturbance. Site-level, long-duration impacts would be low and would occur at 32 launch facilities because of minor increased traffic levels and low increases in human activity and noise. These impacts would not be significant because behavioral disruption and displacement would be temporary since the wildlife species would become adapted to operations activities. With the addition of minor onbase and T/E route surface disturbance, the overall short- and long-duration impacts on wildlife would be low and not significant for these actions.

Alternative 1 would result in almost the same amount of disturbance as the Proposed Action. Short-duration impacts would be negligible at 67 launch facilities, low and not significant at 17 launch facilities, and moderate and not significant at another 16 launch facilities where proximity to big game wintering habitat is a factor. Long-duration impacts would be low and not significant at 32 launch facilities because of minor increased traffic levels and low increases in human activity and noise at the sites. These overall short- and long-duration impacts would be low and not significant.

Alternative 2 would result in short- and long-duration, negligible impacts at 83 and 84 launch facilities, respectively. Short-duration impacts would be low and not significant at 20 launch facilities and moderate and not significant at 22 launch facilities that are close to big game severe wintering habitat. Long-duration, low, and not significant impacts would result from increased traffic levels and increases in human activity and noise at 41 sites. These overall short- and long-duration impacts would be low and not significant.

Alternative 3 may result in some local-level impacts on wildlife during construction because all launch facilities (including 37 launch facilities in sensitive wildlife habitat) would be used. This additional disturbance of daily activities would result in overall short-duration, moderate and long-duration, low impacts that would not be significant.

On a site-level basis, short- and long-duration impacts at 124 launch facilities would be negligible. Short-duration impacts would be low and not significant at 39 launch facilities and moderate and not significant at 37 launch facilities. Long-duration impacts would be low and not significant at 76 launch facilities.

Additional short- and long-duration impacts on wildlife habitat at Malmstrom AFB that would result from concurrent deployment of the Small ICBM and Peacekeeper in Rail Garrison programs would be negligible because only a small amount of poor quality wildlife habitat would be lost.

2.8.3 Aquatic Habitats

The Proposed Action would result in accumulated impacts onbase, along T/E routes (especially at bridge upgrade sites), and at launch facilities that may affect fisheries and wetlands. These overall short-duration impacts would be moderate due to temporary disturbance from equipment, debris, and in-stream structures, and sedimentation in stream and wetland habitats causing fish mortality and degradation of habitat during construction. Overall long-duration impacts would be low because of limited landfill encroachments or operations effects at aquatic habitats near launch facilities. These impacts would not be significant because construction would be in compliance with the Montana Stream Protection Act and the Montana Streambed and Landform Preservation Act. The greatest potential for site-level, short-duration impacts on aquatic habitats at launch facilities would result from construction (including landfill, sedimentation, and direct physical disturbance). Most of these disturbances at launch facilities would not be significant (short duration: 78 negligible, 16 low, 2 moderate, 1 high; long duration: 95 negligible, 5 low). Three sites have the potential for short-duration impacts (2 low and 1 moderate) that would be significant due to the high wetland and fisheries value of the stream habitats potentially disturbed. Site-level, long-duration impacts on aquatic habitats at launch facilities are less intensive than are site-level, short-duration impacts, with 95 rated as negligible and 5 low and not significant.

Alternative 1 impacts would be similar to those of the Proposed Action. Most of the impacts at launch facilities would not be significant (short duration: 74 negligible, 19 low, 2 moderate, and 1 high; long duration: 94 negligible and 6 low). Short-duration, significant impacts would occur at four launch facilities (3 low and 1 moderate). These significant impacts would result from potential disturbances to one prairie pothole and several streams with high wetland and fisheries values. Most of the T/E routes that would be used for this alternative are expected to be the same as those used for the Proposed Action, and no additional large impacts are expected to result from road and bridge construction. Overall short-duration impacts would be moderate and not significant because of these dispersed, minor impacts. Overall long-duration impacts would be low and not significant.

Alternative 2 impacts would be almost identical to those of the Proposed Action, differing only in the accumulation of impacts at 25 additional launch facilities. These additional 25 site-level impacts would not add substantially to the accumulated impacts. Most of these impacts at launch facilities would not be significant (short duration: 93 negligible, 25 low, 2 moderate, and 1 high; long duration: 118 negligible and 7 low). Short-duration, significant impacts would occur at four launch facilities because of potential disturbances to wetland and fisheries resources in several streams and one prairie pothole. Although Alternative 2 would probably use more routes than the Proposed Action, no large additional impacts would occur from road and bridge construction. These potential disturbances would result in short-duration, moderate impacts and long-duration, low impacts. These overall short- and long-duration impacts would not be significant. Alternative 3 would result in some severe site-level impacts on aquatic habitats because none of the launch facilities would be avoided; however, these accumulated impacts would not be substantially greater than accumulated impacts for the other alternatives. Most of these potential impacts at launch facilities would not be significant (short duration: 152 negligible, 33 low, 4 moderate, and 1 high; long duration: 185 negligible, 13 low, and 2 moderate). Short-duration, significant impacts would occur at ten launch facilities because of potential disturbance to high-quality wetland and fisheries resources in several streams, riparian zones, and one prairie pothole. Alternative 3 would use the entire T/E route system, but no additional large impacts are expected beyond those considered for the Proposed Action for road and bridge construction. Overall short-duration impacts would be moderate and overall long-duration impacts would be low. These overall impacts on aquatic habitats would not be significant.

Concurrent deployment of the Small ICBM and Peacekeeper in Rail Garrison programs at Malmstrom AFB would result in only minor additional sedimentation disturbance to aquatic habitats (Missouri River), and cumulative short- and long-duration impacts would remain the same as the Proposed Action.

2.8.4 Unique and Sensitive Habitats

No unique and sensitive habitats would be directly affected by the Proposed Action or alternatives; therefore, short- and long-duration impacts on unique and sensitive habitats would be negligible for all alternatives. Concurrent basing of the Small ICBM and Peacekeeper in Rail Garrison programs at Malmstrom AFB would not change the impact rating.

2.8.5 Threatened and Endangered Species

Federally listed and Montana-recognized threatened and endangered species occur near some of the launch facilities and T/E route segments. There are no federally listed plants but there are five federally listed animal species in the deployment area. Because of the distributions of these animals, it is unlikely that they would be disturbed by the program. Montana-recognized plant species and their habitat types occur near some of the launch facilities and roads but none are known to occur in the areas of potential direct surface disturbance. All other similar short- and long-duration impacts

(90 negligible and 10 low) at the remaining launch facilities would not be significant because of the small number of sensitive species occurring in the area of direct surface disturbance. Overall short- and long-duration impacts on threatened and endangered species would be low and not significant.

Alternatives 1 and 2 would result in approximately the same level of disturbance to sensitive species as the Proposed Action and overall impacts would be the same. Short- and long-duration impacts at ten launch facilities would be low and not significant for Alternatives 1 and 2 because of potential impacts on nearby habitats of the bald eagle and/or the mountain plover. All other launch facilities would have negligible impacts. For Alternative 3, launch facilities associated with habitat for sensitive species would not be avoided, but overall disturbances are unlikely to produce large impacts. Short- and long-duration impacts would be high and significant at launch facility A-5 where a state-recognized sensitive plant occurs in the area of potential surface disturbance. Short- and long-duration impacts on 18 launch facilities would be low and not significant with the remaining 181 launch facilities rated as negligible. Overall short- and long-duration impacts would be moderate and not significant for Alternative 3.

No additional cumulative short- and long-duration impacts on threatened and endangered species would result from the concurrent deployment of the Small ICBM and Peacekeeper in Rail Garrison programs at Malmstrom AFB.

2.9 Water Resources

Water resources include three elements: water use, surface water hydrology and quality, and groundwater hydrology and quality. Surface water resources would receive site-level impacts associated with road and bridge improvements and launch facility modifications. All three elements would receive local-level impacts because of program-related water supply requirements.

2.9.1 Water Use

For the Proposed Action, water use, including direct program-related construction and operations water use and indirect domestic use by program inmigrants, would range from 4,700 to 5,210 acre-feet (acre-ft) during the construction phase, at an average use of 780 to 870 acre-feet per year (acre-ft/yr). During the operations phase, total water use would range from 1,380 to 1,590 acre-ft/yr, depending on the housing option. Most of the program-related water use would occur in the Great Falls metropolitan area. The water sources available to the affected cities of Great Falls, Lewistown, and Conrad, and to Malmstrom AFB, are adequate and would meet program-induced needs. Only relatively small amounts of program water (460 acre-ft over the 6-yr construction phase) would be needed in the rural portions of the deployment area and its diversion for program use would generally have minimal impacts on existing users. Therefore, the overall short- and long-duration impacts on water use would be low and not significant.

For Alternatives 1, 2, and 3, construction-phase water use would vary from 3,900 acre-ft for Alternative 1, with the onbase housing option, to 5,370 acre-ft for Alternative 2, with the offbase housing option. This represents average uses of 650 and 900 acre-ft/yr, respectively. The corresponding water use during the operations phase would range from 990 to 1,930 acre-ft/yr. Water use in Lewistown and Conrad and in the rural portions of the deployment area would remain substantially the same as that of the Proposed Action. The water supply available to Great Falls and the base can readily meet the somewhat higher water demands of Alternative 2. The water use impacts for all alternatives would be the same as the Proposed Action.

The concurrent deployment of the Small ICBM and Peacekeeper in Rail Garrison programs would require approximately an additional 550 acre-ft of water during the construction phase (or an average of 90 acre-ft/yr) and 150 acre-ft/yr during the operations phase. This water use would be confined to the Great Falls area. The cumulative water use impacts resulting from the Peacekeeper in Rail Garrison program would be the same as those for the Small ICBM program alone.

2.9.2 Surface Water Hydrology and Quality

Site-level impacts of the Proposed Action on surface water hydrology and quality would result from several types of construction activities. Most of these impacts involve increased levels of sedimentation because of program-induced land disturbance. Improvements to 29 T/E route bridges that span perennial streams would result in short-duration water quality impacts ranging from low to high at individual sites, depending on the sensitivity of the stream and the number of bridges to be upgraded along a particular stream. There are about 2 miles of T/E route that parallel Careless Creek in the Musselshell Basin that may require upgrading. Because of the proximity of road construction to a sensitive stream, the short-duration water quality impact would be moderate. Finally, the construction activities associated with modifications at two launch facilities (A-11 and H-7) that are located in proximity to streams with high water quality would result in short-duration, moderate to high water quality impacts. Most of the site-level, short-duration water quality impacts would occur only during and immediately following construction activities. These impacts would not be significant. For the onbase housing option, 330 acres of new military housing would result in increased stormwater runoff from Malmstrom AFB, increased local sedimentation in the Missouri River, and the possible need for improvements in the offbase stormwater drainage system. For the offbase housing option, the additional 290 acres of housing could require upgrades to the existing stormwater system of Great Falls. In either case, this represents a long-duration, moderate, and not significant impact at the local level.

Water diversions required to meet program needs would have only a minor effect on local streamflows in most cases. No new wastewater discharge points would be created by the proposed program and existing wastewater treatment facilities would have adequate capacity to handle program-related wastewater. The local water quality effects of the program would be low. Regionally, the program is not expected to substantially diminish flows or degrade water quality in any of the major streams. Therefore, the overall short- and long-duration impacts of the Proposed Action on surface water hydrology and quality would be low and not significant.

The site-level impacts of Alternatives 1 and 2 are virtually the same as the Proposed Action, except that one or two additional bridge upgrades over perennial streams may occur. In addition, moderate to high, not significant water quality impacts would occur at one to two additional launch facilities. For Alternative 3, up to 18 miles of T/E route segments, running in proximity to perennial streams, could be upgraded. Up to 36 bridges spanning perennial streams may be upgraded. Moderate to high, not significant impacts on water quality would occur at ten launch facilities. Although the number of site-level impacts is likely to be somewhat higher, water quality would not be substantially degraded at the regional level. The water-related impacts at Great Falls for any of the alternatives would be virtually the same as those of the Proposed Action. Therefore, the overall short- and long-duration impacts on surface water hydrology and quality for all alternatives (and either housing option) would remain low and not significant.

The Peacekeeper in Rail Garrison program impacts would be limited to the Great Falls area. The additional effects of the program on the hydrology and quality of the Missouri river would be minor. The program would not appreciably increase the amounts of runoff and sedimentation from Malmstrom AFB into the Missouri River. Therefore, the overall short- and long-duration cumulative impacts would remain low and not significant.

2.9.3 Groundwater Hydrology and Quality

For the Proposed Action, 20 of the launch facilities proposed for expansion lie upgradient of existing, nearby saline seeps. Deployment of HMLs at these launch facilities could intensify saline-seep problems at the site level. However, the effect on regional groundwater quality would be minimal. Only minor amounts of groundwater withdrawals would be needed to support construction in the deployment area. Additionally, small increases in diversions from Big Springs would occur due to temporary increases in water demand at Lewistown during the construction phase. The housing options would not affect groundwater because no program-related groundwater pumpage would occur in the Great Falls area. Overall program-induced short-duration impacts on the regional groundwater aquifers would be low; long-duration impacts would be negligible. These impacts would not be significant.

For Alternative 3, construction would occur at all 200 launch facilities; 30 lie upgradient of existing, nearby saline seeps. Therefore, the extent of site-level effects is likely to be slightly greater. Fewer launch facilities with existing nearby saline seeps are involved with Alternatives 1 and 2 (16 and 23, respectively). Regional groundwater quality would not be affected and the overall impacts on the regional groundwater aquifers of all three alternatives would be essentially the same as those of the Proposed Action.

The cumulative impact of the Small ICBM and Peacekeeper in Rail Garrison programs on groundwater would be the same as the Proposed Action: short-duration, low, and not significant impacts and long-duration, negligible impacts.

2.10 Geology and Soils

The geology and soils resource includes the consideration of effects of the construction and operations of the proposed Small ICBM program at Malmstrom AFB and consists of the following elements: geologic hazards (e.g., mass movements such as landslides), geologic resources (e.g., aggregate and energy resources), and soil erosion.

2.10.1 Geologic Hazards

The overall short- and long-duration impacts of the Proposed Action on mass movements would be low because the majority of sites have negligible (95 sites) to low (2 sites) susceptibility to mass movements. Short- and long-duration, moderate impacts are expected at only three launch facilities and would not be significant since adverse effects are not expected to continue beyond the life of the program or require extensive mitigation measures.

The overall LOIs for Alternatives 1 and 2 are the same as the Proposed Action because the increase in the number of launch facilities used is not enough to change the LOI or significance. There are only slight differences in site-level impacts between Alternatives 1 (94 negligible, 3 low, and 3 moderate) and 2 (120 negligible, 2 low, and 3 moderate) and the Proposed Action and only minor differences in impacts at T/E routes and bridge crossings. Overall impacts on geologic hazards from Alternative 3 are similar to those for the Proposed Action except that all 200 sites would be used. Short- and long-duration, site-level impacts on geologic hazards as a result of Alternative 3 would be moderate at four sites because of potential mass movement areas adjacent to launch facilities. In addition, site-level, short- and long-duration impacts would be low at 5 sites and negligible at 191 sites since few mass movement characteristics could be attributed to these sites. About 15 more miles of T/E routes would have a short- and long-duration, moderate impact, and an additional two bridge crossings would have short- and long-duration, moderate impacts. None of the impacts would be significant because potential mass movement areas identified are not likely to be affected beyond the life of the program or require extensive remedial measures.

There would be no additional cumulative impacts on geologic hazards from the simultaneous basing of the Small ICBM and Peacekeeper in Rail Garrison programs at Malmstrom AFB.

Seismic activity and seismic effects causing adverse impacts on the proposed program are remote because of low seismicity and the absence of active faults within the deployment area. There would be no impacts on seismicity and seismic effects within the proposed program area because no program activities are planned that would affect these geologic conditions.

2.10.2 Geologic Resources

Overall short-duration impacts on geologic resources from the Proposed Action would be high as a result of program demand for aggregate exceeding the production capacity of the region. These impacts would be significant because sand and gravel demand would deplete regional demonstrated and inferred reserves. Long-duration impacts would be moderate and not significant because satisfactory hypothetical reserves and production capacity exist to supply any foreseeable future demand. The Proposed Action may cause regional-level, short-duration impacts in the Lewistown supply area that are considered high since existing sand and gravel production capacity would be exceeded. These impacts would be significant because demonstrated and inferred reserves would be depleted. For the Great Falls and Shelby/Conrad supply areas, short-duration impacts would be moderate and significant because sufficient production capacity exists in the region but demonstrated and inferred reserves would be depleted. Site-level, short-duration impacts on energy resources from the Proposed Action would be negligible at all launch facilities, and long-duration impacts would be negligible (71 launch facilities) to low (29 launch facilities) because of interference with oil and gas leases near some launch facilities and Malmstrom AFB. These impacts would not be significant because the oil, gas, or coal energy reserves affected are not considered appreciable.

Impacts on aggregate for all alternatives are the same as the Proposed Action since the program demand for aggregate for all alternatives is essentially the same as the Proposed Action. Overall short- and long-duration impacts on energy resources for all alternatives would be the same as the Proposed Action. Alternative 1 would have long-duration, low impacts at 30 launch facilities and negligible impacts at 70 sites. Impacts from Alternative 2 are only slightly greater than the Proposed Action: long-duration, low impacts at 35 launch facilities and negligible impacts at 90 sites. For Alternative 3, all 200 launch facilities would be used; therefore, site-level, long-duration impacts would be low at 58 launch facilities and negligible at the remaining 142. Overall long-duration impacts would be low with short-duration, negligible impacts. None of the energy resource impacts would be significant.

Cumulative impacts on aggregate resources may occur as a result of the simultaneous basing of the Small ICBM and Peacekeeper in Rail Garrison programs at Malmstrom AFB due to the additional demand for aggregate as a result of construction of the garrison, railroad spur, and housing at Malmstrom AFB. However, the potential added demand is not expected to change the LOI and significance from that determined for the Proposed Action since the combined demand in the Great Falls supply area only slightly exceeds the production capacity of the area.

2.10.3 Soil Erosion

Site-level, short-duration impacts would occur on soil erosion from the Proposed Action in the deployment area as a result of launch facility expansion and road and bridge improvements. Site-level, short-duration impacts at the launch facilities are predominantly low (83 launch facilities), with moderate impacts at 2 launch facilities and high impacts at 15 sites as a result of program-induced erosion of low to highly sensitive soils. These impacts would not be significant because soil erosion controls would be promulgated after construction upgrades are completed. Site-level, long-duration soil erosion impacts would be high and significant only at the proposed HML vehicle operations training area as a result of removal of topsoil at a rate greater than the soil's natural regenerative capabilities. This removal would result in an appreciable loss of topsoil due to disturbance of the soil by training activities. Overall short-duration impacts would be high and not significant. Overall long-duration impacts on soil erosion from the Proposed Action would be low and not significant due to post-construction soil erosion controls and recovery of vegetation in the construction areas.

The LOIs for Alternatives 1, 2, and 3 are the same as the Proposed Action, though slight differences do occur in the number of launch facilities with short-duration, high impacts. For Alternative 1, short-duration impacts would be slightly less than the Proposed Action, with high impacts expected at 12 launch facilities and moderate and low impacts at 2 and 86 launch facilities, respectively. Although Alternative 2 would use more launch facilities than the Proposed Action, the number of launch facilities expected to have short-duration, high impacts is only two greater. Short-duration, high and short-duration, moderate impacts are expected at 17 and 2 launch facilities, respectively, for Alternative 2. Since Alternative 3 would use all 200 launch facilities as opposed to 100 for the Proposed Action, site-level, short-duration impacts on soil erosion in the deployment area would be greater than for the Proposed Action. Short-duration impacts for all 200 launch facilities would be high at 31 sites, moderate at 3 sites, and low at 166 sites. Short- and long-duration impacts from soil erosion would not be significant because of post-construction soil erosion controls that would be instituted. Long-duration impacts on soil erosion would be negligible for all deployment area construction sites due to post-construction erosion control practices and recovery of vegetation. Short- and long-duration impacts on soil erosion at the HML vehicle operations training area are the same as the Proposed Action. Overall long-duration impacts resulting from program-induced soil erosion would be low and not significant; short-duration impacts would be high and not significant.

Cumulative impacts on soil resources would occur as a result of the simultaneous location of the Small ICBM facilities and Rail Garrison facility (including railroad spurs to the main line and additional housing) on Malmstrom AFB. However, the LOI and significance are not expected to change from that of the Proposed Action because only small and/or temporary disturbances are anticipated.

2.11 Air Quality

The air quality analysis includes consideration of effects of construction, operations, and deployment of the Small ICBM program at Malmstrom AFB and its associated launch facilities. The primary pollutants considered were those associated with transportation (e.g., carbon monoxide [CO]), and those resulting from construction disturbance (e.g., fugitive dust). In addition, sulfur dioxide, nitrogen oxides, and fugitive dust served as indicators for visibility impact analyses. Impacts of onbase and offbase housing options and the HML vehicle operations training area were also considered. For the Proposed Action, short- and long-duration impacts on Great Falls traffic corridors from vehicular emissions of CO would be negligible. Construction-related fugitive dust impacts would be low and not significant on Great Falls air quality and would not exceed the National Ambient Air Quality Standards. The fugitive dust impacts resulting from construction activities at the launch facilities, along deployment area roads, and at bridge improvement sites would be negligible. Regional visibility impacts resulting from construction at Malmstrom AFB would be negligible. Overall short-duration impacts would be low and not significant and long-duration impacts would be negligible.

For Alternatives 1, 2, and 3, overall impacts resulting from vehicular CO emissions, construction-related fugitive dust, and visibility degradation are expected to vary only slightly from those of the Proposed Action. Therefore, the short-duration impacts would be low and not significant and the long-duration impacts would be negligible.

The cumulative impacts resulting from the concurrent basing of the Small ICBM and the Peacekeeper in Rail Garrison programs at Malmstrom AFB would be low and not significant during the construction phase. No cumulative impacts at launch facilities would occur. The long-duration impacts from Peacekeeper in Rail Garrison basing would be negligible.

2.12 Noise

The noise analysis includes consideration of construction and operations of the Small ICBM at Malmstrom AFB and associated launch facilities. Short-duration impacts are derived from construction-related equipment, and long-duration impacts result from operations and employee vehicle traffic. The impact analysis included consideration of both housing options and the HML vehicle operations training area. The proposed program construction-related noise would result in short-duration, negligible impacts in and around Malmstrom AFB. In the deployment area, for those residents living near potential construction areas (near launch facilities, road improvements, and bridge construction sites), short-duration impacts are projected to be moderate and not significant. Long-duration noise impacts generated by traffic during the operations phase would be negligible in Great Falls traffic corridors and throughout the deployment area.

Noise impacts for Alternatives 1, 2, and 3 are expected to vary only slightly from those of the Proposed Action. With construction at 125 launch facilities for Alternative 2 and 200 launch facilities for Alternative 3, noise impacts would be more widely distributed than either the Proposed Action or Alternative 1, each requiring only 100 launch facilities. Measurable short-duration impacts (moderate and not significant) would occur only at those launch facilities where inhabited structures exist within 1,600 feet of the facility (7 out of 100 for the Proposed Action; 9 out of 125 for Alternative 2; 24 out of 200 for Alternative 3). However, overall short-duration impacts for these alternatives would be negligible. Alternative 1 would also have short-duration, negligible impacts because there are no inhabited structures near any of the launch facilities. Long-duration noise impacts in all cases would be negligible.

Cumulative noise impacts from concurrent basing of the Small ICBM with the potential Peacekeeper in Rail Garrison program would consist of additional short-duration noise generated during construction of the garrison facilities, construction of a spur track connecting to the main line, and construction of additional housing. Most of these activities would be concentrated in the southeastern area of the base, away from sensitive receptors. Cumulative short- and long-duration impacts for noise within the affected area on and adjacent to Malmstrom AFB would be negligible.

3.0 AFFECTED ENVIRONMENT

This chapter describes the potentially affected environment at the proposed deployment area in north-central Montana, including Malmstrom Air Force Base (AFB). Because proposed Small Intercontinental Ballistic Missile operations would likely be extended into the early part of the next century, it is necessary to develop projections of future conditions against which program impacts can be compared. Therefore, both existing and future baseline conditions without the program are discussed in this chapter. Future baseline conditions include deployment of the new KC-135R air refueling mission. The baseline conditions for the affected environment are discussed in terms of the specific resource categories that were presented and compared in Chapter 2.0, Comparison of the Proposed Action and Alternatives.

The existing environmental conditions at each launch facility are summarized in tabular form in Appendix A. Appendix A includes data relating to biological resources and threatened and endangered species, geology and soils, water resources, land use, and cultural resources. Appendix A also includes certain basic information about each launch facility, such as its size and distance from Malmstrom AFB.

3.1 Socioeconomics

Deployment of the proposed Small Intercontinental Ballistic Missile system at Malmstrom Air Force Base (AFB) in north-central Montana would affect the socioeconomic environment of the area. Six major elements are addressed in the socioeconomic analysis: economic base, demographics, housing, education, public services, and public finance.

3.1.1 Resource Description

3.1.1.1 Economic Base

The economic base element describes the economic conditions and industrial composition of the region. Civilian labor force, employment, unemployment, and income are the principal measures used to assess historical and future economic changes.

3.1.1.2 Demographics

The demographics element presents a demographic profile of population in the region and identifies impact-sensitive variables for quantification and baseline projections. These variables include military-civilian and urban-rural population distributions.

3.1.1.3 Housing

The housing element describes the permanent and temporary housing stock of major communities in the region. Permanent or year-round housing includes single-family, multifamily, and mobile home structures. Temporary or transient housing consists of hotel and motel rooms, recreational vehicle pads, and camping (tent) spaces.

3.1.1.4 Education

The education element describes major public and private school systems in the region. Special attention is given to public elementary and secondary school districts. Student enrollment, staff levels, and facility capacities are addressed for each educational organization.

3.1.1.5 Public Services

The public services element describes major service functions of county and municipal jurisdictions within the study area. The number of personnel employed by each jurisdiction or organization, appropriate workload measures, and equipment and facilities capacities for selected services are used to evaluate the operational capabilities of each organization or department.

3.1.1.6 Public Finance

The public finance element describes the fiscal conditions of the counties, cities, and school districts within the study area. Annual operation expenditures and revenues are the principal measures used to describe fiscal conditions for each jurisdiction.

3.1.2 General Analysis Methodology

3.1.2.1 Region of Influence

The Region of Influence was defined for the socioeconomic analysis at two levels: the State of Montana, which would serve as a major source of program-required manpower and construction materials, and those counties and communities that are likely to experience appreciable population inmigration during program activities. The City of Great Falls in Cascade County, the host community for Malmstrom AFB, would experience most of the economic and demographic changes as a result of the proposed program. Two other cities, Lewistown in Fergus County and Conrad in Pondera County, are centrally located for construction activities in the deployment area and would, to a lesser degree, experience program-related economic and demographic changes. These three cities and counties are the primary study area for the demographic, housing, education, public services, and public finance analyses.

3.1.2.2 Economic Base

The analysis of baseline economic conditions considered two major components: (1) a compilation of historical data and (2) baseline (without-program) forecasts. The principal factors in the analysis were employment and income. Historical data for these variables were available from the Montana Census and Economic Information Center, Montana Department of Labor and Industry, the U.S. Bureau of Economic Analysis, and other state and federal sources. Some of the baseline projections incorporated forecasts that were prepared by state and local agencies and were revised to include the KC-135 air refueling mission scheduled for Malmstrom AFB beginning in 1988.

3.1.2.3 Demographics

Population data for 1970, 1980, and 1984 (the latest year for which information is available) formed the basis for analysis of current demographic conditions and recent trends. The current size and demographic composition of the population in potentially affected communities, counties, and the state as a whole were reported, and future baseline projections were based on forecasts prepared by state and local agencies.

3.1.2.4 Housing

The existing baseline conditions for the permanent year-round housing stock in the cities of Great Falls, Lewistown, and Conrad were based on 1980 U.S. Bureau of the Census estimates. These data were updated using local sources including the 1985 Federal Home

Loan Bank Housing Vacancy Survey, local realtors, and other housing publications. Housing demand projections were prepared using estimates of projected baseline populations, including the KC-135R air refueling mission-related population, and assumptions of persons per household. Housing supply projections were derived from projected vacancy rates. In addition, for housing in Great Falls, growth patterns within the city were considered.

Baseline supply data for temporary housing units were collected from primary sources. Supply and demand projections were prepared using assumptions provided by local proprietors and the Great Falls Area Chamber of Commerce.

3.1.2.5 Education

Baseline enrollment projections for the Great Falls Public Schools (GFPS) system were extracted from the GFPS system report: *A Demographic Study for the School District by Attendance Areas* (1986). The GFPS system baseline projections were modified to reflect planned Malmstrom AFB missions for the period 198[illegible] through 1990. The enrollment projections and historical pupil-to-teacher ratios formed the basis for projections of baseline teacher requirements.

3.1.2.6 Public Services

Staffing, program descriptions, and major equipment and facilities were analyzed for selected public services. Historical service delivery patterns were studied to determine peak-service requirements and their correlation to population change. An evaluation of total governmental employment in each of these jurisdictions was used as an indicator of other public services not specifically addressed.

3.1.2.7 Public Finance

Historical trends in public finance were analyzed for revenues, expenditures, taxable value of property, and the demographic and economic conditions for each jurisdiction in order to quantify the relationships among them. Financial data for the cities and counties were derived from the annual reports of those jurisdictions. The school district data reflect budgeted revenues and expenditures of each district's general fund. These parameters, in addition to discussions with local officials, were used to forecast baseline growth in revenues and expenditures.

3.1.3 Existing and Future Baseline Conditions

3.1.3.1 Economic Base

Montana's economy experienced substantial growth during the 1970s. The state's employment grew at an average annual rate of 3.2 percent, while inflation-adjusted personal income grew 3.1 percent annually. North-central Montana, specifically the nine counties containing the 341st Strategic Missile Wing's launch facilities, shared in this economic growth. Regional employment expanded 2.4 percent annually, and income rose an average of 1.7 percent annually.

The state and regional economic situation deteriorated substantially between 1980 and 1984. Statewide employment growth amounted to just 0.6 percent per year, and personal income grew only 1.6 percent annually. Regional income grew just 1.1 percent per year between 1980 and 1984.

Cascade County. In the past few years Cascade County has suffered relative economic stagnation. County employment fell by about 800 jobs between 1980 and 1984, jobs in both the farm and government sectors declined, and the reduction in government employment exceeded 800 jobs (Table 3.1.3-1). County personal income, adjusted for inflation, grew at an average annual rate of 1.4 percent between 1980 and 1984. This increase occurred despite a slight reduction in employment because of increases in nonlabor income. Earnings (in current dollars) in some key sectors fell substantially during these years. Farm earnings fell 56 percent and manufacturing earnings fell 13 percent. Unemployment in the county was measured at 7.6 percent in 1984, slightly higher than the 1980 rate of 7.3 percent, but down from the 9-percent rate observed in 1983.

Total appropriated fund staffing levels at Malmstrom AFB have fluctuated from 4,400 in 1961 to a peak of 6,300 in 1976, and to the 25-year low of 4,200 in 1986 (Figure 3.1.3-1). Approximately 2,000 jobs were lost at the base in the past 10 years as activity declined due to phasing out of North American Air Defense and EB-57 defense system evaluation missions at the base. Future increases related to the KC-135R air refueling mission will add as many as 700 jobs onbase between 1986 and 1990.

The Mountain West Research-North, Inc. (1985) report on economic and demographic trends in the City of Great Falls projected a gradual recovery from the adverse economic conditions of the early 1980s. Projections by the University of Montana's Bureau of Business and Economic Research predicted growth in nonfarm earnings and personal income in Cascade County at about 1.5 percent per year through 1989.

Fergus County. Total employment in Fergus County was measured at 5,900 jobs in 1984, down 300 jobs from the 1980 level (Table 3.1.3-1). Farm employment represented 18 percent of all county jobs in 1984. Personal income declined by about 5 percent between 1980 and 1984 in Fergus County, with current-dollar farm earnings registering a 76-percent reduction.

Pondera County. Pondera County employment stood at 3,300 jobs in 1984, virtually unchanged from its 1980 level (Table 3.1.3-1). The county is largely dependent on farming and ranching, with agriculture representing 23 percent of total employment. Personal income of Pondera County residents increased very slightly between 1980 and 1984, at an average annual rate of 0.7 percent. However, current-dollar earnings from agriculture were off 55 percent from 1980 to 1984.

3.1.3.2 Demographics

The nine north-central Montana counties containing Malmstrom AFB and the launch facilities of the 341st Strategic Missile Wing have recently experienced population growth below the state average. During the 1980 to 1984 period, the regional (9-county) population grew at an average annual rate of 0.6 percent compared to 1.2 percent average annual growth rate for the state (computed from Table 3.1.3-2).

Cascade County. Cascade County had a 1984 population of 81,800, almost identical to its population in 1970 and just slightly above its 1980 population of 80,700. The City of Great Falls' population was estimated at 58,800 persons in 1984, down from its 1970 population of 60,100 but up from its 1980 population of 56,700.

The population of military personnel and their dependents in the Great Falls area was estimated at about 9,060 persons in 1986, compared to the peak of 13,760 persons in 1972 (Figure 3.1.3-2). At its peak in 1972, the military population of Great Falls and Malmstrom AFB stood at about 20.4 percent of the urban area's population, compared to 12.9 percent in 1986.

Table 3.1.3-1

Changes in Employment and Earnings for Selected Sectors, Cascade, Fergus, and Pondera Counties, Montana (1980-1984)

County and Sector	Employment (Jobs) 1980	Employment (Jobs) 1984	Employment (Jobs) 1980-1984 Change	Earnings (Thousands $) 1980	Earnings (Thousands $) 1984	1980-1984 % Change
Cascade County						
TOTAL:	41,610	40,836	-774	$522,460	$645,998	23.6
Farm	1,072	1,035	-37	5,929	2,584	-56.4
Nonfarm	40,538	39,801	-737	516,531	643,414	24.6
Private	30,015	30,105	90	372,776	470,156	26.1
Construction	2,163	2,086	-77	42,581	48,206	13.2
Manufacturing	1,653	1,326	-327	33,159	28,741	-13.3
Finance	3,457	3,719	262	40,917	49,904	22.0
Services	9,716	10,068	352	94,863	141,059	48.7
Other Private	13,026	12,906	-120	161,256	202,246	25.4
Government	10,523	9,696	-827	143,755	173,258	20.5
Fergus County						
TOTAL:	6,224	5,927	-297	$66,434	$64,704	-2.6
Farm	1,102	1,071	-31	11,355	2,740	-75.9
Nonfarm	5,122	4,856	-266	55,079	61,964	12.5
Private	3,991	3,819	-172	41,065	45,657	11.2
Construction	461	371	-90	7,345	4,610	-37.2
Services	1,208	1,288	80	10,139	14,704	45.0
Other Private	2,322	2,160	-162	23,581	26,343	11.7
Government	1,131	1,037	-94	14,014	16,307	16.4
Pondera County						
TOTAL:	3,282	3,288	6	$31,683	$36,104	14.0
Farm	778	748	-30	6,559	2,952	-55.0
Nonfarm	2,504	2,540	36	25,124	33,152	32.0
Private	2,037	2,068	31	20,153	26,317	30.6
Mining	53	46	-7	1,649	1,495	-9.3
Construction	159	202	43	1,682	3,129	86.0
Other Private	1,825	1,820	-5	16,822	21,693	29.0
Government	467	472	5	4,971	6,835	37.5

Note: Earnings data are in current dollars, not adjusted for inflation.

Source: U.S. Bureau of Economic Analysis 1986.

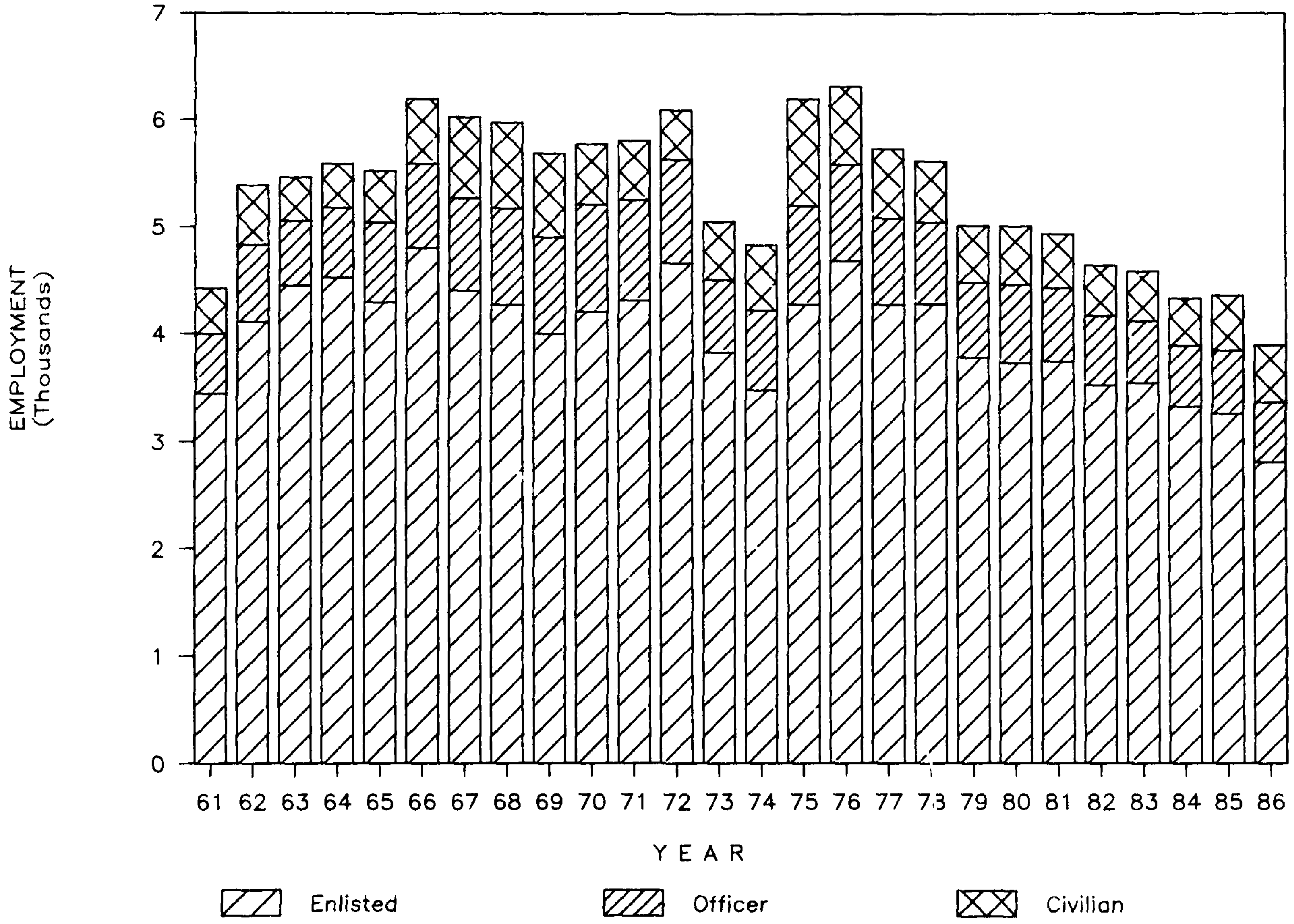


FIGURE 3.1.3-1 MILITARY AND APPROPRIATED FUND CIVILIAN EMPLOYMENT AT MALMSTROM AFB, 1961 TO 1986

Table 3.1.3-2

Actual and Projected Population of Selected Montana Counties and Cities, the State of Montana, and the United States (1970-2000)

County and City	1970	1980	1984	1990	2000
Cascade	81,804	80,696	81,815	87,400	89,900
Great Falls	60,091	56,725	58,769	61,500	63,500
Chouteau	6,473	6,092	6,175	6,100	5,800
Fergus	12,611	13,076	12,929	13,300	13,600
Lewistown	6,437	7,104	6,895	7,100	7,300
Judith Basin	2,667	2,646	2,705	2,400	2,200
Lewis and Clark	33,281	43,039	45,766	51,100	59,500
Pondera	6,611	6,731	7,072	7,200	7,500
Conrad	2,770	3,074	3,056	3,400	3,700
Teton	6,116	6,491	6,444	6,500	6,400
Toole	5,839	5,559	5,742	5,700	5,700
Wheatland	2,529	2,359	2,308	2,200	2,100
Regional TOTAL:	157,931	166,689	170,956	181,900	192,700
Montana	694,409	786,690	824,057	859,900	935,600
United States (thous)	203,302	226,546	236,634	249,900	268,300

Note: For Cascade County and Great Falls, projections were prepared from Mountain West Research-North, Inc. 1985.

Sources: U.S. Bureau of the Census 1972b, 1982b; Montana Department of Commerce 1981, 1986; Data Resources, Inc. 1985; Council of Economic Advisors 1986.

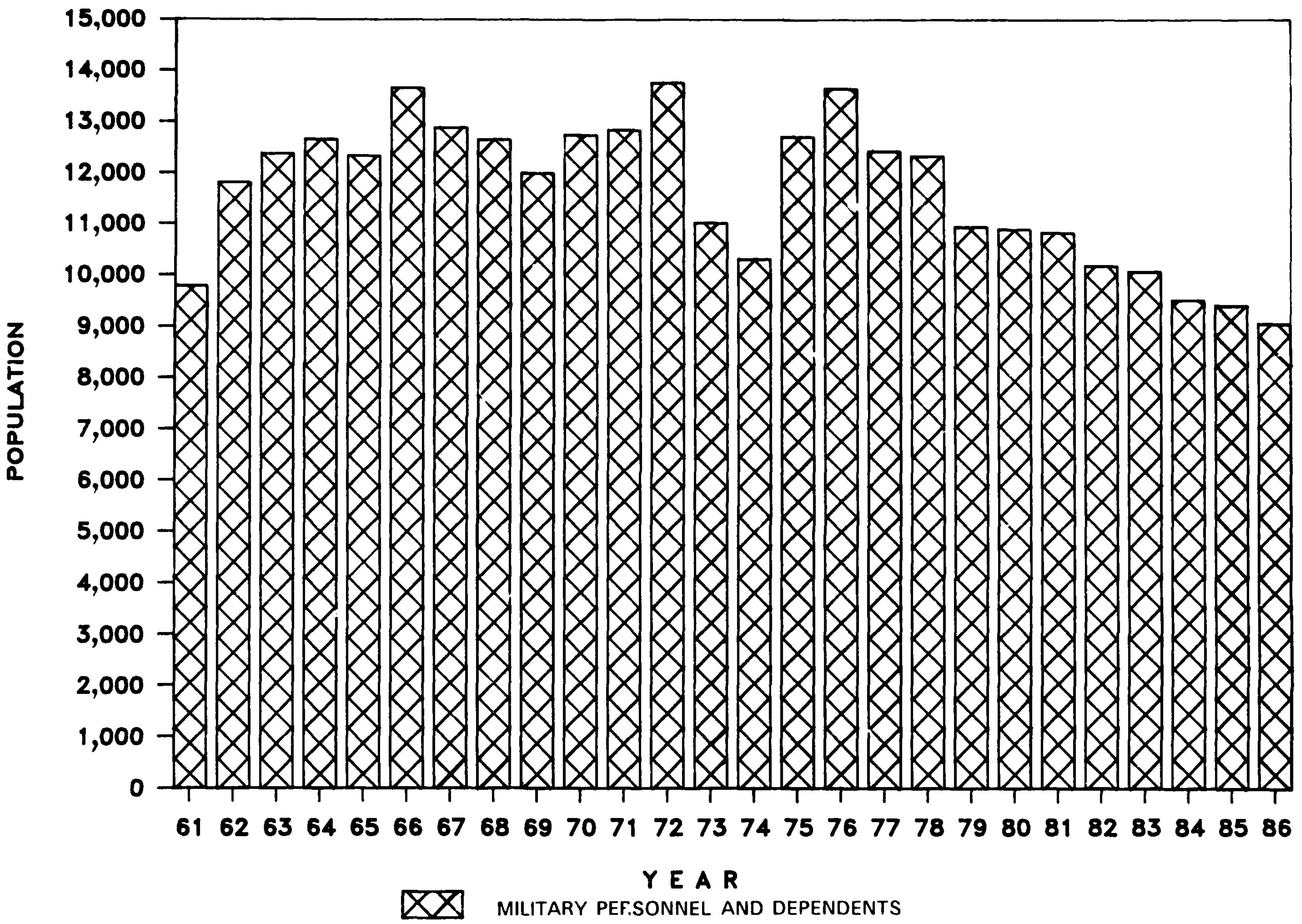


FIGURE 3.1.3-2 MALMSTROM AFB MILITARY POPULATION IN THE GREAT FALLS URBAN AREA, 1961 TO 1986

County population is projected to increase gradually through the year 2000, from its 1984 level of 81,800 to a projection of 89,900 for the year 2000. About 70 percent of this growth is forecast for the urban planning area around Great Falls. The population of the urban area is projected at 72,700 in 1990 and 74,700 in the year 2000.

Fergus County. The population of Fergus County was estimated at 12,900 persons in 1984. This was a slight increase from its 1970 level of 12,600. The City of Lewistown had a 1984 population estimated at 6,900. Fergus County's population is projected to grow slightly, to 13,600 by the year 2000, while Lewistown's population would increase to 7,300 in the same period.

Pondera County. The county's 1984 population is estimated at about 7,100. This was an increase over its 1970 level of 6,600. The City of Conrad had a 1984 population estimated at approximately 3,100, also an increase from its 1970 level of 2,800. Conrad's population showed no net change between 1980 and 1984, though the county's population increased during this period by about 400. Both Pondera County and the City of Conrad are projected to gradually gain population through the year 2000, reaching approximately 7,500 for the county and 3,700 for the city.

3.1.3.3 Housing

Great Falls Urban Area.

Permanent Housing Units. The Great Falls urban area (Figure 3.1.3-3), which corresponds to planning divisions 1 through 8, includes most of census tracts 1 through 20. In this area, the total number of permanent year-round housing units was estimated at 27,253 in 1980. Vacancies were estimated to be 2,240 (8.2%), with 337 units vacant "for sale only," 1,385 units vacant "for rent," 232 units awaiting occupancy or held for occasional use, and 286 units classified as "other vacant." Using the housing vacancy survey, it was estimated that 29,252 permanent year-round units existed in 1985 of which 1,487 were vacant. Available vacancies were estimated to be 3.3 percent, or approximately 970 units.

Currently, there are 2,030 low-income housing units (1,540 private and 490 public) in Great Falls with an additional 60 under construction. Low-income housing units in Great Falls are always occupied and are not available in sufficient quantities to meet the current demand, even with planned additions.

Based on the demand created by population growth, the supply of permanent housing units in the Great Falls urban area is expected to grow from 30,300 units in 1990 to 31,100 units by the year 2000. Available vacancies are projected to exceed 850 between 1990 and the year 2000. This change in permanent housing occupancy includes the offbase housing requirements for the KC-135R air refueling mission.

Temporary Housing Units. The temporary housing stock in the City of Great Falls in 1986 included 4 private campgrounds (260 sites) and 32 hotels/motels (1,600 rooms), with an average annual vacancy rate of about 75 percent and 50 percent, respectively. During the peak season, June to August, the vacancy rate decreases to approximately 40 percent for campgrounds and 25 percent for hotels/motels. However, on a few weekends during the summer, all sites and rooms are filled. Because of relatively high annual vacancy rates, no new facilities are planned.

Malmstrom Air Force Base. Malmstrom AFB has 1,406 housing units including 710 Capehart, 492 Wherry, 4 appropriated, and 200 "relocatable" modular homes on

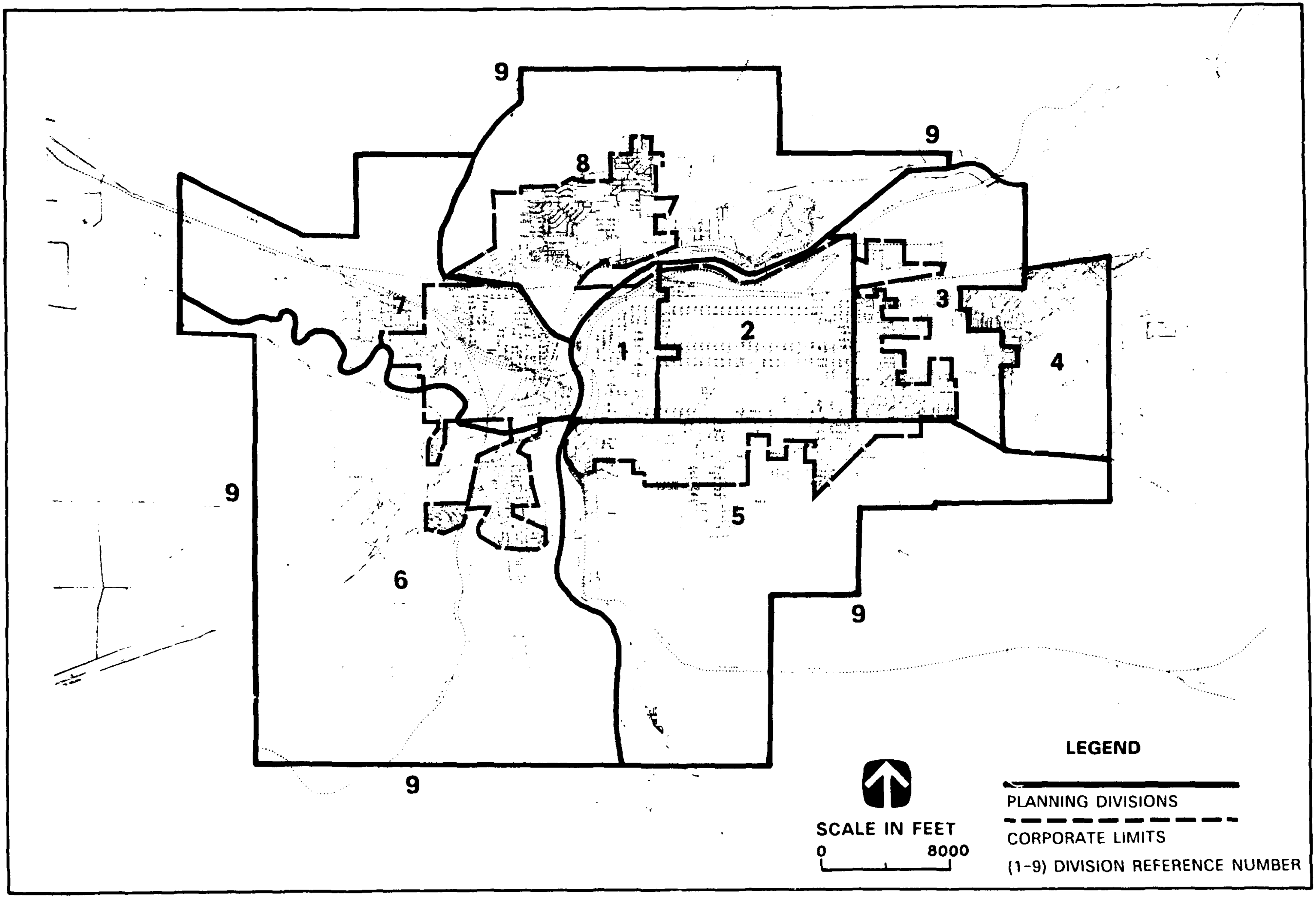


FIGURE 3.1.3-3 CITY OF GREAT FALLS AND CASCADE COUNTY PLANNING DIVISIONS

permanent foundations. These units are currently 99.7 percent occupied. An onbase mobile home area with capacity for 100 units exists for military personnel use, and is 50 percent occupied. In addition, there are 40 units of temporary living quarters for inbound or outbound families.

Malmstrom AFB has the facilities to house 40 unaccompanied officers and 1,663 unaccompanied enlisted personnel. All unaccompanied personnel dormitories are currently fully occupied. The renovation of three dormitories in 1987 and of an additional two dormitories in 1988 will reduce the personnel capacity of these quarters by 200. Transient quarters include space for 40 officers and 48 enlisted personnel.

City of Lewistown.

Permanent Housing Units. Permanent year-round housing units in the City of Lewistown in 1980 were reported at 2,935 by the U.S. Bureau of the Census. Approximately 22 units were identified as vacant "for sale only," 94 units "for rent," and 103 units were identified as "other vacant." Local realtors feel that these conditions reflect the current housing stock in Lewistown.

Temporary Housing Units. The temporary housing stock in the City of Lewistown in 1986 included 286 hotel/motel rooms and 66 private campground spaces. Average annual vacancy rates in these facilities are about 45 and 60 percent, respectively. During the peak season, June through November, these rates fall to between 10 and 15 percent. There are no available vacancies during some summer and fall weekends. There are an additional 100 commercial recreational vehicle sites available. Because of relatively high annual vacancy rates, no new facilities are planned.

City of Conrad.

Permanent Housing Units. Permanent year-round housing in the City of Conrad was reported at 1,291 units in 1980 by the U.S. Bureau of the Census. Of these, 144 (11.1%) were identified as being vacant. Twenty-three of these vacant units were "for sale only," 88 were "for rent," and 33 were identified as being "other vacant." Since 1980, 29 new homes and 13 new mobile homes have been added to the housing stock in the City of Conrad bringing the total number of year-round units to 1,333 in 1986. Local realtors have estimated vacancies at 5 units (0.4%) for sale and 24 units (1.8%) for rent.

Temporary Housing Units. The temporary housing stock in the City of Conrad in 1986 was estimated at 115 hotel/motel rooms and 75 existing mobile home spaces which could be used to park recreational vehicles. Conrad has no private campgrounds. Average annual vacancy rates in Conrad run about 40 percent. This rate decreases to about 10 percent in the summer. Because of relatively high annual vacancy rates, no new facilities are planned.

3.1.3.4 Education

City of Great Falls. The GFPS system consists of two districts: District No. 1, an elementary school district (K-8), and District A, a high school district (9-12). The total GFPS system enrollment declined from a peak of 19,649 students in 1970 to 16,579 students in 1976-77 and to 12,193 students in 1986-87 (Table 3.1.3-3). There were 545 regular classroom teachers with an overall pupil-to-teacher ratio of 22-to-1. The GFPS system operates 15 elementary schools, 2 junior high schools, 2 high schools, and 3 education centers. In addition, three vacant school buildings have been maintained with a total design capacity of 1,900 students.

Table 3.1.3-3

Great Falls Public Schools Historical Enrollments (1976-1986) and Projected Enrollments (1987-2000) by Grade Level

Historical Enrollments	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87
Elementary (K-6)	7,910	7,753	7,356	6,681	6,540	6,467	6,389	6,440	6,407	6,481	6,603
Jr. High (7-8)	4,262	4,092	3,593	3,196	2,993	2,907	2,812	2,836	2,817	1,732	1,582
Sr. High (9-12)	4,407	4,299	3,905	3,684	3,382	3,057	2,892	2,765	2,708	3,595	3,558
Subtotal:	16,579	16,144	14,854	13,561	12,915	12,431	12,093	12,041	11,932	11,808	11,743
Special Ed	---	---	---	---	---	334	323	345	324	351	450
TOTAL:	16,579	16,144	14,854	13,561	12,915	12,765	12,416	12,386	12,256	12,159	12,193

Projected Enrollments	1987-88	1988-89	1989-90	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-2000	2000-01
Elementary (K-6)	6,736	6,983	7,032	7,185	7,285	7,343	7,330	7,311	7,335	7,354	7,354	7,354	7,354	7,354
Jr. High (7-8)	1,645	1,758	1,791	1,814	1,781	1,773	1,886	1,962	1,924	1,886	1,909	1,928	1,928	1,928
Sr. High (9-12)	3,373	3,277	3,202	3,177	3,266	3,333	3,332	3,328	3,407	3,474	3,539	3,569	3,560	3,545
Subtotal:	11,754	12,018	12,025	12,176	12,332	12,449	12,548	12,601	12,666	12,714	12,802	12,851	12,842	12,827
Special Ed	473	473	473	473	473	473	473	473	473	473	473	473	473	473
TOTAL:	12,227	12,491	12,498	12,649	12,805	12,922	13,021	13,074	13,139	13,187	13,275	13,324	13,315	13,300

Note: The senior high school enrollments included grades 10-12 prior to 1985-86 and grades 9-12 beginning in 1985-86. Junior high school enrollments included grades 7-9 prior to 1985-86 and grades 7-8 beginning in 1985-86.

Source: Great Falls Public Schools enrollment reports and demographic study projections 1987.

The number of regular classroom students in the GFPS system is projected at 12,176 in 1990; 12,666 in 1995; and 12,827 in the year 2000 (Table 3.1.3-3). The projections include about 300 students expected to enroll as a result of the KC-135R air refueling mission at Malmstrom AFB. It is anticipated that the number of special education students will stabilize at around 470, that the pupil-to-teacher ratio will increase to an overall ratio of 23-to-1 (which is below the state maximum standard), and that the number of certified teachers will increase to approximately 590. The existing facilities including the vacant facilities should be adequate to accommodate the projected increase in baseline enrollment. There are five private schools in Great Falls with a total enrollment of approximately 600 students.

City of Lewistown. The Lewistown Public School system consists of two school districts: Elementary District No. 1 (K-8) and High School District No. 1 (9-12). It includes three elementary schools (K-6), a junior high school (7-8), and a senior high school (9-12). The total design capacity of these facilities is 2,200 students. There are 102 certified teaching staff members and 68 noncertified teaching staff members, with a 1986-87 enrollment of 1,631 students. The projected enrollment for the two Lewistown school districts is expected to remain at the 1986-87 levels, or decrease slightly. Consequently, the projected staff and facility needs will not increase over the current situation.

City of Conrad. The Conrad Public Schools system consists of two school districts: Elementary District No. 10 (K-8) and High School District No. 10 (9-12). In the 1986-87 school year, a total of 742 students were enrolled in two elementary schools (K-5), one middle school (6-8), and one high school (9-12), with 70 certified teaching staff members. The pupil-to-teacher ratios in the two Conrad school districts were 14-to-1 for grades K through 8, and 11-to-1 for grades 9 through 12.

Future enrollments for the Conrad school districts are expected to remain at the 1986-87 levels with the exception of an increase of approximately 20 to 40 students anticipated in 1988 as a result of an Air Force Strategic Training Range installation locating in Conrad.

3.1.3.5 Public Services

City of Great Falls. In 1986, the City of Great Falls employed 406 persons in 16 departments, approximately 20 fewer employees than in the late 1970s. By 1999, city government employment is projected to reach 421 personnel as a result of the projected increase in population. A description of the Great Falls Police and Fire departments is provided because of their expressed importance to the community and relatively large budgetary requirements.

Police. In early 1987, the Great Falls Police Department had 63 sworn officers and 22 other administrative personnel. The department responded to about 21,000 calls for service in 1986, and operated 33 vehicles including 20 patrol cars. The number of personnel can be expected to increase slightly in the future to accommodate the increase in population. The city detention facility has a capacity for 19 persons, with an average daily occupancy of 15 to 17 prisoners. The average daily occupancy of this facility is expected to reach or exceed capacity because of projected future increases in population.

Fire. The Great Falls Fire Department provides service to the incorporated part of the city and has contracts with 15 neighboring communities and mutual-aid agreements with Malmstrom AFB, the Montana Air National Guard, and the Black Eagle Volunteer Fire

Department. In 1987, the Great Falls Fire Department had 68 firefighters and 4 administrative personnel. The department responded to 1,100 alarms in 1986, a 34-percent reduction from the 1983 level. Current staffing levels are sufficient to meet the needs of the community in the future unless housing expansion occurs some distance from current station houses. The fire district the department serves has a Class 2 overall fire-insurance rating. The Great Falls Fire Department has four fire stations that were designed to handle a population of up to 80,000; therefore, no need for additional facilities is foreseen.

Cascade County. In 1986, Cascade County had 587 employees in 45 departments. This number represents an annual average over the last 10 years. In order to maintain existing service levels, Cascade County will have to hire an additional 14 personnel by 1999 as a result of increased population growth.

Sheriff. In early 1987, the Cascade County Sheriff's Department had 34 sworn officers and 16 other administrative personnel. Staffing can be expected to increase slightly in the future as the population increases. The Sheriff's Department currently has 38 vehicles.

The county jail, built in 1914, is overcrowded; it has been housing between 55 and 65 prisoners exceeding its design capacity of 42 to 45. Two recent attempts (in 1982 and 1984) to fund a new jail by issuing public bonds have failed. The inadequate jail facilities will not meet the needs associated with the projected baseline population increases including additional military population from the KC-135R air refueling mission.

Fire. In 1986, the Cascade County Rural Fire Council, made up of 15 rural fire stations, was staffed by one salaried fire chief and 200 to 300 volunteers. The majority of the rural areas served by the council has a Class 10 fire-insurance rating. The council, which has 69 vehicles, responded to 200 calls in 1986.

Health. The City-County Public Health Department offers public and environmental health programs, and employs 30 full-time personnel. Among the services offered are preschool exams, women/infant/children (WIC) education programs, immunization clinics, and an air pollution control program. Currently, the immunization program is operating at capacity and the WIC program has a 4-month waiting list; many Malmstrom AFB personnel use this program.

The Golden Triangle Mental Health Center offers psychiatric and psychological services to an eight-county area in north-central Montana, with the Cascade County office handling between 60 percent and 70 percent of the total number of cases.

Human Services. The Cascade County Office of Human Services handles public assistance programs including aid to families with dependent children, food stamps, medical assistance, and a low-income energy assistance program. The office currently has 55 employees. However, in the last 3 years, the workload has increased substantially but staffing has not increased proportionately.

The Montana Department of Family Services in Cascade County protects children and adults from abuse and neglect. Services include counseling, foster care, and the provision of clothing and shelter. The department currently employs 17 social workers and works closely with representatives of the child abuse and spouse abuse programs at Malmstrom AFB.

Services Provided by Private Agencies. Malmstrom AFB offers its personnel and their dependents a wide array of services including medical care, child and spouse abuse programs, legal services, counseling, child care, community and family services, as well as library and recreational facilities. By providing these services to military personnel in the area, the Air Force relieves some of the burden of provision by community agencies.

Health and Hospitals. The medical facilities in the City of Great Falls include two major hospitals: Columbus Hospital, a 199-bed facility; and Montana Deaconess Medical Center, a 288-bed facility. Columbus Hospital employed a total of 647 full-time equivalent (FTE) employees in 1986, up from 500 in 1976. The current occupancy rate is 50 percent, compared to the 11-year peak of 78 percent in 1979. Montana Deaconess Medical Center employed a total of 951 FTE employees in 1986, up from 625 in 1976. The occupancy rate was 54 percent in 1986 compared to the 11-year peak of 66 percent in 1976.

Emergency Services. Bicsak Ambulance serves the Great Falls area, and in 1986, it had a staff of 15 with four vehicles. There are four crewmen on duty at all times manning two vehicles. In the last 4 years, calls for service have averaged approximately 10 per day, compared to the 1979 peak of 12 calls per day. In addition to ambulance service, Great Falls has the North Central Mercy Flight, an emergency air service that has been in operation for 5 years. In 1986, the North Central Mercy Flight averaged about one call per day; 70 percent of these calls were for scheduled transfers from smaller hospitals.

Human Services. Approximately 175 nonprofit community support groups provide emergency services (food and shelter), support, and information or referrals in the Great Falls area. The following private organizations have been included as major representative agencies in the Great Falls area: the Great Falls Community Help Line; Opportunities, Inc.; and the Salvation Army.

The Great Falls Community Help Line operates a 24-hour telephone service for persons in the community in need of information about human service agencies. In 1986, over half of the 13,830 calls were regarding the Mercy Home, which operates a temporary shelter for abused women and children, and offers counseling and consultations.

Opportunities, Inc. is a nonprofit community action group that helps people make the transition from public assistance to self-sufficiency. The agency employs 20 full-time and 25 part-time employees, and also relies on volunteers to assist with the various programs. Opportunities, Inc. handles the federal government commodity programs such as distribution of food to needy families when the commodities are available and also makes housing referrals.

The Salvation Army runs three programs: Outreach (food and shelter), Thrift Store, and Youth and Family Center. In 1986, a total of 20 FTE employees staffed the agency, with additional volunteer workers and general assistance workers. The paid staff is ten FTE fewer than 1 year ago because of budget cuts. The shelter capacity is 50 persons and approximately 70 persons are served meals each day.

City of Lewistown. In 1986, there were 165 employees in local government in 14 city departments. No change in city personnel is expected over the study period. A description of police and fire departments is provided because of their expressed importance to the community and relatively large staffing and budgetary needs.

Police. The Lewistown Police Department consists of 11 officers and 4 administrative personnel, and this has been the staffing level for the last 15 years. The Lewistown Police Department responded to 4,240 calls in 1985, with an annual average of 3,063 calls over the last 10 years. The city and Fergus County share a jail facility which can handle 39 prisoners and has a current average daily population of 3 prisoners.

Emergency services for the city and parts of Fergus County are provided by the Lewistown Police Department. Lewistown has 15 trained certified technicians who man two emergency vehicles. These technicians average about one call per day.

Fire. The Lewistown Fire Department, which has a Class 4 fire-insurance rating, is staffed by 7 full-time firefighters and 18 part-time firefighters. The fire station is equipped with two 1,000-gallon-per-minute (gpm) pumpers and one 65-foot snorkel pumper. In addition, the rural fire district has a 750-gpm pumper. In 1986, the department responded to 136 calls for service.

Fergus County. Fergus County employs 68 full-time and 32 part-time employees and has 24 departments. The Roads Department is the largest with 20 employees. No change in county personnel is expected over the study period. The Fergus County Sheriff's Department and health and hospitals were analyzed further due to their expressed importance to the community.

Sheriff. The Fergus County Sheriff's Department has eight employees. The county jail, which is shared with the City of Lewistown, is located in the same structure as the Sheriff's Department. The Fergus County Sheriff's Department received 17,432 radio calls in 1985.

Health and Hospitals. The Central Montana Hospital in Lewistown has 47 licensed beds with an average daily census of 19 patients. The Central Montana Nursing Home has 70 licensed beds and the Vale Vista Manor in Lewistown has 95 licensed beds for long-term care.

City of Conrad. The City of Conrad employs 33 persons in eight departments. No change in city personnel is expected over the study period. A description of the Conrad Police and Fire departments is provided because of their expressed importance to the community and relatively large budgetary needs.

Police. In 1986, the Conrad Police Department was staffed by five officers. The department had two vehicles and responded to an average of 120 calls per month. The jail population has averaged two to three prisoners per day. A new jail facility, which will be shared with the county, is planned to open in the near future.

Fire. The Conrad Fire Department serves the city and parts of the surrounding rural areas. The department has an all volunteer staff of 22. In 1986, the department responded to 9 city calls and 17 rural calls. The city has a Class 5 fire-insurance rating while the majority of the surrounding rural areas have a Class 10 fire-insurance rating. The department has two vehicles, one 750-gpm pumper and one 1,000-gpm pumper. The rural areas have an additional 750-gpm pumper.

Pondera County. Pondera County employs 100 full-time and 30 part-time employees in 20 departments. The Roads Department is the largest with 28 employees, including summer employment. No change in county personnel is expected over the study period. The Sheriff's Department, health and hospitals, and emergency services were analyzed due to their expressed importance to the community.

Sheriff. The Pondera County Sheriff's Department has five full-time and three part-time officers. The jail averages two prisoners per day. The new jail, expected to be completed by the summer of 1987, will have a capacity of approximately 16 prisoners.

Health and Hospitals. The Pondera Medical Center has 34 acute-care beds and 78 nursing home beds, with an average daily census of four patients. Pondera County Ambulance provides service to the county as well as nearby areas in Toole and Teton counties. As of February 1987, Pondera County Ambulance had 20 personnel. The company has three vehicles and responds to an average of 250 to 275 calls per year; the majority of these calls are for traffic-related incidents.

3.1.3.6 Public Finance

City of Great Falls. City revenues and expenditures were $17.6 million and $16.4 million, respectively, in fiscal year (FY) 1986 (Table 3.1.3-4). In constant 1986 dollars, the decline in expenditures and revenues from FY 1980 to FY 1983 was 25 percent and 30 percent, respectively, while the recent increases ranged from 14 to 19 percent. Outstanding general obligation bond indebtedness was $2,440,000 as of FY 1986. This represented about 15 percent of the general obligation bonding capacity of the city.

Taxable valuation of property in the city grew slowly from $48.9 million in 1970 to $60 million in 1985 (current dollar values). However, the 1986 reappraisal resulted in a reduction to approximately $53.7 million. Measured in constant 1986 dollars, taxable valuations dropped over 50 percent since 1970.

Based on historical fiscal and population patterns and projected population and economic growth over the forecast period, revenues and expenditures are assumed to increase to approximately $22 million (constant 1986 dollars) and stabilize at these levels through FY 2000 (Table 3.1.3-4).

Cascade County. Revenues of the county's governmental funds were $12.8 million in FY 1986 (Table 3.1.3-5). By FY 1986, revenues had declined by 25 percent from the FY 1981 levels. Expenditures in FY 1981 were $15.9 million and by FY 1986 amounted to only $12.6 million. In constant 1986 dollars, the decline in both revenues and expenditures has been approximately 40 percent from FY 1981 to FY 1986. The county has no general obligation bond indebtedness.

Taxable valuation of property in the county has experienced a similar pattern of decline as in the city. In constant 1986 dollars, taxable valuation in the county has dropped approximately 50 percent since 1976. Unlike the city, however, the 1986 reappraisal resulted in a slight increase in 1986 valuations, from $91.6 million in 1985 to $92.2 million in 1986.

The fiscal outlook for FY 1988 and beyond depends on action taken by the Montana State Legislature in response to the passage of Initiative 105 and the health of the state and local economies. While the recent upturn in taxable valuation in the county appears to signal a turnaround in recent trends in the county's tax base, protested reappraisals leave the estimated tax collections for FY 1987 in doubt. If current economic trends continue, revenues and expenditures can be expected to continue to decline through FY 1988. Any improvement in the county's fiscal position is assumed to be limited to a stabilization of revenues and expenditures at the current levels.

Table 3.1.3-4

City of Great Falls Revenues and Expenditures
All Governmental Funds
FY 1980-2000
(million $)

Fiscal Year	Current Dollars			Constant 1986 Dollars		
	Revenues	Expenditures	Net	Revenues	Expenditures	Net
1980	$15.9	$13.3	$2.6	$22.1	$18.5	$3.6
1981	16.5	15.9	0.6	21.2	20.4	0.8
1982	14.5	15.0	(0.5)	17.4	18.0	(0.6)
1983	13.5	12.0	1.5	15.4	13.8	1.6
1984	15.7	13.5	2.2	17.2	14.8	2.4
1985	16.0	14.5	1.5	16.6	15.0	1.6
1986	17.6	16.4	1.2	17.6	16.4	1.2
1990	24.1	24.1	0.0	22.0	22.0	0.0
1995	33.6	33.6	0.0	22.3	22.3	0.0
2000	45.8	45.8	0.0	22.6	22.6	0.0

Note: Governmental funds include general, special revenue, debt service, capital projects, and special assessment funds. Enterprise, trust, and internal service funds are excluded. Current dollar estimates of forecasted expenditures and revenues based on average annual increases in price deflator for gross national product of 3.6 percent per year over the 1985-1990 period; 5.5 percent per year over the 1990-1995 period; and 6.1 percent per year over the 1995-2000 period.

Sources: Douglas Wilson and Company 1980, 1984; Junkermier et al. 1982; Montana Local Government Services Division 1984; Council of Economic Advisors 1986; Data Resources, Inc. 1987.

Table 3.1.3-5

Cascade County Revenues and Expenditures
All Governmental Funds
FY 1981-2000
(million $)

	Current Dollars			Constant 1986 Dollars		
Fiscal Year	Revenues	Expenditures	Net	Revenues	Expenditures	Net
1981	$17.0	$15.9	$1.1	$21.9	$20.5	$1.4
1982	14.6	14.2	0.4	17.5	17.0	0.5
1983	14.0	15.4	(1.4)	16.1	17.7	(1.6)
1984	14.0	14.1	(0.1)	15.3	15.4	(0.1)
1985	14.1	13.4	0.7	14.6	13.8	0.8
1986	12.8	12.6	0.2	12.8	12.6	0.2
1990	13.4	13.4	0.0	11.6	11.6	0.0
1995	17.8	17.8	0.0	11.8	11.8	0.0
2000	24.1	24.1	0.0	11.9	11.9	0.0

Note: Governmental funds include general, special revenue, debt service, capital projects, and special assessment funds. Enterprise, trust, and internal service funds are excluded. Current dollar estimates of forecasted expenditures and revenues based on average annual increases in price deflator for gross national product of 3.6 percent per year over the 1985-1990 period; 5.5 percent per year over the 1990-1995 period; and 6.1 percent per year over the 1995-2000 period.

Sources: Cascade County Clerk and Recorder 1981; Council of Economic Advisors 1986; Data Resources, Inc. 1987.

Great Falls Public Schools. Budgeted general fund revenues and expenditures of the Great Falls Elementary School District No. 1 were $22.1 million in FY 1987 and have grown from $15.1 million in FY 1980. In constant 1986 dollars, expenditures and revenues have remained relatively stable at approximately $21 million and are assumed to increase slightly as enrollments increase (Table 3.1.3-6). Outstanding general obligation bond indebtedness was $1,339,000 as of March 1986, representing about 4 percent of the bonding capacity of the district. Under the P.L. 81-874 program, Elementary School District No. 1 received approximately $400,000 in FY 1986. Eligible enrollments in FY 1986 consisted of 820 regular "A" students, which resulted in $370,070 in contributions, and [illegible]35 regular "B" students, which resulted in $26,900 in contributions.

Budgeted general fund revenues and expenditures of the Great Falls High School District No. A were $13.5 million in FY 1987 and have increased from FY 1980 levels of $9.3 million. In constant 1986 dollars, revenues and expenditures have been relatively stable at approximately $13 million. Outstanding general obligation bond indebtedness as of March 1986 amounted to $3,189,000, representing 9 percent of the bonding capacity of High School District No. A. Under the P.L. 81-874 program, High School District No. A received approximately $100,000 in FY 1986. Eligible enrollments in FY 1986 consisted of 144 regular "A" students, which resulted in $88,400 in contributions, and 551 regular "B" students, which resulted in $12,800 in contributions.

City of Lewistown. Lewistown governmental fund revenues and expenditures amounted to approximately $1.7 million in FY 1986. General obligation bond indebtedness consisted of three issues with approximately $708,100 outstanding as of FY 1986, representing 50 percent of the city's general obligation bond capacity.

Fergus County. Fergus County governmental fund revenues and expenditures amounted to approximately $3 million in FY 1985, up from approximately $2.7 million in FY 1983. The county has no general obligation bond indebtedness. In constant 1986 dollars, revenues and expenditures have remained fairly stable at approximately $3 million.

Lewistown Public Schools. Lewistown Elementary School District No. 1 budgeted revenues and expenditures for FY 1987 are approximately $2.7 million. Expenditures (enrollment based) per pupil were $2,300 in FY 1987. In constant 1986 dollars, total revenues and expenditures as well as per pupil costs have been declining steadily since FY 1983 when revenues and expenditures amounted to $2.8 million and costs were approximately $2,500 per pupil.

Lewistown High School District No. 1 budgeted revenues and expenditures in FY 1987 were $1.7 million, up 5.6 percent from FY 1986 levels. In constant 1986 dollars, the increase was 2.6 percent, which represented a reversal of steadily declining budget levels since FY 1983. Costs per pupil were $3,200 in FY 1987. These costs have been declining since FY 1983 when they amounted to $3,700 per pupil.

City of Conrad. Conrad governmental fund revenues amounted to approximately $940,000 in FY 1986, about equal to FY 1983 levels, but down from FY 1984 levels of $1.1 million and FY 1985 levels of $1 million. Expenditures have fluctuated between $750,000 and $850,000 over the same period. The city has no general obligation bond indebtedness.

Pondera County. Pondera County governmental fund revenues amounted to approximately $3.4 million in FY 1986, up from $2.8 million in FY 1985. Expenditures were $3.7 million in FY 1986, up from $3 million from the previous year. General obligation

Table 3.1.3-6

Great Falls Public Schools
Budgeted General Fund Revenues and Expenditures
FY 1980-2000
(million $)

Fiscal Year	Elementary School District No. 1		High School District No. A	
	Current	Constant 1986$	Current	Constant 1986$
1980	$15.1	$21.1	$ 9.3	$13.0
1981	16.0	20.6	9.9	12.7
1982	17.6	21.1	10.4	12.5
1983	18.6	21.3	11.3	13.0
1984	20.0	21.8	12.2	12.9
1985	20.7	21.4	12.5	13.0
1986	21.4	21.4	12.9	12.9
1987	22.1	21.4	13.5	13.1
1990	26.6	23.1	13.7	11.9
1995	36.4	24.2	18.5	12.3
2000	49.2	24.3	26.5	13.1

Note: Budgeted revenues, by definition, equal budgeted expenditures. Projections assume constant per pupil expenditure rate based on FY 1987 budgeted revenues and expenditures and estimated school year 1986-87 regular and special education enrollments.

Sources: Great Falls Public Schools n.d[a]; Data Resources, Inc. 1987.

bond indebtedness amounted to $99,000 as of FY 1986, representing 3.6 percent of the county's bonding capacity.

Conrad Public Schools. Conrad Elementary School District No. 10 budgeted revenues and expenditures for FY 1987 are $1.5 million, up 2.6 percent from FY 1986 levels. Costs per pupil in constant 1986 dollars remained stable at approximately $2,900. Conrad High School District No. 10 budgeted revenues and expenditures for FY 1987 are $1 million, up 9.4 percent from FY 1986 levels. Costs per pupil in constant 1986 dollars rose from approximately $3,700 in FY 1986 to $4,150 in FY 1987. The district has no long-term general obligation bond indebtedness.

Montana State Government. State government finances have been adversely affected by the recent statewide economic slowdown. General fund revenue shortfalls in 5 of the last 6 years have been registered. The FY 1987 general fund revenue shortfall is estimated at approximately $44 million ($347.3 million in revenues compared to $391.3 million in expenditures). The FY 1987 shortfall was funded by a $35-million transfer from the educational trust fund and monies left from the previous fiscal year. The current fund balance is estimated at approximately $16 million, representing approximately 4.1 percent of general fund expenditures.

Forecasted revenue shortfalls over the next biennium (FY 1988 and FY 1989) have been funded by the 1987 legislature through a combination of transfers from educational and coal tax trust funds and a 10-percent personal income tax surcharge. Other major tax measures enacted by the legislature include an increase in the gasoline tax of 3 cents per gallon; a change in motor vehicle taxes from a flat fee to a 2-percent tax based on the value of the vehicle; a reduction in coal severance taxes from 30 percent to 15 percent (assuming the industry increases production to meet target production rates); implementation of a statewide property tax freeze; and a 4-percent accommodations tax to be added to the price of hotel/motel rooms, as well as campground accommodations.

3.2 Utilities

The increased demand for utility services during the construction and operations phases of the Small Intercontinental Ballistic Missile program at Malmstrom Air Force Base (AFB) may affect the current service levels of towns, counties, or private firms. The utilities most likely to be affected by the proposed program are potable water treatment and distribution, wastewater, solid waste, and energy utilities.

3.2.1 Resource Description

For this analysis, all issues that affect the performance of community and private systems that service the local area are considered.

3.2.1.1 Potable Water Treatment and Distribution

The potable water treatment and distribution element considers the facilities that distribute water of a specific quality to meet municipal and industrial demands. The water supply system is used for diverting water from its natural state, treating it to a desired quality, storing it, and distributing it to final users.

3.2.1.2 Wastewater

The wastewater disposal system element considers the facilities that provide collection, treatment, and disposal of nonhazardous waterborne wastes generated by municipal and industrial users. The wastewater system includes collection, treatment, and disposal of wastewater generated within a defined service area.

3.2.1.3 Solid Waste

The solid waste element examines the facilities and systems that provide collection and disposal of solid waste products from municipal and industrial sources. The solid waste element includes a discussion of the disposal of hazardous wastes within the study area.

3.2.1.4 Energy Utilities

The energy utilities element includes electricity, natural gas (and other heating fuels), gasoline, and diesel fuel. These energy types account for the majority of energy consumed in the study area. The element includes a discussion of major energy generators and suppliers, associated transmission and distribution systems, and also identifies state and Air Force energy conservation programs.

3.2.2 General Analysis Methodology

3.2.2.1 Region of Influence

The Region of Influence (ROI) for the utilities resource is the geographic area where community utility service may be directly or indirectly affected by the proposed program. The demographics analysis (Section 3.1) identified the communities expected to have a notable population change. Based on this analysis and the data collected on the installation of the Minuteman system, the major population centers of Great Falls, Lewistown, and Conrad are the communities closest to potential worksites and are the focus of the utilities analysis.

Service area boundaries in these communities define the ROI for the potable water, wastewater, and solid waste elements. The ROI for the energy utilities element is defined by the service areas of those companies providing power and fuel to the communities and to Air Force facilities located in the deployment area.

3.2.2.2 Potable Water Treatment and Distribution

Municipal water systems potentially affected by the proposed program were contacted and a historical profile of their use was generated. When available, data for a 5-year period were collected to identify trends in the amount of water treated and distributed. Maximum daily demands and peak-hour demand data were collected in addition to average daily demands. If a breakdown of major water users was available, it was used in the development of per capita water rates for residential, industrial, and other water users. Potable water demands at Malmstrom AFB were analyzed separately and as part of the overall demand on the Great Falls system.

The data collected were used to evaluate current demands on the system and to perform the future baseline demand forecasts. In addition, these data helped evaluate the adequacy of existing treatment processes and the sizes of any additional facilities. The soundness of current distribution systems and any proposed improvements were reviewed along with the current maintenance program. In addition to data on the performance of the treatment and distribution system, data on water rates, operation and maintenance (O&M) budgets, and staffing levels were incorporated into this analysis.

3.2.2.3 Wastewater

Wastewater treatment facilities in each community affected by the proposed program were assessed as to their ability to process additional flows and continue to meet their discharge requirements. The analysis began with an assessment of the flows processed in the past 5 years. Data concerning the service area and number of customers assisted in developing per capita rates. These rates were used to forecast future wastewater flows, which were then compared to existing and future capacities. Wastewater facilities at Malmstrom AFB were analyzed separately and as part of the overall demand on the Great Falls system.

Storm drainage systems are analyzed in Section 3.9. In addition to data on the performance of the treatment and collection system, data on sewer rates, O&M budgets, and staffing levels were incorporated in this analysis.

3.2.2.4 Solid Waste

Individual solid waste facilities that may be affected by the proposed program were identified and evaluated. Average daily disposal rates were developed through communication with each facilities' owners and operators. If this information was not available, disposal volumes were calculated using an equation that takes into account the per capita rates, cover requirements, and compaction ratios. Based on this information, the capacity of the existing disposal sites was calculated and the lifespan of the facilities identified. Waste generation at Malmstrom AFB was assessed separately and as part of the overall demand on the local system.

For each facility or system, current operating costs were obtained in terms of their collection and disposal rates. Staffing levels and O&M budgets were analyzed. Proposed facility expansions or equipment and staffing additions were noted as part of the baseline analysis.

Hazardous waste treatment, storage, and disposal facilities within the ROI were identified and the characteristics of the facility were recorded. Known hazardous waste sites were identified and the data were provided to the water resources group so that the potential effect on surface and groundwater resources could be assessed.

3.2.2.5 Energy Utilities

Major utility companies that provide electricity and natural gas, along with local suppliers of liquid fuels and other alternative energy sources, were included in the study. For electricity and natural gas suppliers (and, to some extent, liquid fuel distributors), the service area of the supplier extended beyond the ROI identified for the potable water, wastewater, and solid waste elements. Energy consumption at the base and the outlying facilities was assessed separately. Energy resources were evaluated in terms of historical use and price. Energy use identified per capita annual consumption of electricity (in kilowatt-hours [kWh]), natural gas (in thousand cubic feet [Mcf]), and gasoline and diesel fuel (in gallons).

Unit costs for these energy forms were obtained from the suppliers or derived from average annual customer costs. Information on consumption and cost was obtained from energy utility suppliers in the ROI, and federal energy data reports were used to verify these data.

Each energy service was analyzed to determine existing capacities and the ability to meet demands, as well as the nature of the systems, their size, extent and existing conditions, and frequency of energy interruptions and system disturbances. This portion of the analysis included a description of the capacities and reserve margins of electrical-generating systems, natural gas reserves, liquid fuel supply contract quantities, and in addition, facilities plans, energy conservation programs, and use of nonrenewable energy resources.

3.2.3 Existing and Future Baseline Conditions

3.2.3.1 Potable Water Treatment and Distribution

Water treatment and distribution data for the systems servicing cities within the ROI are identified in the following sections. These systems are currently providing adequate service to their customers and do not anticipate any difficulties in meeting future demands.

City of Great Falls. The City of Great Falls provides potable water to approximately 64,600 persons, including Malmstrom AFB. The existing daily demands, met with diversions from the Missouri River, average 11.63 million gallons per day (MGD). In 1985, maximum daily peak demand was 39.85 MGD and minimum daily use was 5.05 MGD. The existing water treatment facility has a capacity of 48 MGD. The distribution system consists of 5 pumping stations and 11 storage tanks (15.7 million gallon [MG] capacity).

The service area population for the Great Falls water system will increase to 66,800 persons by 1990 and to 68,300 persons in the year 2000. Average daily potable water requirements are expected to increase to 12.24 MGD in 1990 and to 12.51 MGD by the year 2000. Adequate capacity will continue to be available through the year 2000, with the plant operating at 26 percent of capacity.

Malmstrom Air Force Base. Potable water use at Malmstrom AFB equaled 367 MG in fiscal year (FY) 1985. The present contract with the city allows for the use of 460 MG of water per year at a cost of $191,000. The base receives this supply through a 12-inch and an 8-inch main and monitors the quality to determine if additional chlorine is needed. Total capacity of the interconnection at 70 pounds per square inch is estimated to be 3.37 MGD. Onbase storage tank capacity equals 2.2 MG with an additional 0.6-MG tank at the Weapon Storage Area for fire protection.

Onbase potable water requirements will increase by 73 MG annually as a result of the KC-135R air refueling mission. This additional demand will increase average daily use to a total of 1.16 MGD by 1990. Onbase water use should remain relatively constant through the year 2000.

City of Lewistown. Potable water is supplied to Lewistown from Big Springs, which is located approximately 7 miles southeast of the city. Two pipelines (16- and 20-inch) supply up to 6.9 MGD to approximately 7,100 residents. This includes 75 customers whose property is adjacent to the city's water supply lines but is located outside the city limits. Average daily water use from 1983 to 1986 equaled 1.8 MGD with peak demands averaging 3.1 MGD. Two elevated steel storage tanks provide 1.35 MG of potable water for use in meeting peak demands and firefighting purposes. Voluntary water restrictions have been instituted during the summer to control lawn watering and other uses.

Lewistown's service area population will be 7,300 in 1990 and 7,500 in the year 2000, including 200 persons outside the city limits. The average daily demands will increase to 1.85 MGD in 1990 and 1.9 MGD in the year 2000. The city's system can presently supply 6.9 MGD, and average daily demands will equal 28 percent of capacity in the year 2000. Adequate capacity will be available for future growth without the construction of any additional system facilities.

City of Conrad. Potable water is supplied to the City of Conrad from Lake Frances, which is located approximately 12 miles to the northwest. Water is obtained from the Pondera Canal and Reservoir Company and is delivered to the city through two 12-inch pipelines. Two 2,000-gallon-per-minute (gpm) pumps deliver the supply to a 2.85-MGD filtration facility. Storage consists of two 1-MG storage tanks. Currently, average daily demands equal 0.45 MGD with maximum daily demands reaching 1.5 MGD.

Conrad's service area population is projected to increase to 3,400 in 1990 and 3,700 in the year 2000. Potable water demands will increase to 0.48 MGD in 1990 and 0.52 MGD in the year 2000. The filtration facility will be operating at 18-percent capacity in the year 2000, with adequate capacity to meet projected demands.

3.2.3.2 Wastewater

Wastewater treatment facilities serving the ROI are identified in the following sections. Each of the facilities examined has adequate capacity for existing and future demands.

City of Great Falls. Wastewater from Great Falls and Malmstrom AFB is treated at a regional wastewater facility operated under contract with the City of Great Falls by Envirotech Operating Services. This activated-sludge facility has a design capacity of 21 MGD and 60,000 pounds per day of total solids. Average daily flows to the facility, generated by approximately 64,600 persons, were 9.4 MGD in 1986 including a flow of 0.65 MGD from the base. Discharges from the plant to the Missouri River have consistently met the Montana Pollutant Discharge Elimination System permit requirements.

An older portion of the sewer system in the city's downtown area still consists of combined storm and sanitary sewers. During rainstorms and periods of rapid snow melt, high flows enter this system. During such conditions, untreated wastewater has entered the Missouri River since the flows exceed the capacity of the pump station at 6th Street and River Drive. Under these conditions, flows at the treatment plant have ranged from 30 to 50 MGD or three to five times above normal. To alleviate these problems, the city has incorporated sewer replacement and improvement projects, including improvements to the northeast interceptor, into its budget. Current efforts include the Heren Park relief sewer, separation of combined downtown sewers ($1.3 million), the south interceptor sewer, and $536,000 in sewerline replacements.

The service population of the Great Falls treatment plant will increase to 66,800 persons by 1990 and to 68,300 persons in the year 2000. Wastewater flows are anticipated to increase to 9.6 MGD in 1990 and to 9.9 MGD by the year 2000. With the plant operating at 47 percent of capacity by the year 2000, adequate capacity will continue to be available at the existing 21-MG, activated-sludge facility. Additional capacity will become available as the city continues to implement improvement plans that reduce infiltration/inflow to the sewer system.

Malmstrom Air Force Base. Wastewater generation at Malmstrom AFB averages 0.65 MGD with peak flows equaling 0.9 MGD. The sewer system flows to a lift station on the northern edge of the base that pumps the sewage through a 12-inch force main to the Great Falls system. Capacity of the force main is estimated at 1,900 gpm or 2.74 MGD. The present contract with the city provides for the treatment of 300 MG of effluent at a cost of $150,000. In FY 1985, the city processed a total of 236 MG of sewage from the base at a cost of $124,931.

With the addition of the KC-135R air refueling mission, it is estimated that wastewater flows will increase by 0.10 MGD in 1989 to 0.75 MGD. Currently, there are no improvements planned to the base system other than the tie-ins associated with the new mission. Adequate capacity will be available in the existing force main to handle these wastewater flows.

City of Lewistown. Wastewater is treated at a recently improved secondary treatment plant with a capacity of 2.83 MGD. The plant discharges approximately 2.38 MGD to Big Spring Creek. Wastewater flows processed at the treatment plant are being surcharged by groundwater that is infiltrating into the sanitary sewers. This condition is especially prevalent in the southern part of the city where the groundwater table is high and the sewers are made of tile with unsealed joints. The extent of this problem is illustrated by comparing the water use of 1.8 MGD to the actual wastewater processed, which is 2.38 MGD. Currently, there is no specific program planned to alleviate this problem.

Lewistown's service area population is expected to grow to 7,100 persons in 1990 and to 7,300 persons by the year 2000. Wastewater flows are estimated to increase to 2.5 MGD in 1990 and remain at that level through the year 2000. Flows are expected to stabilize as infiltration to the system is reduced as a result of a periodic maintenance of sewers and manholes and emergency replacements of pipe sections. In the year 2000, the treatment plant will be operating at 87 percent of capacity and it will be adequate to process the projected flows.

City of Conrad. Wastewater generated by the City of Conrad is treated in a lagoon system that consists of one aerated pond and two settling ponds and has the capacity for a service population of 6,000 persons. Average daily flows in 1986 were 0.43 MGD; however, wet springtime weather produced high groundwater conditions that led to infiltration problems in the city's sewer system and increased flows by 34 percent. Typically, wastewater flows have averaged 0.32 MGD or approximately 100 gallons per capita per day. Currently, the ponds operate at 60-percent capacity and discharge to the Dry Fork-Marias River.

Conrad's wastewater flows are expected to increase to 0.35 MGD in 1990 and 0.38 MGD by the year 2000. The existing lagoons will be operating at 62-percent capacity in the year 2000 with adequate capacity to treat projected flows.

3.2.3.3 Solid Waste

Solid waste collection and disposal service in the ROI is summarized in the following sections. Currently, the systems are adequate to service all residential and commercial collection and disposal needs.

City of Great Falls. The City of Great Falls Public Works Department provides collection and disposal service to 10,000 residential and 1,200 commercial customers within the city limits. Approximately 225 tons per day (T/day) are disposed at the city-owned landfill and the city is leasing an additional 40 acres adjacent to the site for future disposal requirements. The remaining service life of both sites is estimated to be 15 years.

Collection and disposal is also provided by two private companies: Greens Disposal and Black Eagle Disposal (both owned by Bayside Waste, Hauling, and Transfer, Inc. of Redmond, Washington). Together, the two companies serve approximately 8,000 residential and 700 commercial accounts within the City of Great Falls, the surrounding rural areas, and Malmstrom AFB, and dispose of approximately 120 T/day at Greens Disposal Site No. 1. Currently, Greens Disposal Site No. 1 has a remaining service life of 10 years, at which time Site No. 2 will be placed into operation. Site No. 2, an 80- to 100-acre permitted site in a nearby coulee, will have an estimated service life of between 75 and 100 years.

The service area population for all three collectors will increase to 79,200 persons in 1990 and 81,100 persons by the year 2000. Total daily disposal requirements will increase from the current volume of 345 T/day to 357 T/day in 1990 and to 366 T/day by the year 2000. Some changes in the collection routes may be necessary; however, the disposal services have included population increases in their projected remaining landfill capacity, and will be able to adequately service the baseline solid waste disposal needs.

Malmstrom Air Force Base. Solid waste generated onbase is collected and disposed of by Greens Disposal Company. A total of 4,040 tons per year (T/yr) or approximately 11 T/day was generated onbase in 1985. The annual cost of the pickup, delivery, and removal of waste from the base is approximately $125,000. The base recently awarded Greens Disposal Company a new 1-year contract with a 2-year option for collection and disposal of all nonhazardous wastes.

The KC-135R air refueling mission at Malmstrom AFB will generate an increase in solid wastes. These wastes will be similar to those generated by the Minuteman missile maintenance program, and the existing procedures are adequate to handle the additional wastes. Construction and operations wastes associated with the new mission will be hauled offbase under a contract with a licensed solid waste disposal contractor.

City of Lewistown. Solid waste collection and disposal in the City of Lewistown is provided by two private companies, Seversons Disposal and Mister "M" Disposal.

Seversons operates within a 5-mile radius of Lewistown and provides collection for approximately 550 residential and 70 commercial accounts. Approximately 10,000 cubic yards per year (cy/yr) or 17 T/day of waste are deposited at a Class II landfill 2 miles east of the city. The company is presently using 25 acres for disposal; however, according to the company's owner, there is unlimited space available for disposal.

Mister "M" Disposal provides collection and disposal service to a seven-county region in Montana, including 1,300 residential and 300 commercial customers. The company operates a Class II landfill 3 miles east of Lewistown on U.S. 87 and disposes of approximately 9 T/day at the site. The site is adequate for all disposal needs, and at the present rate of disposal, will remain in service for 20 years, through the year 2006.

Lewistown's population is projected to increase by 200 persons between 1985 and 1990, and again between 1990 and the year 2000. Solid waste generation is expected to increase proportionately and will be handled by the existing collection and disposal systems.

City of Conrad. The City of Conrad Public Works Department provides collection and disposal service for approximately 1,250 residential and commercial accounts within the city limits. Approximately 23,700 cy/yr or 36 T/day are deposited by the city. Only 5 acres of the original 40-acre site are still being used for disposal; however, city officials estimate the remaining service life to be 20 years. The city plans to begin siting a new facility within the next 10 years to replace the existing site.

The population of Conrad is projected to increase to 3,400 persons by 1990 and to 3,700 persons by the year 2000. Solid waste generation in the area will increase proportionately, and the existing and planned additions to the collection and disposal system will be adequate to handle the baseline solid waste generation.

Hazardous Wastes. Approximately 2,500,000 gallons of hazardous wastes are generated in Montana annually. The municipal and private landfills do not accept hazardous wastes for disposal. All hazardous wastes generated within the state are either recycled or transported out-of-state to a variety of state or U.S. Environmental Protection Agency permitted facilities. Malmstrom AFB generated approximately 10,900 pounds of hazardous waste in 1985 and 6,600 pounds in 1986. The majority of wastes included sodium chromate, batteries and battery acid, oils, paints, thinners, and other regulated materials. Included in this amount are wastes generated by the Montana National Guard in Great Falls and Helena.

The base has a hazardous waste storage facility that is permitted by the Montana Department of Health and Environmental Sciences, Solid and Hazardous Waste Bureau. The facility consists of a 40- by 50-foot asphalt storage pad and has a maximum capacity of 7,000 gallons or approximately 56,000 pounds. It is located adjacent to the Defense Reutilization and Marketing Office (DRMO). Construction of a new facility was included in the FY 1988 O&M program and is programmed for construction in 1988.

The DRMO is responsible for providing for the proper handling of the wastes and arranging for the transport of wastes to treatment and disposal facilities. The DRMO contracts with a permitted hazardous waste transporter for out-of-state disposal.

The addition of the KC-135R air refueling mission at Malmstrom AFB will increase onbase hazardous waste generation. Typical waste includes thinner, paint stripper, alkaline corrosion remover, and aircraft cleaning solution. Based on experience with other KC-135R missions, annual generation will equal 5,470 gallons or approximately

43,800 pounds. However, new corrosion control processes will be used at Malmstrom AFB and estimates of the actual waste amounts are anticipated to be less.

In compliance with the federal Resource Conservation and Recovery Act, Malmstrom AFB has developed a Hazardous Waste Management Plan. This plan outlines the procedures for the identification and testing of wastes, requirements and use of the manifest, pretransport requirements, facility standards, and emergency plans. The base also has a Spill Prevention and Response (SPR) Plan that outlines procedures that base personnel must follow in response to fires, explosions, or unplanned releases of hazardous wastes. The SPR Plan contains an Oil and Hazardous Substance Contingency Plan and an outline of the training requirements for the Spill Response Team. Recovery operations are carried out in accordance with the procedures in these plans.

3.2.3.4 Energy Utilities

Electricity.

Regional Overview. Montana's electricity needs have historically been met by hydroelectric generation (85-99%), supplemented by coal generation. Since 1976, the percentage of hydroelectric capacity has been steadily declining, and by 1984, it accounted for only 53 percent of generating capacity. At the same time, the percentage of coal generation has increased, and by 1984 accounted for 41 percent of the total electricity generated in the state. Out of a total of 4,008 megawatts (MW) of electricity generated in Montana in 1984, 2,116 MW were from hydroelectric plants and 1,877 MW were from fossil fuel-fired plants.

Local Distributors. The Montana Power Company (MPC) provides electrical service to the municipal areas of Cascade, Fergus, and Pondera counties. Three rural electric cooperatives, Fergus, Marias River, and Sun River, supply electrical power to the rural areas of the ROI.

In 1985, MPC had a system capability of 1,510 MW, including approximately 1,313 MW of generating capability and 197 MW of purchased power. A record peak demand of 1,295 MW was recorded in 1985, with a 14-percent reserve margin. Total sales of electricity for the system were 7.6 billion kWh, a 1-percent increase from 1984. Average annual residential consumption was 9,267 kWh per year, at a cost of $0.0433 per kWh compared to the national average of $0.0795 per kWh.

The MPC projects a 1.6 percent average annual increase in peak demand between 1986 and the year 2000. To meet the projected peak demands of 1,441 MW in 1990 and 1,710 MW in the year 2000, the company will rely on purchased power and hydroelectric generating plant upgrades. Reserve margins will be 12 percent in 1990 and 10 percent in the year 2000. Because of the loss of a large industrial load, a decline in the rate of growth of electrical loads, and a considerable surplus for the foreseeable future, MPC has agreed with the Montana Public Service Commission not to include its 210-MW share of Colstrip 4 in the rate base charged to its utility customers. Instead, it has made a simultaneous sale-leaseback arrangement with a group of private investors to reduce the cost of the plant to the company, and it is trying to market the power from the plant within and outside the region. This effort has been hindered by a surplus of power throughout the region and by limited access of MPC to the transmission lines that would permit sale of the power outside the Pacific Northwest. If the power is not sold on a long-term contract, it might be available to serve increases in load in the company's system. Total energy sales are projected to grow at a 1.2-percent annual rate from 1987 to the year 2010. This forecasted growth rate is lower than that experienced from 1960 to 1986, and is attributed to slower economic growth in the state and increasing electricity prices.

The Fergus, Marias River, and Sun River rural electric cooperatives supply electrical service to the rural portions of Judith Basin, Wheatland, Chouteau, Lewis and Clark, Teton, Fergus, Toole, Pondera, and Cascade counties. The cooperatives do not operate any generating facilities, but purchase power from regional wholesalers through the Central Montana Electric Power Cooperative. Formed by 13 member cooperatives, Central Montana Electric purchases power from MPC, Western Area Power Administration (WAPA), and Basin Electric Cooperative in Bismarck, North Dakota, for sale to the member cooperatives. Central Montana uses a blended rate for the member cooperatives, and differences result from individual load factors of the member cooperatives.

In 1985, Fergus Electric purchased approximately 75,700,000 kWh from Central Montana. Sales to customers and their own use is estimated at 68,500,000 kWh, based on monthly averages. Fergus Electric projects total system energy requirements to decrease at a 1.5-percent average annual compound rate between 1984 and 1989. A small increase (0.6% annually) is projected between 1989 and the year 2000. As a result, energy requirements are projected to be 81,489,000 kWh in 1990 and 86,574,000 kWh in the year 2000. Fergus Electric experiences highest peak demand in the winter. Winter peak demand is projected to decrease at a 0.5-percent average annual compound rate between 1984 and the year 2000. The winter peak demand will fall from 24.9 MW in 1984 to 22.9 MW in the year 2000. The company anticipates a 4-percent rate increase in June 1987 because of increased costs from Central Montana Electric.

Marias River purchased a total of 106,515,200 kWh in 1985. Total sales and their own use accounted for 95,187,200 kWh. Between 1984 and the year 2000, Marias River Electric projects system energy requirements to increase at a 3.1-percent average annual compound rate. Requirements are projected to be 129,094,000 kWh in 1990 and 167,308,000 kWh in the year 2000. During the same time period, peak demand (winter) is projected to increase at a 2.6-percent average annual compound rate to 26.5 MW in 1990 and to 34.2 MW in the year 2000.

Sun River Electric purchased a total of 91,760,000 kWh from Central Montana in 1985. The company's sales and own use totaled 80,841,700 kWh. Between 1984 and the year 2000, Sun River Electric projects system energy requirements to increase at a 4-percent average annual compound rate. Requirements are projected to be 100,349,000 kWh in 1990 and 118,337,000 kWh in the year 2000. Sun River experiences its highest peak demand in the summer. Peak demand is projected to increase at a 1.2-percent average annual compound rate, and is projected to be 25.5 MW in 1990 and 30 MW in the year 2000. The member cooperatives receive all needed power from Central Montana Electric in accordance with their individual power requirement projections.

Malmstrom Air Force Base. The MPC and Fergus, Marias River, and Sun River rural electric cooperatives supply power to the base and deployment area. In FY 1985, the base electricity consumption was 40,438,800 kWh at a cost of $1,193,672. Monthly peak demand for FY 1985 was 7.3 MW. Service to the base is supplied by MPC from the Great Falls northeast substation, which has a transformer capacity of 20 megavolt-amperes (MVA). Peak demand on the substation was 10.3 MVA in 1985. Backup feed to the base is supplied by the Great Falls eastside substation, which has a transformer capacity of 20 MVA. Peak demand on the substation in 1985 was 23 MVA.

With the addition of the KC-135R air refueling mission, demand onbase is projected to increase by 3.35 MW to a total of 11 MW. Additional power requirements can be supplied by MPC or from WAPA. A complete upgrade of the onbase distribution system is planned for FY 1992 at an estimated cost of $8,000,000. In addition, a new 115-kilovolt transmission line and 30-MW substation may be installed onbase prior to 1990, and will replace the use of the Great Falls northeast substation. The MPC plans to increase the capacity of the eastside substation by 25 percent with the addition of fan cooling to the transformer banks.

Launch Control Facilities and Launch Facilities. Fergus, Marias River, and Sun River rural electric cooperatives supply power to 110 launch facilities and 8 launch control facilities. In FY 1985, they supplied approximately 18,230,000 kWh of electricity to the sites, at a combined cost of $714,001. The facilities have a high load factor and therefore receive attractive rates. According to the cooperatives, any new facility would receive the same rates. The MPC supplies power to a total of 12 launch control facilities and 90 launch facilities and in FY 1985 supplied 17,350,080 kWh at a cost of $544,007. There are 50 substations that distribute power to the launch facilities and launch control facilities. The suppliers own and operate the substations, transformers, lines, and meters up to and including the service pole for each launch control facility and launch facility.

Natural Gas and Heating.

Regional Overview. Natural gas sales in Montana rose steadily from 1950 until the mid-1970s when sales began to dramatically decline. Historically, the industrial sector has been the largest user of natural gas, with the residential sector the second largest user. This trend has reversed, and by 1985, the residential sector was the largest user of natural gas and the commercial sector became the second largest user.

Local Distributors. Great Falls Gas Company and MPC supply natural gas in the ROI. The Great Falls Gas Company, which provides natural gas to the City of Great Falls, had sales in FY 1985 that reached 4,920 million cubic feet (MMcf), a 2.8-percent increase from 1984. In 1985, the company provided service to approximately 22,518 customers, and average annual residential consumption was 115 Mcf at a cost of $461. Residential rates are $4.11 per Mcf, compared to the national average of $6.12 per Mcf. The company purchases its supply from MPC and currently has a 30-percent excess capacity margin due to reduced use as a result of conservation measures. This enables the company to increase their operations from 5 MMcf up to an additional 30 MMcf for peak consumption.

The Great Falls Gas Company anticipates growth in the residential, commercial, and industrial sectors, except for Malmstrom AFB which has installed a coal-fired central heat plant and hot water distribution system. This represents a 6-percent loss of the company's total system load. Sales are projected to increase at a 2-percent annual rate between 1987 and 1997 to a total of approximately 5,200 MMcf in 1990 and 6,000 MMcf in 1997.

The MPC also provides natural gas service to much of central and western Montana including the municipal areas of Conrad and Lewistown. In 1985, the company sold a total of 35,632 MMcf to 103,748 customers. In 1985, average annual residential consumption for customers of MPC was 130 Mcf at a cost of $498. Residential customers paid an average of $3.83 per Mcf in 1985. The company has adequate natural gas reserves to supply the system for 25 years, based on the company's own reserves plus reserves under long-term contract. The company reports that natural gas sales have stabilized, and projects sales should remain constant over the next 10 years.

Both Great Falls Gas Company and MPC received approval on January 1, 1987 for a decrease in natural gas prices for both residential and commercial customers. The 9.9 cents per Mcf decrease reflects lower gas costs from suppliers. Great Falls Gas Company customers will receive a net decrease of 3.8 cents per Mcf as a result of decreased loads in their service area.

Malmstrom Air Force Base. Great Falls Gas Company provides natural gas to the base via a 12-inch-diameter line with a rated capacity of 470 Mcf per hour. In FY 1985, the base consumed 552 MMcf. The 1987 estimate for onbase use is 275 MMcf. With the addition of a new mission in 1988, consumption is estimated to increase by 12 MMcf to a total of 287 MMcf.

In 1983, as part of the Air Force energy conservation assurance plan which called for the conversion of gas-fired boiler installations to a coal-fired system, a coal-fired central heat plant was installed onbase to serve the industrial and commercial-type facilities. The plant has three high-temperature water generators, each rated at 85 million British thermal units per hour (MBtu/h) output. The maximum existing heating load is estimated to be 102 MBtu/h in the winter and 10 MBtu/h in the summer. The minimum reserve capacity is assumed to be 160 percent. Preconstruction estimates of yearly coal use equaled 36,000 tons. During the winter of 1986 to 1987 (an exceptionally mild winter), only 5,000 tons were consumed. With the addition of the KC-135R air refueling mission, the peak heating load in 1990 will be approximately 163 MBtu/h, with a 95-percent reserve capacity. Increased coal consumption is estimated to be 9,000 T/yr. The existing heat plant will be adequate to handle the new load only if all three boilers are used.

Liquid Fuels.

Regional Overview. Montana's total gasoline sales in 1984 were 451,152,000 gallons. Per capita use was 548 gallons, 123 percent of the national average. Diesel sales totaled 198,933,000 gallons in 1984, with a per capita rate of 241 gallons, 232 percent of the national average. Transportation accounted for 57 percent of the state's diesel sales, and military use accounted for 0.4 percent.

Local Distributors. The local retailers of petroleum products purchase their supplies from either the Montana Refining Company of Black Eagle or the Yellowstone Pipeline Company of Billings. Montana Refining Company operates a petroleum refinery with a capacity of 6,500 barrels per day (bbl/day) that currently operates at 6,000 bbl/day. The refinery produces regular, unleaded, and premium unleaded gasoline, No. 2 diesel fuel, Jet-A fuel (commercial airline fuel), JP-4 (aviation fuel), and all road oils (e.g., asphalt). The company's sales area encompasses a 150-mile radius from Great Falls. In 1986, the company produced a total of 2,410,621 barrels of petroleum products, an 18-percent increase from 1985.

Yellowstone Pipeline Company is jointly owned by Conoco, Exxon, and Unocal companies. The pipeline carries refined products to the Great Falls area and portions of western Montana. Continental Pipeline Company owns and operates two oil pipelines that deliver crude oil to three refineries in the Billings area. Conoco operates a 52,000-bbl/day capacity refinery, the Exxon refinery has a 45,000-bbl/day capacity, and the Cenex refinery has a 40,000-bbl/day capacity.

Malmstrom Air Force Base. Liquid fuels are supplied to Malmstrom AFB through contracts with local and regional distributors that are filled through the Defense Fuels Supply Center (DFSC). The fuel is currently delivered to the base from the refinery by

Cenex Company in tanker trucks, and stored in 56 onbase tanks with a total capacity of 52,715 barrels or 2.2 MG. In 1986, vehicle use of regular and unleaded gasoline was 482,067 gallons and 248,817 gallons of diesel. Nonvehicle use, such as that delivered to launch control facilities storage tanks, was 173,188 gallons of regular and unleaded gasoline and 161,146 gallons of diesel fuel.

The KC-135R air refueling mission will use approximately 12 MG of JP-4 fuel per year. Onbase fuel storage capacity will be increased by 60,000 barrels or 2.52 MG. The fuel will continue to be procured through the DFSC. Fuel deliveries to the base will be either by tank truck or through the Yellowstone Pipeline Company service line.

Energy Conservation/Alternative Resources.

State of Montana. The Montana Department of Natural Resources and Conservation established the Conservation and Renewable Energy Bureau in the mid-1970s in response to the oil embargo and national energy crisis. The bureau administers programs funded by the U.S. Department of Energy, the Bonneville Power Administration, and with revenues generated by the state coal-severance tax. The goals of the bureau are to reduce energy consumption in the residential, commercial, governmental, and agricultural sectors through the use of energy efficient technologies and renewable energy resources.

Montana Power Company. The 1978 Public Utility Regulatory Policy Act requires electric utility companies to purchase power from independent power producers (Qualifying Facilities [QF]) at an avoided cost (i.e., the utility's savings is based on the cost to buy the power elsewhere or produce the power itself). In Montana, the rate that MPC is required to pay is set by the Public Service Commission. The MPC forecasts that 282 MW of QF resources, including wind, small hydro, and cogeneration, will be made available during the 1986 to 2009 planning period. This is a 680-percent increase from the 1984 forecast of 36 MW. In addition, the MPC also includes forecasts for programmatic conservation. This is provided by the company's electric customers through participation in the company's Electric Conservation Purchase Plan and/or the Street and Area Lighting Electric Conservation Program. These plans are designed to achieve savings in the residential, commercial, industrial, local-governmental, and irrigation sectors, and from street and area lighting customers through the use of retrofits for existing structures and devices. As a result of these programs, the company forecasts annual savings between 26 and 49 MW by 1995.

Malmstrom Air Force Base. The Energy Management and Control System onbase monitors and controls facility heating, ventilation, and air conditioning in 39 buildings. The FY 1986 Military Construction Program budget includes the addition of 21 buildings to the system, and upgrading the systems in 23 of the existing 39 buildings. The new system will be able to monitor points at 816 locations onbase.

3.3 Transportation

Deployment of the Small Intercontinental Ballistic Missile (ICBM) system would generate additional travel demand during the construction and operations phases. As a result, potential problems may include increased congestion; increased travel and shipment times; decreased safety, comfort, and convenience; insufficient road right-of-way; and increased utilization of terminal and control facilities.

3.3.1 Resource Description

The transportation resource includes the various facilities used for the safe and efficient movement of persons and materials from place to place, the traffic associated with these facilities, and the ancillary facilities required for operation. The transportation resource elements include roads, public transportation, railroads, and commercial airports.

3.3.1.1 Roads

Roads include all interstates, federal-aid designated primary and secondary U.S. or state-numbered highways, county-maintained roads, and federal-aid designated urban roads. Of particular importance in the transportation analysis are the roads to be used during the construction and operations phases of the Small ICBM system and other program-related traffic.

3.3.1.2 Public Transportation

Public transportation includes all facilities provided for the movement of passengers and their incidental baggage within the main population areas. Buses and taxis are the most common public transit services available in the Montana study area

3.3.1.3 Railroads

Railroads include all facilities utilized for the movement of passengers and freight on rail lines. These consist of the rolling stock and terminal and control facilities.

3.3.1.4 Airports

Airports consist of all facilities utilized for he airborne movement of passengers and freight. These facilities include aircraft landing facilities, terminal buildings, navigational control systems, and ground vehicle access facilities.

3.3.2 General Analysis Methodology

3.3.2.1 Region of Influence

The Region of Influence (ROI) for transportation includes all potentially affected transportation elements in the Montana study area such as highways, principal arterials, public transportation routes, railroads, and airports. The geographic boundary of the ROI is defined by the construction sites for the Small ICBM program, which include onbase construction areas and the affected launch facilities, roads, and operations areas. The ROI also includes locations where additional transportation facilities will have to be provided to serve the direct and indirect program-induced population. As shown in Figure 3.3.2-1, the ROI for transportation is located within the nine Montana counties of Cascade, Chouteau, Fergus, Judith Basin, Lewis and Clark, Pondera, Teton, Toole, and Wheatland.

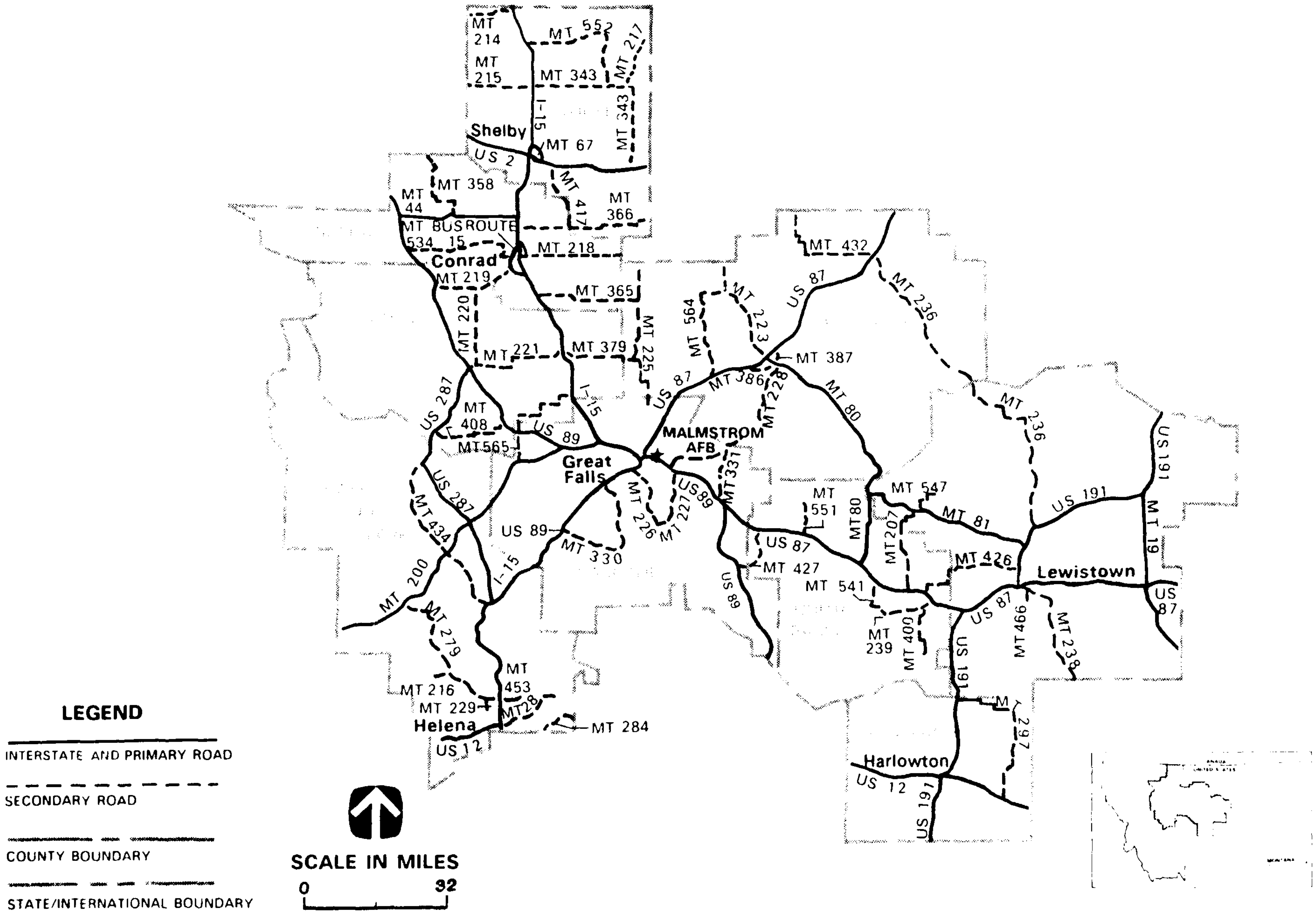


FIGURE 3.3.2-1 REGION OF INFLUENCE FOR TRANSPORTATION

3.3.2.2 Roads

Roads were identified by their physical features and estimated level of service (LOS). The LOS, which is specified by letter scores A (very good) to F (failure), is a qualitative measure that incorporates the collective factors of speed, travel time, traffic interruptions, freedom to maneuver, safety, driving comfort and convenience, and operating costs provided by a road facility under a particular volume condition. Figure 3.3.2-2 illustrates the operational characteristics for the six LOS scores in a basic freeway segment, and Table 3.3.2-1 lists typical conditions of each letter score along freeways and multilane roads, two-lane highways, and urban arterial streets. The estimated LOS values were based on historic traffic volumes, including both passenger cars and heavy vehicles, and available road descriptions.

Future conditions on rural roads were projected by considering traffic changes to be proportional to countywide population changes. Future traffic volumes on interstate and primary highways connecting major population centers were estimated using statewide population changes. Population changes were derived from the socioeconomics resource. Travel demand in the Great Falls urban area was assessed by developing a computerized transportation model to simulate existing traffic conditions. Population, employment, housing units, and vehicle registration forecasts were obtained and applied to the model to estimate future travel demands. Future planned missions at the base, including the KC-135R air refueling mission, were considered in the analysis. The approach followed procedures outlined in the National Cooperative Highway Research Program Report 187, Quick Response Urban Travel Estimation Techniques and Transferable Parameters User's Guide (Transportation Research Board 1978). The LOS and capacity analyses at critical intersections and principal arterials in Great Falls, Lewistown, Conrad, and on deployment area roads, were performed for traffic conditions for the years 1990, 1995, and 2000.

3.3.2.3 Public Transportation

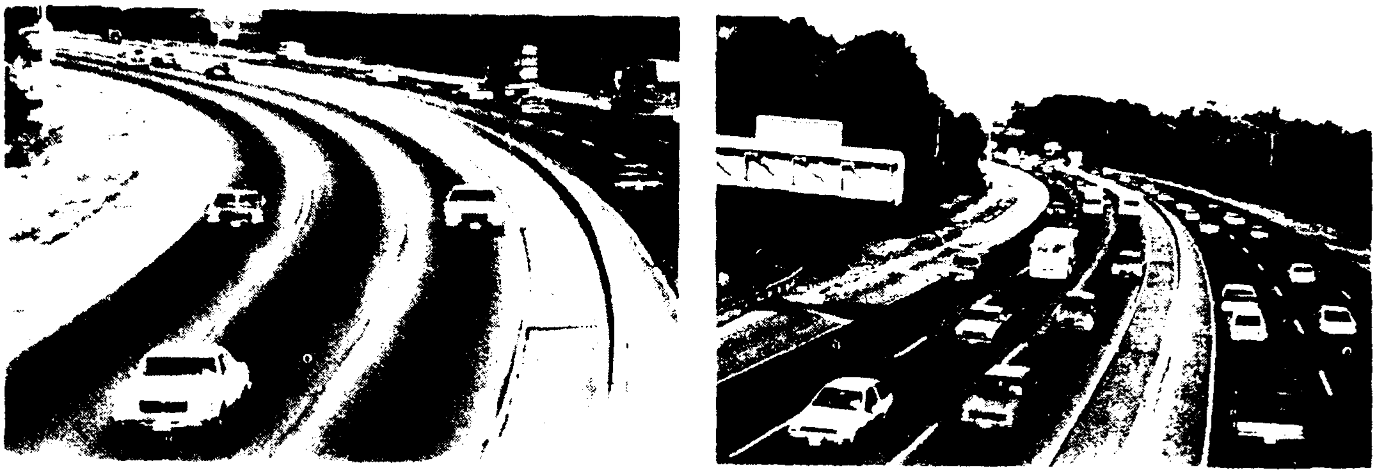
Public transportation services were characterized by size of fleet, types and extent of service, frequency of service, ridership, and potential for expansion. Future conditions were obtained from information provided by transit officials.

3.3.2.4 Railroads

The general characteristics of railroads within the region were evaluated. Existing and planned conditions of the rail network, including its rolling stock, railyard capacity, freight hauled, and availability of lines to access program sites, were considered. The possibility of abandoning specific sections, where indicated in state railroad plans, was noted where pertinent. The ROI for railroads is shown in Figure 3.3.2-3.

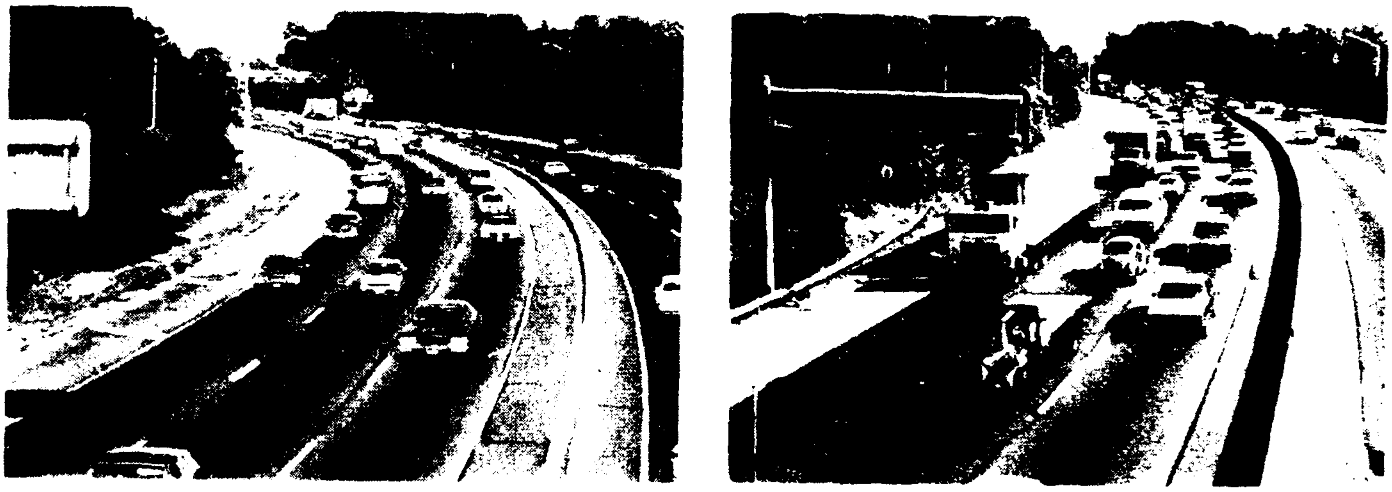
3.3.2.5 Airports

Commercial airports were characterized by their location, type of service, commercial airline and general aviation aircraft served, terminal and landing facilities, parking, and other services provided at the airport. Future conditions and planned improvements or expansions, as indicated in the airport's master plan or the state airport system plan, were included. The ROI for airports is shown in Figure 3.3.2-3.



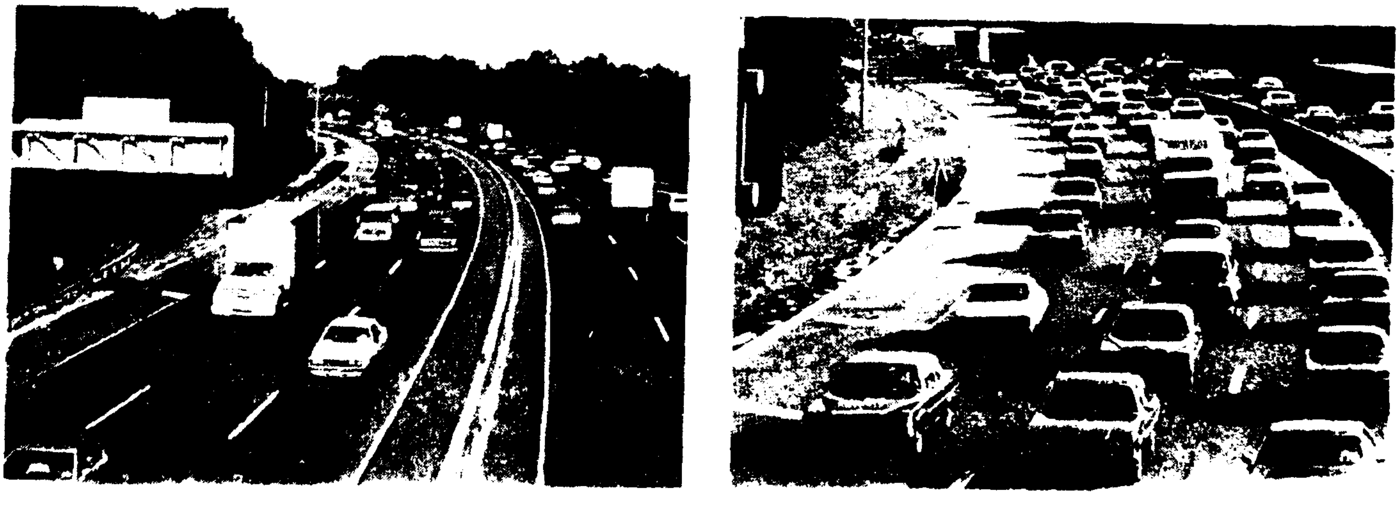
LEVEL OF SERVICE A

LEVEL OF SERVICE D



LEVEL OF SERVICE B

LEVEL OF SERVICE E



LEVEL OF SERVICE C

LEVEL OF SERVICE F

EM3-TR/3

Source: Transportation Research Board 1985.

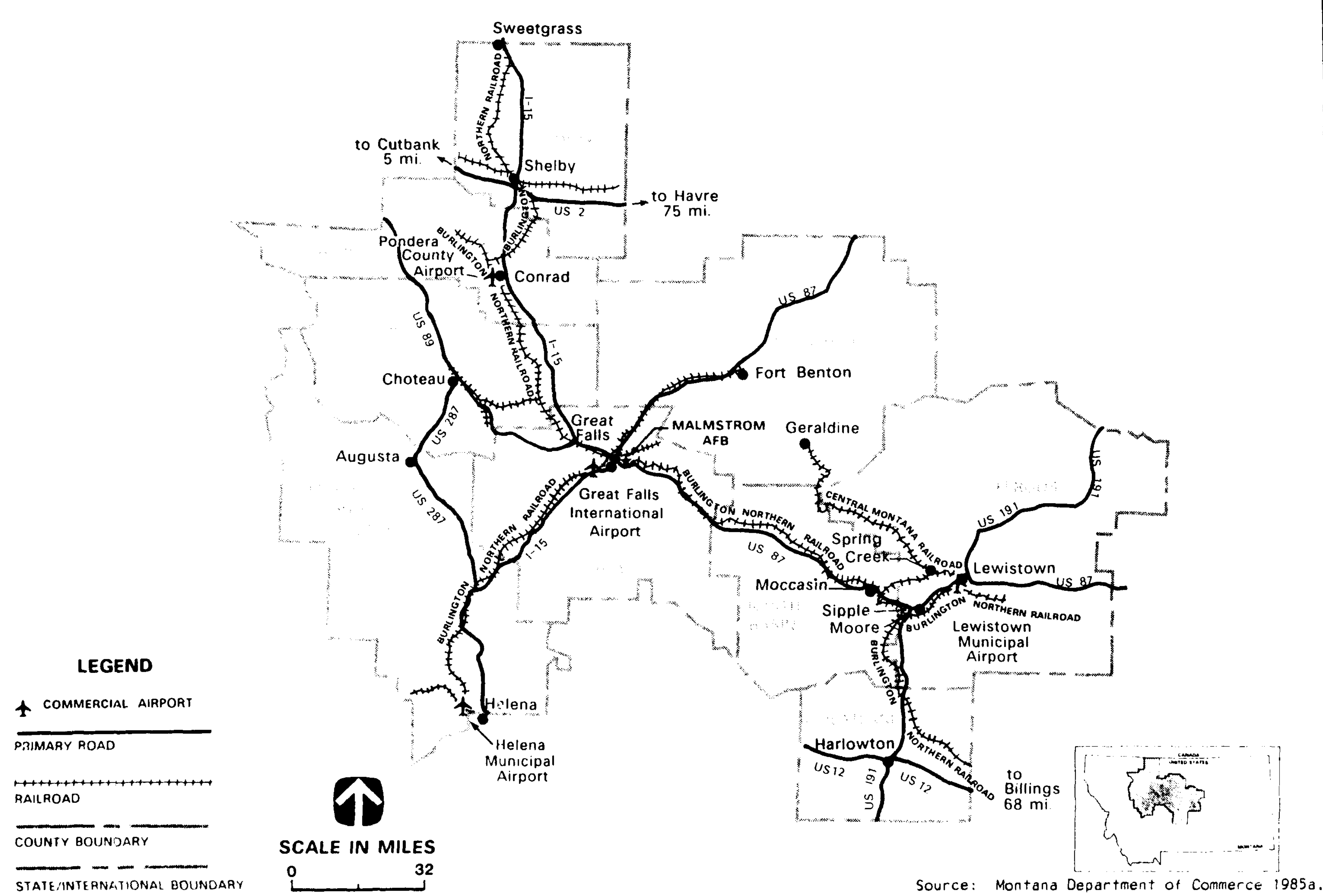
FIGURE 3.3.2-2 OPERATIONAL CHARACTERISTICS AT VARIOUS LEVELS OF SERVICE

Table 3.3.2-1

General Operating Conditions For Different Road Types by Level of Service

Level of Service	Operating Conditions		
	Freeways, Multilane Highways	Two-Lane Roads	Arterial Streets
A	Traffic essentially free-flowing. Speeds about 60 mph[1]. Great freedom to maneuver. Minor disruptions easily absorbed.	Motorists can drive at desired speed, often about 60 mph[1]. Passing demand well below capacity; delays no more than 30%. Few platoons of 3 or more cars.	Free-flow operations at average travel speeds usually about 90% of the free-flow speed for the arterial class. Vehicles are completely unimpeded in their ability to maneuver within the traffic stream. Stopped delay at signalized intersection is minimal.
B	Reasonably free flowing, speeds about 57 mph. Maneuvering slightly restricted. High comfort. Incidents still easily absorbed.	Passing demand significant; delay about 45%. Speeds near 55 mph. Some platooning.	Reasonably unimpeded operations at average travel speeds usually about 70% of the free-flow speed for the arterial class. The ability to maneuver within the traffic stream is only slightly restricted and stopped delays are not bothersome. Drivers are not generally subjected to appreciable tension.
C	Stable flow, speeds in low 50s. Lane changes require care and vigilance. Noticeable driver tension. Incidents cause degraded service, queuing.	Noticeable increases in numbers and sizes of platoons; delay about 60%. Speeds in low 50s. Stable flow, but subject to congestion.	Stable operations, but ability to maneuver and change lanes in midblock locations may be more restricted than LOS B, and longer queues and/or adverse signal coordination may contribute to lower average travel speeds of about 50% of the average free-flow speed for the arterial class. Motorists will experience an appreciable tension while driving.
D	Conditions border on unstable flow; small changes cause substantial deterioration in service. Speeds in low 40-mph range. Severe restrictions on maneuver, driver discomfort. Most disruptions cause LOS F.	Passing demand high, passing capacity near zero. Speeds may reach 50 mph. Platoons of 5-10 vehicles common. Delays may reach 75%. Approaches unstable flow.	Borders on a range in which small increases in flow may cause substantial increases in approach delay and hence, decreases in arterial speed. This may be due to adverse signal progression, inappropriate signal timing, high volumes, or some combination of these. Average travel speeds are about 40% of free-flow speed.
E	Conditions extremely unstable. No usable gaps; disruptions propagate upstream. Driver comfort, maneuverability extremely poor. Disruptions cause rapid transition to LOS F.	Passing virtually impossible; platooning intense, delays greater than 75%. Speeds below 50 mph, operation very unstable.	Characterized by significant approach delays and average travel speeds of one-third the free-flow speed or lower. Such operations are caused by some combination or adverse progression, high signal density, extensive queuing at critical intersections, and inappropriate signal timing.
F	Forced or breakdown flow.	Heavily congested flow, volumes below capacity at low speed.	Arterial flow at extremely low speeds below one-third to one-quarter of the free-flow speed. Intersection congestion is likely at critical signalized locations, with high approach delays resulting. Adverse progression is frequently a contributor to this condition.

Note: [1] In the absence of strict enforcement.
Source: Transportation Research Board 1985.



Source: Montana Department of Commerce 1985a.

FIGURE 3.3.2-3 RAILROADS AND COMMERCIAL AIRPORTS WITHIN THE TRANSPORTATION REGION OF INFLUENCE

3.3.3 Existing and Future Baseline Conditions

3.3.3.1 Roads

City of Great Falls. The Great Falls urban area is configured in a grid-type network of north-south and east-west roads. Most of the major roads in Great Falls have two lanes except 10th Avenue South and Central Avenue West, and sections of 6th Avenue West, 1st Avenue South, 2nd Avenue North, 57th Street, Northwest Bypass, 3rd Street West, Smelter Avenue, 10th Street North, and 25th Avenue Northeast; these are all four-lane roads.

Most of the major arterial or federal-aid designated urban routes within Great Falls provide operation at LOS A or B except along sections of Central Avenue, 1st Avenue North, and 2nd Avenue North within the central business area where service levels are LOS C or D. Traffic flow is also reduced along 10th Avenue South (which is part of U.S. 87/89) between River Drive and 38th Street where service levels are at LOS D or E during peak hours. Estimated LOS resulting from normal traffic increases without the program are not expected to change, or at most, drop by one level in the years 1990 through 2000.

Planned transportation improvement programs in Great Falls that may influence future travel patterns include the reconstruction of a bridge and an interchange, installation of signal lights, institution of traffic management schemes, and the construction of an arterial bypass south of 10th Avenue South.

Malmstrom Air Force Base. Malmstrom Air Force Base (AFB) is located approximately 1.5 miles east of the city limits of Great Falls. The major roads within Malmstrom AFB include Goddard Avenue, 1st Street, 2nd Street, 5th Street, Avenue C, and Avenue G. Most of the base streets and roads were repaired and resurfaced during the fall of 1986. They are all two-lane roads and vary from a 42-foot to 54-foot right-of-way.

The average annual daily traffic (AADT) flow entering or leaving Malmstrom AFB by the main gate at 2nd Avenue North was 10,538 vehicles in 1985. The section of 10th Avenue North leading to the commercial gate had an AADT of 3,584 in the same year. There are no significant congestion or problem areas except during the peak periods (7:30 A.M.-9:00 A.M. and 3:30 P.M. - 5:00 P.M.) when occasional, short delays occur at the gate for those entering the base. The base, however, has a south gate along U.S. 87/89 which is used by military traffic commuting to the Weapons Storage Area and the eastern part of the base.

City of Lewistown. Lewistown is located in Fergus County, 106 miles southeast of Great Falls. The major roads in the city include sections of primary highways U.S. 87 (Main Street), U.S. 87 Bypass (6th Avenue/1st Avenue), and U.S. 191 (Kendall Road); and federal-aid designated urban roads Boulevard Street; Spring Street; Casino Creek Drive; 5th Avenue; Brassey Street; Walnut Avenue; 1st, 4th, and 7th Avenues; Entrance Street; Wendell Avenue; and Mount Pleasant Avenue. Traffic along Main Street varies between 5,410 and 6,770 AADT, along 1st Avenue (part of U.S. 191) between 6,040 and 7,360 AADT, and along Boulevard Street from 1,750 to 1,860 AADT, which results in peak-hour flow conditions of LOS B, LOS C, and LOS A, respectively. Service levels on other major arterial or federal-aid designated urban routes within Lewistown are at LOS A.

There are no proposed programs that would affect the service levels along the arterial routes in Lewistown. Estimated LOS resulting from normal traffic growth without the program are not expected to change between the years 1990 and 2000.

City of Conrad. Conrad is located in Pondera County, approximately 60 miles northwest of Great Falls. The major roads in the city include Main Street (which is also designated as Business Route 15), 4th Avenue (which is part of Federal-Aid Secondary Road 534), and Sollid Road (which is part of Federal-Aid Secondary Road 218). The AADT in 1985 was 6,890 along Business Route 15 between 4th and Central Avenues, and 1,434 along 4th Avenue west of Main Street. This results in peak-hour flow conditions of LOS B along Business Route 15 and LOS A along 4th Avenue.

There are no proposed programs that would affect the service levels along the arterial routes in Conrad. Estimated LOS resulting from normal traffic growth without the program are not expected to change between the years 1990 and 2000.

Deployment Area Roads. The road network within the nine counties that comprise the ROI consists of 14,864 miles of U.S. and state highways, county roads, and city-owned streets. The network consists of an interstate, 17 federal-aid primary routes, and 47 federal-aid secondary routes. Figure 3.3.2-1 (Section 3.3.2.1) shows the interstate and the various federal-aid designated primary and secondary U.S. and Montana-numbered roads within the ROI. The major highways that link the major cities include Interstate 15; U.S. 87, 89, and 191; and Montana State Highway 200.

A total of 1,707 miles of roads are currently designated as Minuteman transporter/erector (T/E) routes. Nearly all of these two-lane T/E routes are of asphalt (56%) and gravel (43%) surface. Traffic flows are mostly low, but moderate flows occur along primary and urban routes such as Interstate 15, U.S. 87 and 89, and their urban sections within Great Falls. This results in operations of LOS A along the T/E routes, except along U.S. 89 west of Vaughn (LOS C), along Montana State Highway 200 east of Simms (LOS B), and along U.S. 89 west of Belt (LOS B).

A 4-mile section of U.S. 87/89 from the U.S. 87 Bypass east of Great Falls (10th Avenue South and 57th Street South intersection) to the Montana State Highway 227 and 228 intersection (Highwood and Sand Coulee/Stockett intersection) is planned for major upgrade and reconstruction. The proposed improvement is to widen the existing two-lane road into a divided four-lane highway.

Population projections show an increase for Cascade, Fergus, Lewis and Clark, and Pondera counties, whereas the population will remain the same or decrease for all other counties. Consequently, normal traffic changes between the years 1990 and 2000 are not expected to reduce the quality of service lower than the current LOS along the rural roads.

There are 315 bridges along the T/E route network including 30 bridges on alternate T/E routes. Nearly 44 percent of the bridges in the network are timber structures. All bridges have adequate vertical clearance for the Hard Mobile Launcher (HML) and HML transporter vehicle. Most of the bridges are on interstate or primary highways. These are located in eight counties, with Cascade and Fergus counties containing nearly 57 percent. Bridge distribution by location and type of road is shown in Table 3.3.3-1. Based on the proposed HML configuration and operational requirements, 124 bridges have been identified as incapable of supporting the HML. A total of 3,308 culverts and 74 cattle guards have been identified along the T/E routes. The culverts are classified by type and distributed by counties as shown in Table 3.3.3-1.

At present, military vehicle movements in support of the Minuteman program include an average of 48 T/E round-trips per year with two security vehicles and a federal marshall controlling the travel of the convoy. Approximately 14 times a month, a reentry vehicle

Table 3.3.3-1

Transporter/Erector Route Bridges and Culvert Distribution by County

	Distribution of Bridges					Distribution of Culverts				
County	Federal-Aid Interstate & Primary Roads	Federal-Aid Secondary & Local Roads	Federal-Aid Urban Roads	Total Bridges	Bridges Scheduled for Improvement	Corrugated Metal Pipe	Reinforced Concrete Pipe	Box Culverts	Total Culverts	Number of Cattle Guards
Cascade	64	26	1	91	31	330	267	18	615	7
Chouteau	0	0	0	0	0	27	12	2	41	0
Fergus	64	23	1	88	41	712	217	6	935	35
Judith Basin	22	2	0	24	16	328	120	10	458	4
Lewis & Clark	15	9	0	24	8	82	103	4	189	5
Pondera	17	19	0	36	12	408	46	0	454	0
Teton	21	15	0	36	11	207	165	3	375	11
Toole	4	1	0	5	0	62	19	0	81	0
Wheatland	8	3	0	11	5	120	38	2	160	12
TOTAL:	215	98	2	315	124	2,276	987	45	3,308	74

is moved to the base for periodic/update maintenance. Four security vehicles, one helicopter, and a federal marshall accompany the reentry vehicle. Utility vehicles such as water, refueling, and wastewater transports service each launch control facility on an as-needed basis (average is 1 trip per vehicle per month). Maintenance vehicles make two to five trips per week to the launch facilities and launch control facilities. Safety vehicles travel to the deployment area in response to hazardous conditions and/or accidents and perform periodic safety checks. In addition, crews, support technicians, and security police are replaced on a 1, 3, and 4-day cycle, respectively.

3.3.3.2 Public Transportation

Public transportation service in Great Falls is provided by both buses and taxis. The Great Falls Transit District manages the bus service within Great Falls and Black Eagle, Montana and offers two types of services: scheduled fixed route and chartered service. In 1985, the system had an annual ridership of 485,000 passengers or an average weekday ridership of 1,750 passengers, and on Saturdays, an average ridership of 850 passengers. There are no plans to increase fleet size or to extend bus routes in the near future. Taxi service in Great Falls is provided by the Diamond Taxicab Company, a privately owned company that operates on an on-call basis 24 hours a day. No local bus and taxi services are available within the cities of Lewistown and Conrad.

3.3.3.3 Railroads

Two major rail lines provide service in the area, the Class I Burlington Northern Railroad (BN) and the Class III Central Montana Railroad (CMR). Rail passenger service is provided across northern Montana by Amtrak's "Empire Builder," which passes through Havre, Shelby, and Cut Bank (Section 3.3.2.2, Figure 3.3.2-2). Freight service is provided by the BN which operates the north-south main line between Billings and Sweetgrass at the Canadian border. Another main freight line passes from Helena through Great Falls to Fort Benton. The BN maintains a branch line from Great Falls and terminates just northwest of Malmstrom AFB.

In the Lewistown area, a branch line extends from Sipple near the BN mainline to Lewistown. The BN has recently extended the line between Sipple and Moore.

The CMR was formed to preserve rail service to central Montana on a 66.1-mile branch line that was abandoned by the BN. This CMR line extends southeast from Geraldine to the Spring Creek junction, and then proceeds west to Moccasin, which is on the BN mainline.

3.3.3.4 Airports

The region is serviced by airports located in Great Falls, Lewistown, and Conrad.

Great Falls International Airport. Located about 3 miles southwest of downtown Great Falls, the Great Falls International Airport is the largest commercial airport in north-central Montana. Four major airlines, Northwest Orient, Delta, Continental, and United, currently serve Great Falls. Smaller regional carriers, Northwest Airlink (formerly Big Sky Airlines) and Horizon Air, also serve the area. The airport has three active runways. The primary access to the airport is through Airport Road (Federal-Aid Urban Route 5212), which connects directly to Interstate 15.

Other facilities at the airport include those for air cargo, mail, and for the Montana Air National Guard, which currently leases about 125 acres of land southwest of the passenger terminal complex.

Lewistown Airport. Lewistown Municipal Airport, located approximately 3 miles southwest of the City of Lewistown, is a commuter airport that serves Fergus County and surrounding areas. Northwest Airlink serves Lewistown with two round-trips every weekday from Billings and Havre. The airport has three paved runways. The main access to the airport is via Federal-Aid Urban Route 7103, which connects directly to U.S. 87 or Main Street within Lewistown.

Conrad Airport. Conrad (Pondera County) Airport, located immediately west of the City of Conrad, serves mostly general aviation. The airport has a paved main runway and a turf runway that is used during crosswind conditions. The airport is accessed through Federal-Aid Secondary Route 534, which connects to Business Route 15.

3.4 Land Use

Deployment of the Small Intercontinental Ballistic Missile at Malmstrom Air Force Base (AFB) would result in population increases that may require additional residential and associated commercial and public infrastructure development in the affected communities. It would also result in changes or disruptions to rural land uses or agricultural management practices.

3.4.1 Resource Description

3.4.1.1 Urban Land Use

Urban land use addresses direct impacts resulting from construction of program-related facilities on or in the vicinity of the base, and indirect program impacts caused by population growth. These impacts can affect both developed and undeveloped land.

3.4.1.2 Rural Land Use

Rural land use addresses the changes in land use caused by acquisition of land for proposed program use and the impacts from transporter/erector (T/E) route modifications, launch facility modifications, and establishment of required explosive safety zones around the launch facilities. It also addresses indirect impacts on agricultural management practices.

3.4.2 General Analysis Methodology

3.4.2.1 Region of Influence

The Region of Influence (ROI) for urban land use was based on the assumption that inmigration could lead to land use changes in the form of new residential development and associated support services and infrastructure. The ROI includes Malmstrom AFB and the counties and communities where program-induced population inmigration is anticipated. The City of Great Falls in Cascade County is expected to be the largest recipient of program-related population increases. The communities of Lewistown and Conrad in Fergus and Pondera counties, respectively, are also likely to receive program-induced population growth.

The ROI for rural land use includes the nine counties where the launch facilities are located and where direct and indirect land use impacts from the proposed program could occur. These counties are Cascade, Chouteau, Fergus, Judith Basin, Lewis and Clark, Pondera, Teton, Toole, and Wheatland.

3.4.2.2 Urban Land Use

Urban land use was evaluated in terms of the overall rate of development and the local capacity to absorb additional population. An urban land use inventory was conducted to determine acreage. Planning documents were reviewed to identify land use issues and policies most relevant to the ROI.

Future baseline conditions focused on urban land development as a whole. Communities were analyzed using a systematic procedure that addressed local planning capabilities, access to service and facilities, and proposed development.

Future baseline land uses without the program were estimated. To estimate residential land use, the required change in supply of housing units, based on housing projections developed in the socioeconomic analysis, was multiplied by density factors determined from local conditions and practices using densities (i.e., units per acre) shown in Section 4.4.1.1. Vacant land absorption was determined for each community by considering historical trends and annexation policies. Land use changes anticipated as a result of the KC-135R air refueling mission were incorporated.

3.4.2.3 Rural Land Use

Land uses in the deployment area were identified through interpretation of aerial photographs and existing maps. The generalized pattern of agriculture was determined and subdivided by type of use. Future baseline conditions assumed a continuation of existing patterns, except in specific locations undergoing conversion.

3.4.3 Existing and Future Baseline Conditions

3.4.3.1 Urban Land Use

The expansion of urbanized areas occurs through the utilization of vacant developable land and/or the redevelopment of existing urban areas. Vacant developable land includes land designated as urban or non-open space categories in the adopted comprehensive plan of a city, county, or regional planning agency.

City of Great Falls. Great Falls contains approximately 10,860 acres within the city's corporate boundaries. An unincorporated area of approximately 28,245 acres surrounds the city. The City of Great Falls and the unincorporated area, which includes Malmstrom AFB (3,163 acres) and the surrounding land within 1 mile of the base, comprise the study area for the land use analysis. Land use data for this study area are presented in Table 3.4.3-1.

Table 3.4.3-1

Land Uses in the Great Falls Urban Area
and at Malmstrom AFB
1986
(acres)

Land Use	Great Falls Urban Area	Malmstrom AFB and Vicinity
Single-Family Residential	6,629	0
Multiple-Family Residential	702	360
Commercial	997	28
Industrial	2,332	150
Public	3,231	332
Administrative	0	211
Flightline	0	865
Ordnance Related	0	82
Agricultural/Rangeland	19,096	5,291[1]
Vacant Developable	6,118	1,135
TOTAL:	39,105	8,454

Note: [1] Lands located within 1-mile zone of the base.

The largest outward growth has occurred on the south side of the city west of the Missouri River, and on the east side between the city and Malmstrom AFB. Infill has occurred in the western section of the city. Present growth patterns have the potential to continue due to the presence of large amounts of vacant developable land present at locations adjacent to and within developed areas.

The City of Great Falls and the Great Falls City-County Planning Board have adopted zoning ordinances, subdivision ordinances, and a comprehensive plan.

Malmstrom Air Force Base and Vicinity. Figure 3.4.3-1 illustrates the existing land uses at Malmstrom AFB and in the vicinity of the base as of March 1986.

City of Lewistown. Lewistown contains 1,011 acres within the city's corporate boundaries, whereas the city-county planning area contains 13,975 acres. Considerable vacant developable land is located within the built-up areas of Lewistown. The City of Lewistown and the Lewistown City-County Planning Board have adopted zoning ordinances, subdivision ordinances, and a comprehensive plan.

City of Conrad. Conrad contains 685 acres within the city's corporate boundaries. There is considerable developed land available in the form of essentially vacant trailer parks. The City of Conrad and the Conrad-Pondera City-County Planning Board have adopted a comprehensive plan, a zoning ordinance, and a subdivision ordinance.

3.4.3.2 Rural Land Use

Analysis of existing rural land use conditions focused on the T/E route corridors (1,000-ft wide on either side of the T/E route centerline) and the land surrounding each launch facility. The existing patterns of rural land use are expected to continue in the future throughout the ROI.

Generalized Land Use in the Region of Influence. Figure 3.4.3-2 presents a generalized overview of rural land use in the ROI. The livestock industry utilizes approximately 43 percent of the land in the form of rangeland. Cattle raising is the primary livestock activity with the sheep, horse, hog, and poultry industries as secondary. Dry-farmed cropland constitutes the second largest type of land use activity. Dry-farmed crops generally include wheat and barley. Irrigated agriculture has the highest value per acre. Hay is the principal crop grown on irrigated lands, followed by barley. Both crop and livestock agricultural industries are dependent on the road network.

Rural areas are characterized by small towns with lower population densities. The remaining land use type in rural areas consists of woodlands, generally located in mountainous areas and usually managed by the U.S. Forest Service.

Land Use Along Deployment Area Roads. The principal land uses along deployment area roads are dry-farmed cropland and rangeland.

Land Use Around Launch Facilities. Land uses around the launch facilities are primarily characterized by dry-farmed cropland or rangeland.

Inhabited Structures Within a 2,000-Foot Study Area. To cover a range of potential explosive safety zone expansions at each launch facility, areas within 2,000 feet of existing Minuteman silo closures were analyzed for the presence of inhabited structures.

An analysis of the 2,000-foot study area at each of the 200 launch facilities identified the presence of 91 residences, 10 commercial structures, and 1 school in the vicinity of 45 launch facilities (Table 3.4.3-2; Figure 3.4.3-3).

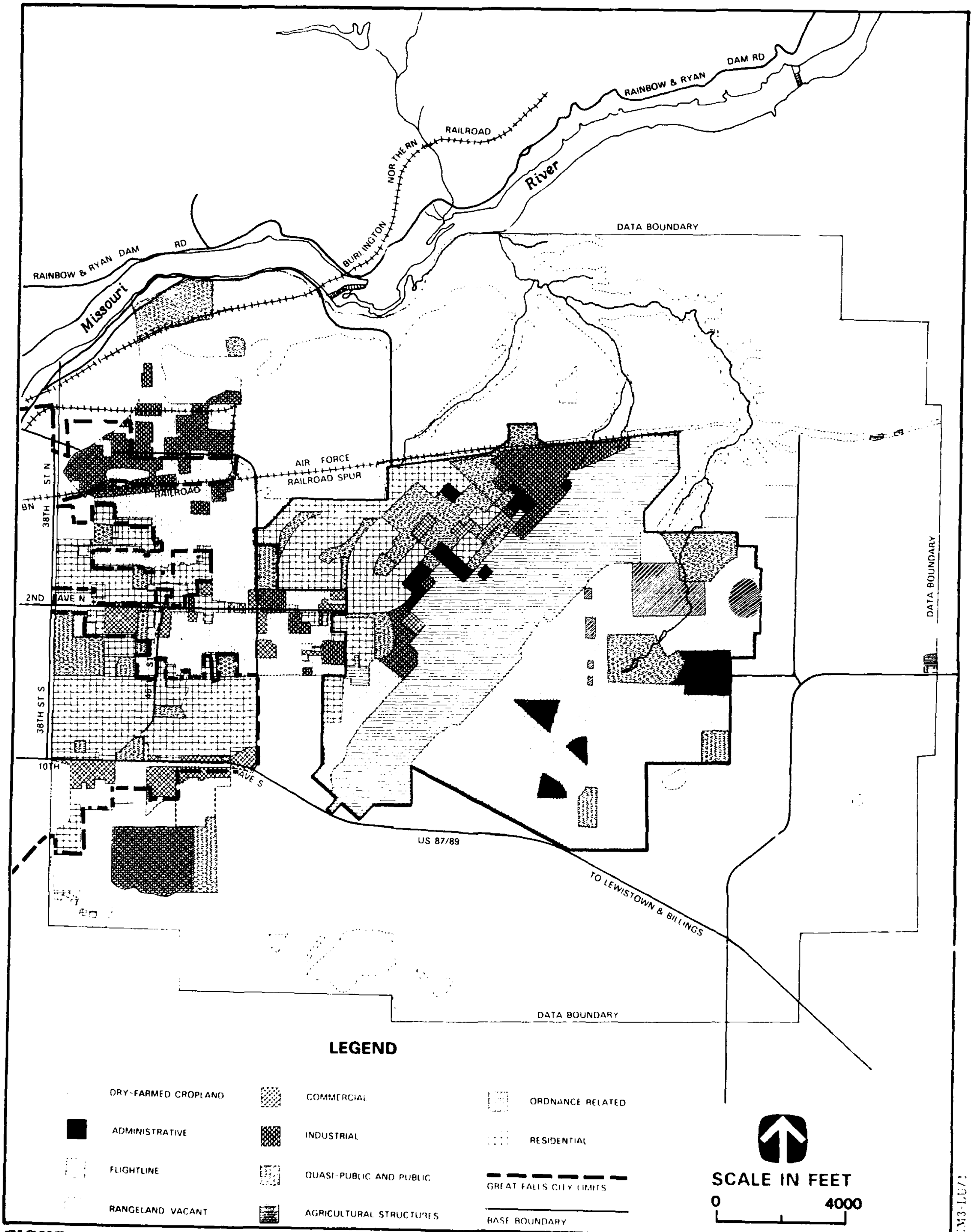


FIGURE 3.4.3-1 GENERALIZED URBAN LAND USE OF MALMSTROM AFB AND VICINITY, 1986

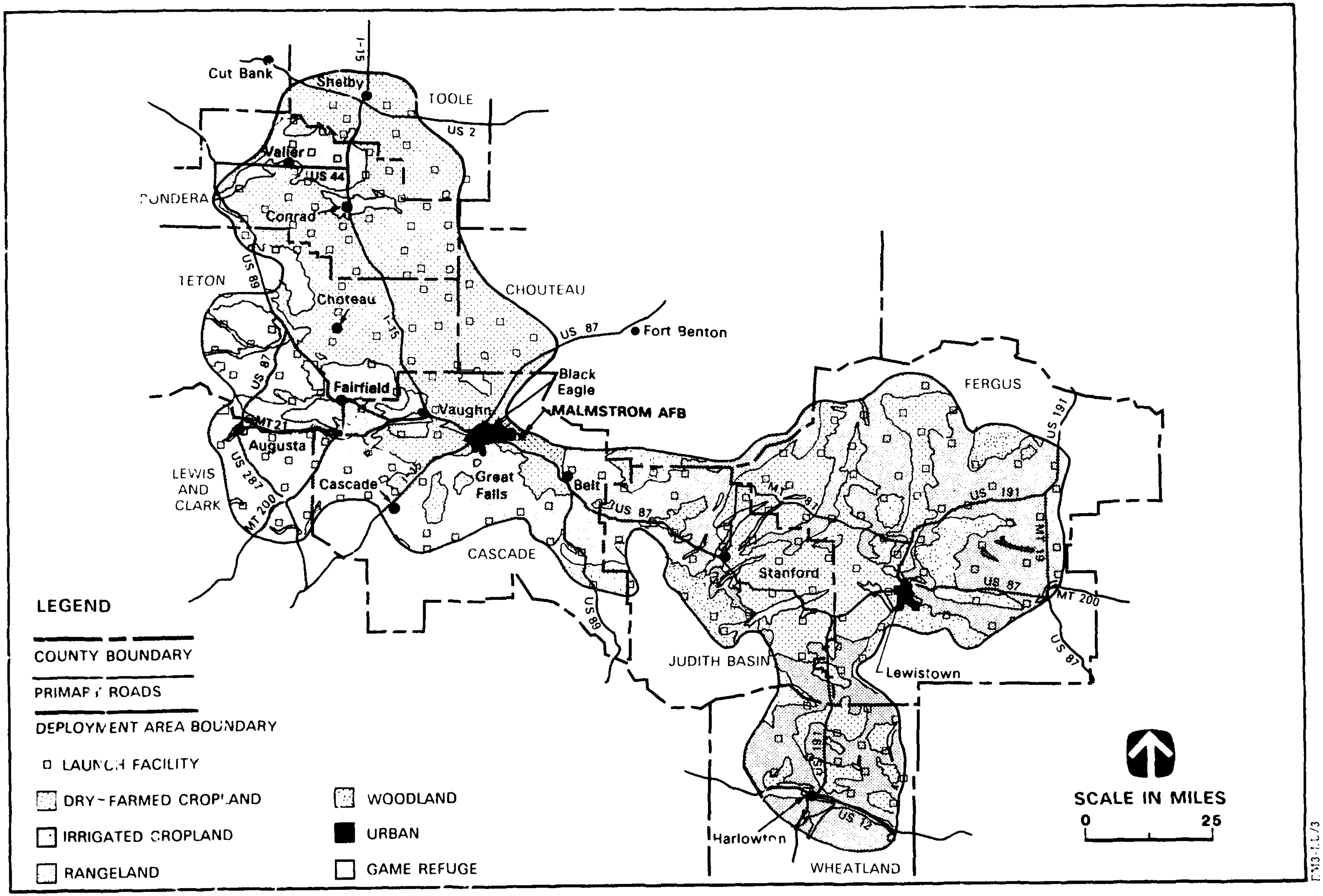


FIGURE 3.4.3-2 GENERALIZED RURAL LAND USE OF THE REGION OF INFLUENCE

Table 3.4.3-2

Number of Inhabited Structures Within the 2,000-Foot Study Areas of the 341st Strategic Missile Wing Launch Facilities

Launch[1] Facility	School[2] Structures	Commercial Structures	Residential Structures	Residential[3] Population
A-4	0	0	2	5
A-6	0	0	17	46
A-7	0	0	2	5
A-8	0	0	3	8
A-11	0	0	1	3
B-3	0	0	1	3
B-8	0	0	1	3
B-10	0	0	4	11
C-2	0	0	2	5
C-5	0	0	1	3
C-8	0	0	2	5
C-11	0	2	5	14
D-6	0	0	1	3
D-7	0	0	1	3
D-8	0	0	1	3
D-9	0	0	1	3
D-11	0	0	2	5
E-3	0	0	2	5
E-9	0	0	1	3
H-4	0	0	5	14
H-5	0	0	1	3
H-6	0	0	1	3
H-9	0	0	1	3
I-10	0	0	2	5
J-6	1	0	1	3
J-10	0	0	3	8
K-5	0	0	1	3
M-2	0	0	4	11
M-5	0	2	4	11
M-7[4]	0	3	3	8
N-2	0	0	1	3
N-3	0	0	2	5
N-8	0	0	1	3
N-9	0	2	1	3
O-7	0	0	1	3
P-6	0	0	1	3
P-9	0	0	1	3
Q-15	0	0	1	3
Q-16	0	0	1	3
Q-18	0	0	1	3
S-33	0	0	1	3
S-34	0	0	1	3
T-42	0	0	1	3
T-43	0	1	0	0
T-44	0	0	1	3
TOTAL:	1	10	91	252

Notes:

[1] Launch facilities that contain no inhabited structures within an explosive safety zone are not listed.

[2] School population consisted of 9 students and 1 teacher in 1986.

[3] Estimated persons per residential structure using ROI average number of 2.7 per household and rounding off to nearest person.

[4] One of the three commercial structures at M-7 contains multiple uses including a 4-unit motel, barber shop, and a self-service laundry/shower facility and is counted as one structure.

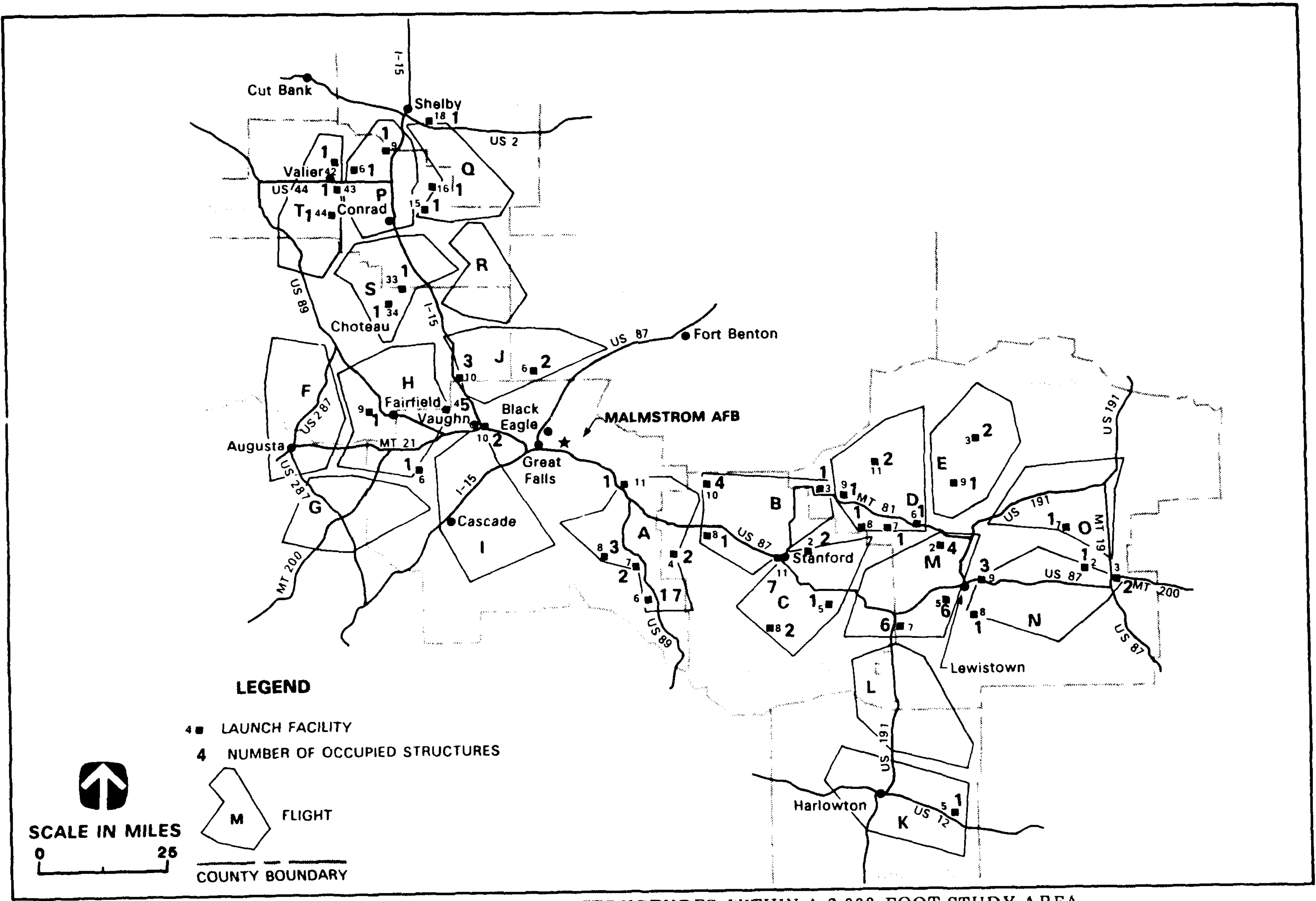


FIGURE 3.4.3-3 LAUNCH FACILITIES WITH OCCUPIED STRUCTURES WITHIN A 2,000-FOOT STUDY AREA

3.5 Recreation

Deployment of the Small Intercontinental Ballistic Missile would result in population increases in communities in or near the deployment area. Depending on the availability of recreation resources and facilities and their current use, population increases associated with the proposed program may result in an increased demand that is greater than the available supply. For purposes of analysis, recreation has been divided into regional and local recreation. In addition, a discussion of the Montana tourism industry is included in the regional recreation section.

3.5.1 Resource Description

3.5.1.1 Regional Recreation

Regional recreation is defined as outdoor recreation activities that are dependent on or enhanced by natural surroundings or resources (e.g., lakes, rivers, and forests). This type of recreation, also known as resource-based recreation, is generally associated with federal, state, and other public lands that do not necessarily have developed facilities.

3.5.1.2 Local Recreation

Local recreation is defined as recreation activities that are directly linked to developed facilities and/or parklands. This type of recreation, also known as user-based recreation, is generally associated with municipal or county government lands developed specifically for recreation.

3.5.2 General Analysis Methodology

3.5.2.1 Region of Influence

The Region of Influence (ROI) for the regional recreation analysis includes federal, state, and regionally managed recreation areas located within an approximate 150-mile travel distance from Great Falls, Montana. The ROI for the local recreation analysis includes those urban areas projected to receive a majority of the program-induced inmigration, specifically Great Falls, Lewistown, and Conrad.

3.5.2.2 Regional Recreation

The determination of existing and projected baseline conditions for the analysis involved the identification of resource-based recreation areas. Information pertaining to available recreation opportunities and facilities and visitation data were collected for each recreation area. Recreation opportunities and use were considered for various activities, including camping, picnicking, swimming, fishing, hunting, boating, backpacking, horseback riding, off-road vehicle (ORV) use, skiing (both cross-country and downhill), and snowmobiling.

Existing and projected recreation use (in activity days) within the ROI was calculated using participation rates determined for the existing population for each activity in a 1985 outdoor recreation needs survey conducted by the Montana Department of Fish, Wildlife and Parks (MDFWP). Participation values derived for the department's Administrative Region 4 were used because the geographical boundary of this region corresponds approximately to that of the ROI. Projected use was based on the expected increase in population within the ROI, because there is a direct relationship between population levels and increased recreation use.

3.5.2.3 Local Recreation

The determination of existing and projected baseline conditions for the analysis involved the inventory and evaluation of recreation facilities and programs provided by the communities. Park and recreation master plans and inventories, local recreation information brochures, and comprehensive plans for the affected cities and counties were used in the analysis. Primary agency contacts were made with local park and recreation departments/boards and land use planning officials. Field surveys were conducted to supplement and update data from local agencies and available documents.

For the local recreation analysis, established population-based recreation standards were applied to the existing and projected population for the city-county planning areas for two categories: parkland and recreation facilities. The analysis considered existing conditions in terms of available supply and the need for additional improvements based on locally identified deficiencies and comparison to established standards. Staffing levels were examined to determine the staffing necessary to administer, operate, and maintain the park and recreation system. Commercial/private recreation facilities in the communities were also considered in the analysis.

3.5.3 Existing and Future Baseline Conditions

3.5.3.1 Regional Recreation

A wide variety of recreation opportunities exist within the ROI. These opportunities occur in portions of three national forests (Lewis and Clark, Lolo, and Helena), Giant Springs State Park, numerous state recreation areas and fishing access sites, the Upper Missouri National Wild and Scenic River, Glacier National Park, and several national wildlife refuges and state wildlife management areas. These areas are primarily associated with various physiographic features including the Rocky Mountain Front Range, the Little Belt Mountains, the Missouri River and its tributaries, three large lakes on the Missouri River (Canyon Ferry, Hauser, and Holter), and various other water bodies and mountain ranges in north-central Montana.

Lewis and Clark National Forest, which consists of five separate land units, is the most heavily used recreation area in the ROI. The national forest, particularly along the Rocky Mountain Front and in the Little Belt Mountains, provides a majority of the opportunities in the ROI for camping, fishing, hunting, hiking/backpacking, horseback riding, ORV use, and winter activities. The national forest has two developed downhill skiing facilities and also provides numerous trails for cross-country skiing and snowmobiling. The portions of the Lolo (Seeley Lake area) and Helena national forests within the ROI provide similar recreation opportunities.

Giant Springs State Park is the most heavily used state park or recreation area in the ROI. The park, located just outside Great Falls along the Missouri River, is a day-use facility and includes a large picnic area and a fish hatchery. Other heavily used areas include state recreation areas on Holter, Hauser, and Canyon Ferry lakes. The U.S. Bureau of Land Management (BLM) also manages a recreation area on Holter Lake. These areas provide camping, fishing, swimming, boating, waterskiing, and other water-based recreation opportunities.

Fishing is the major recreation activity in the region. The Missouri, Smith, Sun, Blackfoot, Marias, and Teton rivers and numerous reservoirs and lakes throughout the ROI provide fishing and some boating opportunities. The state maintains fishing access sites on most of these water bodies with the heaviest use occurring at Willow Creek, Pishkun, Eureka, Nilan, and Bynum reservoirs. The approximately 30-mile segment of the Missouri River downstream from Holter Lake and south of Great Falls is one of the most heavily fished areas in the state. Floating is a popular activity on the Missouri, Smith, and Blackfoot rivers.

Hunting is also a major recreation activity in the region. Big game and upland game bird hunting occur on national forest lands, state lands, and scattered parcels of BLM land, but a large amount of hunting also occurs on private lands. Use of public lands for hunting is increasing as more private landowners are restricting hunting opportunities on their lands. Popular waterfowl hunting areas include Freezeout Lake Wildlife Management Area, Benton Lake National Wildlife Refuge, Lake Helena, and Canyon Ferry Lake. Recreation participation within the ROI for various activities is presented in Table 3.5.3-1.

Tourism. The tourism industry in Montana is an important component of the state's economic base. Since the early 1980s, when the traditional industries of the state (i.e., wood products, mining, agriculture, and energy) began to decline, tourism has grown steadily. An estimated 2.75 million nonresident travelers, who spent approximately $475 million on goods and services, visited Montana in 1986. The number of nonresident visitors has increased by approximately 2.5 percent annually since 1979. In addition, resident travel within the state has increased and total expenditures by residents and nonresidents exceeded $850 million in 1986 and directly supported approximately 22,000 travel-related jobs.

Until recently, the State of Montana spent very little on travel promotion compared to other states (Montana was recently ranked 49th in the nation). The state spent approximately $600,000 in fiscal year (FY) 1980-81, $1.25 million in FY 1983-84, and $1.16 million in FY 1986-87. However, with the recent approval by the Montana State Legislature of a 4-percent tax on overnight accommodations to be used for travel promotion, Montana will spend more than $4 million dollars in FY 1987-88 and approximately $5 million in FY 1988-89 to promote the state as a vacation destination.

The state has expanded its travel promotion program in an effort to increase awareness of the state and attract more visitors to Montana. Recent studies conducted for the Montana Promotions Division concluded that a majority of the nonresidents contacted for the studies had little or no perception of the state. The state's primary markets are considered to be the upper Midwest, along the Pacific Coast, the Southwest, and western Canada. Montana's tourism industry is primarily based on the scenic attraction of the state's natural resource base. Travel promotion has focused on the recreation opportunities offered by the numerous rivers, streams, lakes, and forested mountain ranges in the state and the "old west" image associated with the many small towns and historic attractions throughout the state. Montana is also in competition with many of its neighboring states, all of which offer natural resource-based attractions and opportunities that are similar.

Tourist attractions in the north-central Montana region include Glacier National Park, Giant Springs State Park, historical sites associated with the Lewis and Clark Expedition, and the Charles M. Russell Museum and Studio. Glacier National Park is the cornerstone of the state's tourism industry, and together with Yellowstone National Park, results in a steady flow of tourists through the central region of the state.

Table 3.5.3-1

Estimated Recreation Participation in the Region of Influence[1] (in Activity Days)

Activity	Population[2] Participation (%)	Median[3] Days	Total Participation[4]		
			1986	1996	2000
Camping	54.5	8	575,500	620,400	634,000
Hunting	36.8	10	485,800	523,700	535,400
Backpacking	12.3	6	97,400	105,000	107,400
Horseback Riding	20.6	6	163,200	175,900	179,800
Off-Road Vehicle Use (4x4)	19.0	7	175,600	189,300	193,500
Off-Road Vehicle Use (All-Terrain Vehicles)	11.9	10	157,100	169,300	173,100
Picnicking	77.1	6	610,600	658,300	673,100
Fishing	57.3	12	907,600	978,500	1,000,500
Motorboating	33.6	5	221,800	239,100	244,400
Waterskiing	16.2	4	85,500	92,200	94,300
Swimming[5]	43.1	7	398,200	429,300	439,000
Rafting	14.6	3	57,800	62,300	63,700
Canoeing	7.9	4	41,700	45,000	46,000
Snowmobiling	19.0	5	125,400	135,200	138,200
Cross-Country Skiing	12.3	7	113,700	122,500	125,300
Downhill Skiing	17.8	6	141,000	152,000	155,400

Notes:

[1] Based on participation rates for MDFWP Administrative Region 4 (Cascade, Chouteau, Fergus, Glacier, Judith Basin, Lewis & Clark, Liberty, Meagher, Petroleum, Pondera, Teton, and Toole counties) from The Montana Outdoor Recreation Needs Survey (University of Montana 1986).

[2] Percent of population 18 years or older estimated to participate in activity at least once during the year.

[3] Median number of days participation in activity occurs.

[4] Total annual participation in activity days based on an estimated population (18 years or older) of approximately 132,000 for 1986, 142,300 for 1996, and 145,500 for the year 2000 for MDFWP Region 4.

[5] Swimming in lakes, streams, rivers, or ponds.

3.5.3.2 Local Recreation

City of Great Falls. The City of Great Falls Park and Recreation Department is the major provider of parkland and recreation facilities in the Great Falls urban area. In addition, the Great Falls Public Schools (GFPS) system provides additional facilities which supplement the city's facilities; however, these are not regularly available to the general public. Commercial/private facilities (e.g., golf courses, bowling centers, and racquet clubs) are also available in the Great Falls urban area.

The Great Falls Park and Recreation Department operates and maintains 43 developed parks containing approximately 743 acres, including a softball complex, and both a 9- and 18-hole golf course. Approximately 280 acres of the developed parkland consists of neighborhood or multi-neighborhood parklands. An additional 9-hole golf course may be developed by 1990. In addition, the department has 15 undeveloped parkland parcels containing approximately 370 acres, including 2 islands located in the Missouri River and a 240-acre parcel. Several small parcels are planned for development over the next several years.

The developed parks provide 24 ballfields, 32 tennis courts, 9 soccer fields, 3 outdoor swimming pools, and an indoor swimming pool. Thirty-two parks have playground apparatus, three parks have jogging paths/fitness courses, and ten parks have basketball courts. The GFPS system provides additional indoor and outdoor facilities, including an indoor swimming pool, an indoor running track, two tennis courts, basketball courts, gymnasiums, and football/soccer fields.

Based on information provided by the Park and Recreation Department and comparisons with established recreation standards, Great Falls currently has adequate parkland acreage and recreation facilities to serve the existing population. Parkland and facilities are also adequate to serve the projected population with the exception of softball and golf facility shortages that could develop over the next several years.

City of Lewistown. The City of Lewistown operates and maintains eight parks, a softball complex (4 softball fields), and the Lewistown Civic Center. The parks, totaling approximately 35 acres, provide a swimming pool, an ice skating rink, six tennis courts, four basketball courts, and five ballfields (1 baseball and 4 youth baseball). One park is available for hiking and nature study. The Lewistown Public Schools system supplements the city's facilities with an athletic field and gymnasium at Fergus High School and playground equipment and basketball courts at three elementary schools. Private recreation facilities available include two bowling alleys, a racquetball club (2 courts), and a country club with a swimming pool and 18-hole golf course. Lewistown has adequate parkland and recreation facilities to accommodate its existing and projected population.

City of Conrad. The City of Conrad operates and maintains approximately 31 acres of developed parkland, which include five parks and the Conrad Sports Complex. These areas provide a swimming pool, one basketball court, and eight ballfields. The city also has an undeveloped 1.7-acre parcel. The city has a cooperative agreement with the Conrad Public Schools system for use of school district facilities, including eight tennis courts, two athletic fields, outdoor basketball courts and playground areas, and two gymnasiums. In addition to these facilities, commercial recreation facilities available include a bowling alley, a racquetball/health club (2 courts), and a 9-hole golf course. Conrad has adequate parkland and recreation facilities to accommodate its existing and projected population.

3.6 Visual Resources

Small Intercontinental Ballistic Missile facilities or program-induced land disturbance could influence visual resources and, therefore, the environmental character of the region. For this reason, an analysis of visual resources is included in this Environmental Impact Statement.

3.6.1 Resource Description

Visual resources are defined as the physical characteristics or qualities of the environment that can be seen by observers of the landscape. A landscape is defined as a portion of land that the eye can comprehend in a single view, irrespective of its aesthetic value. Each type of landscape is determined by its visible features and their arrangement in the landscape composition. These landscape features consist of landform, vegetation, and structures. Each of these features is defined by four basic elements: form, line, color, and texture. All of these elements are present in every landscape, but each exerts a different degree of visual influence within a given landscape. The more elements that exert a strong visual influence or contrast in a particular landscape, the stronger or more interesting the landscape character.

3.6.2 General Analysis Methodology

3.6.2.1 Region of Influence

The Region of Influence for visual resources covers the entire deployment area. However, a smaller area of intensive study was identified and includes only those launch facilities that are located within 0.5 mile of and are visible from scenic and heavily traveled highways (highways with a 1985 annual average daily traffic of at least 1,000). Twenty-one launch facilities (out of the total of 200) and their surrounding landscapes are included in this area. There are other launch facilities within 0.5 mile of such highways which cannot be seen from the highways because of intervening topography. The proposed Hard Mobile Launcher enclosures to be constructed at launch facilities that are more than 0.5 mile from the highways are not likely to be exposed to a large enough number of viewers to have an effect on visual resources.

3.6.2.2 Baseline Methodology

Because the analysis methodology to determine program impacts on visual resources, as used here, is a modified version of the U.S. Bureau of Land Management (BLM) Visual Resources Management (VRM) methodology, it requires that landscape descriptions be prepared. Instead of identifying VRM classes, as is done with the BLM VRM methodology, four generalized landscape types were identified within the deployment area: mountains, foothills, rolling plains, and planar (level) uplands. Similar landscape areas are termed landscape characteristic provinces (LCPs) and were derived mainly from landform maps. The visual character within each LCP is similar; that is, within each LCP, landscape features (landform, vegetation, and structures) are similar in form, line, color, and texture. Using computer graphic methods, a deployment area map showing launch facilities and launch control facilities was compared with an LCP map, and the number of launch facilities in each LCP was plotted.

3.6.3 Existing and Future Baseline Conditions

3.6.3.1 Landscape Characteristic Provinces

The deployment area is located within the northwestern portion of the Great Plains Physiographic Province. Like most of the Great Plains, the deployment area has flat to rolling terrain naturally vegetated with short grassland, but also includes some mountainous terrain along its southern edge. The major river through the deployment area is the Missouri, with the Sun, Teton, Marias, and Judith rivers as its largest tributaries. There are also numerous other streams and creeks. Visual resources should remain unchanged in the future, with dryland agriculture and grazing continuing to be the major modifications to the landscape.

Mountains Landscape Characteristic Province. The Mountains LCP is located mainly along the southern edge of the deployment area and comprises approximately 4 percent of the total deployment area. It includes the community of Monarch. This LCP ranges in elevation from 4,000 to 8,000 feet, with slopes generally over 25 percent and relief of over 1,000 feet. It includes portions of the Big Snowy, Little Belt, Moccasin, Highwood, and Judith mountains, and Square Butte. These areas have a rich diversity of form, line, color, and texture in steep-walled canyons and alpine meadows. The slopes are mostly forested with ponderosa pine, Douglas fir, and Rocky Mountain juniper, with seasonal colors ranging from deep greens, browns, and golds, to the white of winter snows. The minimal manmade intrusions on the landscape include fencelines, roads, timber-cutting operations, and a few mining operations in the Little Belt, South Moccasin, and Judith mountains.

Foothills Landscape Characteristic Province. The Foothills LCP is located mainly in the southern portion of the deployment area and comprises approximately 6 percent of the deployment area. It includes the communities of Heath and Forest Grove, east of Lewistown. The foothills are generally at elevations ranging from 3,500 to 4,500 feet with slopes between 10 and 25 percent and local relief of up to 1,000 feet. The foothills, with their mountain backdrops, provide interesting linear variety and shape contrasts. Vegetation includes fescue grasslands, sagebrush, and trees in riparian areas. Seasonal colors range from green to gold, to white, to deep browns. Visual intrusions include occasional ranches and farmsteads, scattered roads, and fencelines. Most of the area is rangeland, but some cultivation occurs.

Rolling Uplands Landscape Characteristic Province. The Rolling Uplands LCP is fairly well distributed across the deployment area and comprises approximately 36 percent of the deployment area. It includes the community of Harlowton. There is less diversity in form, line, color, and texture in this LCP. Ranging between 3,000 and 4,000 feet in elevation, the Rolling Uplands LCP reveals land surface slopes of 3 to 10 percent and relief of up to 200 feet. Numerous creeks and streams provide interesting linear contrasts in the area. Vegetation along these creeks includes cottonwood, ash, box elder, and willow, while the natural vegetation of the Northern Great Plains includes fescue grasslands and sagebrush. Colors range from green to brown to white, depending on the season. Visual intrusions include roads, fencelines, farmsteads, and a few power transmission lines; none appear frequently enough to be visually objectionable. Farms and ranchhouses are considered picturesque in this setting. Much of the land is cultivated. Depending on the season, fields are either plowed, are planted in wheat, or are covered with stubble.

Planar Uplands Landscape Characteristic Province. The Planar (level) Uplands LCP is also widely distributed across the deployment area and comprises approximately 54 percent of the total deployment area. It includes the communities of Lewistown, Stanford, Great Falls, and Shelby. This LCP ranges from 2,500 to 3,500 feet in elevation, with the majority of the area nearly flat to gently rolling. Surface slopes are generally less than 3 percent and relief is less than 100 feet. The topography is divided by steep walls of low-gradient streams lined with riparian vegetation. Predominant natural vegetation is western, bluebunch, and thickspike wheatgrass, as well as green needlegrass. Colors are similar to the Rolling Uplands LCP. Visual diversity is provided by creeks, reservoirs, and lakes scattered throughout the area. Visual intrusions include roads, fencelines, powerlines, farmsteads, and farm-storage structures. Croplands create bold, rectilinear patterns which at times distract from the natural landscape.

3.6.3.2 Launch Facilities in Landscape Characteristic Provinces

There are 200 launch facilities in the approximately 8,500-square-mile deployment area. The facilities are fairly evenly distributed across the area, with an average distance between them of about 6.5 miles. Only 21 of the launch facilities are located within 0.5 mile of and can be seen from scenic or heavily traveled highways.

Because the 200 Minuteman launch facilities have no aboveground buildings and the communication/security facilities have a low or see-through profile, they do not create a noticeable visual intrusion on the deployment area landscape. The facilities are most likely to be seen in the Planar Uplands LCP, where the fences and powerpoles are more likely to be silhouetted against the sky of the flat terrain.

3.6.3.3 Visual Environment at Malmstrom Air Force Base

Malmstrom Air Force Base (AFB) is located on the eastern limits of the City of Great Falls in north-central Montana. The base is situated in the Planar Uplands LCP (at about the 3,500-ft elevation) overlooking the Missouri River. Although U.S. 87/89 passes through the runway clear zone in the southwestern portion of the base, the majority of the cantonment area is located over a mile from the highway. However, some housing is found approximately 0.5 mile from the highway on the west side of the base. Except for water towers and radar domes, all onbase facilities appear very low on the horizon from that distance. Power and light poles near the southern boundary of the base are the most obvious intrusions on the landscape. The future visual environment at Malmstrom AFB will be changed to a minor extent by the introduction of support facilities for the KC-135R air refueling mission.

3.7 Cultural and Paleontological Resources

Deployment of the Small Intercontinental Ballistic Missile (ICBM) at Malmstrom Air Force Base (AFB) is likely to disturb cultural and paleontological resources. Procedures for the identification, evaluation, and treatment of cultural resources are contained in a series of federal and state laws and regulations in addition to the National Environmental Policy Act. Paleontological resources are generally not afforded the same degree of protection, but some federal agencies (e.g., U.S. Forest Service) and states, including Montana, have laws and regulations that include the treatment of fossil materials. For this analysis four major elements are discussed: prehistoric resources, historic and architectural resources, Native American resources, and paleontological resources.

3.7.1 Resource Description

For this Environmental Impact Statement (EIS), previous studies, archival data, and some new field studies were used to identify cultural/historical contexts and distributional patterns of prehistoric, historic, and paleontological sites. Such information provides the basis for identifying resources likely to be affected and for assessing the relative importance of those resources. Native American groups were consulted directly for specific data on sacred areas and site types.

3.7.1.1 Prehistoric Resources

Prehistoric resources are physical properties resulting from human activities predating written records. They are generally identified as either isolated artifacts or sites. Sites contain artifacts (manufactured implements and their by-products), features (hearths, tipi rings, and other nonportable facilities), and faunal and floral materials. The more common site types include short-term hunting/gathering camps and quarry/lithic sources. Less common types include complex villages, burial sites, pictograph/petroglyph areas, and ceremonial sites.

3.7.1.2 Historic and Architectural Resources

Historic and architectural resources consist of physical properties, usually related to Euroamerican occupations, that postdate written records. Historic resources include a wide variety of architectural structures and archaeological features at sites such as towns, forts, homesteads, cemeteries, dumps, railroads, mines, and trails.

3.7.1.3 Native American Resources

Native American resources include districts, sites, areas, or raw materials considered important to Native Americans for traditional or religious reasons. They may include prehistoric sites, contemporary sacred sites and areas, and source areas for materials used in the production of sacred objects and traditional implements.

3.7.1.4 Paleontological Resources

Paleontological resources are the physical remains, impressions, or traces of plants or animals from a former geological age. These include casts, molds, or trace fossils such as impressions, burrows, and tracks. Areas where such remains can be recovered typically include surface exposures and subsurface deposits exposed by ground-disturbing activities.

3.7.2 General Analysis Methodology

3.7.2.1 Region of Influence

The Region of Influence (ROI) for cultural and paleontological resources is an irregular 8,500-square-mile area defined by the Minuteman deployment area and associated transporter/erector (T/E) routes (Section 1.3.3, Figures 1.3.3-1 and 1.3.3-2). Background data were generally obtained from larger study areas encompassing the ROI.

3.7.2.2 Prehistoric Resources

Baseline conditions for prehistoric resources were estimated using existing data to construct a predictive model of site distribution. State of Montana site records from the nine-county area around the ROI were used in the analysis. Statistical techniques, such as logistic regression, were used to relate site locations to topographic variables and to project the probabilities of encountering sites in various unstudied landform settings. Site types were evaluated according to their rarity and potential for yielding information relevant to high-priority research goals. The results were incorporated, along with site probabilities, into a sensitivity map of the ROI. The sensitivity patterns were considered in identifying the impact of proposed facilities. Subsequent to completion of the Draft EIS (DEIS), cultural resources surveys were conducted at specific launch facilities, in areas near Malmstrom AFB, and along deployment area roads.

3.7.2.3 Historic and Architectural Resources

Historic resources distributions were estimated from records of known sites in the nine counties encompassing the deployment area. Site locations were obtained from a search of the state site files and from a Montana Department of Highway's study of historic bridges. Patterns of site distribution were used to identify those areas likely to contain National Register of Historic Places (NRHP) eligible resources and to make qualitative judgments about their sensitivity. Subsequent to the preparation of the DEIS, field surveys were conducted to obtain site-specific data on resources likely to be disturbed or affected visually.

3.7.2.4 Native American Resources

Baseline conditions for Native American resources were ascertained by identifying as many sacred and traditional use areas as possible. Data were obtained from previous ethnographic and ethnohistoric studies, and from existing state site records. Additionally, 39 Native Americans representing 15 tribal and 4 intertribal groups were contacted about potential concerns in the ROI. As a result of these initial contacts, ongoing consultation relationships were established with recognized religious specialists. The identification and ranking of sensitive resources, and the evaluation of specific launch facilities, were accomplished through consultation. Sacred and traditional use area distributions were not summarized on maps because of the sensitivity of some resource types.

3.7.2.5 Paleontological Resources

Existing paleontological resources distributions were estimated by identifying known fossil localities and by defining the regional extent and exposure of surface and near-surface geological formations. The distribution of fossils in a given formation, along with the relative importance of those fossils, contributed to the assessment of relative sensitivity. Paleontological sensitivity was evaluated throughout a regional study area including a 15-mile buffer around the ROI. This approach permitted the evaluation of deposits which, though buried in the ROI, might be close enough to the surface to be affected by Small ICBM construction.

3.7.3 Existing and Future Baseline Conditions

3.7.3.1 Prehistoric Resources

The archaeological record in the study area spans 12,000 years of prehistory from the Paleoindian period (10,000-5500 B.C.) to the Protohistoric period (1750-1803). Although the area has not been extensively studied, 1,261 prehistoric sites have been recorded. Prehistoric site types represent different activities carried out in various environmental settings. Those identified in the ROI include short-term plant-processing camps and hunting stands; habitation sites, including stone circle sites and rockshelters; antelope or buffalo kill and butchering sites; rock art sites (petroglyphs or pictographs); quarries and lithic sources; and rock cairns and alignments.

Prehistoric site types differ with regard to preservation, age, and function which, in turn, affects their research potential (i.e., importance). Buried sites, such as Sun River, Lost Terrace, or Holmes Terrace, contain excellent stratigraphic integrity and provide good spatial and temporal control for evaluating cultural deposits. The ROI has the potential for yielding additional buried sites along the major drainages. Undisturbed surface sites, such as stone circle sites on grazing lands, provide structural information, and site configuration may contribute to an understanding of social organization of prehistoric groups. Even some types of disturbed sites, such as vandalized buffalo kills, can provide limited information contributing to time-period and settlement-pattern studies.

Sites may also be important when they relate to time periods not well known in the ROI. Early Middle Prehistoric sites and Paleoindian materials are relatively rare, and sites from either period are important because of their potential to fill gaps in the present data base. Materials related to the late Middle Prehistoric cultural manifestation, Pelican Lake, and to the Late Prehistoric period manifestation, Avonlea, constitute important components of the local archaeological record.

Only three prehistoric sites in the study area, Ulm Pishkun (Ulm Buffalo Jump), 24JT104, and 24TT83, are listed on or considered eligible for the NRHP (Table 3.7.3-1). The majority of known prehistoric sites have not been evaluated for the NRHP, and additional potentially eligible sites are expected to occur in the region.

Previous archaeological research projects have involved approximately 1 percent coverage of the study area, confined primarily to river valleys. Environmental zones that are likely to contain prehistoric sites are not equally well represented in the current data base, and the areas most likely to be affected by the program are those within which the archaeological resource base is least well known. Roadcuts and specific launch facilities were examined for cultural resources. However, this is an ongoing process which will not be completed in the immediate future (see Appendix B.2, Programmatic Agreement). In order to consider potential impacts throughout the study area, a predictive model was used to project baseline conditions.

In predictive modeling, the locational correlates of known resources are used to project the probability of the occurrence of sites in areas not yet studied. Theoretically, the results permit the planner to predict the numbers, types, and sizes of sites likely to be affected in various topographic settings. However, the condition of the existing data base imposes limitations on the level of detail which can be expected in the results.

Table 3.7.3-1

National Register of Historic Places Sites in the Study Area, by County

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Formally Determined Eligible

Cascade County

Great Falls and Vicinity

Central High School (now called Paris Gibson Square)
Charles M. Russell House and Studio[1]
Great Falls Portage[1]
Mullan Road
Margaret Block, 413-415 Central Avenue
Building at 108 Central Avenue
Cascade County Courthouse
Timothy Edwards Collins Mansion
Liberty Theater Building
St. Peters Mission Church and Cemetery, Cascade vicinity
Ulm Pishkun (Ulm Buffalo Jump), Ulm
J.C. Adam's Stone Barn, Sun River vicinity
Robert Vaughn Homestead (Captain Couch Ranch), Vaughn vicinity

Chouteau County

Judith Landing Historic District, Winifred vicinity

Fergus County

Lewistown

St. James Episcopal Church and Parish House
St. Joseph's Hospital
Masonic Temple
Culver Studio
Fergus County Improvement Corporation Dormitory
Carnegie Library
St. Leo's Catholic Church
Fergus County High School
Huntoon Residence
Lewistown Central Business Historic District
Lewistown Courthouse Historic District
Lewistown Silk Stocking District

Judith Basin County

Prehistoric Site 24JT104

Pondera County

Conrad City Hall, Conrad

Wheatland County

Graves Hotel, Harlowton
McQuitty Building, Harlowton

Table 3.7.3-1 Continued, Page 2 of 2

Determined Eligible by Consensus[2]

Cascade County

Great Falls and Vicinity
- Great Falls Historic District
- 109 Jefferson
- Truly Stage Stop/Hotel
- Great Falls Post Office
- 10th Street Bridge
- CM STP and P Railroad Overpass

Fergus County

Lewistown
- Jawbone Railroad Depot
- Berry Seed Co. Warehouse
- Reedsport Post Office

Judith River Bridge
Sample's Crossing Building

Lewis and Clark County

Dearborn River Bridge

Teton County

24TT118 (timber stringer bridge)
24TT83 (tipi ring site)
Burgmaier Homestead
Cordova Grain Elevator
Dinkes Farmstead
Bremmer Farmstead
Alzheimer Farmstead
H. Schwert Homestead

Notes: [1] National Historic Landmark.
[2] State Historic Preservation Officer (SHPO) and federal agency have determined site eligible (see Code of Federal Regulations 1983b, 36 CFR 800.4(c)).

Existing records from the north-central Montana region vary greatly in the precision of their data on site type, site size, time period, and even location. Therefore, it was necessary to limit the present analysis to a consideration of the simple occurrence or nonoccurrence of prehistoric sites.

Site probabilities, or predicted relative densities, are represented as different shades on a sensitivity map (Figure 3.7.3-1). High sensitivity areas (Zone 4) occur along drainages and elsewhere where moderate relief occurs near water. On the basis of previous surveys in such areas, site densities are estimated at five per square mile. The site types expected to occur in this zone are those with the highest research potential, including stratified campsites, large stone circle sites, and buffalo kill and processing sites. Low sensitivity (Zone 1) is predicted in areas lacking water and areas of low relief or steep slopes. Site densities of one or less per square mile are estimated, and site types are typically limited to small campsites and lithic scatters. Intermediate probabilities were identified for transitional slope areas such as foothills.

The model was tested by classifying the input data (posteriori probabilities) as if site/nonsite identity were unknown; 72 percent of site-likely and 55 percent of site-unlikely areas were correctly classified. These results are in line with previous applications of the technique in spite of the larger study area and coarser-grained data and grid units used in the present study. The model also accords well with the results of recent investigations on the Suffield Military Reserve in southern Alberta, Canada. The primary indicators of site locations in both cases are distance to water and relief, even though the variables were measured differently in the two studies. Additionally, the generally low site occurrence on glacial plains, contrasted with high density in hummocky moraine areas, is indicated in both studies (Figure 3.7.3-1, areas east and southeast of Conrad). Although these results are likely to be further tested and refined by future researchers, the sensitivity zones in Figure 3.7.3-1 provide the basis for assessing program impacts (Chapter 4.0, Environmental Consequences).

3.7.3.2 Historic and Architectural Resources

The historic period in Montana began approximately 1800 when the Lewis and Clark Expedition, following the Missouri River, passed through on its way to the Pacific Ocean. Recorded cultural sites in the counties encompassing the study area number approximately 1,900. About 640 of these sites are historic and relate to the wide variety of historic activities that have occurred since 1800. Historic bridges comprise approximately 150 of the sites, and an additional 150 buildings or other types of structures occur in urban historic districts listed in the NRHP.

Historic cultural resources recorded in the study area consist of mines and their associated structures; homesteads, ranches, sheep camps, line shacks, and corrals associated with agriculture; sawmills and camps associated with the timber industry; military posts; residences and public buildings in towns and cities; trails, roads, railroad construction camps, and railroad grades associated with exploration and transportation; bridges (highway and railroad); and fur-trading posts. Approximately 24 individual historic sites and 4 historic districts in the study area are listed in the NRHP (Table 3.7.3-1). An additional 19 sites and 1 historic district have been determined eligible by consensus of the SHPO and a federal agency (Table 3.7.3-1).

Patterns in the significance of central Montana sites reveal similarities in the importance of site types pertaining to different historical activities. This is because the patterns of development often affected interrelated segments of society that produce distinctive types. For example, mining activities hastened the development of both the

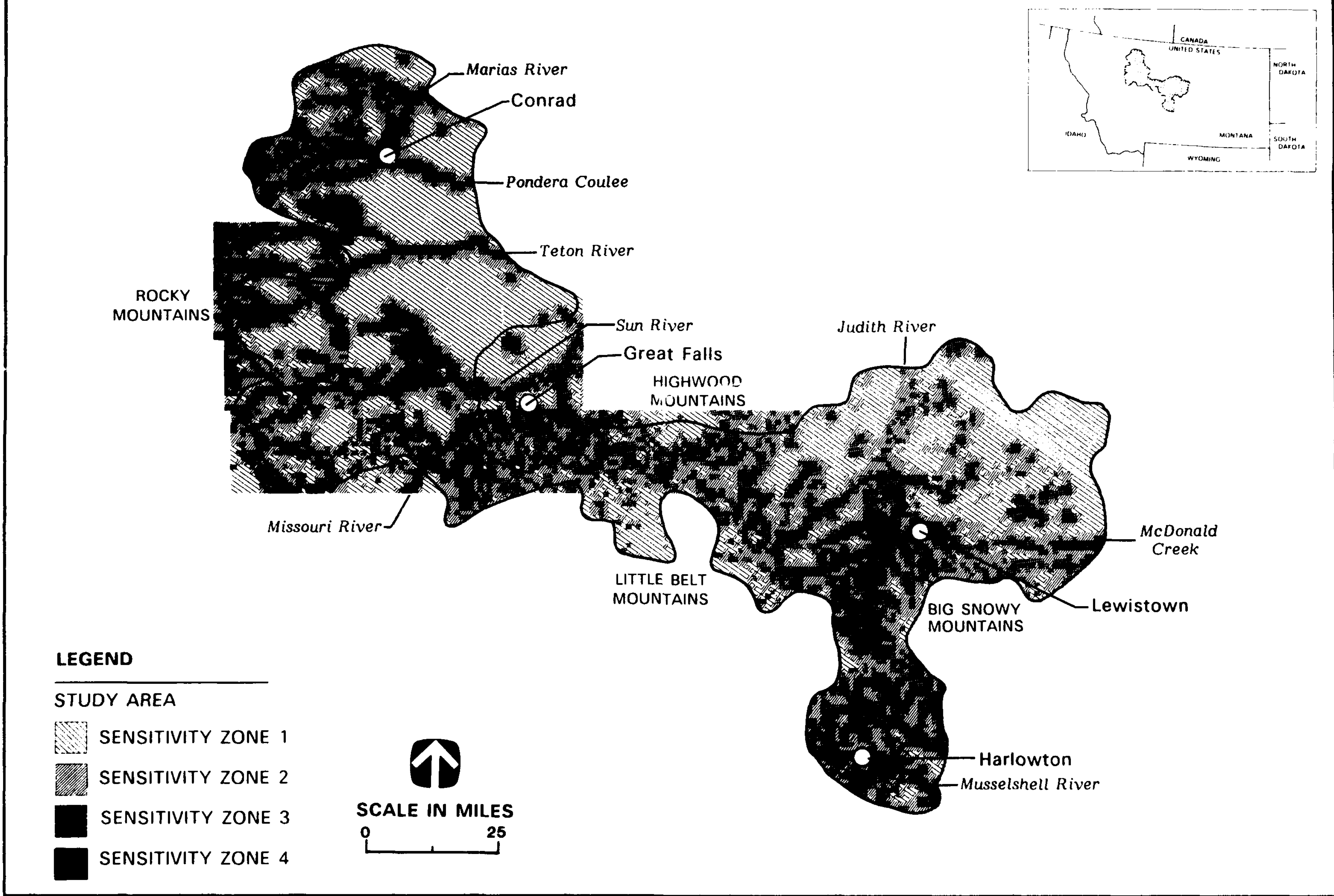


FIGURE 3.7.3-1 PROJECTED PREHISTORIC SITE SENSITIVITY IN THE STUDY AREA, NORTH-CENTRAL MONTANA

transportation industry and agriculture in the lower valleys. The long history of military exploration and occupation affected settlement patterns of agriculturists, the locations of trading posts, and the development of transportation routes. Early Montanans often influenced several aspects of the state's development. These persons, the events in their lives, and the physical structures which remain as evidence of their activities, are parts of Montana's history. When this history is more fully documented, the result is likely to be new listings of significant sites, buildings, or historic districts which are eligible for inclusion in the NRHP.

On Malmstrom AFB, some buildings potentially eligible for inclusion in the NRHP may be affected by the proposed program. None have yet been determined eligible, but 16 properties are old enough to be considered under an existing Department of Defense (DOD) Programmatic Memorandum of Agreement (PMOA) (Table 3.7.3-2). The PMOA establishes guidelines for the treatment of temporary World War II buildings in the context of the DOD program for the demolition of such structures. Fourteen of these structures have been rated as candidates or scheduled for demolition. It will be necessary for the Air Force Regional Civil Engineer to evaluate these structures in consultation with the SHPO, according to the stipulations of the PMOA (Appendix B.1).

Historic highway and railroad bridges are of concern to State of Montana officials. The Montana Department of Highways conducted a statewide bridge survey from 1979 to 1981, and more than 500 bridges were listed. Analysis of state bridge inventories revealed 152 bridges in the study area old enough to qualify for the NRHP. Twenty are categorized as being either too narrow or structurally unsound for Hard Mobile Launcher use. They would require upgrading or replacement and must, therefore, be evaluated for NRHP eligibility. Six of these bridges have either been repaired or upgraded since construction, which implies that their integrity has been damaged; they may no longer be considered eligible.

Of the remaining 14 bridges, 8 are of timber stringer construction, 5 are tee beam, and 1 is a steel girder and floor beam. One timber stringer bridge (24TT118, state bridge No. P00009043+03091) has been determined eligible for the NRHP (Tables 3.7.3-2 and 3.7.3-3). This bridge, built in 1936, crosses the Floweree Canal northeast of Augusta on U.S. 287. It is unique in the state because of its length and number of spans. Most timber stringer bridges are single spans approximately 25 feet long. This bridge has three spans (43-ft center span and end spans of 25 ft) and may be the longest of the standard Montana highway construction designs. The probability of NRHP eligibility for the other timber stringer bridges is remote. The only other potentially eligible bridges in the deployment area are the six intact tee-beam and steel-girder floor bridges (Table 3.7.3-3).

Another possible area of concern is Square Butte, located just west of Great Falls. Square Butte is a massive natural landmark, made famous by and closely identified with Montana's most famous artist, Charles M. Russell. Because of the cultural significance of this landmark for local residents and people interested in western art, it may be eligible for inclusion in the NRHP and for listing as a National Natural Landmark.

A number of old mining and farming towns, some of which are now ghost towns, are within the study area, on or near T/E routes, and may be eligible for inclusion in the NRHP. Some of these are Moccasin, Hobson, and Giltedge on U.S. 87; Monarch on U.S. 89; Barker and Hughesville; and areas north of Lewistown, Maiden, Hilger, Kendall, Christina, and Moulton. The Robert Vaughn Homestead, 2 miles from Vaughn in Cascade County, has been determined eligible for the NRHP; and the Judith Landing Historic District, located just outside the deployment area, has been listed.

Table 3.7.3-2

Potential National Register-Eligible Buildings on Malmstrom AFB

Building No.	Description	Condition Code[1]	Year Built
100	Flagpole Base	1	1942
140	Heating Plant Building	3	1944
205	Heating Plant Building	3	1943
210	Base Engineer Maintenance Shop	3	1943
280	Vehicle Operations, Heating, and Parking	3	1943
439	Base Engineering Storage Shed	3	1942
440	Exchange Retail Warehouse	3	1942
464	Base Engineering Covered Storage	3	1943
529	Military Family Housing Maintenance Contractor Support Area	3	1943
677	Post Office/Consolidated Mailroom	3	1942
1308	AFOSI Office - Security Police Operations	3	1942
1441	Communications Maintenance Shops and Storage	3	1943
1443	Aircraft Maintenance Shops and Storage	3	1943
1445	Aircraft Maintenance Hangar	3	1943
1502	Sewage Treatment Plant	4	1942

Notes: [1] Condition Code:
1 - Fine
2 - OK, needs repair
3,4 - Candidate or scheduled for demolition

Several Hutterian colonies, including Milford, Cascade, New Rockport, Spring Creek, and Deerfield, are located within the study area. Hutterites originally settled in South Dakota in the 1870s, and gradually moved into adjacent states and Canada. They are communal agriculturists and have been described as the largest family-type communal group in the western world.

3.7.3.3 Native American Resources

Native American groups known to have used the central Montana region include the Shoshone, Bannocks, Salish, Northern Paiute, Kootenai, Blackfeet (Piegan and Blood), Flathead, Nez Perce, Crow, Gros Ventre (Atsina), Chippewa-Cree, Assiniboine, Sioux, Arapaho, and Cheyenne. The northwestern boundary of the deployment area is near the Blackfeet Indian Reservation.

Archaeological evidence indicates the presence of Protohistoric-period populations in the study area before A.D. 1600. Sites associated with these Protohistoric hunters are virtually identical to prehistoric sites; can be identified only by dating; and are represented by tipi rings, buffalo jumps, short-term camps, and quarries. Not until the

Table 3.7.3-3

Potential National Register-Eligible Bridges in the Montana Study Area That May Be Affected by the Proposed Program

Bridge No.[1]	Hwy	County[2]	Feature Crossed	Type[3]	Date	Status[4]
L07561003+02001	CR 561[5]	CA	Shaw Canal, west of Simms	TBM	1934	2
P00060082+03731	U.S. 87	CA	Southeast of Great Falls	TBM	1941	2
U05205000+04681	U.S. 89	CA	Burlington Northern	TBM	1934	2
P00057082+02191	U.S. 87	FG	Mill Ditch	TBM	1922	2
P00057103+08521	U.S. 87	FG	Drainage north of Grassrange	TS	1939	3
P00061067+01311	U.S. 191	FG	Box Elder Creek	TS	1940[6]	3
P00081034+00551	MT 81	FG	Canal near Hilger	TS	1934	3
P00057034+09231	U.S. 87	JB	Wolf Creek west of Stanford	TS	1937	2
P00057042+02741	U.S. 87	JB	Drainage, Windham	TS	1935[6]	3
P00057043+01841	U.S. 87	JB	Sage Creek, Windham	TS	1935[6]	3
P00057044+02931	U.S. 87	JB	Drainage, Windham	TS	1935[6]	3
P00057045+07231	U.S. 87	JB	Dry Creek, Windham	TS	1935[6]	3
P00057046+00001	U.S. 87	JB	Stockpass Drainage	TS	1935	3
P00057048+08001	U.S. 87	JB	Stockpass Drainage	TS	1935	3
P00009037+02001	U.S. 287	LC	Hogan Slough	TS	1931	3
P00009038+01621	U.S. 287	LC	Elk Creek	TS	1931	3
P00009043+01451	U.S. 287	LC	North Fork Sun River, Northeast of Augusta	SGFB	1936	2
P00021002+06271	I-15	PD	Canal South of Conrad	TBM	1931	3
L50068010+06001	CR 068	TT	Spring Coulee	TS	1930[6]	3
P00009043+03091	U.S. 287	TT	Floweree Canal, Northeast of Augusta	TS	1936	1

Notes: [1] Federal Highway Administration bridge number.

[2] County: CA = Cascade; FG = Fergus; JB = Judith Basin; LC = Lewis and Clark; PD = Pondera; TT = Teton.

[3] Type: TBM = tee beam; TS = timber stringer; SGFB = steel girder floor beam.

[4] Status:
1 = Determined eligible for NRHP.
2 = Highest potential for eligibility.
3 = Old enough to qualify for NRHP.

[5] CR = County road.

[6] Bridge has been repaired or upgraded.

early 1700s when horses were acquired did the nature of sites change and evidence of continuity between the Protohistoric Indians and more recent occupants emerge.

The Protohistoric groups entering the area from the south and west may have been direct ancestors of contemporary tribes. Indians living in the southern and eastern Plains were pushed westward toward the Rocky Mountains by eastern groups who were themselves forced west by Euroamerican expansion. The Kootenai have been identified as the earliest resident Indians, but by about 1700, Shoshone from the south and Blackfeet from the northeast forced the Flathead westward, where they joined the Pend d'Oreille, became friendly with the Kootenai, and formed hunting partnerships with the Nez Perce. While most of these people settled west of the Continental Divide, they continued to hunt in the Plains. By the early nineteenth century, the Piegan Blackfeet controlled north-central Montana east of the Rocky Mountains. The Crow eventually settled southeast of the deployment area but continued to hunt as far west as Blackfeet territory. The last Indian groups to enter Montana were bands of Chippewa, Cree, and Metis who moved south from Canada in the late nineteenth century. The Metis are predominantly Cree, with Assiniboine, Chippewa, and French or other European blood. Members of the Little Shell Band of Metis settled in north-central Montana, and some of them live in Great Falls, while others settled on the Rocky Boy Reservation, outside of the deployment area.

Among traditional Plains Indians, religion pervades all aspects of life and is intimately interwoven with all features of nature. Spiritual values are ascribed to some types of vegetation, animals, rock formations, and springs. Identification of these places of sacred significance can be made only by consultation with appropriate tribal representatives of those groups known to have used the area.

While none of the study area includes Indian reservation lands, it is possible that areas of sacred or heritage importance outside the reservations may be affected by the proposed program. Tribes known to have used or lived in the ROI have been notified of the proposed program and invited into a consultation process. Most of the region is within Blackfeet territory as recognized in Lame Bull's Treaty of 1855; therefore, most concerns regarding the present analysis have been voiced by the Blackfeet. Respondents have indicated that there will be a high level of concern about the discovery of burials during construction and have expressed a desire to provide Indian monitors. Several tribes have identified large areas which are not now within reservations but which, in the past, were used in a sacred, ceremonial, or traditional manner and are still held to be sacred in tribal mythology and oral history.

Potential sacred or ceremonial areas include vision-quest sites, rock art, Sun Dance grounds, large tipi rings (diameters greater than 10 meters), medicine wheels, cairns, eagle-catching pits, and burials. Forty of these types of sites have been recorded in the state site files from the nine-county study area. The most common identifiable site types are vision-quest structures and medicine wheels. Of the 40 sites, only 9 occur in or adjacent to the deployment area. The most sensitive sites are burial grounds, four of which are known to occur in the study area: on Arrow Creek in Fergus County, on Deep Creek and near Priest Butte in Teton County, and at St. Peter's Mission Cemetery near Cascade. One major sacred area has been located at the confluence of the Sun and Missouri rivers, and possible vision-quest sites have been reported south of the Sun River on Square Butte. Existing records probably provide a minimal estimate of Native American resources, and additional areas of concern may be identified as a result of the consultation process.

3.7.3.4 Paleontological Resources

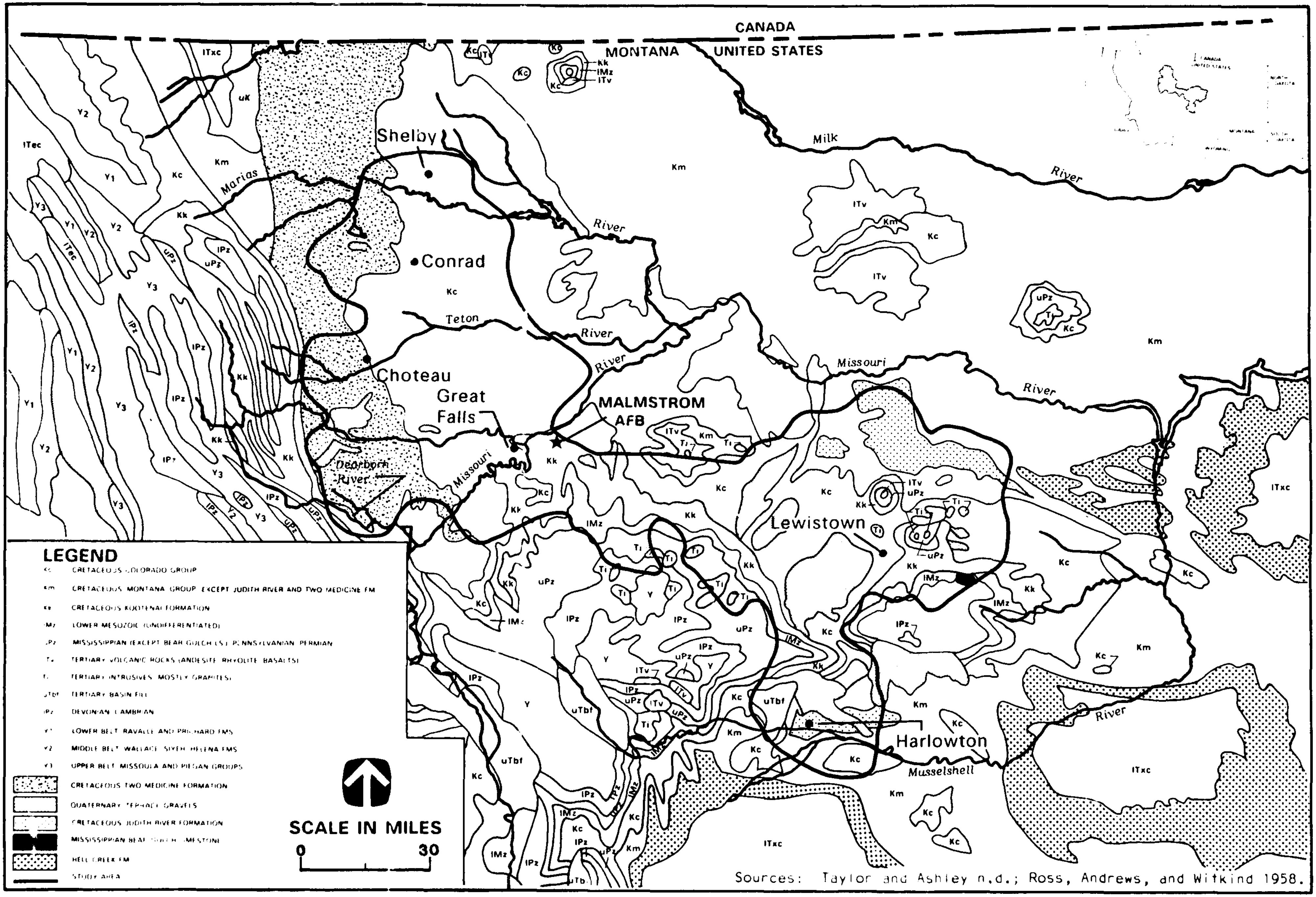
Some of the best preserved and most unique fossil localities in North America occur in the Malmstrom AFB deployment area. Fossils may occur in almost all geological units from Cambrian to Quaternary times. The most important are the Cretaceous Two Medicine and Judith River formations, famous for dinosaurs, reptiles, and early mammals; the Bear Gulch Limestone of Mississippian age, famous for excellent preservation of diverse vertebrate and invertebrate marine faunas; and the fossil-rich Upper Cretaceous and Paleocene Hell Creek Formation, which contains important dinosaur and mammal fossils. Vertebrate fossils are found occasionally in Quaternary deposits scattered across the study area.

Fossil assemblages containing vertebrate remains, or associated vertebrate and invertebrate remains, are among the most important. Invertebrate fossils are usually of marine origin and, therefore, abundant, widespread, and well preserved. Vertebrate fossil finds are localized and relatively rarely preserved making them important when encountered. Other conditions that contribute to the importance of a deposit include diversity of species, condition of preservation or depositional integrity, or the presence of rare species. Both the Bear Gulch Limestone and the Two Medicine Formation in Montana meet these special circumstances. The significance of these fossil areas is reflected in the amount of national and international publicity they receive and by the great amount of professional investigation currently being conducted.

The areal distributions of surface and near surface bedrock geologic units in the study area are shown in Figure 3.7.3-2. Mississippian limestones (Madison and Big Snowy groups) are exposed in many of the mountain ranges of north-central Montana. The most important Mississippian unit in this area is the Bear Gulch Limestone, within the uppermost formation of the Big Snowy Group. The Bear Gulch Limestone is important because it contains vertebrate and invertebrate faunal assemblages characterized by excellent preservation. The deposit is considered the third most rich and diverse fossil-bearing formation in the world after the Jurassic Solnhofen Limestone in Bavaria and the Burgess Shale in Canada.

The most extensive, significant, fossil-bearing deposits in the study area are the Two Medicine and Judith River formations, covering 11.5 and 5 percent of the surface, respectively. The Two Medicine Formation crops out on the extreme western end of the study area. Hadrosaur and Hypsilophodont nests, eggs, and baby dinosaurs were found in this unit. The discovery of intact dinosaur nests has been duplicated in only two other areas in the world, a 1923 discovery in the Gobi Desert and a 1987 discovery in Alberta, Canada. The nests in Montana also contained young dinosaurs and evidence of adults caring for the newly hatched young. Some articulated fossils may be found wherever the Two Medicine Formation occurs, but the Willow Creek Anticline west of Choteau is the most productive area yet identified. The Cretaceous Judith River Formation, found in the eastern portion of the study area, is as fossiliferous as the Two Medicine Formation to the west and the Hell Creek beds to the east, but the dinosaur fossils are generally disarticulated.

The Hell Creek Formation occurs subsurface and near surface in the extreme eastern and southeastern portions of the study area. This Upper Cretaceous and early Tertiary formation is one of the most important and fossiliferous in Montana, but major fossil-collecting localities are located east of the study area near Fort Peck. Major dinosaur fossils from the Hell Creek beds include Tyrannosaurus rex and Triceratops. It is also famous for containing the most prolific mammal fossil localities yet discovered.



Sources: Taylor and Ashley n.d.; Ross, Andrews, and Witkind 1958.

FIGURE 3.7.3-2 GEOLOGIC MAP OF NORTH-CENTRAL MONTANA

Quaternary terrace gravels occur throughout the region over 7 percent of the surface. These gravels occasionally contain important vertebrate fossils. Fossils appear to be more numerous in the gravels outside the study area to the north and east.

The Cretaceous Colorado Group comprises 44 percent of the exposed bedrock geologic units in the study area, and it does not contain significant fossils. Based on the apparent geographic distribution of significant fossiliferous rocks in the region, the Two Medicine, Judith River, and Hell Creek formations are the areas where fossils are most likely to be affected in the Malmstrom AFB deployment area; the Two Medicine and Hell Creek formations are the most significant and fossiliferous.

Paleontological resource distribution was summarized by a series of sensitivity zones based on near surface and surface exposure of geologic units and the fossils they contain. Areas of high sensitivity contain dense concentrations of unique, very well-preserved fossils. The Willow Creek Anticline area (Egg Mountain) of the Two Medicine Formation, the Bear Gulch Limestone outcrop area, and the Middle Dome area of the Kootenai Formation were all classified as high sensitivity areas.

Geologic units with a moderate sensitivity ranking also contain important vertebrate fossils. However, fossils in these units may be dispersed rather than concentrated in well-known, well-preserved localities. Most of the geologic units of Cretaceous age are included in this category. The Morrison Formation of Jurassic age and Quaternary deposits were also included. Geologic units characterized by a sparse distribution of vertebrate fossils throughout the unit are designated as low-to-moderate sensitivity. They include the limited Tertiary deposits in the area, and the Telegraph Creek Formation of Cretaceous age.

Areas with low sensitivity rankings are units containing invertebrates. A negligible sensitivity ranking was given to strata with no fossils such as the Kibbey Sandstone of Mississippian age and volcanics of Cretaceous age. The sensitivity zones provide the basis for the impact assessment discussed in Chapter 4.0, Environmental Consequences.

3.8 Biological Resources and Threatened and Endangered Species

Deployment of the Small Intercontinental Ballistic Missile (ICBM) system at Malmstrom Air Force Base (AFB) may affect biological resources and threatened and endangered species. Construction of roads, stream crossings, buildings, and other facilities would disturb habitat and wildlife. The inmigrating construction and operations-related population would increase hunting and fishing pressure on existing resources, and program induced development would result in additional habitat disturbance. Biological resources and threatened and endangered species are addressed in the following sections under five elements: vegetation, wildlife, aquatic habitats, unique and sensitive habitats, and threatened and endangered species.

3.8.1 Resource Description

Biological resources include the major components of the terrestrial and aquatic ecosystems potentially affected by the proposed program. For this study, all available site-specific information was used to make site-specific and regional (i.e., ecosystem-level) conclusions about the status of biological resources. Terrestrial ecosystems are divided into vegetation and wildlife elements. Aquatic habitats and biota are addressed together because they are closely related spatially and ecologically. Other major biological features that are addressed as separate biological elements are unique and sensitive habitats and threatened and endangered species (plant and animal). The analysis and discussion of these elements also addresses their relationship to ecosystem processes. Further descriptions of these biological elements are given in the following sections.

3.8.1.1 Vegetation

The vegetation element addresses major vegetation types common to the deployment area. Locally or regionally important vegetation types that occur in areas where they could be affected by the proposed program are also addressed. Vegetation described in this element is restricted to terrestrial types; wetland vegetation (species strictly dependent on the aquatic habitat) is addressed in the aquatic habitats element. Riparian (water-edge) vegetation and phreatophytes (plants with long roots reaching to the water table such as mesquite and saltcedar), which are not strictly dependent on the aquatic habitat, are discussed in this element. In areas where native vegetation has been largely removed for agriculture or grazing, the historical or potential native vegetation is described.

3.8.1.2 Wildlife

Descriptions of wildlife focus on species or groups of species of high public, management, or scientific importance with emphasis on big game, furbearers, upland game, waterfowl, and raptors. Important characteristics (e.g., high diversity) are noted and habitat types of exceptional value (e.g., winter range and nesting sites) that could be directly affected by deployment are also identified.

3.8.1.3 Aquatic Habitats

Aquatic habitats include both water-bearing habitats (e.g., streams, lakes, and ponds) and wetlands (e.g., marshes and riparian zones). The greatest emphasis is placed on aquatic habitats that are likely to be affected by the proposed program and support recreational fisheries, substantial native fish populations, regionally important waterfowl or other wildlife populations, or important native plant populations.

3.8.1.4 Unique and Sensitive Habitats

Unique and sensitive habitats are defined as areas that are regionally uncommon; limited in areal extent; and support specialized uses by wildlife, unique multiple-species complexes, or rare, threatened, or endangered species. In many cases, these habitats represent areas that have been identified by natural resource management agencies or recognized regional experts. In other cases, these habitats represent areas meeting special criteria that were identified during the analysis. Greatest emphasis is given to unique and sensitive habitats that are likely to be altered by the proposed program.

3.8.1.5 Threatened and Endangered Species

The threatened and endangered species section focuses on plant and animal species that are federally listed as threatened or endangered and species that are proposed or candidates for federal listing. Montana-recognized species are also addressed. Important characteristics of threatened and endangered species (e.g., wintering areas, nesting sites, and high densities) are described.

3.8.2 General Analysis Methodology

3.8.2.1 Region of Influence

The Region of Influence (ROI) for biological resources and threatened and endangered species is defined as the areas or locations where these resources can be reasonably expected to be directly or indirectly affected by construction or operations of the proposed program. For biological resources, it is important to distinguish between areas and resources that may be subject to direct surface disturbance and other direct impacts from construction and operations activities, and areas where only indirect program impacts could occur as a result of increased recreation and program-induced development. Areas of direct surface disturbance include the locations on Malmstrom AFB where Small ICBM facilities would be built, areas adjacent to Hard Mobile Launcher transporter/erector (T/E) routes and access roads that would be upgraded, areas adjacent to launch facilities, and areas adjacent to bridge improvement sites.

Indirect impacts may occur where program-induced development is expected, or where program-induced recreational use would affect biological resources. The shape and extent of the ROI depends on the layout and type of roads in the area and the location of recreational facilities and biological resources of special sensitivity or interest. It is actually these points or features of interest that were analyzed, rather than the entire ROI. Specific features in the ROI include Glacier National Park, the Rocky Mountain Front Range, the Missouri River (from Townsend to Charles M. Russell National Wildlife Refuge), the Yellowstone River (from Springdale to near Billings), and streams, reservoirs, national wildlife refuges, and national forests within commuting distance.

3.8.2.2 Vegetation

For Malmstrom AFB, major vegetation types occurring along the T/E routes, along launch facility access roads, and around the launch facilities and launch control facilities were described, mapped, and incorporated into a computerized Geographic Information System. Present vegetation was mapped using 1:24,000 color aerial photographs, 1:62,500 color infrared photographs, and existing vegetation and land use maps. The major vegetation types and locally important types were described in detail using information obtained from published reports. The major vegetation types common to the indirect impact area were described but not mapped.

3.8.2.3 Wildlife

Baseline conditions for wildlife resources at Malmstrom AFB and in the deployment area were determined through a comprehensive review of existing data and from site-specific field studies. Primary attention was given to big game, raptors, waterfowl, and upland game. Highly sensitive species that may be affected by the proposed program were identified, and their habitats were given special attention. Specific attributes used to assess baseline conditions for wildlife species included geographic distributions, species composition, species diversity, behavioral sensitivity, and relative abundance or density. Locations of key habitats (e.g., winter and summer ranges) were also noted. Important characteristics of nongame species (e.g., exceptional numbers or concentration of migratory birds) were addressed and incorporated into the evaluation process where appropriate.

3.8.2.4 Aquatic Habitats

All aquatic habitats occurring at bridge improvement sites, along T/E routes and access roads, and adjacent to launch facilities were identified. The quality of fisheries in these habitats was determined using the Montana Department of Fish, Wildlife and Parks (MDFWP) fisheries data base where applicable. Direct field observation was used to supplement and confirm these ratings. The quality of wetland habitats was determined from direct observation, literature review, and comments from local experts (e.g., U.S. Fish and Wildlife Service [USFWS], MDFWP, and experts from universities). The status of other aquatic species was considered a function of the overall aquatic habitat and fisheries value. Major aquatic habitats in the ROI that are used for recreation or that may be affected by factors such as population growth were treated in a similar manner. Portions of this element are related to elements of geology and soils, water resources, recreation, and factors such as soil erosion, water quality, and recreational use were considered only as they apply to the biological aspects of aquatic habitats.

3.8.2.5 Unique and Sensitive Habitats

Unique and sensitive habitats were identified through interviews with natural resource management agencies and informed local experts (e.g., MDFWP, the Montana Natural Heritage Program [MNHP], the USFWS, and The Nature Conservancy) and through direct analysis of habitats in the potential impact areas. Each habitat's unique qualities, degree of legal protection (if any), and likelihood for improvement or degradation in the future (as a result of nonprogram-related activities) were described. Unique and sensitive habitats in the deployment area that are likely to be altered because of proposed program activities (such as construction) and habitats that are major recreational areas or are in locations that may be developed because of population-induced growth were also identified.

3.8.2.6 Threatened and Endangered Species

Species considered in this section include federally listed threatened and endangered species, proposed species, and federal-candidate species (Section 3.8.3.5, Table 3.8.3-1), as well as species given special state and global status by the MNHP. Occurrences of threatened and endangered species were compiled from data supplied by the USFWS, MDFWP, the MNHP, and base environmental personnel. Other sources included the U.S. Bureau of Land Management and state universities. Information from the MNHP provided the basis for the discussion of threatened and endangered plant species. Comprehensive tabulations of federally listed species, species proposed for federal listing, species that are candidates for federal listing, and Montana-recognized species that are located in the areas of direct surface disturbance and areas that may receive indirect impacts were compiled (Section 3.8.3.5, Tables 3.8.3-1 and 3.8.3-2).

Special attention was given to threatened and endangered species that are thought to occur within the deployment area. Where possible, specific locations of threatened and endangered species were mapped. The USFWS-designated critical habitats, permanent habitats, and important habitats used on a seasonal or transitory basis were also mapped. Site-specific field studies were conducted to verify threatened and endangered species locations and to locate additional species where possible.

Information regarding regional and site-specific distributions, abundance, population status and prognosis, habitat requirements, recovery plans, and importance to national populations were reviewed for each threatened and endangered species that may be affected by the proposed program.

3.8.3 Existing and Future Baseline Conditions

3.8.3.1 Vegetation

Malmstrom AFB lies within a grassland biome. The undeveloped portion of the base has been seeded with introduced grasses to control erosion. Trees and shrubs have been planted throughout the cantonment area, along streets, and in open areas. Much of the deployment area has been converted to agriculture. Approximately 61 percent of the area along T/E routes most likely to receive improvement and along access roads is cropland, while 38 percent supports native vegetation. Much of the native vegetation occurring in the deployment area is characterized as mixed-grass prairie. The most common grassland type in the deployment area is the Judith Basin-northern grassland type. A foothills grassland type occurs more extensively in the foothills and mountains of the southern and western parts of the ROI. A distinguishing feature of the foothill grasslands is the admixture of plains and mountain species. Shrub- and tree-covered canyons from higher elevations extend into this type. The central grassland type is encountered occasionally in the easternmost part of the deployment area. The presence of sagebrush is a distinguishing feature of this type. Transitions from lower elevations to mountains support rolling grassland interspersed with patches of timber. The mountain ranges of the ROI and other disjunct mountainous areas in the deployment area are dominated by coniferous forests. Ponderosa pine types border grassland areas.

Future baseline military activities onbase (e.g., the KC-135R air refueling mission) may result in disturbance of native vegetation. No major losses of native vegetation in the deployment area or the ROI are expected to result from urban or agricultural expansion. Livestock grazing will continue to affect the composition and production of rangeland vegetation. Minor disturbance of both native vegetation and agricultural land may result from construction of transmission lines.

3.8.3.2 Wildlife

Big game species in the deployment area provide important opportunities for hunting and nonconsumptive activities such as wildlife photography. Mule deer occur primarily in the foothills, mountains, and semi-open forests, whereas white-tailed deer are most abundant in riparian and forest areas with dense undergrowth. Wintering areas for both species are located along various river drainages and mountains in the deployment area. Pronghorn are restricted to open grassland and sagebrush habitats with their main concentrations occurring primarily in the eastern portion of the deployment area. Wintering habitats occur throughout the ROI. Additional big game species that occur within the ROI include elk, black bear, mountain lion, bobcat, and bighorn sheep. Moose and mountain goats also occur in the ROI. The region also supports numerous furbearers including mink, marten, fisher, river otter, and muskrat. Numerous nongame species occur in the deployment area and ROI, such as raccoon and badger. Additionally, smaller species of mammals such as ground squirrels, mice, voles, and shrews are found in virtually every habitat within the areas of direct surface disturbance. The various habitats in the deployment area also support a diverse group of bird species including waterfowl, shorebirds, upland game species, and raptors. The study area does not support a diverse group of herpetofauna (reptiles and amphibians).

Future baseline military activities onbase (e.g., the KC-135R air refueling mission), as well as within the deployment area, are not expected to adversely affect the status of wildlife. However, any military or civilian population increases may cause increased hunting pressure. Any significant increase in hunting will be of particular importance for those areas in the region already receiving high hunting pressure (such as the Highwood and Little Belt mountains). Urban expansion and agricultural activities are not expected to adversely affect wildlife in the future.

3.8.3.3 Aquatic Habitats

Wetlands. The small wetland area on Malmstrom AFB consists of ponded water and cattails in a drainage near the Weapons Storage Area. Riparian forests of cottonwood, box elder, and willow are common in the floodplains of the major drainages throughout the deployment area. Smaller streams tend to support shrubby riparian species such as willows. Emergent herbaceous plants such as cattails are found in essentially all wetlands in the area. Most of the deployment area is used for agriculture and the remaining riparian wetlands are important to waterfowl and other species (especially in the deployment area east of Great Falls, which lacks other major types of wetlands). Swamps, ponds, and prairie potholes (including Benton and Freezeout lakes) in the deployment area northwest of Great Falls have created a major waterfowl flyway. Many of these wetlands are maintained as easements or fee-owned lands by the USFWS. This wetland region extends to the border of the ROI, north of Shelby. Riverine riparian zones form the dominant wetland habitat in the remaining ROI along the Rocky Mountain Front Range, in the Big and Little Belt mountains, and in the plains of the northeastern portion of the ROI.

Aquatic Biota. The artificial pond in the Pow Wow Recreation Area onbase is occasionally stocked with trout and serves as a children's fishery. The T/E routes and access roads cross or run along a large number of streams in the deployment area that are generally ranked as moderate to substantial fisheries resources and a relatively large number of these streams are ranked as high-value and outstanding fisheries resources. In addition to the many species of warm and coldwater sport fish that occur in the study area, eight species of special concern to the MDFWP occur in the ROI. From the southwestern portion of the ROI to the northeastern portion, there is a general trend from coldwater to warmwater fisheries. "Blue-ribbon" trout streams occur along stretches of the Missouri River and its tributaries and along the Rocky Mountain Front Range in the ROI. Amphibians are abundant in many of the wetland habitats that do not support fisheries (e.g., the pond and pothole region northwest of Great Falls).

Future baseline activities onbase (e.g., the KC-135R air refueling mission) and at the launch facilities are not expected to affect the future status of aquatic resources in the deployment area. Normal road improvement and bridge upgrading and replacement are expected to occur in the vicinity of the base and in the deployment area and should have little overall impact on the aquatic habitats of the area. State plans call for aquatic resource enhancement to provide for the following increases in recreational fishing by 1990: salmonids in streams, 12 percent; salmonids in lakes, 12 percent; coolwater species in streams, 20 percent; and cool and warmwater species in lakes, 39 percent.

3.8.3.4 Unique and Sensitive Habitats

No unique and sensitive habitats have been identified on Malmstrom AFB or immediately adjacent to launch facilities. Launch facility F-10 is near the southeastern boundary of the Pine Butte Swamp Preserve. Freezeout Lake and Blackhorse Lake are the only unique habitats directly adjacent to T/E routes. Over 50 unique habitats have been identified in the ROI. Giant Springs, a highly regulated state park and fish hatchery on the Missouri River at Great Falls, receives use by residents of Great Falls. Crown Butte Nature Conservancy Preserve occurs within several miles of the T/E routes. Willow Creek, Pishkun, and Benton Lake national wildlife refuges are near T/E routes (three other refuges occur in the ROI), and a number of USFWS easements for waterfowl production occur in the deployment area. The Missouri and Smith rivers in Cascade County are considered high-value use areas for wildlife. In general, natural resource management agencies recognize stream riparian zones and wetlands as unique habitats in the ROI. The majority of these habitats in the ROI are managed by public or private agencies for the protection of the habitat. Little growth and development is expected in these areas; therefore, additional unmanageable pressure should not occur on these habitats. In addition, conditions will not change significantly in these habitats in the future.

3.8.3.5 Threatened and Endangered Species

Plants. No federally listed threatened or endangered plant species are known to occur in the deployment area or elsewhere in the ROI. One Category 2 candidate species, persistentsepal yellowcress, occurred historically near the Sun River and Benton Lake area. The plant grows on shores and pond margins and is also reported from locations along the Yellowstone River, southeast of the deployment area. (Scientific names and the federal and state status of plant species discussed in this section are listed in Table 3.8.3-1).

Twelve plant species listed by the MNHP as species of special concern (Montana-recognized) and ranked on the basis of their rangewide/global rarity or rarity within the state occur or may occur within the deployment area. Long-styled thistle is known to occur in the area of direct surface disturbance at launch facility A-5 and along the T/E route, Dry Fork Road, near Monarch, and is considered by the MNHP to be imperiled (Figure 3.8.3-1). Eleven others, including subterranean breadroot, Craw's sedge, pale sedge, tapered rush, many-headed sedge, foxtail muhly, Guadalupe water-nymph, dwarf wooly-heads, chaffweed, graceful arrowgrass, and Klaus bladderpod occur or potentially occur in the deployment area. Results of rare plant surveys conducted during the 1987 field season indicate that none of these 11 species are likely to occur in the area of direct surface disturbance.

Five Category 2 candidate plants (aromatic everlasting, wavy moonwort, peculiar moonwort, goose-grass sedge, and Howell's gum-weed) occur or are likely to occur elsewhere in the ROI. All of these species are considered to be species of special concern by the MNHP. In addition, 22 Montana-recognized species may also occur in the indirect impact area (Table 3.8.3-1).

Animals. The American peregrine falcon is known to occur within the deployment area, where it is primarily associated with lakes, rivers, and marshes (Table 3.8.3-2). Aeries

Table 3.8.3-1

Federal-Candidate and Montana-Recognized Plant Species Occurring or Potentially Occurring in the Deployment Area and Region of Influence

Common Name[1]	Scientific Name[1]	Federal[2] Status	MNHP/State[3] Status
Deployment Area			
Chaffweed	Centunculus minimus	-	S1
Craw's sedge	Carex crawei	-	S1
Dwarf wooly-heads	Psilocarphus brevissimus var. brevissimus	-	S1
Foxtail muhly	Muhlenbergia andina	-	S2
Graceful arrowgrass	Triglochin concinnum var. debile	-	S2
Guadalupe water-nymph	Najas guadalupensis	-	S1
Klaus bladderpod	Lesquerella klausii	-	S1
Long-styled thistle	Cirsium longistylum	-	S2Q
Many-headed sedge	Carex sychnocephala	-	S1
Pale sedge	Carex livida	-	S1
Persistentsepal yellowcress	Rorippa calycina	Cat. 2	S2
Subterranean breadroot	Psoralea hypogaea	-	S1
Tapered rush	Juncus acuminatus	-	S1
Region of Influence Exclusive of Deployment Area			
Aromatic everlasting	Antennaria aromatica	Cat. 2	S2
Bird's egg lady's slipper	Cypripedium passerinum	-	S1
Curved sedge	Carex incurviformis var. danaensis	-	S1
Cushion townsendia	Townsendia condensata	-	S1
Dwarf sawwort	Saussurea nuda var. densa	-	S1
Fan-leaved daisy	Erigeron flabellifolius	-	S2
Goose-grass sedge	Carex lenticularis var. dolia	Cat. 2	S1

Table 3.8.3-1 Continued, Page 2 of 2

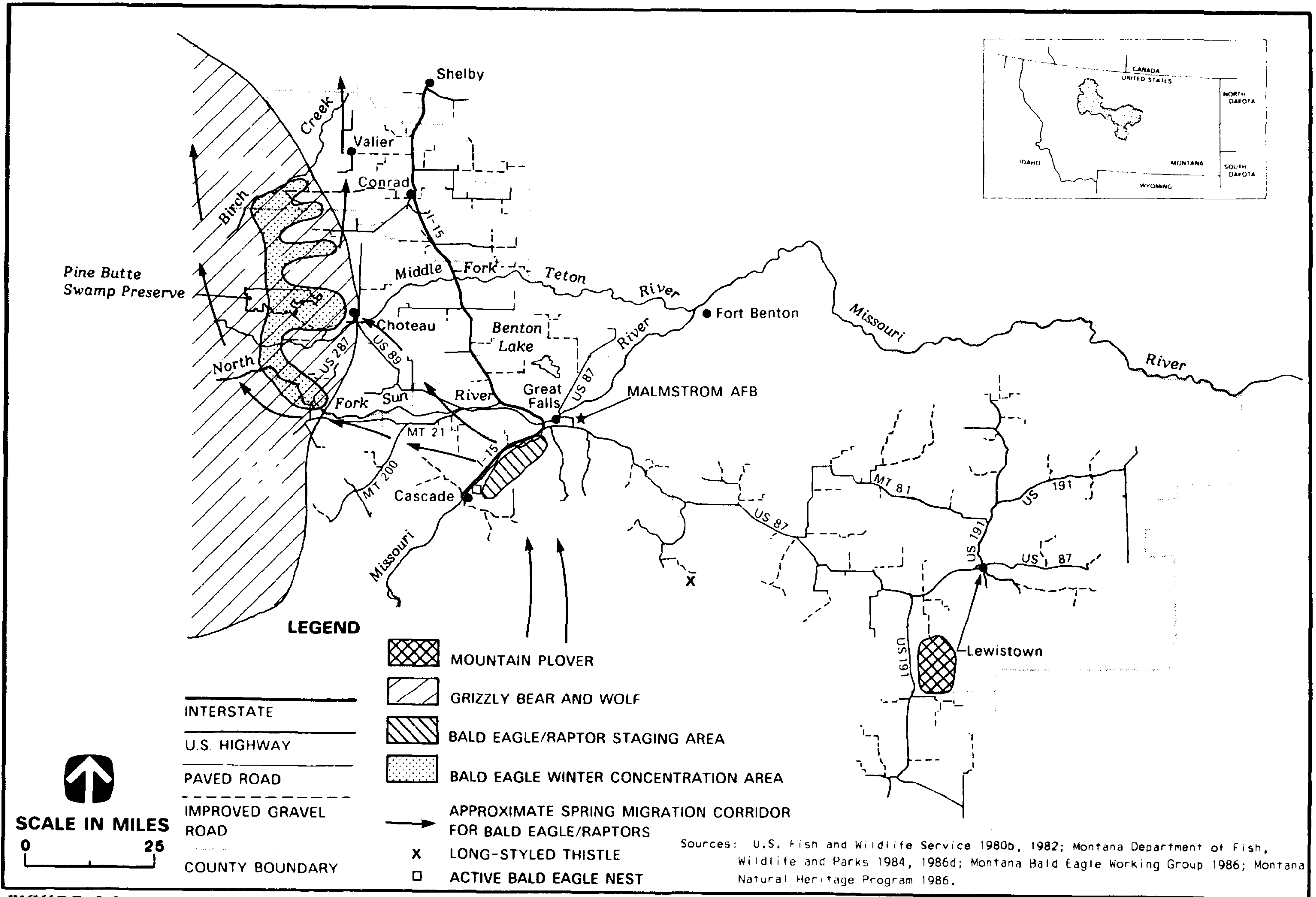
Common Name[1]	Scientific Name[1]	Federal[2] Status	MNHP/State[3] Status
Heart-leaved buttercup	Ranunculus cardiophyllus	-	S1
Howell's gum-weed	Grindelia howellii	Cat. 2	S3
Klaus' fleabane	Erigeron lackschewitzii	-	S1Q
Leadville milk-vetch	Astragalus molybdenus	-	S1
Missoula phlox	Phlox missoulensis	-	S2Q
Montana cryptantha	Cryptantha sobolifera	-	S1
Mountain moonwort	Botrychium montanum	-	S2
Mountain twinpod	Physaria saximontana var. dentata	-	S1
Northern eyebright	Euphrasia disjuncta	-	S1
Park milk-vetch	Astragalus leptaleus	-	SUS1
Peculiar moonwort	Botrychium paradoxum	Cat.2	S1
Round-leaved orchis	Orchis rotundifolia	-	S1
Running fleabane	Erigeron flagellaris	-	S1
Showy pussy-toes	Antennaria pulcherrima	-	S1
Stalked-pod crazyweed	Oxytropis podocarpa	-	S1
Timber milk-vetch	Astragalus convallarius	-	S1
Water clubrush	Scirpus subterminalis	-	S1
Wavy moonwort	Botrychium crenulatum	Cat. 2	S1
White glacierlily	Erythronium grandiflorum ssp. candidum	-	S2
Wooly daisy	Erigeron lanatus	-	S2

Notes: [1] Nomenclature follows Montana Natural Heritage Program 1986 and Lesica et al. 1984.

[2] Cat. 2 = Category 2 candidate threatened and endangered species.

[3] S1 = critically imperiled in Montana; S2 = imperiled in Montana; S3 = rare in Montana; Q = taxonomic questions or problems involved; SU = possibly imperiled in Montana, status unknown.

Source: Montana Natural Heritage Program 1986.



Sources: U.S. Fish and Wildlife Service 1980b, 1982; Montana Department of Fish, Wildlife and Parks 1984, 1986d; Montana Bald Eagle Working Group 1986; Montana Natural Heritage Program 1986.

FIGURE 3.8.3-1 APPROXIMATE LOCATIONS OF THREATENED AND ENDANGERED SPECIES IN THE DEPLOYMENT AREA

Table 3.8.3-2

Federally Listed, Federal-Candidate, and Montana-Recognized Animal Species Occurring in the Deployment Area and Region of Influence

Common Name	Scientific Name	Federal[1] Status	State[2] Status
Deployment Area			
American peregrine falcon	Falco peregrinus anatum	E	S1
Bald eagle	Haliaeetus leucocephalus	E	S2
Black-footed ferret	Mustela nigripes	E	SH
Canadian toad	Bufo hemiophrys	-	S1
Ferruginous hawk	Buteo regalis	Cat. 2	S3
Gray wolf	Canis lupus	E	S1
Grizzly bear	Ursus arctos	T	S3
Harlequin duck	Histrionicus histrionicus	-	S2
Long-billed curlew	Numenius americanus	Cat. 2	S4
Lynx	Felis lynx	Cat. 2	S4
Milk snake	Lampropeltis triangulum	-	S1
Mountain plover	Charadrius montanus	Cat. 2	S2
Northern swift fox	Vulpes velox	Cat. 2	S1
Preble's shrew	Sorex preblei	Cat. 2	S3
Sage sparrow	Amphispiza belli	-	S2
Spotted bat	Euderma maculatum	Cat. 2	S1
Upland sandpiper	Bartramia longicauda	-	SU
Wolverine	Gulo gulo	Cat. 2	S4
Region of Influence Exclusive of Deployment Area			
Alexander's rhyacophilan caddisfly	Rhyacophila alexanderi	Cat. 2	S1
Arctic peregrine falcon	Falco peregrinus tundrius	T	S1
California bat	Myotis californicus	-	S2
Dickcissel	Spiza americana	-	S1
Fringed bat	Myotis thysanodes	-	S2
LeConte's sparrow	Ammodramus leconteii	-	S1
Meltwater lednian stonefly	Lednian tumana	Cat. 2	S1
Montana Arctic grayling	Thymallus arcticus montanus	Cat. 2	S2
Northern bog lemming	Synaptomys borealis sphagnicola	Cat. 2	S1
Paddlefish	Polydon spathula	Cat. 3C	S2
Pallid sturgeon	Scaphirhynchus albus	Cat. 2	S2
Spoonhead sculpin	Cottus ricei	-	S1
Trout-perch	Percopis omniscomaycus	-	S1
Whooping crane	Grus americana	E	SH

Notes:

[1] E = endangered; T = threatened; Cat. 2 = Category 2 candidate threatened and endangered species; Cat. 3C = Category 3C candidate threatened and endangered species.

[2] S1 = critically imperiled in Montana; S2 = imperiled in Montana; S3 = rare in Montana; S4 = apparently secure in Montana; SH - historically known in Montana; and SU = possibly imperiled in Montana, status uncertain.

(nesting areas) are believed to occur within Lewis and Clark, Cascade, and Chouteau counties, and nesting activities may also occur in other places within the deployment area. In addition, approximately 60 known bald eagle breeding pairs occur in Montana, with several nesting sites occurring in or near the deployment area. One active nest occurs approximately 1.5 to 2 miles south of launch facility I-7 and 1.5 to 2 miles south of a bridge scheduled for improvement on Interstate 15. Approximately 450 to 500 bald eagles overwinter in Montana with many concentrated along the Missouri River (Figure 3.8.3-1). Other wildlife species listed as threatened or endangered that may occur within the deployment area include the grizzly bear, gray wolf, and black-footed ferret (Figure 3.8.3-1). Primary grizzly bear and gray wolf habitat is located outside the deployment area along the Rocky Mountain Front Range. No known populations of black-footed ferrets occur in Montana.

In addition to the federally listed species previously discussed, several federal-candidate species are known to occur in the deployment area (Table 3.8.3-2). Mammalian candidate species inhabiting the deployment area include the northern swift fox, spotted bat, Preble's shrew, wolverine, and lynx. Avian species include the ferruginous hawk, long-billed curlew, and mountain plover. Montana-recognized species that also occur in the deployment area are listed in Table 3.8.3-2. In addition to those federally listed and federal-candidate species known to occur in the deployment area, several additional species may occur in the ROI and along the periphery of the deployment area. These federally listed, federal-candidate, and Montana-recognized animal species are also listed in Table 3.8.3-2.

3.9 Water Resources

The construction and operation of the proposed Small Intercontinental Ballistic Missile system would require substantial amounts of water. The integrated diversion, use, and return of the water resources are of primary concern to local users and to state and federal regulatory agencies. In addition, the land disturbance which would occur during program construction may degrade the quality of nearby surface waters.

3.9.1 Resource Description

The evaluation of water resources is divided into three elements: surface water hydrology and quality, groundwater hydrology and quality, and water use.

3.9.1.1 Surface Water Hydrology and Quality

This element addresses the effects of the proposed program on the regional water quality and flow characteristics of the major streams, lakes, and reservoirs within the study area.

3.9.1.2 Groundwater Hydrology and Quality

This element addresses the effects of the proposed program on groundwater reserves, well yields, water table fluctuations, and water quality characteristics of the principal groundwater aquifers of the study area.

3.9.1.3 Water Use

Water use is considered a separate element in this analysis. This element addresses the amount and type of water use (including program water) that is diverted from the natural resource base. It also covers the adequacy of the regional supply sources to meet baseline and program-induced water demands and the legal and institutional aspects of water use.

3.9.2 General Analysis Methodology

3.9.2.1 Region of Influence

The following considerations were used to define the Region of Influence (ROI) for water resources: the surface water basins and groundwater aquifers that provide water supplies for program-induced water requirements; areas of program-induced alteration to surface water drainage and storage features; and areas of program-induced water quality impacts. The ROI contains an area of approximately 18,300 square miles and is shown in Section 3.9.3.1, Figure 3.9.3-1.

3.9.2.2 Surface Water Hydrology and Quality

The average magnitude and range of streamflow values and selected water quality parameter values were calculated for selected locations using data available on the water data storage and retrieval system (WATSTORE) and on the storage and retrieval system (STORET) national water data bases. The STANDARDS program available on STORET and water quality criteria adopted by the Montana Water Quality Bureau (MWQB) were used to calculate a summary of the frequency of violations of appropriate water quality standards.

The water quality effects of the wastewater discharges of the three cities potentially affected by the program (Great Falls, Conrad, and Lewistown) were determined from discharge information and agency interviews. Storm drainage maps of these cities were obtained from their public works offices (and from the Civil Engineers Office at Malmstrom Air Force Base [AFB]). Interviews were held with public works personnel to obtain information on storm runoff problems and localized flood problems within the cities as well as plans to correct the problems. Planned water resource programs in the ROI were identified from interviews with water agencies.

3.9.2.3 Groundwater Hydrology and Quality

A map developed by the Montana Bureau of Mines and Geology was used to depict the principal aquifers in the ROI. Data characterizing the major aquifers were summarized, including well yields, depth to groundwater, areas of historical groundwater declines, and other pertinent data. As existing data permitted, information on recharge and discharge areas, pumpage, specific capacity of wells, and groundwater quality trends in the principal aquifers was developed. The regional interaction between surface water and groundwater was reviewed and information on major springs was summarized. Current evidence of saline seep in the vicinity of existing Air Force facilities was determined using aerial photographs and verified by field inspection.

3.9.2.4 Water Use

Five categories of regional water use were analyzed: (1) military water use, (2) self-supplied industrial water use (including hydroelectric power generation), (3) municipal water supply, (4) water use for agricultural irrigation, and (5) rural water use (rural domestic and livestock use). Water use data for Malmstrom AFB, Great Falls, and cities with a potential to experience a substantial, program-induced population increase (Conrad and Lewistown) were compiled and the adequacy of their existing supply sources was evaluated. In-stream flow requirements for hydroelectric generation, recreation, and habitat maintenance were also reviewed. Agricultural irrigation, which is the dominant category of water use in the ROI, was quantified by irrigation district for individual stream basins. Areas with existing or projected water shortages were determined from both literature and interviews with water resource agencies. Basic legal constraints controlling water use (e.g., Montana water law, local water management policies, and interstate compacts) were reviewed.

3.9.3 Existing and Future Baseline Conditions

Most of the ROI has a semiarid climate that generates little runoff. Surface water supplies are of large quantity and good quality in the mountains, but variable in both quantity and quality in the Plains. Great Falls, which supplies Malmstrom AFB, receives an ample supply from the Missouri River and does not anticipate any problems in meeting its future water requirements. The groundwater resource is also generous, though much of the water lies at considerable depth and is highly mineralized. The 1980 total water use in the ROI was approximately 1.9 million acre-feet (acre-ft); the main consumptive use was irrigation.

3.9.3.1 Surface Water Hydrology and Quality

The principal hydrologic feature in the ROI is the Missouri River, which originates at the confluence of the Madison, Jefferson, and Gallatin rivers in southwestern Montana. The Missouri River enters the ROI at Holter Dam and flows through it in a northerly and then easterly direction for 250 miles. Shortly after entering the ROI, the river leaves the

Rocky Mountains and flows into the Northern Great Plains. As it flows, it picks up large quantities of sediment from the Plains. The river's quality is further degraded as a result of discharges of municipal and industrial wastes and extensive agricultural activities. Because of these factors, water quality decreases in a downstream direction and the river changes from a salmonid fishery above Great Falls to a warmwater fishery just downstream of Great Falls below Rainbow Dam. A 150-mile segment of the Missouri River is classified as wild and scenic from Fort Benton downstream almost to Fork Peck Lake.

Other major streams in the ROI are the Dearborn, Smith, Sun, Marias, Teton, Judith, and Musselshell rivers and Belt, Arrow, and Flatwillow creeks (Figure 3.9.3-1). Like the Missouri River, they originate in the mountains and tend to undergo considerable water quality degradation as they flow toward the Missouri River. Agricultural diversions greatly deplete the flow of several of these streams. Tables 3.9.3-1 and 3.9.3-2 summarize data on these streams. The three largest reservoirs in north-central Montana (and their total storage capacities) are Fort Peck Lake (18.9 million acre-ft), Canyon Ferry Lake (2 million acre-ft), and Lake Elwell (1.4 million acre-ft) (Figure 3.9.3-1). Because of the lack of local consumption, the irrigation supply provided by Lake Elwell has been only partially used. Lake Elwell and Canyon Ferry reservoirs may have water available for additional downstream uses.

There are no major problems associated with the storm-drainage systems of Great Falls, Lewistown, and Conrad. These entities have a few, highly localized areas that drain slowly and may flood during high-intensity storms; however, their respective public works departments generally have long-term programs to implement corrective measures. Malmstrom AFB drains north, directly to the Missouri River, via several coulees. Although the base has no major drainage problems, onbase-generated runoff has caused substantial erosion in some of these coulees.

Wastewater generated at Malmstrom AFB is collected and treated by the Great Falls wastewater treatment system and discharged to the Missouri River. Great Falls discharged 10,500 acre-ft in 1986, which includes 725 acre-ft generated at Malmstrom AFB. Lewistown discharged about 2,700 acre-ft of effluent to Big Springs Creek in 1986. Conrad discharged 480 acre-ft of effluent to Dry Fork-Marias River via the Little Dry Coulee during the same period. State effluent discharge requirements for the three wastewater treatment systems have generally been met and no major water quality problems are currently reported.

Figure 3.9.3-2 shows the state-designated uses of the major streams in the ROI. The MWQB is currently reviewing the classification of all streams in the state. Within the ROI, the classification of the Marias River below Lake Elwell and Muddy Creek could be upgraded in early 1988.

Generally, water quality in the ROI is good and the State of Montana has classified most river segments as suitable for municipal supply. However, several significant problems exist. Natural sediments and salinity amplified by agricultural practices and irrigation returns are the main causes of surface water quality degradation. Figure 3.9.3-2 emphasizes those stream segments that fail to meet their appropriate water quality standards. These segments have been identified from the limited number of recent water quality analyses available through the STORET data base. The combination of water withdrawals and increased sedimentation resulting from stream channelization has significantly decreased the water quality in the Teton River near Choteau. In addition, saline discharges from Freezeout Lake have impaired irrigation uses in the Teton River during low-flow periods. Extensive sedimentation in the Muddy Creek drainage has

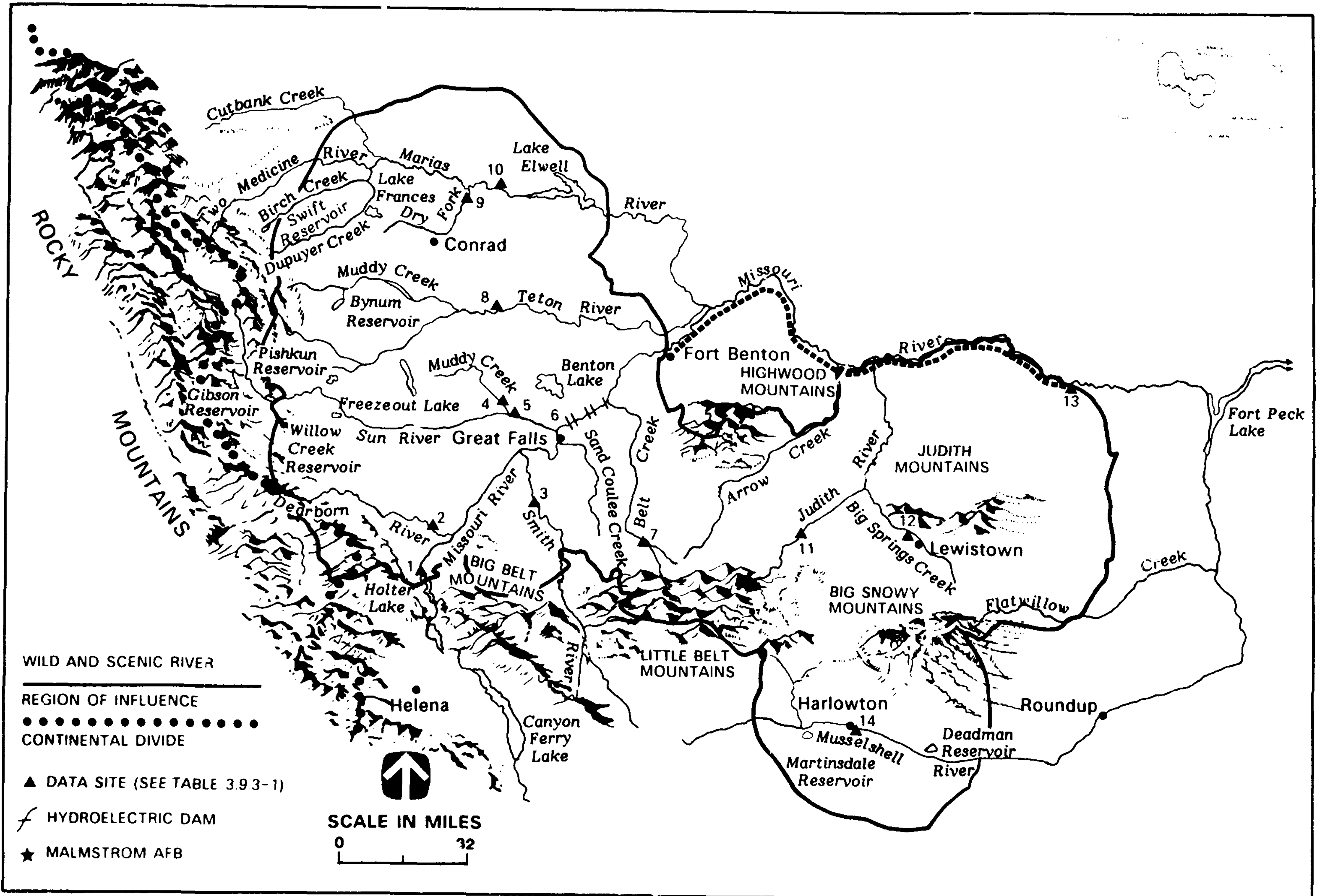


FIGURE 3.9.3-1 SURFACE WATER FEATURES IN THE REGION OF INFLUENCE

Table 3.9.3-1

Selected Hydrologic Data for Major Streams in the Region of Influence

Gaging Station				Streamflow Characteristics			
Site[1] No.	Stream Name	Drainage Area (sq mi)	Years of Record	Estimated 7-Day, 10-Year Low Flow (cfs)[2]	Average Annual Flow (cfs)	Average Annual Flow [acre-ft/yr]	Estimated 100-Year Flood (cfs)
1.	Missouri River	17,149	40	1,565	5,724	[4,147,000]	43,800
2.	Dearborn River	325	25	18	218	[158,000]	18,000
3.	Smith River	1,594	15	15	338	[245,000]	12,700
4.	Muddy Creek	314	18	11	128	[93,000]	6,500
5.	Sun River	1,854	52	79	718	[520,000]	69,800
6.	Missouri River	23,292	30	3,777	8,087	[5,855,000]	81,300
7.	Belt Creek	368	31	6	192	[139,000]	11,400
8.	Teton River	1,307	32	13	157	[114,000]	27,300
9.	Dry Fork-Marias River	314	13	N/A[3]	26	[19,000]	3,706
10.	Marias River	3,242	78	65	933	[675,000]	76,000
11.	Judith River	328	55	0.3	55	[40,000]	1,700
12.	Big Springs Creek	140	24	83	107	[77,500]	220
13.	Missouri River	40,987	52	2,785	9,455	[6,845,000]	144,400
14.	Musselshell River	1,125	76	65	166	[120,000]	5,800

Notes:

[1] See Figure 3.9.3-1 for location of sites.
[2] Cubic feet per second.
[3] N/A = Data not available.

Source: U.S. Geological Survey 1987.

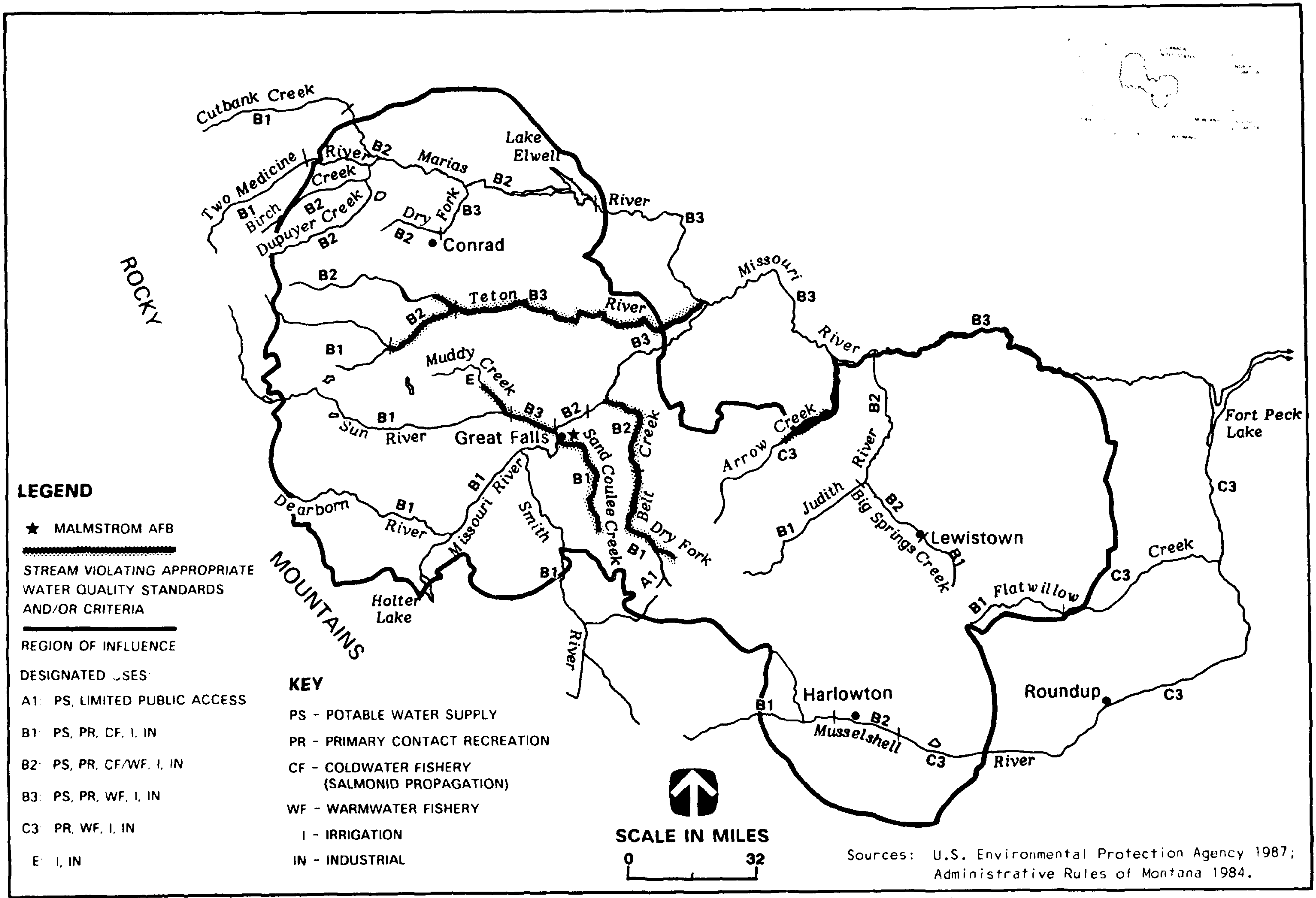
Table 3.9.3-2

Selected Water Quality Data for Major Streams in the Region of Influence

Site[1] No.	Stream Name	Water Quality Parameters (Average of All Observations Values) Total Dissolved Solids (mg/l)[2]	Suspended Solids (mg/l)	Turbidity (JTU)[3]	pH (S.U.)[4]	Dissolved Oxygen (mg/l)	Total Phosphorus (mg/l)	Nitrates N (mg/l)	Fecal Coliforms (MPN/100 ml)[5]
1.	Missouri River	N/A[6]	8	N/A	N/A	N/A	N/A	0.14	N/A
2.	Dearborn River	N/A	N/A	0.5	N/A	N/A	0.01	0.3	N/A
3.	Smith River	N/A	N/A	1.5	N/A	9.6	N/A	N/A	12
4.	Muddy Creek	669	4,940	85	8.1	7.2	0.28	3.24	N/A
5.	Sun River	500	53	25	8.3	10.4	0.04	0.84	10
6.	Missouri River	250	26	8	8.2	8.0	0.06	0.11	N/A
7.	Belt Creek	N/A	7	4	7.6	9.5	N/A	N/A	7
8.	Teton River	N/A	N/A	5	8.4	10.0	0.13	0.4	19
9.	Dry Fork-Marias River	N/A	N/A	N/A	7.0	10.0	N/A	N/A	200
10.	Marias River	387	N/A	N/A	N/A	N/A	0.22	0.4	N/A
11.	Judith River	N/A	N/A	0.6	8.4	N/A	0.01	0.04	N/A
12.	Big Springs Creek	N/A	7	3.4	8.0	N/A	0.08	0.34	50
13.	Missouri River	308	208	167	8.4	8.9	0.11	0.15	N/A
14.	Musselshell River	1,675	30	11	8.5	9.9	0.07	0.11	170

Notes:
[1] See Figure 3.9.3-1 for locations of sites.
[2] mg/l = milligrams per liter.
[3] JTU = Jackson Turbidity Unit.
[4] S.U. = Standard units.
[5] MPN = Most probable number
[6] N/A = Data not available.

Source: U.S. Environmental Protection Agency 1987.



Sources: U.S. Environmental Protection Agency 1987; Administrative Rules of Montana 1984.

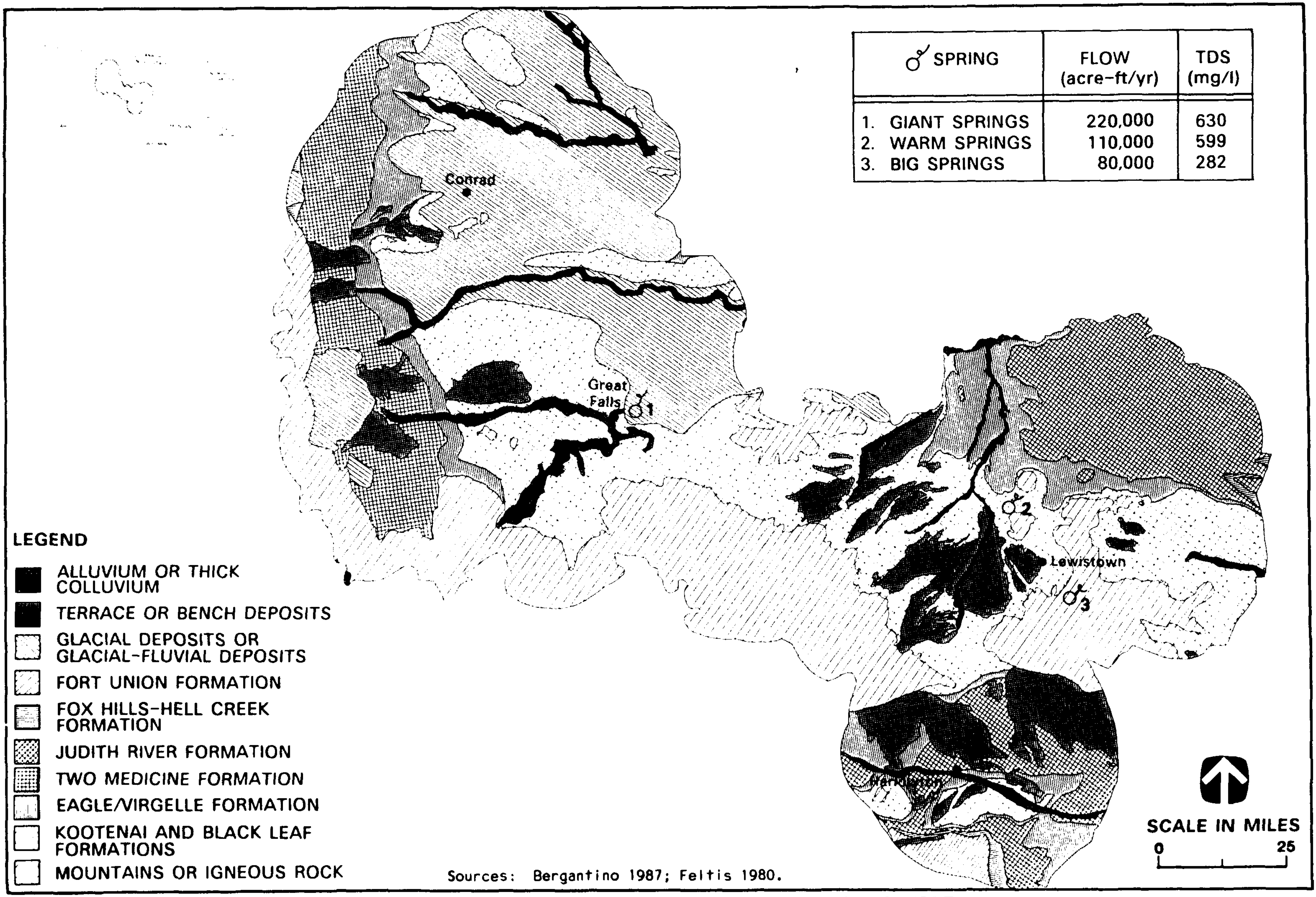
FIGURE 3.9.3-2 DESIGNATED USES OF THE MAJOR STREAMS IN THE REGION OF INFLUENCE caused water quality degradation in the lower reach of the Sun River. Sedimentation is also a water quality problem in Arrow Creek. Other streams violating their appropriate water quality standards include Sand Coulee Creek and the Dry Fork of Belt Creek, which experience severe pollution from acid mine drainage.

During droughts, irrigators diverting water from the downstream reaches of many rivers experience severe and unpredictable shortages late in the season. This occurs regularly on tributaries and along the main stems of the Sun, Marias, Teton, and Musselshell rivers. The Musselshell River has historically been known for its very low flows, with its middle reach sometimes going dry in the late summer. The Teton River is periodically dry in its middle reach. These shortages also make it difficult to maintain minimum streamflows for the state's sport fisheries. Remedies that are being considered by state and local officials include the construction of additional storage reservoirs and conjunctive use, such as streamflow augmentation with groundwater. Such practices may increase minimum streamflows in the future. However, no major surface water developments are scheduled to be constructed in the ROI during the projected period.

3.9.3.2 Groundwater Hydrology and Quality

Groundwater is highly variable throughout the ROI in terms of both quality and quantity. Three of the largest springs in the United States lie within the ROI (Figure 3.9.3-3). However, in portions of the ROI, rural water users must haul water long distances because of too low well yields and poor groundwater quality. There has been comparatively little groundwater development in the ROI. However, groundwater is the source of water for approximately 90 percent of the communities in the Great Plains of Montana with municipal water supply systems. Major groundwater aquifers in the ROI include (in stratigraphic order) alluvial and bench deposits; glacial deposits; the Fort Union and Fox Hills-Hell Creek formations; the Judith River; Two Medicine, and Eagle/Virgelle formations; the Black Leaf and Kootenai formations; the Swift Formation; and the Madison Aquifer. Several of the deep aquifers underlie most of the ROI but their depth has prevented groundwater development. The total dissolved solids (TDS) concentrations in the deeper aquifers are usually at a minimum near the areas of recharge in the mountains and along the major rivers. Groundwater quality tends to deteriorate away from the mountains, and as one moves east through the ROI, TDS concentrations frequently exceed 2,000 milligrams per liter (mg/l), rendering the groundwater nonpotable. The aquifers supplying the majority of the groundwater in the ROI (e.g., the principal aquifers) are shown in Figure 3.9.3-3.

The most heavily used groundwater sources in the ROI are unconsolidated alluvium and terrace deposits of Quaternary age such as those adjacent to the Missouri River and the lower reach of the Sun River. Although areally limited, these aquifers are an important water source for the rural population and are mainly used for domestic and livestock consumption. The water from unconsolidated deposits is generally of good quality but locally may be high in mineral content. The TDS concentration from alluvial water averages around 500 mg/l, but it can range up to 2,500 mg/l, making it unsuitable for domestic use. As a result, rural landowners in some areas, particularly the northwestern portion of the ROI, must haul potable water long distances from municipal sources. The water from some wells tapping alluvium and terrace deposits occasionally exceeds primary drinking water standards with elevated concentrations of lead, selenium, cadmium, nitrate, fluoride, and arsenic. No large-scale regional declines in groundwater levels have occurred in the ROI. Nevertheless, the state recognizes the important contribution that shallow aquifers can have in maintaining streamflow and has moved to limit new groundwater development in several water-short areas in the northwestern portion of the ROI.



SPRING	FLOW (acre-ft/yr)	TDS (mg/l)
1. GIANT SPRINGS	220,000	630
2. WARM SPRINGS	110,000	599
3. BIG SPRINGS	80,000	282

Sources: Bergantino 1987; Feltis 1980.

FIGURE 3.9.3-3 PRINCIPAL AQUIFERS AND MAJOR SPRINGS IN THE REGION OF INFLUENCE

A major water quality problem with the shallow groundwater in the ROI is the incidence of saline seep, a condition where wet, salty areas develop in nonirrigated soils and results in the elimination of agriculture. The problem is often caused by precipitation moving through the root zone and into salty substrata when a field lies fallow. The shallow groundwater picks up dissolved solids and resurfaces downslope to form a salt-laden seep. Saline seep affects water quality by increasing the TDS concentration of shallow aquifers. Currently, some rural areas are experiencing degradation of drinking water. Many sources of livestock water are being abandoned because of salinization; aquatic life, fisheries, and irrigation are also being affected. Saline-seep problems are prevalent in the northwestern and southeastern portions of the ROI.

No major groundwater developments are expected to occur in the ROI during the projected period. However, as surface water sources become more heavily appropriated, groundwater becomes the alternative source available for many new developments. Therefore, it is reasonable to assume that increasing withdrawals from groundwater sources would be necessary to supplement future water demands.

3.9.3.3 Water Use

The vast majority of water used in the ROI (99%) is supplied by surface water sources. Total water use in the ROI amounted to approximately 1.9 million acre-ft in 1980. The seasonal variation in quantity, rather than quality, is the primary constraint on surface water use. Table 3.9.3-3 summarizes water use in the ROI by major categories.

Agricultural irrigation accounts for 98 percent of total water use. In 1980, approximately 1.89 million acre-ft were diverted in the ROI for irrigation. Over one-half of that amount became conveyance losses and approximately 20 percent of the total diversions were used consumptively for crops. The great majority of the irrigation water is derived from surface water sources, with the Musselshell, Sun, and Teton rivers and the upper Marias River drainage supplying most of the water. As a result, seasonal water shortages commonly occur in these drainages as indicated in Figure 3.9.3-4.

Table 3.9.3-3

1980 Water Use in the Malmstrom AFB
Region of Influence
(acre-ft)

Category	Supplied by Surface Water	Supplied by Groundwater	Total
Agricultural Irrigation	1,874,000	16,000	1,890,000
Municipal	17,000	6,000	23,000
Military	1,200	0	1,200
Rural	3,600	2,400	6,000
Industrial	800	200	1,000
TOTAL:	1,896,600	24,600	1,921,200

Source: Montana Department ot Natural Resources and Conservation 1986.

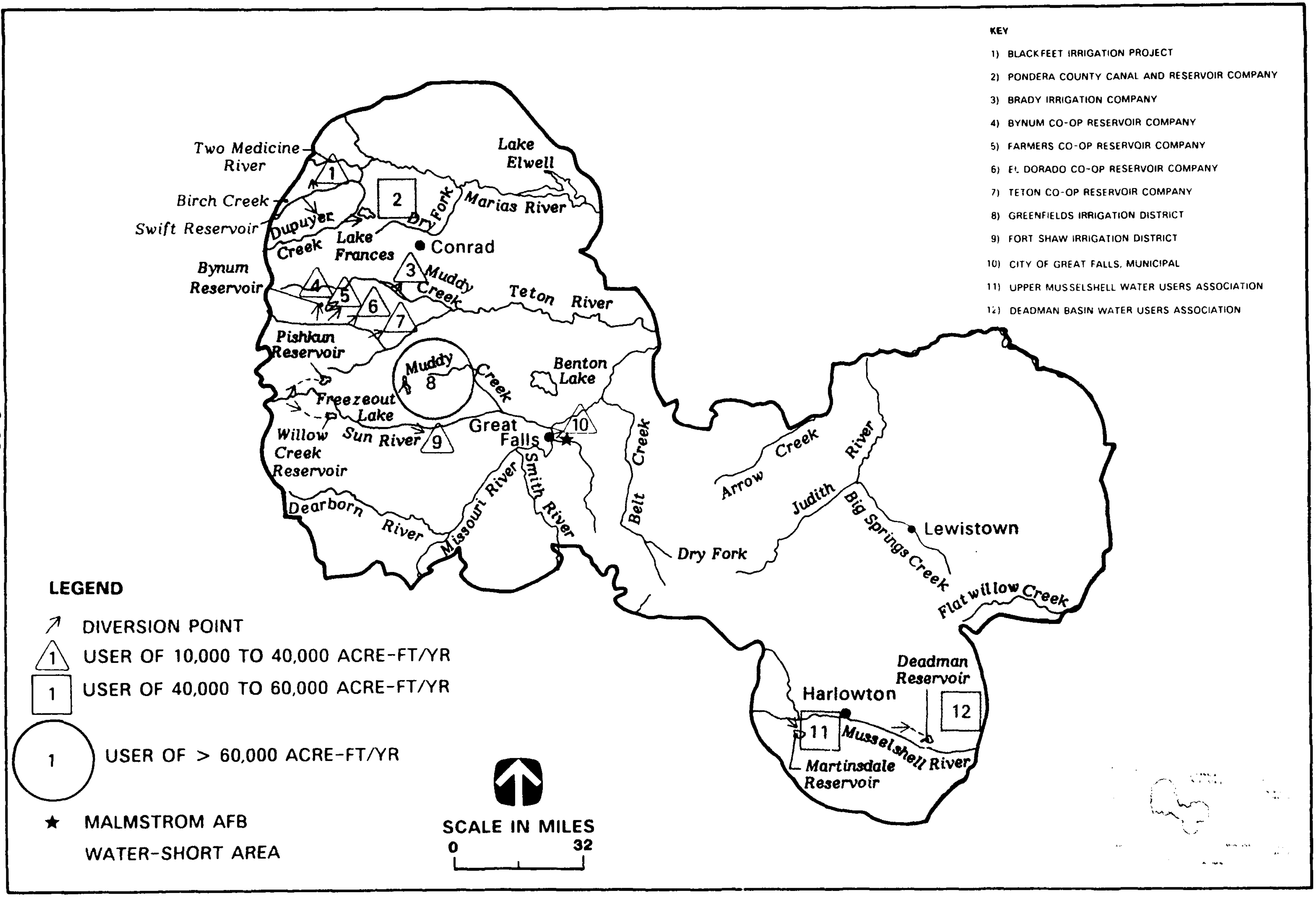


FIGURE 3.9.3-4 SCHEMATIC LOCATION OF MAJOR DIVERSIONS AND WATER-SHORT AREAS IN THE MALMSTROM AFB REGION OF INFLUENCE

Existing and projected municipal water use for the major entities in the ROI is presented in Table 3.9.3-4. Great Falls obtains all of its supply from the Missouri River and holds water rights to withdraw 73,120 acre-feet per year (acre-ft/yr). Lewistown obtains its water supply from Big Springs and holds water rights amounting to approximately 4,200 acre-ft/yr. Conrad obtains its water from the Pondera County Canal and Reservoir Company via Lake Frances and owns shares for up to 3,270 acre-ft/yr. The entitlements of the entities are adequate to meet their anticipated water requirements throughout the projected period.

Malmstrom AFB obtains all of its water from Great Falls. The base currently has a contract for water delivery with Great Falls of 1,410 acre-ft/yr, which is adequate to meet projected baseline onbase water needs. Nearly all the military water use in the ROI occurs at Malmstrom AFB. The base used 1,230 acre-ft in 1986. An additional 16 acre-ft/yr are used in the deployment area at the 20 launch control facilities. Malmstrom AFB has other programs scheduled to occur by 1990. As a result of the KC-135R air refueling mission, baseline water use at the base is projected to increase to 1,300 acre-ft/yr in 1990 and remain relatively constant throughout the projected period.

Rural use consists of self-supplied domestic use and water consumed by livestock. This category amounted to approximately 6,000 acre-ft of water in 1980; 40 percent of that water was derived from groundwater supplies. Self-supplied industrial use, excluding hydroelectric power generation, amounted to approximately 1,000 acre-ft in 1980, accounting for the least amount of water used in the ROI. The main source of supply for industrial use is surface water, which provides 80 percent of the water consumed by self-supplied industries.

Table 3.9.3-4

Existing and Projected Municipal Water Use for Major Entities in the Region of Influence

Entity	Primary[1] Source	1986 Use (acre-ft/yr)	Per Capita Use (gpcd)[2]	Projected Use Year 2000 (acre-ft/yr)
Malmstrom AFB	SC	1,230	160	1,300
Great Falls[3]	S	13,040	190	14,560
Lewistown	SP	2,020	260	2,130
Conrad	S	500	160	660

Notes: [1] S = surface water; SC = support community; SP = springs.
[2] gpcd = gallons per capita per day (reflects average over last 5 yr).
[3] Includes water used at Malmstrom AFB.

The Montana Water Use Act of 1973 adopted the appropriation doctrine. In times of water shortages, appropriators with more recent (junior) rights must cease water diversions in order to allow those with older (senior) rights to receive their full allocations. The Montana Department of Natural Resources and Conservation (MDNRC) is responsible for reviewing applications for permits to appropriate water that are required for new appropriations of more than 100 gallons per minute. Temporary permits may be issued for construction water or other one-time water needs; because such permits are for a limited period of time, public notice requirements are often dispensed with. The permit to appropriate water is a provisional document and will be replaced by a certificate of water right when the stream or area is adjudicated. To date, only a small number of basins have been fully adjudicated in Montana. Changes in water use and transfers of water rights are allowed under the Act with the approval of the MDNRC. Because of protests from hydroelectric dam operators, new surface water appropriations requested for the Missouri River drainage above Great Falls have not been granted by the state over the last several years. Applications for new appropriations in the upper to middle portions of the Sun, Teton, and Marias River drainages receive very close scrutiny from the state due to existing, periodic shortages resulting from intensive irrigation. In addition, the state is considering closing the Musselshell Basin to further surface water appropriations. No major changes in water use patterns are expected to occur in the ROI during the projected period.

3.10 Geology and Soils

The proposed program would consume or use geologic and soils resources within the program area. Program demand could affect the supply and production of some geologic resources. Typical geological materials that could be affected include aggregate, oil, gas, and coal. Soil resources may be affected through increased erosion due to construction activities. Proposed program interaction with geologic conditions (such as mass movements) may affect public health and safety. The analysis of geology and soils has been divided into considerations of geologic hazards, geologic resources, and soil erosion, which cover the range of issues relevant to the Small Intercontinental Ballistic Missile system at Malmstrom Air Force Base (AFB).

3.10.1 Resource Description

The elements of the geology and soils resource are geologic hazards (including seismicity, seismic effects, and mass movements), geologic resources (including aggregate, oil and gas, and coal) and soil erosion (including wind and sheet erosion).

3.10.1.1 Geologic Hazards

Geologic hazards include those physical or chemical geological features that interact adversely with the works of man. These hazards can be naturally occurring geological phenomena or the result of man's activities. The hazards considered include seismicity and seismic effects and mass movements.

3.10.1.2 Geologic Resources

Geologic resources include aggregate resources and energy resources. Aggregate resources consist of sand and gravel that would be used for facility construction at Malmstrom AFB and in the deployment area. Energy resources discussed include oil, gas, and coal. These resources would be affected by certain program activities (e.g., expansion of fee-owned areas at launch facilities), which may restrict access to areas considered valuable for energy resource exploration.

3.10.1.3 Soil Erosion

Ground-disturbing activities associated with the proposed program have the potential to initiate or accelerate soil erosion. Program activities such as road upgrades, bridge modifications, and facility construction are expected to alter the physical characteristics (e.g., slope and vegetation) that control the rate of soil erosion. The wind and sheet erosion subelements were used to determine program effects on soil erosion. Erosion issues also affect the biological environment and water quality. These aspects are discussed in Section 3.8, Biological Resources and Threatened and Endangered Species and Section 3.9, Water Resources.

3.10.2 General Analysis Methodology

Baseline conditions for the proposed program area were determined from site-specific geology and soils data collected from publications of local, state, and federal agencies. In addition, data collected by the Air Force during the area narrowing process were used in evaluating baseline conditions. Computerized data bases were used to provide additional data on soils.

The geologic and soils data were compiled and entered into a computerized data base system for retrieval during impact analysis. Large-scale aerial photographs were used to identify and compile some geologic and soil characteristics in the region (e.g., mass movements). The same aerial photographs were also used to assist in integration of slope, soils, and vegetation data at potential construction sites within the program area. Field reconnaissance was used to verify the compiled information.

Geologic conditions generally change at a very slow rate; therefore, the past and present geologic conditions effectively identify future conditions over the operations life of the proposed program.

3.10.2.1 Region of Influence

The Region of Influence (ROI) is different for each element of the geology and soils resource. Each ROI is limited to the area directly affected by the construction and upgrading of facilities at Malmstrom AFB and in the deployment area, and the demand for resources by the program. The ROIs were selected to evaluate potential site and local effects where possible.

The ROI for geologic hazards includes Malmstrom AFB, construction sites in the deployment area, and geologic conditions near those areas that may potentially affect or be affected by the proposed program.

The aggregate resources ROI is the area encompassed by a 30-mile buffer around the transporter/erector (T/E) route network, launch facilities, and Malmstrom AFB, and reflects the maximum economical haul distance for aggregate. The energy resources ROI includes construction sites at the base and launch facilities in the deployment area as well as expanded areas on the base and at the launch facilities.

The ROI for soil erosion includes those areas affected by construction at Malmstrom AFB and the deployment area. For the base, the ROI includes the installation plus a 1-mile buffer including the potential construction, housing, and training areas. In the deployment area, the ROI includes areas within 1,000 feet of the T/E route system or expansion areas of the launch facilities. The ROI also includes areas where bridges need to be replaced or upgraded.

3.10.2.2 Geologic Hazards

Geologic hazards considered include seismicity and seismic effects and mass movements (e.g., landslides). Seismicity and seismic effects were evaluated on a regional basis because of the regional nature of the potential effects. Seismicity was determined by evaluating the historic seismicity and tectonics of the region, and seismic effects (e.g., faulting) were evaluated by identifying the faulting regime and geologic history of the program area. Landslide potential was determined for areas along the T/E routes and bridge construction sites, near the launch facilities, and for Malmstrom AFB by identifying areas with geologic characteristics (e.g., bedrock type and slope) known to contribute to slope instability and where previous events have occurred.

3.10.2.3 Geologic Resources

Baseline conditions for aggregate resources were determined by contacting existing aggregate producers in the deployment area and obtaining estimates of current production rates and capacities, as well as approximations of aggregate reserves for each operation. Potential source areas for aggregate were identified and samples were analyzed to determine the suitability of the potential sources for use in concrete and road-surfacing material. Oil- and gas-leasing activities near the launch facilities as well as proximity to known producing areas were used as a measure of the potential for future production of oil and gas resources in the deployment area. The location of coal deposits in the deployment area, the degree of mineability, and production status of coal-mining operations were determined in the baseline evaluations.

3.10.2.4 Soil Erosion

Baseline soil erosion conditions were determined primarily from maps obtained from the U.S. Soil Conservation Service (SCS), tabular soils data from the U.S. Army Corps of Engineers Construction Engineering Research Laboratory, and professionals knowledgeable about soils in the deployment area. Soil types were identified for areas within about 1,000 feet of the T/E routes and for all other areas likely to be disturbed by the proposed program in the ROI.

The analyses of soil erosion compared the effects of wind and sheet erosion to the maximum tolerable soil losses defined by the SCS. Wind erosion involves the movement of topsoil by wind action as in dust storms, while sheet erosion refers to erosion resulting from nonchannelized water flow such as stormwater runoff. Maximum tolerable soil losses represent the maximum level of soil erosion that will permit a high level of vegetative productivity to be sustained economically and indefinitely. Soil erosion rates were estimated by using the Wind Erosion Equation and Universal Soil Loss Equation.

3.10.3 Existing and Future Baseline Conditions

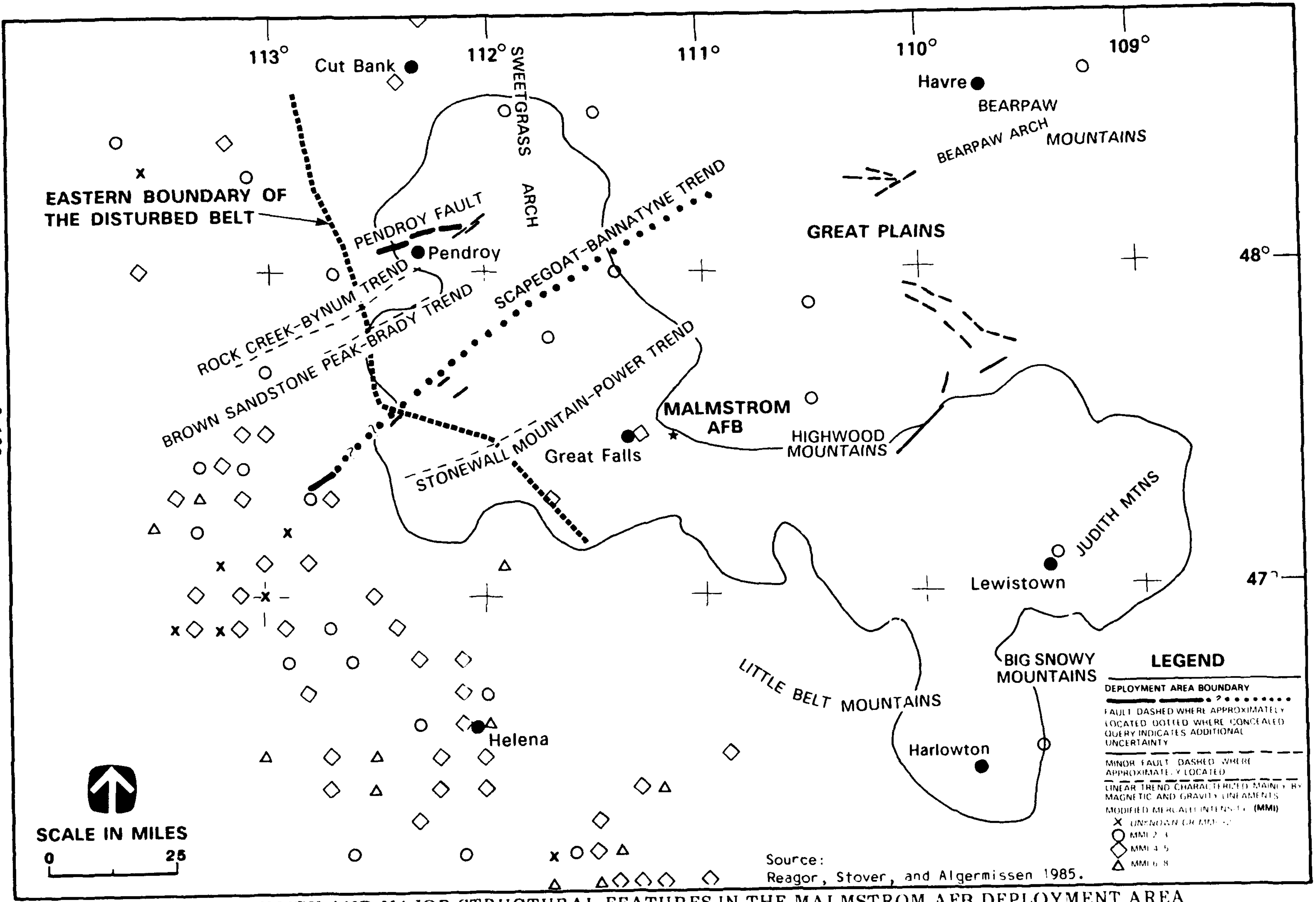
Malmstrom AFB and the deployment area are located in north-central Montana within the northern section of the Great Plains Physiographic Province. The ROI is characterized by rolling high plains interrupted by isolated mountain ranges rising 2,000 to 4,000 feet above the surrounding plains.

Rocks of Precambrian to Quaternary age are exposed in the deployment area. Igneous and metamorphic rocks (Precambrian gneiss, schist, quartzite, and argillite and Tertiary crystalline rocks) form the core of most mountains, and Paleozoic sedimentary rocks (marine sandstone, shale, limestone, and dolomite) are exposed in all of the mountainous areas in the ROI except the Highwood Mountains. Mesozoic rocks occur throughout the prairie areas with shales (Colorado and Bearpaw shales of Cretaceous age) forming the near surface bedrock. Quaternary glacial till, stream and lake deposits, and alluvium comprise the surficial deposits.

3.10.3.1 Geologic Hazards

The ROI is characterized by low-level seismicity. No active faults have been identified within the deployment area. A moderate potential for landsliding exists in steep areas underlain by Cretaceous-age shale.

Seismicity and Seismic Effects. The deployment area lies in the Great Plains of north-central Montana and is characterized by widely scattered, low-level seismicity and a maximum credible earthquake magnitude (Richter) of 6.5. Most seismic activity occurs west of the deployment area to the west and south of the Disturbed Belt (Figure 3.10.3-1). Seismic intensity and magnitude scales are shown in Figure 3.10.3-2. Although the deployment area is characterized by low-level seismicity, features with potential for seismic activity are present in the western portion of the deployment area.

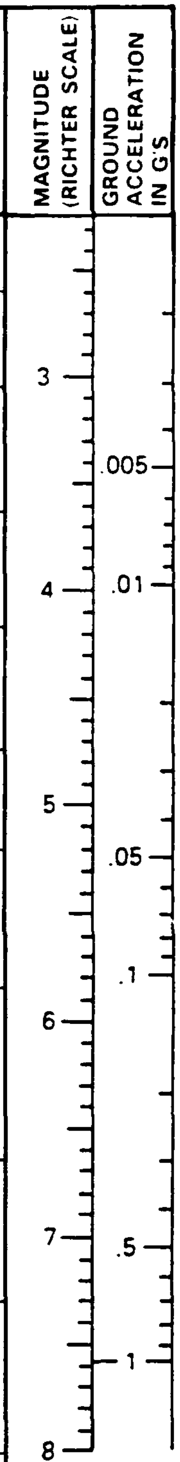


Source:
Reagor, Stover, and Algermissen 1985.

FIGURE 3.10.3-1 SEISMICITY AND MAJOR STRUCTURAL FEATURES IN THE MALMSTROM AFB DEPLOYMENT AREA

ABRIDGED MODIFIED MERCALLI INTENSITY SCALE

ROSSI-FOREL INTENSITY SCALE		
I	I	Not felt except by a very few under especially favourable circumstances.
II	II	Felt only by a few persons at rest, especially on upper floors of buildings. Delicately suspended objects may swing.
III	III	Felt quite noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibration like passing of a truck. Duration estimated.
IV V	IV	During the day felt indoors by many, outdoors by few. At night some awakened. Dishes, windows, and doors disturbed, walls make creaking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
V VI	V	Felt by nearly anyone, many awakened. Some dishes, windows, etc., broken, a few instances of cracked plaster, unstable objects overturned. Disturbance of trees, poles and other tall objects sometimes noticed. Pendulum clocks may stop.
VII	VI	Felt by all; many frightened and run outdoors. Some heavy furniture moved; a few instances of fallen plaster or damaged chimneys. Damage slight.
VIII	VII	Everybody runs outdoors. Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures, considerable in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving motor cars.
VIII IX	VIII	Damage slight in specially designed structures, considerable in ordinary substantial buildings with partial collapse; great in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments and walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Persons driving motor cars disturbed.
IX	IX	Damage considerable in specially designed structures; well designed frame structures thrown out of plumb, great in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken.
X	X	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations, ground badly cracked. Rails bent. Landslides considerable from river banks and steep slopes. Shifted sand and mud. Water splashed (slopped) over banks.
	XI	Few if any (masonry) structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipelines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.
	XII	Damage total. Waves seen on ground surfaces. Lines of sight and level distorted. Objects thrown upward into the air.



Note: These relationships are given to illustrate general comparisons for regional studies and should not be used for design parameters.
Source: Earth Technology Corporation 1984.

GR72 EM3 GS/8

FIGURE 3.10.3-2 SEISMIC INTENSITY-MAGNITUDE SCALE

Geologic features of interest lie on the southern part of the Sweetgrass Arch and include the northeast-trending Pendroy Fault, Scapegoat-Bannatyne Trend, Rock Creek-Bynum Trend, and other minor, parallel trends (Figure 3.10.3-1). Some investigators suggest these geologic features are part of an old zone of crustal weakness referred to as the Great Falls Tectonic zone, which stretches from central Idaho into Canada. Faults in this zone were recurrently active from 1 billion years before present (B.P.) to the Holocene (<10,000 years B.P.); however, evidence for Holocene activity has not been identified within the deployment area.

The future level of seismic activity is not expected to be different from that displayed in the geologic record over the past 10,000 years. However, the short record of instrumental seismic activity (about 200 yr), in the region makes it difficult to predict future conditions.

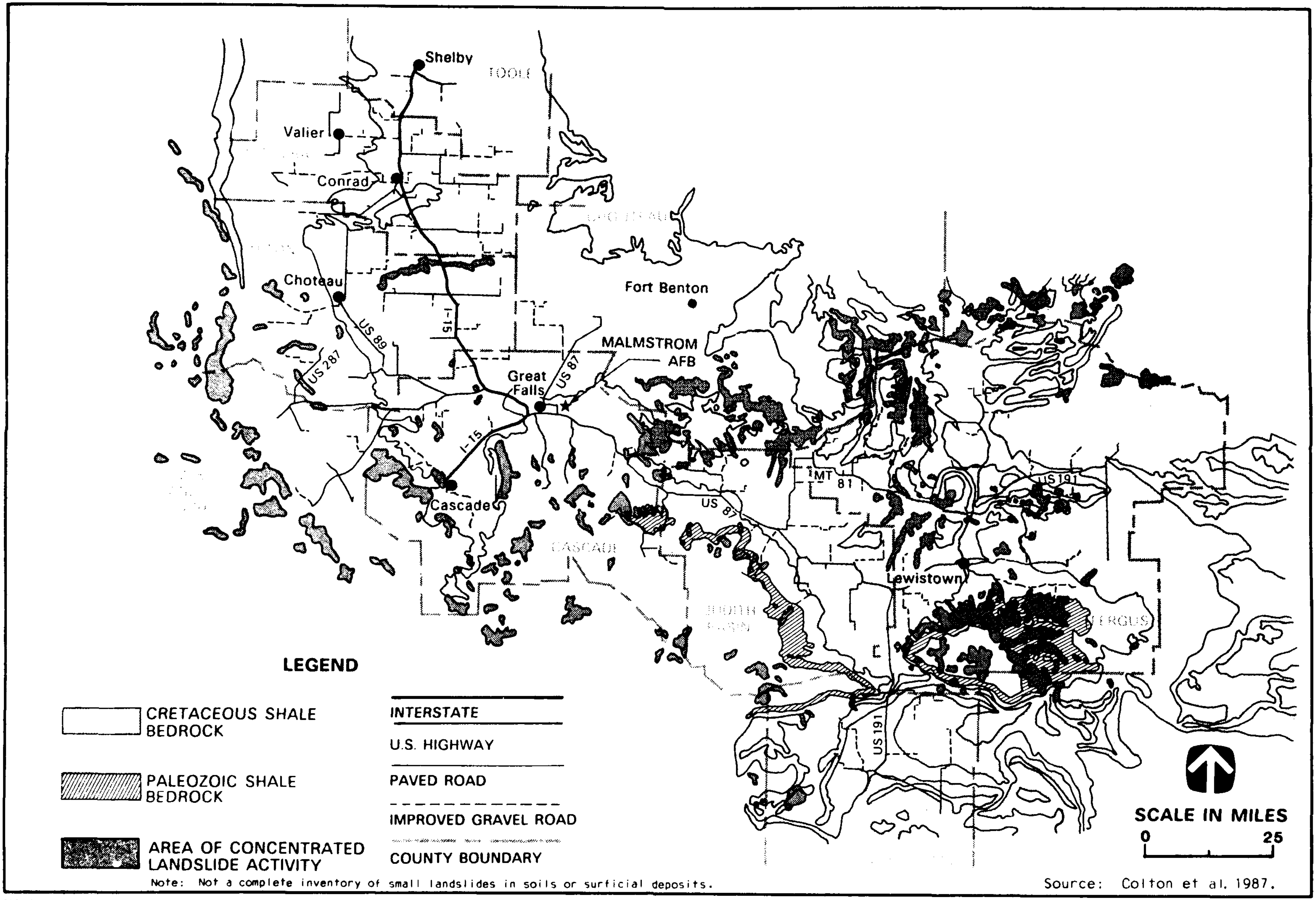
Mass Movements. The presence of landslide deposits in an area is the best indicator of the potential for future mass movements. In general, those areas with slopes greater than 10 percent, and with Cretaceous or Paleozoic shale bedrock, may be prone to landsliding and slumping. Areas highly susceptible to mass movements include the extreme eastern edge of the Rocky Mountain Front Range, the area of Tertiary intrusives between Simms and Cascade, the Smith River and Belt Creek valleys south of Great Falls, the Highwood and northern Judith mountains, and the triangular area between Lewistown, Danvers, and Hilger. Smaller, isolated areas occur throughout the deployment area. Flights in areas susceptible to mass movements include C, G, H, M, and N, and the northern portions of flights B and D. The extreme northern portion of the ROI as well as the portion in Wheatland County are less susceptible to mass movements because of more gentle slopes. Mass movements in these areas are usually restricted to stream channels where cutbank erosion may lead to slumping.

Mass movements that occur in the deployment area include landslides in both bedrock and overlying soil and rockfalls. Landsliding is most commonly associated with Cretaceous shales such as the Bearpaw, Claggett, and Colorado shales, which collectively cover roughly two-thirds of the deployment area (Figure 3.10.3-3). Landsliding has also occurred in Paleozoic shales in the Little Belt Mountains, surrounding Tertiary-age buttes southwest of Great Falls, and in glacial lake deposits around Great Falls. Slumping of bedrock and soils commonly occurs throughout the deployment area along rivers and streams cutting into the Colorado Shale. The entire length of the Judith River from about Hobson to its confluence with the Missouri River is particularly susceptible to this form of landsliding. Other rivers along which slumping is common include the Marias River south of Shelby, and the Sun and Missouri rivers west and southwest of Great Falls, respectively.

3.10.3.2 Geologic Resources

An estimated 54 million short-tons of aggregate (demonstrated and inferred sources) have been identified in the deployment area. Oil and gas leases or producing wells are most common near launch facilities in flights P, Q, R, S, and T. Coal beds are located in the ROI but only minor amounts of proven mineable coal reserves have been identified in the ROI.

Aggregate Resources. Sand and gravel sources vary in composition, quality, and abundance on Malmstrom AFB and in the deployment area. The deployment area can be divided into three regions, Shelby-Conrad, Lewistown, and Great Falls, based on the distribution of aggregate production facilities (Figure 3.10.3-4). Aggregate suitable for road base or concrete may be derived from Quaternary glacial and stream deposits in the



Note: Not a complete inventory of small landslides in soils or surficial deposits.

Source: Colton et al. 1987.

FIGURE 3.10.3-3 LANDSLIDE AND LANDSLIDE-PRONE BEDROCK AREAS

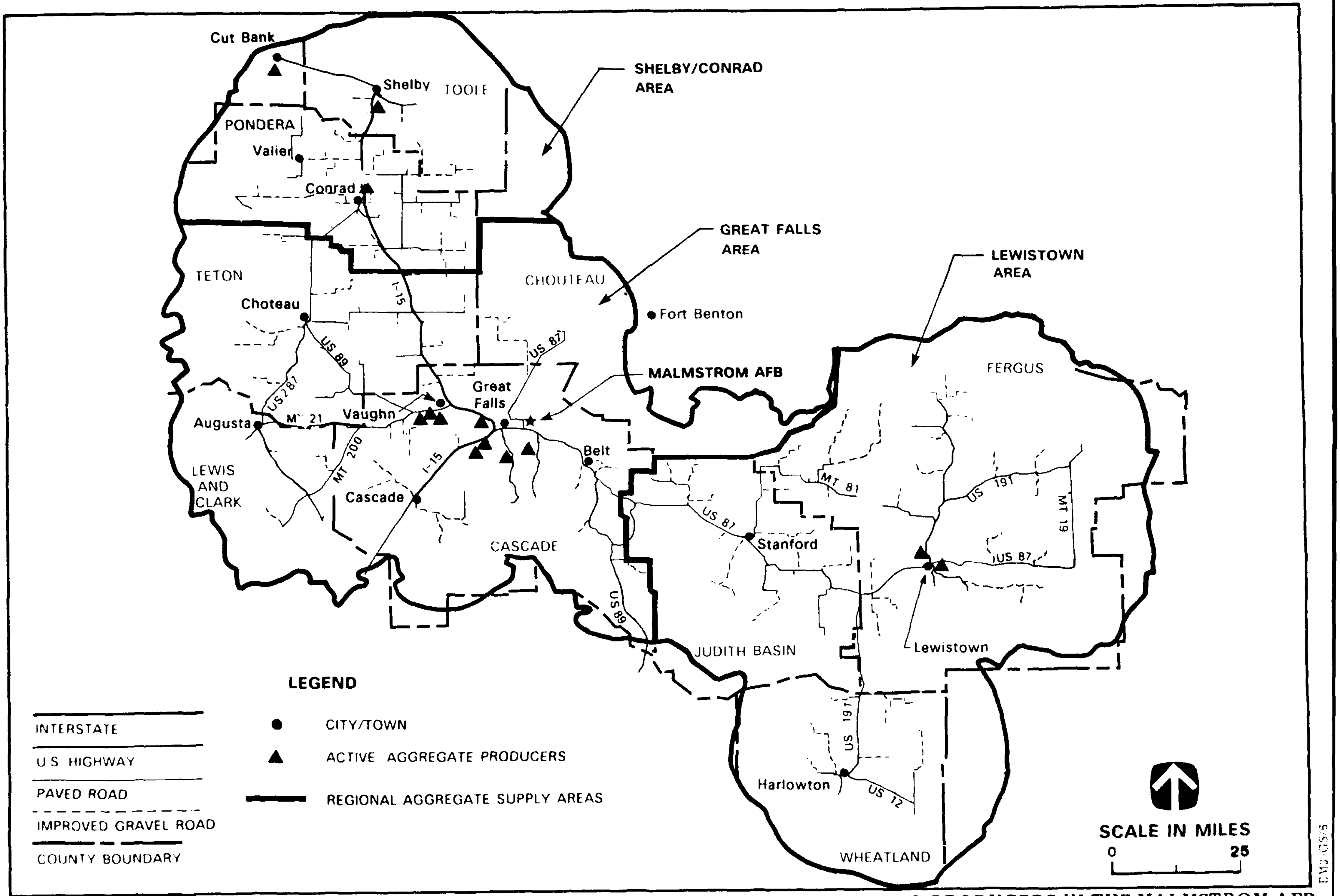


FIGURE 3.10.3-4 REGIONAL AGGREGATE RESOURCE SUPPLY AREAS AND COMMERCIAL PRODUCERS IN THE MALMSTROM AFB STUDY AREA

northern portion of the deployment area (the Shelby-Conrad region). These aggregate sources consist mainly of limestone, sandstone, quartzite, and granite materials. About 1.2 million tons of demonstrated commercial and noncommercial reserves and 18.5 million tons of inferred commercial and noncommercial reserves occur in this region. In the eastern portion of the deployment area (the Lewistown region), road base and concrete aggregate sources are found in fluvial deposits and are derived predominantly from limestone and igneous rock; gravel sources are limited. No demonstrated reserves have been reported but about 15.3 million tons of inferred commercial and noncommercial reserves occur in this region. Road base and concrete aggregate sources in the central portion of the deployment area (the Great Falls region) are derived from Missouri River terrace and stream deposits. These are derived mainly from quartzite sources with varying amounts of igneous rock. More than 5.1 million tons of demonstrated commercial and noncommercial reserves and 13.6 million tons of inferred commercial and noncommercial reserves have been identified in this region.

Aggregate producers are found in the northern (Shelby-Conrad), eastern (Lewistown), and central (Great Falls) regions of the deployment area. Additional aggregate may be available from a Cut Bank producer but this provider was not included in the analysis because production data were not available. Commercial production data for the various regions are shown in Table 3.10.3-1. Baseline consumption is roughly equivalent to annual production since aggregate is usually produced on demand. Aggregate required for the KC-135R air refueling mission and maintenance of the existing T/E route system is included in the baseline demand. Future commercial production and reserves are difficult to predict but the several billion tons of hypothetical reserves identified in the deployment area are expected to provide road base and concrete aggregate sufficient for baseline requirements for the foreseeable future.

Future baseline commercial production and reserves are expected to remain near levels shown in Table 3.10.3-1 as a result of the low level of projected growth in the ROI.

Oil and Gas. Large portions of land throughout the deployment area have been leased for oil and gas exploration. Fifty-eight of the launch facilities, or about 30 percent, are directly adjacent to an oil or gas lease. Most of these launch facilities are concentrated in four areas: along the Sweetgrass Arch in Pondera and Toole counties (flights P, R, and S), along the Sun River west of Great Falls (flights F, G, H, and I), to the north and east of the Judith Mountains near Lewistown (flights E and O), and surrounding Judith Gap in the southern portion of the deployment area (flights K and L). Twelve launch facilities (P-1, P-5, P-8, P-10, Q-16, Q-20, R-22, R-28, S-35, S-37, T-45, and T-49) are located within the boundaries of oil and gas fields and ten launch facilities (P-2, P-3, P-6, Q-15, Q-17, R-23, R-29, S-36, T-43, T-46) are located within 1 mile of a producing oil or gas well. Current oil or gas production within the deployment area occurs in the northwestern portion along the Sweetgrass Arch, and near the eastern portion of the deployment area on the Bearpaw Uplift, in the Big Horn Basin, and in the Bull Mountain area. In 1985, 19 oil and gas fields located within the boundaries of the deployment area produced about 1.5 million barrels of oil and nearly 5 million cubic feet of natural gas, accounting for 5 percent and 9 percent, respectively, of the state's production. Exploratory drilling in the Sweetgrass Arch proved successful in 1985 with a success rate of 35 percent for wildcat wells, which was the highest success rate in Montana, exceeding the 1984 rate by 5 percent. However, many of the oil and gas fields in the Sweetgrass Arch, including the most productive, are currently in secondary recovery utilizing injection wells.

Coal. Sub-bituminous coal is found in the Great Falls-Lewistown coal field, which covers much of the central portion of the ROI, though more economical deposits occur elsewhere in the state. Bituminous coal is found on the eastern flank of the Rocky

Table 3.10.3-1

Aggregate Resources in the Deployment Area

Region	Number of Producers	Current Production Rate (million tons/yr)	Maximum Production Capacity (million tons/yr)[1]
Northern (Shelby-Conrad)	2	0.59	0.74
Eastern (Lewistown)	2	0.16	0.20
Central (Great Falls)	8	1.92	2.40

Region	Demonstrated Commercial Reserves (million tons)	Inferred Commercial Reserves (million tons)	Demonstrated Noncommercial Reserves (million tons)	Inferred Noncommercial Reserves (million tons)
Northern (Shelby-Conrad)	1.23	2.55	0	15.97
Eastern (Lewistown)	N/A[2]	0.78	0	14.55
Central (Great Falls)	5.20	3.56	0	10.07

Notes: [1] Estimated 25% above current production rate.
[2] N/A = Data not available.

Mountains in the Judith River Formation. The coal beds of this Cretaceous-age formation are generally less than 2 feet thick and not considered mineable at the present time. Northern Fergus County is underlain by 2.5- to 7-foot-thick Jurassic-age beds of subbituminous coal; however, only two small areas near Winifred and near the confluence of the Judith and Missouri rivers are considered mineable at present. There is no current production from either of these fields, though areas just south of Great Falls and east of Lewistown contain subsurface mineable coal reserves and active leases. There are no proven strippable coal reserves within the ROI. The majority of the state's production is from the Powder River and Williston basins in eastern Montana. Production of coal in the region is not expected to vary much from present levels in the foreseeable future.

3.10.3.3 Soil Erosion

Most soils in the ROI have moderate or low inherent susceptibilities to wind erosion which is expected to exceed the maximum tolerable soil loss on unvegetated ground. Soils with high susceptibilities to sheet erosion near launch facilities occur primarily north and west of Great Falls. Soil erosion is a continuing problem at launch facilities in the deployment area and has required a variety of mitigation measures to control and reduce erosion both on and offsite including the use of straw mulch, check dams, and sediment traps.

Wind Erosion. Wind erosion of unvegetated ground (e.g., fallow fields) in the ROI is a major concern of the SCS in Montana. The prevailing winds in the ROI are from the southwest; consequently, long tracts of barren ground (e.g., croplands, fallow ground, and construction sites) with a southwest-northeast orientation are the most susceptible to wind erosion. Baseline wind erosion susceptibility of soils in the ROI was categorized based on the Wind Erodibility Group (WEG) designation assigned to each soil by the SCS.

None of the soils near the launch facilities have high wind erosion susceptibilities. Moderate susceptibilities are prevalent in the following areas:

- The western portion of the ROI near flights F and H;
- The eastern portion of the deployment area north and northeast of Lewistown (flights E and O), as well as near Harlowton (flights K and L); and
- The northern portion of the ROI in flight P.

The highest WEG designation at a launch facility was group 3. This WEG designation has been assigned to soils near launch facilities D-11, H-5, H-7, K-9, P-1, and S-33. Soils in WEG 3 have the potential to erode at a rate of 86 tons per acre per year (T/ac/yr) if soil conservation techniques are not implemented. The remainder of the soils at launch facilities are considered to have low inherent susceptibilities to wind erosion.

Moderate or high susceptibilities to wind erosion exist on at least 30 percent of the soils along 10 T/E route segments in Cascade County, 18 segments in Fergus County, 2 segments in Lewis and Clark County, 11 segments in Teton County, and 4 segments in Wheatland County. Only one bridge in the deployment area (located in Cascade County) is built on soils having high susceptibility to wind erosion. The remainder are about equally split between low to moderate susceptibilities.

Most soils on the base likely to be disturbed by the proposed program have low to moderate susceptibilities to wind erosion. Many soils in the potential construction areas on or near Malmstrom AFB are moderately susceptible to wind erosion. Soils in the proposed base housing area have moderate to low susceptibilities to wind erosion. Onbase construction sites and the proposed Hard Mobile Launcher (HML) vehicle operations training area have predominantly moderate erosion susceptibility. Soils of the Hillon series along the drainageway flowing north from the base and the Lawther-Gerber soil association in the extreme eastern portion of the base have the potential to erode at rates in excess of 100 T/ac/yr if the vegetative cover is disturbed due to their locations on slopes of 8 percent to 45 percent. Barren patches of the Dooley, Gerber, and Lawther soil series, as well as the Gerber-Lawther association, can erode at rates in excess of 10 T/ac/yr. All other soils on the base potentially affected by the proposed program will erode at rates exceeding the maximum tolerable soil loss if their vegetative cover is removed.

Sheet Erosion. Baseline sheet erosion susceptibility of soils in the ROI was categorized based on the K-factor designation assigned to each soil by the SCS.

Many of the soils around the launch facilities are assigned high or moderate susceptibilities to sheet erosion. Soils at 42 launch facilities have been identified as having high susceptibilities to sheet erosion. These launch facilities are concentrated in flights J, P, Q, and R north and northwest of Great Falls. Each of these flights have six or seven launch facilities located in soils with high sheet erosion susceptibilities. High susceptibilities are expected at the soils found at four launch facilities in flight S, but only at two or fewer launch facilities in the remainder of the flights. Highly erodible soils at the launch facilities include the Nobe, Tanna, Scobey, Abor, Gerdrum, Gallatin, Marias, Hilton, and Joplin series. Moderate sheet erosion susceptibilities are present for soils at 126 launch facilities. Only flights J, P, Q, and R have fewer than five launch facilities located in soils with moderate susceptibilities.

Most bridge locations likely to require upgrades have moderate susceptibilities to sheet erosion with highly susceptible soils near 23 bridges. Most of the bridges with highly susceptible soils nearby are located in Cascade and Judith Basin counties. Highly susceptible soils near the bridges include the Danvers silty clay loam, Harlem silty clay loam, Scobey-Kevin clay loams, and Gallatin clay loam. None of the bridges in Fergus, Lewis and Clark, or Wheatland counties have high susceptibilities to sheet erosion.

Many soils along the T/E routes in the deployment area are moderately to highly susceptible to sheet erosion. High sheet erosion susceptibility occurs most commonly in soils along the roads likely to be upgraded in Teton and Chouteau counties. Highly susceptible soils occur along T/E routes in Pondera, Fergus, and the other counties in the ROI, but are much less common than in Cascade County. The Kevin-Scobey clay loam, Adel silt loam, and Absher clay loam are examples of highly susceptible soils that have been identified along the T/E route segments. Nearly all of the remaining road segments are near soils classified as moderately susceptible to sheet erosion.

Most soils on the base likely to be disturbed by the proposed program have moderate susceptibilities to sheet erosion. These soils generally erode at rates below the maximum tolerable soil losses because of the vegetative cover. Soils of the Hillon series along the drainageway flowing north from the base have the potential to erode at rates in excess of 100 T/ac/yr if the vegetative cover is disturbed because of their locations on slopes of 8 percent to 45 percent. Soils in the Gerber-Lawther and Lawther-Gerber associations possess characteristics indicating potential for erosion rates in excess of 10 T/ac/yr if the vegetative cover is removed. Small portions of the HML vehicle operations training area, new housing area, and facility construction area are underlain by the Dooley soil series and are assigned a low susceptibility to sheet erosion. The Acel, Dooley, and Lawther soil series are expected to erode at rates of 2 to 3 T/ac/yr without vegetative cover or soil conservation management practices.

3.11 Air Quality

The proposed construction and operations of the Small Intercontinental Ballistic Missile system in Montana may result in the emission of various air contaminants in the vicinity of Great Falls, Montana and in the deployment area. Air quality regulations applicable to the proposed program were established by the U.S. Environmental Protection Agency (EPA) according to the Clean Air Act of 1970. The air quality resource describes the general baseline conditions at Great Falls and in the deployment area.

3.11.1 Resource Description

Air quality can be defined by health- and welfare-related pollutant effects, quantitative measures of the amount of certain pollutants in the air, or related aesthetic concerns such as visibility. Both short-term weather fluctuations and long-term climatic factors that control pollution dispersion conditions and affect concentration levels are considered part of the air quality resource. Physical effects of ambient air quality within an area depends on the characteristics of the receptors and the type, amount, and duration of exposure. Air quality standards specify upper limits of concentrations and duration of exposure to pollutants in the ambient air which are consistent with the national goal of preventing harmful effects.

3.11.2 General Analysis Methodology

3.11.2.1 Region of Influence

The Region of Influence (ROI) includes numerous areas where air quality may be affected directly (by construction activities) or indirectly (by program-induced transportation traffic and housing development). The ROI centers on Malmstrom Air Force Base (AFB), the City of Great Falls, adjacent interstate highways, and principal traffic arterials. The ROI also includes the deployment area, launch facilities, and access roads. In addition, the ROI includes federal and state-mandated areas of study such as federal Prevention of Significant Deterioration (PSD) Class I areas (Bob Marshall, Scapegoat, and Gates of the Mountains wildernesses; U.L. Bend National Wilderness; and Glacier National Park).

3.11.2.2 Methodology

Climatological data were obtained from the National Climatic Center in Asheville, North Carolina. Data on severe storms and dispersion meteorology were obtained from EPA and National Weather Service publications.

Ambient air quality data for Great Falls and the deployment area (where applicable) were obtained from the Montana Air Quality Data and Information Summary for 1985 (Montana Department of Health and Environmental Sciences 1986b), which summarizes the air quality from various regions in the state.

Information regarding the location and nature of all significant point sources was obtained from the Montana State Air Pollution Agency. This information is collected by the individual states and reported to the EPA National Emissions Data Systems (NEDS). The NEDS is operated by the EPA to provide current information on air pollution sources and their emissions.

In addition, key roadway segments in the program area were selected to determine vehicular carbon monoxide (CO) concentrations. The CO values were determined using MOBILE-3 emission factors and the CALINE-3 model.

3.11.3 Existing and Future Baseline Conditions

The characterization of the baseline atmospheric environment includes an evaluation of climatology and meteorology, ambient air quality, and applicable rules, regulations, and standards for the program. In general, the baseline data presented serve as a reference point used to assess program-related impacts for which a discussion of climatology and meteorology is important. This is done in order to evaluate pollutant dispersion, describe ambient air quality, and to characterize existing pollutant levels so that comparisons with program-related emission increments can be made. In addition, a review of applicable air quality regulations is made to assist in determining if violations of standards are likely to occur or if mitigation measures and/or emission offsets will be necessary.

3.11.3.1 Climatology and Meteorology

The surface meteorological data collected by the National Weather Service at Great Falls International Airport are considered representative of the deployment area. The Great Falls region and the deployment area are situated in the lee (or dry, eastern side) of the Rocky Mountains. Precipitation varies considerably during the year; the mean annual precipitation is approximately 15 inches. The prevailing winds are from the southwest. Average surface winds are quite high, averaging about 13 miles per hour (mph). The area is subject to gusting winds which can exceed 60 mph 1 or 2 days per year. Great Falls averages about 25 thunderstorm days per year with the majority occurring between May and August.

At Great Falls, the recorded monthly mean temperature ranges from 69°F in July to about 21°F in January. The area experiences about 24 days per year with maximum temperatures exceeding 90°F and about 42 days per year with minimum temperatures of 0°F or below.

3.11.3.2 Air Quality Regulations

The area that may be affected by air emissions from the proposed program includes three Air Quality Control Regions: the Great Falls Intrastate (No. 141), the Billings Intrastate (No. 140), and the Helena Intrastate (No. 142). The ambient air quality within these regions depends on the extent and orientation of emission sources and the characteristics of the receptors, as well as the time of exposure to a given pollutant. National Ambient Air Quality Standards (NAAQS) have been set by the EPA as mandated in the Clean Air Act of 1970. The standards define levels of air quality that are necessary, with an adequate margin of safety, to protect the public health (primary standards) and the public welfare (secondary standards). Standards exist for sulfur oxides (measured as sulfur dioxide [SO_2]), nitrogen dioxide (NO_2), CO, total suspended particulates (TSP), lead, and ozone. In 1971, the EPA promulgated primary and secondary NAAQS for particulate matter, measured as "total suspended particulate matter" or "TSP." The primary standards were set at 260 micrograms per cubic meter ($\mu g/m^3$), 24-hour average not to be exceeded more than once per year, and 75 $\mu g/m^3$, annual geometric mean. The secondary standard, also measured as TSP, was set at 150 $\mu g/m^3$, 24-hour average not to be exceeded more than once per year. In accordance with Sections 108 and 109 of the Clean Air Act, the EPA has reviewed and revised the health and welfare criteria on which these primary and secondary particulate matter standards were based. On July 31, 1987, the EPA replaced TSP NAAQS with a size-specific (10 microns or less) particulate matter standard (PM_{10}). The 24-hour PM_{10} standard is 150 $\mu g/m^3$, taken as a 24-hour average. An area is designated as nonattainment if the PM_{10} exceeds the standard more than once a year. The annual standard is 50 $\mu g/m^3$, measured as the annual arithmetic mean. State and local governments have the authority to impose standards which are more strict than the NAAQS. Montana has amended the national standards to make their own standards more stringent for ozone, SO_2, CO, and TSP, but has not established a PM_{10} standard.

3.11.3.3 Ambient Air Quality

Malmstrom AFB and the deployment area fall within nine counties: Cascade, Chouteau, Fergus, Judith Basin, Lewis and Clark, Pondera, Teton, Toole, and Wheatland. The closest nonattainment area from Malmstrom AFB is Great Falls. A corridor along 10th Avenue South was declared a nonattainment area for CO on the assumption that the violations were due to the high level of traffic along the route. An analysis by the Montana Air Quality Bureau for CO levels and traffic counts for violation days showed high readings were present during late night and early morning hours when traffic was extremely light. It was concluded that, occasionally each winter, the high CO levels were caused by the effects of warmer Chinook winds overriding a shallow layer of cooler air, thus trapping pollutants. The trapped air would then be confined to river valley zones and would persist for the longest time in the lower areas close to the rivers. Therefore, the CO levels on those days with significant trapping were caused by the concentrations of all CO emissions over the entire city. The City of Great Falls has submitted a plan to the EPA for attainment of the standard; 1989 would be the earliest redesignation to attainment that could be expected if no further violations occur during this period. The Great Falls downtown area has not achieved the federal secondary standard for TSP, and is designated nonattainment for TSP; however, the EPA replaced the TSP standard with the PM_{10} standard. Monitored PM_{10} data for Great Falls are below the standards and Great Falls is classified into the Group III PM_{10} category, which is or is presumed to be in compliance with the standards. The entire State of Montana, except where designated as a PSD Class I area, is a Class II area. The Class I areas in the ROI include the Bob Marshall, Scapegoat, and Gates of the Mountains wildernesses; U.L. Bend National Wilderness; and Glacier National Park.

In general, air quality in the rest of the deployment area is excellent. This results from a number of factors, including the rural character and the meteorological and topographical features of the area. The sparse population, combined with large amounts of undeveloped land, few large pollutant emission sources, and the sparsely vegetated terrain which is relatively flat and swept by the east slope winds of the Rocky Mountains, are the major reasons for the excellent air quality.

Ambient air quality at Malmstrom AFB has not been monitored. However, ambient concentrations of specific pollutants have been monitored at a number of locations in Great Falls, 2 miles from Malmstrom AFB. The TSP measurements were also available from the Teton Monitoring Station in Chouteau County. The TSP, CO, and PM_{10} levels are monitored at Great Falls. No other criteria pollutants are monitored because of the lack of either point or area sources. Table 3.11.3-1 presents selected air quality data for Great Falls and Teton County for 1985 and 1986.

Visibility is normally very good in Montana and will average from 45 to 65 miles over the year. There are very few year-round pollution sources in the vicinity of Malmstrom AFB. The predominance of southwesterly drainage winds across Malmstrom AFB usually vents pollution from the small industrial sites in the area. With the occurrence of forest fires in the nearby mountains from late summer through early fall, accompanied by a favorable upper air flow, visibility can occasionally be reduced to 5 to 7 miles at the base and down to 1 mile near the mountains.

Table 3.11.3-1

Air Quality Monitoring Data Within the Region of Influence for Malmstrom AFB and the Deployment Area (1985 and 1986)

TOTAL SUSPENDED PARTICULATES ($\mu g/m^3$)											
		Annual Geometric Mean		Maximum 24-Hour Average		Number of Exceedances of 24-Hour Standards					
						Federal				State	
						Primary		Secondary			
County and City	Site Location	1985	1986	1985	1986	1985	1986	1985	1986	1985	1986
Cascade											
Great Falls	Fire Station No. 1	65.8	61.1	264	204	1	0	5	5	3	3
	Downtown	45.6	45.8	169	167	0	0	1	1	0	0
	Downtown (Collocated)	43.1	44.6	172	171	0	0	1	1	0	0
	Black Eagle Post Office	52.6	59.3	225	232	0	0	3	4	2	1
Teton											
Choteau	Circle 8 Ranch	13.5	*	41	*	0	*	0	*	0	*

	Annual Geometric Mean	24-Hour Average
Federal Standards for TSP ($\mu g/m^3$):[1]		
Primary	75	260^2
Secondary	60	150^2
Montana Standards for TSP ($\mu g/m^3$):	75	200^2

Table 3.11.3-1 Continued, Page 2 of 3

PARTICULATE MATTER (PM_{10}) ($\mu g/m^3$)

County and City	Site Location	Annual Arithmetic Mean		Maximum 24-Hour Average		Number of Exceedances 24-Hour Standard			
						Primary		Secondary	
		1985	1986	1985	1986	1985	1986	1985	1986
Cascade									
Great Falls	Downtown	13.9	30.1	31.0	73.0	0	0	0	0

Federal Standards for PM_{10}:	Annual Arithmetic Mean	24-Hour Average
Primary	50	150^2
Secondary	50	150^2
Montana Standards for PM_{10}:	No Standards Established	No Standards Established

Table 3.11.3-1 Continued, Page 3 of 3

CARBON MONOXIDE ($\mu g/m^3$)							
		1-Hour Average Maximum		8-Hour Mean Maximum		Number of Exceedances of 8-Hour Standard Days	
County and City	Site Location	1985	1986	1985	1986	1985	1986
Great Falls	Pardis Clinic	12,333 (11.1)[3]	27,085 (23.7)	9,000 (8.1)	11,111 (10.0)	0	2
Federal Standards ($\mu g/m^3$):		1-Hour Average				8-Hour Average	
(Primary and Secondary)		40,000[2] (35)				10,000[1] (9)	
Montana Standards (μgm^3):		26,285 (23)				10,000 (9)	

Notes:
[1] TSP standards were replaced with PM_{10} standards on July 31, 1987.
[2] Not to be exceeded more than once per year.
[3] Numbers in parentheses are measured in parts per million (ppm).
*Site discontinued.

Source: Montana Department of Health and Environmental Sciences 1986b.

The air quality in the ROI will continue to be good. Some increases in CO emissions are expected because of increased transportation activities resulting from the population growth expected in the City of Great Falls. However, the increase will be minimal, along with the low increase in traffic, the CO concentration will be lower than baseline conditions because newer model cars will replace older model cars with lower emissions rates. The results of the CO assessment for the future baseline for the years 1990 and 2000 at selected roadway segments are shown in Table 3.11.3-2.

Increases in fugitive dust concentrations are expected in the program area as a result of population growth and nonprogram-related construction. The assessment of these nonprogram-related increases is not possible since the exact time, location, type, and level of construction and operations activities (necessary for quantification of impacts) are not available. The existing urban and rural background concentrations for fugitive dust are conservatively assumed to remain constant in the future. During the past several years, ambient fugitive dust levels have been decreasing even though the population has been increasing. Rural fugitive dust concentrations are primarily a result of natural sources and agricultural activities, which are expected to remain relatively constant.

It is assumed that the visual range will remain unchanged in the deployment area and will average from 45 to 65 miles. This is due to the lack of additional large point sources.

Table 3.11.3-2

Predicted Baseline Carbon Monoxide Concentrations at Selected Receptors for 1985, 1990, and 2000

Roadway Segment	Averaging Time	1985 (ppm)[1]	1990 (ppm)	2000 (ppm)
Great Falls, Montana				
U.S. 87/89				
Between 57th Street and	1-hour	2.4	2.2	2.1
South Gate of Malmstrom AFB	8-hour	0.7	0.7	0.6
57th Street				
Between 2nd Avenue North	1-hour	2.7	2.5	2.3
and 10th Avenue North	8-hour	0.8	0.7	0.7
10th Avenue North				
Between 57th Street and	1-hour	2.8	2.7	2.5
Commercial Gate	8-hour	0.8	0.8	0.7
2nd Avenue North				
Between 38th and 57th Streets	1-hour	4.7	4.4	3.9
	8-hour	1.3	1.2	1.1
Between 57th Street and	1-hour	6.9	6.3	5.4
Malmstrom AFB Main Gate	8-hour	1.7	1.6	1.4

Note: [1]ppm = parts per million.

3.11.3.4 Emissions

The latest annual (1986) regional air quality emissions inventory, extracted from the EPA NEDS, is provided in Table 3.11.3-3. Emissions data were available for TSP, sulfur oxides, nitrogen oxides, CO, and volatile organic compounds (a measure of hydrocarbons). The PM_{10} fraction of TSP emissions are not identified in the NEDS system.

The data include the four most important source categories, namely fuel combustion in stationary sources, transportation, solid waste disposal, and industrial processes, as well as a fifth source category, miscellaneous. Miscellaneous emission types vary according to the region involved, but most commonly include fugitive dust, solvent evaporation, agricultural burning, forest fires, and structural fires. Existing major point sources of air pollutants include the Montana Refining Company, GTA Feed Company, and Congra Feed Mill, all located in Great Falls. Future baseline regional emissions will increase due to normal population and industrial growth, but these increases will be minimal because of the low growth potential in these areas.

Table 3.11.3-3

Regional Air Quality Inventory
1986

	Emission Source (T/Yr)^1														
	Fuel Combustion					Industrial Process					Solid Waste Disposal				
County	TSP	SO$_x$	NO$_x$	VOC^2	CO	TSP	SO$_x$	NO$_x$	VOC	CO	TSP	SO$_x$	NO$_x$	VOC	CO
Cascade	108	393	475	214	654	15	1,012	67	1,016	874	86	1	3	241	722
Chouteau	0	8	12	12	0	N/A^3	N/A	N/A	N/A	N/A	59	2	13	88	276
Fergus	36	23	52	74	226	N/A	N/A	N/A	N/A	N/A	39	1	7	73	227
Judith Basin	0	9	4	0	3	N/A	N/A	N/A	N/A	N/A	26	1	6	37	119
Lewis and Clark	247	141	350	501	1,480	644	26,197	0	0	36,054	35	1	1	99	296
Pondera	125	6	24	265	773	N/A	N/A	N/A	N/A	N/A	23	1	4	41	127
Teton	0	8	12	0	3	N/A	N/A	N/A	N/A	N/A	41	1	9	66	205
Toole	0	6	12	0	3	0	388	0	0	0	30	1	6	49	152
Wheatland	0	1	7	0	3	N/A	N/A	N/A	N/A	N/A	14	0	3	22	68

	Emission Source (T/Yr)^1														
	Air/Water Transportation					Land Transportation					Miscellaneous				
County	TSP	SO$_x$	NO$_x$	VOC	CO	TSP	SO$_x$	NO$_x$	VOC	CO	TSP	SO$_x$	NO$_x$	VOC	CO
Cascade	43	8	69	96	444	2,834	420	4,636	4,780	37,661	28,901	4	103	1,670	3,626
Chouteau	1	0	3	16	186	142	58	492	368	1,883	29,272	6	153	805	5,355
Fergus	1	1	4	21	273	433	100	1,067	1,116	9,496	20,565	6	168	956	5,879
Judith Basin	0	0	1	2	32	65	26	311	244	1,775	10,297	3	71	370	2,500
Lewis and Clark	50	7	62	119	482	1,310	224	2,334	3,288	29,017	23,526	68	1,805	8,333	57,421
Pondera	0	0	2	12	142	237	54	636	715	3,156	9,957	0	13	144	455
Teton	0	0	3	18	141	142	53	619	545	4,025	13,103	1	17	146	595
Toole	0	0	2	16	158	187	42	475	355	2,523	12,215	1	15	265	523
Wheatland	0	0	0	5	26	43	14	175	196	1,473	5,399	2	24	292	1,889

Notes: [1] T/yr = Tons per year.
[2] VOC = Volatile organic compounds; a measure of reactive hydrocarbons.
[3] N/A = Not applicable.

Source: U.S. Environmental Protection Agency 1986.

3.12 Noise

Construction and deployment of the Small Intercontinental Ballistic Missile system would result in potential noise-level increases in and around construction sites and along traffic corridors in the area. Noise sources include construction equipment and the vehicles used to transport workers and materials to the sites. Construction activities that produce noise include those associated with the building of support facilities and residential housing onbase and with the building of Hard Mobile Launcher facilities in the deployment area.

3.12.1 Resource Description

Noise is defined as any unwanted sound, a sound that interferes with speech or hearing, a sound intense enough to damage hearing, or a sound that is otherwise annoying. Noise or sound pressure level (SPL), is usually measured in decibels (dB). The decibel scale is an artificial scale developed to compare one sound pressure to a reference sound pressure. Because humans have varying sensitivity to a wide range of frequencies, a weighting is used and the resultant SPL is known as the A-weighted sound level (dBA). The significance of impacts on the noise environment is a function of community size, time of day, demographics, size of area(s) exposed, frequency of occurrence, and frequency of the noise with community and receptor sensitivity being the arbiter as to whether impacts would or would not be significant.

3.12.2 General Analysis Methodology

3.12.2.1 Region of Influence

The Region of Influence (ROI) centers on Malmstrom Air Force Base (AFB), the City of Great Falls, and principal traffic arterials. The ROI also consists of the deployment area and launch facilities where program construction may take place, and includes Cascade, Chouteau, Fergus, Judith Basin, Lewis and Clark, Pondera, Teton, Toole, and Wheatland counties, Montana.

3.12.2.2 Methodology

Environmental noise can be characterized by average noise levels such as L_{eq}, the energy-equivalent continuous noise levels. The L_{eq} can be averaged over a 24-hour period, or, for specific applications such as schools, can be averaged over a particular portion of the day. The daytime noise level L_d refers to noise between 7:00 A.M. and 7:00 P.M. The L_{dn} represents the day/night equivalent noise level that incorporates a 10-dB penalty for nighttime noise between 10:00 P.M. and 7:00 A.M. to reflect the added likelihood of annoyance during this nighttime period.

Background noise monitoring was conducted from October 20 to 25, 1986 at ten sites (Table 3.12.2-1) in and around Malmstrom AFB to obtain a representative measure of the existing sound levels. Of the ten sites, four were located onbase and six were located offbase. Twenty-four hour noise monitoring was performed close to the following types of receptors:

- Critical noise-sensitive sites such as schools, hospitals, or churches on or near major thoroughfares; and
- Residential areas.

Table 3.12.2-1

Noise Monitoring Sites In and Around Malmstrom AFB

1. North Boundary of the Base (South of Proposed Construction)
2. Loy Elementary School
3. Inside the Base Main Gate
4. Near the Base Hospital (Corner of Avenue C and 5th Street)
5. 2nd Avenue North and 57th Street
6. 47th Street and 10th Avenue South
7. Municipal Golf Course (on River Drive)
8. Base Educational Center (Avenue C and 5th Street)
9. 2nd Avenue North (Between 52nd and 57th Street)
10. U.S. 87 Bypass Road (Residential Area)

The results of the background sound-level survey are summarized in Table 3.12.2-2 which represents the A-weighted L_{10}, L_{50}, L_{90}, L_{eq}, and L_{dn} sound levels of each sampling location for the time span indicated.

3.12.3 Existing and Future Baseline Conditions

The noise measurement area is primarily zoned for commercial, light industrial, and agricultural use. It consists primarily of Air Force multiple-family residences on Malmstrom AFB, a few small apartment buildings on U.S. 87 Bypass, and an elementary school. The noise environment during daytime hours was dominated by local street traffic-generated noise peaks, with distant traffic noise and occasional aircraft overflights near the base, especially the KC-135R air refueling mission stationed at Malmstrom AFB during the first 3 days of monitoring. Therefore, representative KC-135R aircraft noise was included in the baseline noise measurements. The Malmstrom AFB Air Installation Compatible Use Zone (AICUZ) report was released in 1978 based on EB-57 aircraft assigned to the base at that time. The Great Falls City-County Planning Board has recommended that this 1978 AICUZ report remain in effect until the more current Malmstrom AFB KC-135R AICUZ report is completed. However, the new AICUZ noise contours will be compressed due to the quieter KC-135R aircraft. Other noise measurement sites are located near highways and local streets.

Monitoring sites No. 5 (2nd Avenue and 57th Street) and No. 10 (U.S. 87 Bypass Road) are heavily traveled and show high L_{eq} and L_{dn} values. Although site No. 7 (the municipal golf course on River Drive) shows high L_{eq} and L_{dn} values, these are attributed to the constant noise from a nearby hydroelectric generation facility on the Missouri River and occasional heavy trucks on the street. The Federal Highway Administration has established a maximum noise abatement level of 65 dBA from highways for the land use (receptor) activity category that includes parks, residences, and schools. The measured L_{eq} from the Great Falls and Malmstrom AFB monitoring sites are within this standard.

The surrounding deployment area is characterized as a basically quiet, sparsely populated, rural environment. Outdoor daytime residual noise levels at remote wilderness sites are about 16 dBA, while the same type of noise level would range between 35 and 45 dBA on a farm or in rural areas. Infrequent agricultural operations will increase

Table 3.12.2-2

Malmstrom AFB Noise Monitoring Study

Site	Measurement[1] Period	L_{eq} (dBA)	L_{dn} (dBA)	L_{90} (dBA)	L_{50} (dBA)	L_{10} (dBA)
No. 1	6:00 A.M.- 7:00 P.M.	51.4	N/C[2]	46.6	51.2	57.2
No. 2	6:00 A.M.- 6:00 A.M.	52.1	55.7	40.8	54.2	58.8
No. 3	6:00 A.M.- 6:00 A.M.	52.2	55.8	42.4	53.6	58.8
No. 4	6:00 A.M.- 6:00 A.M.	50.7	54.2	40.0	52.4	57.6
No. 5	6:00 A.M.- 12:00 A.M.	59.2	60.9	53.6	60.0	63.2
No. 6	7:00 A.M.- 6:00 A.M.	53.9	57.4	43.2	55.6	59.6
No. 7	7:00 A.M.- 4:00 A.M.	57.7	60.6	50.4	58.4	64.0
No. 8	6:00 A.M.- 2:00 A.M.	51.0	53.3	44.0	51.2	56.8
No. 9	6:00 A.M.- 6:00 A.M.	54.3	58.0	42.4	56.0	60.8
No. 10	6:00 A.M.- 6:00 A.M.	56.2	60.0	43.6	58.8	63.2

Note: [1] Measurement period span is rounded to nearest hour.
[2] N/C = Not calculable.

the ambient levels for short periods throughout the year. Figure 3.12.3-1 depicts the decibel levels (dBA) normally produced by common machines and conditions in the environment.

Estimated daily traffic volumes at selected locations in Great Falls for both existing conditions (1985) and future baseline (1990 and 2000) were used to predict the future noise levels without the program. The results indicate that the greatest increase is less than 1 dBA, which is a minimal increase above existing conditions.

		dBA*	
LETHAL		-180-	
		-175-	
		-170-	
		-165-	
		-160-	
		-155-	
		-150-	
		-145-	
	Sonic Boom	-140-	
		-135-	
THRESHOLD OF PAIN			
		-130-	
	Jet Takeoff at 200'	-125-	
		-120-	
		-115-	Discotheque
PHYSICAL DISCOMFORT	Motorcycle at 20'	-110-	
		-108-	Jackhammer (Peak)
		-105-	Power Mower
		-104-	Loader
		-100-	
	Freight Train at 50'	-95-	Newspaper Press
	Propeller Plane Fly-Over at 1,000'	-90-	Food Blender
		-85-	Electric Mixer
	Freeway Traffic at 50'	-80-	Washing Machine; Alarm Clock; Garbage Disposal; Electric Can Opener
		-75-	Office with Tabulating Machines
	Average Traffic at 100'	-70-	Vacuum Cleaner; Portable Fan
		-65-	Electric Typewriter at 10'
		-60-	Dishwasher Rinse at 10'; Air Conditioning Unit
		-55-	
		-50-	Normal Conversation at 12'
	Light Traffic at 100'	-45-	Rural Residential Area
		-40-	
		-35-	Library
		-30-	
		-25-	
		-20-	Motion Picture Studio
		-15-	
		-10-	Leaves Rustling
		-5-	
THRESHOLD OF HEARING			
		-0-	

*The unit of sound is the decibel (dB). The loudness of sound is typically measured using a sound meter, the A-scale, which corresponds closely to the way the human ear perceives sound. Therefore, the sound level for noise evaluations is frequently expressed in dBA.

AN1/9 EM3-NO/3

FIGURE 3.12.3-1 SOUND LEVELS OF COMMON EQUIPMENT AND ENVIRONMENTAL CONDITIONS

4.0 ENVIRONMENTAL CONSEQUENCES

This chapter describes the environmental consequences of proposed deployment and peacetime operation of the Small Intercontinental Ballistic Missile (ICBM) at Malmstrom Air Force Base (AFB), Montana. Impacts are considered for each of the resource categories described in Chapter 3.0, Affected Environment. Impacts are evaluated and rated in terms of their magnitude and significance.

The Council on Environmental Quality (CEQ) regulations state that environmental impact statements (EISs) "shall provide full and fair discussion of significant environmental impacts," and that impacts shall be discussed in proportion to their significance. In addition, the following definition of significance is provided: " 'Significantly' as used in NEPA requires consideration of both context and intensity."

Under the definition of context, the regulations indicate that "significance varies with the setting of the proposed action." In this EIS, the setting of Small ICBM program activities and their impacts are characterized as site, local, or regional. Site-level impacts are considered as those that occur in the immediate vicinity of the program activity. Generally, site-level impacts would result from construction and operations-related disturbances at the base (including the base expansions for family housing and the Hard Mobile Launcher [HML] vehicle operations training area), at launch facilities, and along the transporter/erector (T/E) route network. Local-level impacts are considered as those that affect an area which extends beyond the immediate vicinity of the program activity site. Local-level impacts would generally take place in communities where program inmigrants reside or at locations adjacent to or nearby construction sites or operations-related activities. Regional-level impacts are considered as those that affect a broad area, usually countywide or larger. Regional settings generally apply to air or watersheds, utility or transportation networks, and regional recreation facilities. Settings that affect resources involving national interests, such as historic resources, threatened and endangered species, and national parks, are also considered as regional. For each resource discussed in this chapter, the settings(s) are specifically defined in relationship to the characteristic of that resource. Table 4.0-1 provides a list of the resources and resource elements analyzed in this EIS and their primary setting. The collective effects of site-level impacts would vary with the launch facilities selected, whereas the collective effects of local-level impacts generally would not.

The CEQ definition of context also indicates that "both short- and long-term effects are relevant." For this EIS, both short- and long-duration impacts have been identified. Short-duration impacts are transitory effects of the proposed program that are of limited duration and are generally caused by construction activities or operation start-up. Long-duration impacts would occur over an extended period of time, whether they start during the construction or operations phases. Most impacts from the operations phase are expected to be of long duration since program operations essentially represent a steady-state condition (i.e., impacts resulting from actions that occur repeatedly over a long period of time). However, long-duration impacts could also be caused by construction activities if a resource is destroyed or irreparably damaged, or if the recovery rate of the resource is very slow.

According to the CEQ regulations (Code of Federal Regulations 1981, 40 CFR 1508.27), intensity "refers to the severity of the impacts." Ten items are listed that "should be considered in evaluating intensity:"

1. Impacts that may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial.

Table 4.0-1

Primary Setting of Impacts on Resource Elements

Resource and Element	Primary Setting
Socioeconomics	
Economic Base	Local
Demographics	Local
Housing	Local
Education	Local
Public Services	Local
Public Finance	Local
Utilities	
Potable Water Treatment and Distribution	Local
Wastewater	Local
Solid Waste	Local
Energy Utilities	Local
Transportation	
Roads	Local
Public Transportation	Local
Railroads	Local
Airports	Local
Land Use	
Urban Land Use	Local
Rural Land Use	Site
Recreation	
Regional Recreation	Regional
Local Recreation	Local
Visual Resources	Site
Cultural and Paleontological Resources	
Prehistoric Resources	Site
Historic and Architectural Resources	Site
Native American Resources	Site
Paleontological Resources	Site
Biological Resources and Threatened and Endangered Species	
Vegetation	Site
Wildlife	Site
Aquatic Habitats	Site
Unique and Sensitive Habitats	Site
Threatened and Endangered Species	Site
Water Resources	
Water Use	Local
Surface Water Hydrology and Quality	Site/Local/Regional
Groundwater Hydrology and Quality	Site/Local/Regional
Geology and Soils	
Geologic Hazards	Site
Geologic Resources	Site/Regional
Soil Erosion	Site
Air Quality	Local/Regional
Noise	Local

2. The degree to which the proposed action affects public health or safety.

3. Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.

4. The degree to which the effects on the quality of the human environment are likely to be highly controversial.

5. The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.

6. The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.

7. Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.

8. The degree to which the action may adversely affect districts, site, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.

9. The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.

20. Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment.

It is not anticipated that the proposed program would have impacts with sufficient intensity to threaten the violation of laws as indicated by consideration 10. Nevertheless, this consideration is included in evaluating the significance of impacts to those resources that are protected by environmental laws.

Controversy, referred to in consideration 4, involves disagreement among recognized professionals over environmental impacts or assessment methodologies. Possible controversy over the purpose, need, or desirability of this program was not considered in evaluating the significance of impacts.

A three-phase impact analysis process was used to evaluate environmental consequences of the proposed Small ICBM program. First, the environmental impacts within resource element categories were identified, then the level of the impact (LOI) was evaluated, and finally significance was assessed.

The LOI is a rating (negligible, low, moderate, or high) of the magnitude of an impact. The magnitude has been evaluated in terms of "numbers and kinds" of effects as compared to baseline conditions. The evaluation of LOI is based on both the absolute quantity of an affected resource and the comparisons of this quantity with the resource base. Once the LOI is determined, an evaluation is made as to whether the impact is significant. Significance is determined by evaluating its context and intensity as previously identified. In many cases, high LOIs will be judged to be significant, but not in all instances. For example, the excess capacity of a system may be large enough so that even a moderate or large impact would not be rated as significant.

The LOI and significance of site-level impacts at Malmstrom AFB and the launch facilities are presented in Figure 4.0-1. For Malmstrom AFB, Figure 4.0-1 identifies impacts within the existing boundaries of the base, and within the two proposed expansion areas: (1) the north side for military family housing and some technical and personnel support facilities, and (2) on the east side for the HML vehicle operations training area. The assessments of site-level impacts shown in Figure 4.0-1 are based on the Proposed Action, which would locate two HMLs at each identified launch facility in earth-covered igloos. The conclusions are valid for all alternatives except for visual resource impacts, which would be generally lower for Alternative 3 where only one pre-engineered building would be constructed at each launch facility. The LOI and significance of local-level impacts and the collective assessment of site-level impacts at launch facilities, T/E routes, and the base are presented in matrices throughout this chapter.

A collective summary of LOI and significance was prepared for each resource element. In preparing these assessments, the collective effects of all individual site- or local-level impacts have been considered for the program as whole. Therefore, it is possible to identify high impacts at some sites and have an overall regional assessment of low or moderate.

The Proposed Action and the three alternatives were selected to represent the range of anticipated environmental impacts that would result from the Small ICBM program at Malmstrom AFB. Comparison of all alternatives with the Proposed Action was performed for two housing options. One option (onbase housing), which requires housing to be built on land acquired adjacent to the base, provides for the required new military family housing onbase; the other (offbase housing) assumes that all housing would be provided by the private sector in the Great Falls urban area. Although a combination of these options for the provision of housing would most likely be used at the time of program construction, these two housing options demonstrate the full range of impacts.

A discussion of the methodology for evaluating potential impacts is provided for each resource category. The methodology includes procedures for evaluating proposed program impacts, determining LOIs, and assessing significance; assumptions and assumed mitigations are also made. Each resource discussion also includes consideration of impacts of the Proposed Action and its alternatives, the cumulative impacts of the Small ICBM and Peacekeeper in Rail Garrison programs at Malmstrom AFB, and the impacts of the No Action Alternative. Finally, each resource discussion includes consideration of potential mitigation measures, irreversible and irretrievable resource commitments, and the relationship between the local short-term use of man's environment and the maintenance and enhancement of long-term productivity.

The Proposed Action and each of the alternatives have been treated equally to determine the environmental impacts associated with Small ICBM deployment. The textual discussions for the Proposed Action are generally lengthier than those for the alternatives because they appear first within each resource category. For brevity, the impact discussions common to the Proposed Action and the alternatives are not repeated for the alternatives. The impact discussions for the alternatives focus on the important differences between the impacts for the Proposed Action and those for the respective alternatives. This approach allows the impacts for the Proposed Action to be compared with those for each of the alternatives.

LEVEL OF IMPACT	SIGNIFICANCE	
Adverse Impacts	Not Significant	Significant
Negligible	☐	
Low	◦	•
Moderate	○	●
High	◯	⬤

IMPACTS FROM MILITARY CONSTRUCTION

SITE / RESOURCE					SHORT DURATION												LONG DURATION														
							BIOLOGICAL						GEOLOGY						CULTURAL				BIOLOGICAL						GEOLOGY		
					LAND USE (RURAL)	VISUAL	VEGETATION	WILDLIFE	AQUATICS	UNIQUE/SENSITIVE	THREATENED & ENDANGERED	SURFACE WATER SEDIMENTATION	GEOLOGIC HAZARDS	ENERGY RESOURCES	SOIL EROSION	NOISE	LAND USE (RURAL)	VISUAL	PREHISTORIC	HISTORIC	NATIVE AMERICAN	PALEONTOLOGICAL	VEGETATION	WILDLIFE	AQUATICS	UNIQUE/SENSITIVE	THREATENED & ENDANGERED	SURFACE WATER SEDIMENTATION	GEOLOGIC HAZARDS	ENERGY RESOURCES	SOIL EROSION
MALMSTROM AFB																															
EXISTING BASE							◦	◦	○						◦					◦		•	◦	◦	◦			◦			◦
NORTHSIDE EXPANSION (HOUSING AND TECHNICAL FACILITIES)							◦	◦							◦					◦		•	◦	◦				○			◦
EASTSIDE EXPANSION (HML TRAINING AREA)							○	○	◦								◦		•	◦		•	○	○	○			○			⬤
LAUNCH FACILITIES	SYSTEM ALTERNATIVES																														
	PA	1	2	3																											
A-2	✓	✓	✓	✓			◦	◦					○		○				●			◦	◦	◦	◦				○		
A-3		✓	✓	✓	◦		◦								◦		◦		●			◦	◦								
A-4	✓	✓	✓	✓			◦								◦				•				◦								
A-5				✓	○		•		⬤		⬤				◦		○		•				•		○		⬤				
A-6				✓	○	○	•	○	⬤			○				○	⬤	○	•			◦	•	◦	○						
A-7	✓		✓	✓	◦	○	◦	○							○		◦	◦	•			◦	◦	◦							
A-8				✓			•	○	○			◦			◦	○	•		•			◦	•	◦	◦						
A-9				✓	◦		◦	◦							◦		◦		●			●	◦	◦							
A-10	✓	✓	✓	✓	◦		◦					◦			◦		◦		●				◦							◦	
A-11	✓	✓	✓	✓	◦		◦	○				○					◦		●			●	◦	◦							
B-2	✓		✓	✓			◦	◦							◦				●			●	◦	◦						◦	
B-3	✓	✓	✓	✓	◦			◦	●						◦		◦		●					◦	◦					◦	
B-4				✓	◦		◦		○						◦		◦		●				◦		◦						
B-5	✓	✓	✓	✓	◦			○							◦		◦		•					◦							
B-6		✓		✓			◦	○	◦			○			○				●			●	◦	◦							
B-7			✓	✓	◦	○	◦								◦		◦	◦	⬤				◦								
B-8	✓		✓	✓	◦	○	◦								◦		◦	◦	●				◦								
B-9	✓	✓	✓	✓			◦	○	○			◦	○		◦				⬤				◦	◦	◦				○		
B-10				✓	○		•	◦				○			○		○		●			●	•	◦							
B-11	✓	✓	✓	✓			•	○	◦						◦				⬤			●	◦	◦							
C-2			✓	✓	◦										◦	○	◦		●			●									

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Notes:
1) Launch facilities included in the Proposed Action (PA) and/or Alternatives 1, 2, and 3 are marked ✓ as applicable.

2) Visual resource impacts presented are generally for the Proposed Action and Alternative 2 using earth-covered igloos. Alternatives 1 and 3 using pre-engineered buildings would have a lower level of impacts.

3) All noise resource impacts are assumed to be of short duration.

4) All cultural resource impacts are assumed to be of long duration.

5) For the Proposed Action and Alternative 2, long-duration impacts on land use are low and not significant for launch facilities Q-15 and S-33.

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FIGURE 4.0-1 ENVIRONMENTAL IMPACTS AT MALMSTROM AFB AND LAUNCH FACILITIES ASSOCIATED WITH PROPOSED SMALL ICBM MILITARY CONSTRUCTION IN MONTANA

LEVEL OF IMPACT	SIGNIFICANCE	
Adverse Impacts	Not Significant	Significant
Negligible	☐	
Low	◦	•
Moderate	○	●
High	◯	⬤

IMPACTS FROM MILITARY CONSTRUCTION

SITE					SHORT DURATION												LONG DURATION														
	SYSTEM ALTERNATIVES						BIOLOGICAL						GEOLOGY						CULTURAL				BIOLOGICAL						GEOLOGY		
LAUNCH FACILITIES	PA	1	2	3	LAND USE (RURAL)	VISUAL	VEGETATION	WILDLIFE	AQUATICS	UNIQUE SENSITIVE	THREATENED & ENDANGERED	SURFACE WATER SEDIMENTATION	GEOLOGIC HAZARDS	ENERGY RESOURCES	SOIL EROSION	NOISE	LAND USE (RURAL)	VISUAL	PREHISTORIC	HISTORIC	NATIVE AMERICAN	PALEONTOLOGICAL	VEGETATION	WILDLIFE	AQUATICS	UNIQUE SENSITIVE	THREATENED & ENDANGERED	SURFACE WATER SEDIMENTATION	GEOLOGIC HAZARDS	ENERGY RESOURCES	SOIL EROSION
C-3				✓	◦			◦				◦			◦		◦		⬤			●		◦							
C-4	✓	✓	✓	✓	◦				◦						◦		◦		⬤												
C-5	✓	✓	✓	✓	◦										◦		◦		•												
C-6	✓	✓	✓	✓			◦	◦							◦				●			●	◦	◦							
C-7				✓			◦	○				◦	○						⬤			◦	◦	◦					○		
C-8	✓		✓	✓			•	○								○			•			◦	•	◦							
C-9				✓	○		•	○									○		•			◦	•	◦							
C-10		✓		✓			•	○	•						◦				●		•	●	◦	◦	◦						
C-11	✓		✓	✓	◦	○	◦	○	◦						◦	○	◦	◦	⬤				◦	◦							
D-2	✓	✓	✓	✓	◦										◦		◦		●												
D-3				✓	◦										◦		◦		•			●									
D-4	✓	✓	✓	✓	◦		◦		◦						◦		◦		●			●	◦								
D-5	✓	✓	✓	✓	◦										◦		◦		●			●									
D-6	✓		✓	✓	◦										◦		◦		●	•	•										
D-7	✓	✓		✓	◦			○					◦				◦		●	•	•	●		◦					◦		
D-8			✓	✓	◦				◦						◦	○	◦		•			◦									
D-9	✓		✓	✓	◦				◦						◦		◦		•		●										
D-10		✓	✓	✓	◦										◦		◦		•												
D-11				✓	◦										◦	○	•		●												
E-2	✓	✓	✓	✓	◦										○		◦		●	•										◦	
E-3				✓			◦		◦						◦	○	•		•	•		●	◦							◦	
E-4	✓	✓	✓	✓	◦		•		◦						◦		◦		•			●	◦								
E-5	✓	✓	✓	✓	◦		◦								◦		◦		•				◦								
E-6	✓	✓	✓	✓	◦				◦						◦		◦		●			●									
E-7			✓	✓	◦				◦						◦		◦		•											◦	
E-8	✓	✓	✓	✓	◦		•								◦		◦		•				•								

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Notes: 1) Launch facilities included in the Proposed Action (PA) and/or Alternatives 1, 2, and 3 are marked ✓ as applicable.

2) Visual resource impacts presented are generally for the Proposed Action and Alternative 2 using earth-covered igloos. Alternatives 1 and 3 using pre-engineered buildings would have a lower level of impacts.

3) All noise resource impacts are assumed to be of short duration.

4) All cultural resource impacts are assumed to be of long duration.

5) For the Proposed Action and Alternative 2, long-duration impacts on land use are low and not significant for launch facilities Q-15 and S-33.

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FIGURE 4.0-1 CONTINUED

LEVEL OF IMPACT	SIGNIFICANCE Not Significant	SIGNIFICANCE Significant
Adverse Impacts		
Negligible	☐	
Low	∘	•
Moderate	○	●
High	◯	⬤

IMPACTS FROM MILITARY CONSTRUCTION

SITE					RESOURCE: SHORT DURATION												LONG DURATION														
LAUNCH FACILITIES	SYSTEM ALTERNATIVES						BIOLOGICAL						GEOLOGY						CULTURAL				BIOLOGICAL						GEOLOGY		
	PA	1	2	3	LAND USE (RURAL)	VISUAL	VEGETATION	WILDLIFE	AQUATICS	UNIQUE SENSITIVE	THREATENED & ENDANGERED	SURFACE WATER SEDIMENTATION	GEOLOGIC HAZARDS	ENERGY RESOURCES	SOIL EROSION	NOISE	LAND USE (RURAL)	VISUAL	PREHISTORIC	HISTORIC	NATIVE AMERICAN	PALEONTOLOGICAL	VEGETATION	WILDLIFE	AQUATICS	UNIQUE SENSITIVE	THREATENED & ENDANGERED	SURFACE WATER SEDIMENTATION	GEOLOGIC HAZARDS	ENERGY RESOURCES	SOIL EROSION
E-9				✓			∘								∘				•	•		∘	∘								
E-10			✓	✓			•								◯				⬤				•								
E-11	✓	✓	✓	✓	∘										∘		∘		•	•		●									
F-2	✓	✓	✓	✓			∘	○							∘				●				∘	∘							
F-3		✓	✓	✓	∘		•	∘	∘				∘		∘		∘		•				∘	∘					∘		
F-4			✓	✓	○										∘		○		●												
F-5	✓			✓			•	○			∘	∘			∘				●				∘	∘			∘			∘	
F-6	✓	✓	✓	✓	∘		∘	∘	∘						∘		∘		●		•		∘	∘						∘	
F-7	✓	✓	✓	✓			∘	∘							∘				●				∘	∘						∘	
F-8				✓			∘								∘				●			●	∘								
F-9				✓			∘	∘			∘				∘				⬤		⬤	●	∘	∘			∘			∘	
F-10				✓			∘	○			∘	∘			∘				●			⬤	∘	∘			∘				
F-11				✓			∘	∘	∘		∘	○			∘				⬤			●	∘	∘			∘				
G-2			✓	✓		○	∘								∘			∘	•			●	∘								
G-3				✓			∘	∘							∘				●		•	•	∘	∘						∘	
G-4	✓	✓	✓	✓	∘			∘							∘		∘		•			•		∘							
G-5				✓			∘	∘				∘							●	●	•	●	∘	∘							
G-6				✓			•		•						∘				●				∘		∘						
G-7				✓			∘		•						○				●				∘		∘						
G-8			✓	✓			•		∘			○							●			●	∘								
G-9	✓	✓	✓	✓	∘		∘					∘					∘		●			●	∘								
G-10				✓	∘							∘			∘		∘		⬤	•		●								∘	
G-11				✓			∘		∘						∘				●				∘							∘	
H-2	✓	✓	✓	✓	∘										∘		∘		•			∘									
H-3	✓	✓	✓	✓	∘		∘								∘		∘		⬤				∘								
H-4	✓		✓	✓	○							∘			∘	○	○		●												

EM4/1

Page 3 of 8

Notes: 1) Launch facilities included in the Proposed Action (PA) and/or Alternatives 1, 2, and 3 are marked ✓ as applicable.

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EM4/1

FIGURE 4.0-1 CONTINUED

LEVEL OF IMPACT	SIGNIFICANCE	
Adverse Impacts	Not Significant	Significant
Negligible	☐	
Low	○	•
Moderate	◯	●
High	◌	⬤

IMPACTS FROM MILITARY CONSTRUCTION

SITE				RESOURCE	SHORT DURATION												LONG DURATION														
							BIOLOGICAL						GEOLOGY						CULTURAL				BIOLOGICAL						GEOLOGY		
	SYSTEM ALTERNATIVES				LAND USE (RURAL)	VISUAL	VEGETATION	WILDLIFE	AQUATICS	UNIQUE SENSITIVE	THREATENED & ENDANGERED	SURFACE WATER SEDIMENTATION	GEOLOGIC HAZARDS	ENERGY RESOURCES	SOIL EROSION	NOISE	LAND USE (RURAL)	VISUAL	PREHISTORIC	HISTORIC	NATIVE AMERICAN	PALEONTOLOGICAL	VEGETATION	WILDLIFE	AQUATICS	UNIQUE SENSITIVE	THREATENED & ENDANGERED	SURFACE WATER SEDIMENTATION	GEOLOGIC HAZARDS	ENERGY RESOURCES	SOIL EROSION
LAUNCH FACILITIES	PA	1	2	3																											
H-5				✓	○		○					○			◌	◯	•		●			○	○								
H-6				✓			•								◌	◯	•		•			●	○								
H-7	✓	✓	✓	✓		◯	○											○	●				○							○	
H-8		✓	✓	✓			○	◯				○			○				⬤				○	○						○	
H-9	✓	✓	✓	✓	○										○		○		●												
H-10	✓	✓	✓	✓	○		○	◯							○		○		●	●		•	○	○							
H-11	✓	✓	✓	✓	○										○		○		•												
I-2	✓	✓	✓	✓	○		○					○			○		○		●				○								
I-3				✓	○		○	○							○		○		⬤				○	○							
I-4				✓			○	○							○				●				○	○						○	
I-5	✓	✓	✓	✓			○	◯							○				●				○	○							
I-6	✓	✓	✓	✓		◯	○	○				○			○			○	⬤				○	○							
I-7		✓	✓	✓	○	◯	○	○			○				○		○	○	●			○	○	○			○				
I-8				✓	○		○		○						○		○		●			○	○							○	
I-9	✓	✓	✓	✓	○										○		○		●											○	
I-10				✓	○							○			○	◯	•		●	●											
I-11	✓	✓	✓	✓	○				○						○		○		●											○	
J-2		✓		✓	○										○		○		•			○									
J-3	✓	✓	✓	✓	○										○		○		•			○								○	
J-4				✓	○				○						○		○		●			○									
J-5				✓	○										○		○		•											○	
J-6				✓	○										○	◯	⬤		•			○									
J-7	✓	✓	✓	✓	○										○		○		•	•											
J-8	✓	✓	✓	✓	○										○		○		•												
J-9		✓	✓	✓	○				•						○		○		•			○			○						
J-10				✓			○								○	◯	•		●			○	○							○	

EM4/1

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EM4/1

FIGURE 4.0-1 CONTINUED

LEVEL OF IMPACT	SIGNIFICANCE	
Adverse Impacts	Not Significant	Significant
Negligible	☐	
Low	○	•
Moderate	◯	●
High	❍	⬤

IMPACTS FROM MILITARY CONSTRUCTION

SITE				RESOURCE	SHORT DURATION												LONG DURATION														
							BIOLOGICAL						GEOLOGY						CULTURAL				BIOLOGICAL						GEOLOGY		
LAUNCH FACILITIES	SYSTEM ALTERNATIVES																														
	PA	1	2	3	LAND USE (RURAL)	VISUAL	VEGETATION	WILDLIFE	AQUATICS	UNIQUE SENSITIVE	THREATENED & ENDANGERED	SURFACE WATER SEDIMENTATION	GEOLOGIC HAZARDS	ENERGY RESOURCES	SOIL EROSION	NOISE	LAND USE (RURAL)	VISUAL	PREHISTORIC	HISTORIC	NATIVE AMERICAN	PALEONTOLOGICAL	VEGETATION	WILDLIFE	AQUATICS	UNIQUE SENSITIVE	THREATENED & ENDANGERED	SURFACE WATER SEDIMENTATION	GEOLOGIC HAZARDS	ENERGY RESOURCES	SOIL EROSION
J-11	✓	✓	✓	✓	○										○		○		•												
K-2				✓	○	○									○		○		●												
K-3	✓	✓	✓	✓	○							○			○		○		●	•											
K-4	✓	✓	✓	✓			○		○			○			○				⬤				○							○	
K-5	✓	✓	✓	✓	○										○		○		●	•											
K-6	✓		✓	✓		◯	○					○						○	⬤			●	○								
K-7	✓	✓	✓	✓	○		○								○		○		⬤			●	○								
K-8	✓	✓	✓	✓	◯		○					○			○		◯		●				○								
K-9		✓	✓	✓	○		○								○		○		●			○	○							○	
K-10				✓	○		○								○		○		●				○								
K-11	✓	✓	✓	✓	○										◯		○		●											○	
L-2				✓	○		○	◯			○		○				○		●				○	○			○		○		
L-3	✓	✓	✓	✓			•		•		○	○			○				●			●	○		○		○			○	
L-4	✓		✓	✓	○		○				○				○		○		●				○				○				
L-5	✓	✓	✓	✓	○		○				○	○			○		○		●			●	○				○			○	
L-6		✓					○				○				○				⬤			●	○				○			○	
L-7	✓	✓	✓	✓	○	◯	○				○				○		○	○	●				○				○				
L-8				✓			○				○				○				●			○	○				○				
L-9	✓	✓	✓	✓	○		○				○				○		○		⬤				○				○			○	
L-10	✓	✓	✓	✓	○	◯	○		○		○	○			○		○	○	⬤	•		●	○				○				
L-11	✓	✓	✓	✓	○	◯		○			○	○			○		○	○	⬤					○			○			○	
M-2				✓			•	◯	•			○				◯			●			●	•	○	○						
M-3	✓	✓	✓	✓	○		○								○		○		●			•	○								
M-4		✓	✓	✓	○	◯		○	○						○		○	○	●					○							
M-5				✓	○	○									○	◯	•		⬤					○						○	
M-6	✓	✓	✓	✓	○		○	◯			○		○		○		○		●				○				○		○		

EM4/1

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EM4/1

FIGURE 4.0-1 CONTINUED

LEVEL OF IMPACT	SIGNIFICANCE: Not Significant	SIGNIFICANCE: Significant
Adverse Impacts		
Negligible		
Low	○	•
Moderate	◯	●
High	◯	⬤

IMPACTS FROM MILITARY CONSTRUCTION

SITE	SYSTEM ALTERNATIVES				SHORT DURATION												LONG DURATION														
RESOURCE							BIOLOGICAL						GEOLOGY						CULTURAL				BIOLOGICAL						GEOLOGY		
LAUNCH FACILITIES	PA	1	2	3	LAND USE (RURAL)	VISUAL	VEGETATION	WILDLIFE	AQUATICS	UNIQUE SENSITIVE	THREATENED & ENDANGERED	SURFACE WATER SEDIMENTATION	GEOLOGIC HAZARDS	ENERGY RESOURCES	SOIL EROSION	NOISE	LAND USE (RURAL)	VISUAL	PREHISTORIC	HISTORIC	NATIVE AMERICAN	PALEONTOLOGICAL	VEGETATION	WILDLIFE	AQUATICS	UNIQUE SENSITIVE	THREATENED & ENDANGERED	SURFACE WATER SEDIMENTATION	GEOLOGIC HAZARDS	ENERGY RESOURCES	SOIL EROSION
M-7				✓	○	○					○				○	◯	●		⬤	●							○				
M-8	✓	✓	✓	✓	○		○				○				○		○		●				○				○			○	
M-9	✓	✓	✓	✓	○	◯									○		○	○	●											○	
M-10	✓	✓	✓	✓	○		○		○			○			○		○		⬤			○	○								
M-11	✓	✓	✓	✓	○				○						○		○		●												
N-2	✓		✓	✓	○											◯	○		•			○									
N-3	✓		✓	✓	○		○	◯							○	◯	○		⬤			○	○	○						○	
N-4				✓			•					◯							●			○	•								
N-5				✓	○								○		○		○		•										○		
N-6	✓	✓	✓	✓	◯		•					○					◯		●			○	•								
N-7				✓								○			○				⬤												
N-8				✓												◯	•		●												
N-9	✓		✓	✓			○												●			○	○								
N-10	✓	✓	✓	✓			○												●			●	○								
N-11	✓	✓	✓	✓			○	○	○				◯						●		•	○	○	○					◯		
O-2	✓		✓	✓			○	◯	○						○				•			●	○	○							
O-3	✓	✓	✓	✓	○		○								○		○		•			●	○								
O-4	✓	✓	✓	✓			○								○				•				○								
O-5				✓			○	◯											•			•	○	○						○	
O-6		✓	✓	✓			○	◯	○						○				•			○	○	○						○	
O-7			✓	✓			○	◯	○						○				⬤		•		○	○							
O-8				✓	○		○	○							○		○		•				○	○							
O-9	✓		✓	✓			•	◯	•						○				•			○	•	○	○					○	
O-10		✓	✓	✓			•	◯	○										⬤				○	○							
O-11	✓	✓	✓	✓			○	◯											•				○	○							
P-1		✓	✓	✓				○							○		○		⬤			○		○						○	

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FIGURE 4.0-1 CONTINUED

LEVEL OF IMPACT	SIGNIFICANCE	
Adverse Impacts	Not Significant	Significant
Negligible	☐	
Low	○	•
Moderate	◯	●
High	◌	⬤

IMPACTS FROM MILITARY CONSTRUCTION

					SHORT DURATION												LONG DURATION														
							BIOLOGICAL						GEOLOGY						CULTURAL				BIOLOGICAL						GEOLOGY		
SITE				RESOURCE	LAND USE (RURAL)	VISUAL	VEGETATION	WILDLIFE	AQUATICS	UNIQUE-SENSITIVE	THREATENED & ENDANGERED	SURFACE WATER SEDIMENTATION	GEOLOGIC HAZARDS	ENERGY RESOURCES	SOIL EROSION	NOISE	LAND USE (RURAL)	VISUAL	PREHISTORIC	HISTORIC	NATIVE AMERICAN	PALEONTOLOGICAL	VEGETATION	WILDLIFE	AQUATICS	UNIQUE SENSITIVE	THREATENED & ENDANGERED	SURFACE WATER SEDIMENTATION	GEOLOGIC HAZARDS	ENERGY RESOURCES	SOIL EROSION
LAUNCH FACILITIES	SYSTEM ALTERNATIVES PA	1	2	3																											
P-2				✓	○			○							○		○		⬤			○		○						○	
P-3		✓		✓	○				○						○		○		●			○								○	
P-4				✓	○			○							○		○		●			●		○						○	
P-5				✓	○			○							○		○		●			○		○						○	
P 6				✓	○										○	◯	○		●		•	●									
P 7				✓	○										○		○		⬤			●								○	
P-8				✓	○			◯							○		○		●			○		○							
P-9	✓	✓	✓	✓	○	◯		○	○						○		○	○	●			○		○						○	
P-10	✓	✓	✓	✓	○										○		○		•			○									
Q-11			✓	✓	○			○							○		○		●			○		○							
Q-12	✓	✓	✓	✓	○										○		○		•			○									
Q-13				✓	○										○		○		•			○									
Q-14		✓		✓	○										○		○		•			○									
Q-15	✓		✓	✓	○										○	◯	•		●			○								○	
Q 16	✓			✓	○			○							○		○		•			○		○							
Q-17			✓	✓	○			◯							○		○		•			○		○							
Q-18	✓	✓	✓	✓	○	◯									○		○	○	⬤			○									
Q-19				✓	○			◯							○		○		●			○		○						○	
Q-20	✓	✓	✓	✓	○	◯									○		○	○	•			○									
R-21				✓	○			○				○			○		○		●			○		○							
R-22	✓	✓	✓	✓	○		○	○							○		○		•			○	○	○							
R-23	✓	✓	✓	✓	○			○							○		○		●			○		○						○	
R-24			✓	✓	○			○	○						○		○		•			○		○	○					○	
R-25			✓	✓	○										○		○		●			○									
R-26	✓	✓		✓	○										○		○		●			○								○	
R-27			✓	✓	○										○		○		•			○								○	

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EM4/1

FIGURE 4.0-1 CONTINUED

LEVEL OF IMPACT	SIGNIFICANCE	
Adverse Impacts	Not Significant	Significant
Negligible		
Low	○	•
Moderate	◯	●
High	◌	⬤

IMPACTS FROM MILITARY CONSTRUCTION

SITE				RESOURCE	SHORT DURATION												LONG DURATION														
							BIOLOGICAL						GEOLOGY						CULTURAL				BIOLOGICAL						GEOLOGY		
					LAND USE (RURAL)	VISUAL	VEGETATION	WILDLIFE	AQUATICS	UNIQUE SENSITIVE	THREATENED & ENDANGERED	SURFACE WATER SEDIMENTATION	GEOLOGIC HAZARDS	ENERGY RESOURCES	SOIL EROSION	NOISE	LAND USE (RURAL)	VISUAL	PREHISTORIC	HISTORIC	NATIVE AMERICAN	PALEONTOLOGICAL	VEGETATION	WILDLIFE	AQUATICS	UNIQUE SENSITIVE	THREATENED & ENDANGERED	SURFACE WATER SEDIMENTATION	GEOLOGIC HAZARDS	ENERGY RESOURCES	SOIL EROSION
LAUNCH FACILITIES	SYSTEM ALTERNATIVES PA	1	2	3																											
R-28				✓	○			○	○						○		○		•			○		○						○	
R-29				✓	◯										○		◯		⬤			●									
R-30	✓	✓	✓	✓	○				◯						○		○		•			○									
S-31	✓	✓	✓	✓	○										○		○		•			○								○	
S-32				✓	○			○							○		○		⬤			○		○						○	
S-33	✓		✓	✓	○										○	◯	•		●			○									
S-34				✓	○			○							○	◯	•		•			○		○							
S-35	✓	✓	✓	✓	○							○			○		○		●			○								○	
S-36				✓	○										○		○		⬤			○									
S-37			✓	✓	○										○		○		●			○								○	
S-38		✓	✓	✓	○										○		○		•			○									
S-39	✓	✓	✓	✓	○										○		○		●			○									
S-40				✓	○										○		○		•			○								○	
T-41		✓	✓	✓	○			◯							○		○		⬤		●	●		○							
T-42	✓		✓	✓	○			◯							○		○		●		•	●		○							
T-43	✓	✓	✓	✓	○			○							○		○		●			●		○							
T-44				✓	○			○							○		○		●			●		○							
T-45				✓	○										○		○		⬤			○									
T-46				✓	○										○		○		•			●									
T-47	✓	✓	✓	✓	○										○		○		⬤		•	●								○	
T-48	✓	✓	✓	✓	○												○		⬤			●								○	
T-49		✓	✓	✓	○										○		○		⬤			○									
T-50				✓	○			◯							○		○		●			●		○							

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Notes: 1) Launch facilities included in the Proposed Action (PA) and/or Alternatives 1, 2, and 3 are marked ✓ as applicable.

2) Visual resource impacts presented are generally for the Proposed Action and Alternative 2 using earth-covered igloos. Alternatives 1 and 3 using pre-engineered buildings would have a lower level of impacts.

3) All noise resource impacts are assumed to be of short duration.

4) All cultural resource impacts are assumed to be of long duration.

5) For the Proposed Action and Alternative 2, long-duration impacts on land use are low and not significant for launch facilities Q-15 and S-33.

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FIGURE 4.0-1 CONTINUED

4.1 Socioeconomics

Deployment of the proposed Small Intercontinental Ballistic Missile (ICBM) system at Malmstrom Air Force Base (AFB) in Montana is expected to affect the socioeconomic environment of the area. Six major elements are addressed in the socioeconomic analysis: economic base, demographics, housing, education, public services, and public finance.

4.1.1 Impact Analysis Methodology

The impact analysis methodology for socioeconomics involved three separate procedures: evaluation of program impacts, determination of levels of impact (LOI), and determination of the significance of impacts. The methodology also included consideration of a number of assumptions and assumed mitigations. Economic base impacts were evaluated at the state level and at the regional level, which consists of the nine-county deployment area. Demographic impacts were assessed at the regional level for the nine counties and at the local level for the three communities of Great Falls, Lewistown, and Conrad. Housing and public service effects were evaluated for the three communities. Education impacts were identified for both school districts and appropriate schools in those cities. Public finance impacts were evaluated for counties, cities, and school districts.

The Air Force continues to refine its plans for deploying the Small ICBM at Malmstrom AFB. Minor changes may be made in the list of facilities required, the type and timing of construction activities, and operating procedures. In addition, seasonal variations in weather, start-up and phase-down activities of individual contractors, and changes in authorized funding levels could cause implementation of the program to deviate from current Air Force plans. Such changes could influence the magnitude and composition of the resource requirements and disturbed areas. However, these changes are not expected to be large enough to affect the conclusions reached in this Environmental Impact Statement (EIS) regarding the level and significance of environmental impacts.

4.1.1.1 Evaluation of Program Impacts

Economic Base. The purpose of the economic base analysis was to evaluate the beneficial effects and adverse impacts of the Proposed Action and Alternatives 1, 2, and 3 on the local, regional, and state economies and particular economic sectors. Data used as inputs to the analysis were derived from preliminary deployment plans. The methods used to evaluate the economic base inputs consisted of four principal components: (1) estimating direct effects on jobs and spending; (2) projecting secondary changes in employment and income; (3) forecasting regional labor-force impacts; and (4) evaluating the distribution of effects among local areas within north-central Montana. These four components and the results of each are discussed in this analysis. The results of the economic base analysis were also used as inputs for other socioeconomic elements as well as other resources.

Direct effects on labor and resource requirements were measured using projections prepared by the U.S. Army Corps of Engineers (COE). Direct construction employment was derived from labor-hour forecasts, using informed assumptions regarding full-time equivalent (FTE) work-hours per construction worker per year. Payroll earnings were estimated and expenditures were calculated by adjusting earnings and nonlabor outlays for taxes, savings, and nonlocal spending. Direct jobs, earnings, and spending were evaluated as important indicators of both the regional and the local economic benefits.

Secondary changes in jobs, income, and sales were estimated using an economic (input-output) model for north-central Montana. The model, developed from published data, uses an approach developed by the U.S. Bureau of Economic Analysis. The model is structured to provide information on those sectors most likely to be affected by the program. Estimates of economic impacts on Montana as a whole were prepared using a similar model at the state level. The measures of secondary jobs and income predicted by the model were used to evaluate the beneficial effects of the proposed program. These indicators were also used to assess the likelihood of adverse impacts on local economic activity as a result of high program demands for labor and resources. In addition, these indicators were used as inputs to the analyses of the labor-force and population effects.

Labor-force impacts were forecast on the basis of projected labor demand by employment type (e.g., Site Activation Task Force [SATAF], construction, assembly and checkout [A&CO], and operations) and estimates of the number of local hires, relocating workers, and weekly commuters derived using demand and supply factors compiled during the Peacekeeper Monitoring Program at F.E. Warren AFB as a guide. The distribution of these labor-force effects to local areas was then estimated based on the location of worksites, potential residence locations, and commuting distances. Labor-force changes were used to evaluate the effect of the proposed program on unemployment rates, an important measure of regional economic health. In addition, these labor-force impacts were key inputs to the analyses of demographic, housing, education, public finance, and other issues.

Demographics. The purpose of the demographic analysis was to evaluate the size and composition of population changes resulting from Small ICBM deployment and peacetime operations. The input data were the forecasts of the program-related, relocating labor force developed in the economic base analysis. The analytical method used was the application of accompaniment rates and average household sizes to the forecast of labor-force changes. This produced an estimate of program-related population change for the nine-county deployment area. Population was then allocated to the communities within the local area in the same pattern as for the relocating labor force.

The military-civilian composition of this population change was used to evaluate the potential for adverse demographic impacts. The magnitude of population change was used as a key input to the analysis of other topics such as public finance, utilities, transportation, and recreation.

Housing. The purpose of this analysis was to provide an evaluation of the effects of the Small ICBM on local housing markets, which included the demand for and supply of both temporary and permanent housing units. The City of Great Falls, host community to Malmstrom AFB, would be the primary location for housing needs during the construction and operations phases of the program. The projected baseline evaluation of housing in the Great Falls area included local market supply and demand for all personnel affiliated with the scheduled KC-135R air refueling mission at Malmstrom AFB. Two additional Montana cities, Conrad and Lewistown, are expected to experience some housing demand during the construction phase of the Small ICBM program.

Annual program-induced housing requirements in Great Falls, Lewistown, and Conrad were evaluated and compared to projected locally available vacancies. The impact analysis included four steps: (1) determination of inmigrant housing preferences by occupational category based on previous large-scale construction programs, (2) estimation of permanent and temporary housing requirements, (3) estimation of new housing starts by both the private sector and the Air Force in response to program demand, and

(4) comparison of the program-induced housing requirements to baseline housing stock and available vacancies. For the Small ICBM program, the Air Force will be committed to using locally available housing to the greatest extent possible while assuring that significant adverse impacts would not occur by supplying any additional housing required through existing federal housing programs or through funding supplied in the Military Construction Program (MCP).

Education. The purpose of this analysis was to evaluate the program-related inmigrant enrollment impacts on the school systems in the Region of Influence (ROI) in terms of staffing, major equipment, and facilities. The data inputs for this impact evaluation included historical enrollments, pupil-to-teacher ratios, and facility inventories; numbers of projected inmigrants as indicated in the economic base analysis; ratio of school-age children of inmigrant workers to total inmigrants; ratio of school-age children of inmigrant construction workers to inmigrant construction population; and enrollment breakdown by elementary, junior high school, and senior high school derived from the results of the Peacekeeper Monitoring Program.

Peacekeeper monitoring data were used as a guide in determining various age and student ratios. The ratio of school-age children of inmigrant workers (both civilian and military personnel) to total inmigrant population was estimated to be 0.16, and the ratio of school-age children of inmigrant construction workers to inmigrant construction population was estimated to be 0.12. The enrollment level breakdowns for the school-age children were estimated to be the following: 55 percent elementary students in grades K through 6; 13 percent junior high school students in grades 7 and 8; 29 percent senior high school students in grades 9 through 12; and approximately 4 percent full-time special education students. The ratio of 0.16 was applied to the total inmigrant population estimated for Great Falls in order to determine the number of projected enrollments for the Great Falls Public Schools (GFPS) system. These projected enrollments were distributed among elementary, junior high, senior high, and special education enrollments based on the distribution pattern previously mentioned. The elementary enrollments projected for the GFPS system were distributed among the neighborhood schools according to projected residence location developed in the housing analysis for the two housing options. The ratio of 0.12 was applied to the total inmigrant population projected for Lewistown and Conrad in order to estimate the number of enrollments for those school districts because most inmigration in these areas would consist of construction workers and their families.

The results used for impact evaluation included expressing the projected enrollments by grade level and pupil-to-teacher ratios based on the 1986-87 staffing for each of the three school systems. The housing analyses for the City of Great Falls included an additional distribution of the elementary students to neighborhood schools according to projected location of residence. These results were compared to the pupil-to-teacher ratio criteria for LOI and significance and were also used to estimate facility needs.

Public Services. This element was analyzed to determine the effect(s) of the program-induced population increases on public service delivery systems in the ROI. Data used included locally obtained information on current and historical personnel numbers, key indicators of services, and population figures derived in the demographic analysis. For the public services analysis, existing service levels and trends for major public safety and health functions were evaluated for each jurisdiction or organization. Demand for these services was expected to increase with population inmigration. Increases in workloads and personnel requirements were projected by multiplying the baseline per capita rates by the program-induced population inmigration for each year. For some public services, different demand patterns were taken into account for different segments of the inmigrating population. Military personnel and their dependents, if housed onbase, were assumed to use police services at 80 percent of the rate of the existing offbase population because military police would generally respond to their calls. Weekly commuters, in the area Monday through Friday, were expected to demand police services at 70 percent of the rate of the local offbase population. For some human service agencies that provide services to transient and unemployed people, 10 percent of the inmigrating population was considered to be likely users of their services. For the public and private human service agencies, including the Department of Family Services, workload and personnel requirements were projected by multiplying the baseline per capita rates by the program-induced inmigration for each year. The program-related personnel, equipment, or facility needs for public services were also used as part of the public finance analysis.

Public Finance. Operation and maintenance (O&M) expenditure impacts for city and county government units were estimated based on the additional personnel needs caused by program-related population inmigration and estimates of the per employee costs for the services where personnel needs were estimated (law enforcement and fire protection services). The O&M expenditures for the remaining services (except debt service payments) were estimated on a per capita basis. Expenditures for major capital and equipment outlays as identified by other resource analyses were estimated on a case-by-case basis. School district O&M expenditures were estimated on a per pupil basis. School district expenditures for major capital and equipment outlays were also estimated on a case-by-case basis.

Revenue impacts were estimated for the principal revenue sources of each jurisdiction. Property taxes were calculated by estimating the additional taxable valuation that would be generated by program activities and applying current (fiscal year [FY] 1987) mill-rate levies against the estimated increase in the tax base. Other tax revenues (motor vehicle taxes, licenses, and fees) were estimated on a per capita basis. Other revenue sources (charges for services, fines, fees, redistributed state tax collections, and miscellaneous revenues) were also estimated on a per capita basis.

4.1.1.2 Determination of Levels of Impact

Program impacts, including cumulative effects from other programs, were evaluated as either beneficial or adverse for each socioeconomic element. For those elements where impacts would be adverse, LOIs were assigned using a graded impact classification (negligible, low, moderate, and high).

Impact assessments are provided for short- and long-duration effects. Effects occurring during the construction phase would generally be of a temporary or transitory nature, and are defined as short-duration effects. Once operations begin, the proposed program population (predominantly military) would require a relatively constant annual level of housing and local-government and private-sector services. The program-induced changes in these service levels are characterized as persistent or long-duration impacts. In some instances, however, impacts which are first identified during the construction phase would be characterized as long-duration impacts if they continue over the operations phase of the program.

Economic Base. In general, regional employment and income growth resulting from the program were treated as a beneficial effect. This interpretation is consistent with accepted economic logic that greater employment and earnings opportunities tend to increase individual well-being. However, not all beneficial effects would occur without cost to regional residents. Some economic sectors may be adversely affected by the proposed program. For example, program-related, high-level demands for certain construction materials may cause temporary shortages of those products. In addition, phasing down program-related construction activities may increase local unemployment, adversely affecting the local labor force.

Economic base impacts were evaluated using projected changes in employment by major sectors and overall changes in unemployment. Employment gains are beneficial, though the magnitude of a positive employment change frequently is indicative of related increases in prices and reduction in private-sector resource availability that could be adverse for local users. Consequently, the percentage increase in program-related sectoral employment from the baseline forecast is one of the factors used to measure the LOI. The other factor is the change in unemployment during the phase-down of construction activity. Annual changes in sectoral employment and overall unemployment exceeding historical levels were defined as high, and changes within historical levels were defined as negligible. Low and moderate represent intermediate stages of impact severity. The LOIs for economic base are the following:

- Negligible Impact -- Minimal changes in local labor, materials, or resource markets (no sectoral employment change exceeds 5% of its baseline value); or with-program unemployment rates remain below baseline rates.

- Low Impact -- Shortages in local labor, materials, or resources remaining below historical levels (employment change in a sector of 5% to 25%); or with-program unemployment rates reach baseline rates.

- Moderate Impact -- Shortages in local labor, materials, or resources reaching historical levels (employment change in a sector of 25% to 50%); or increases in with-program unemployment rates exceed baseline rates.

- High Impact -- Shortages in local labor, materials, or resources exceeding historical levels (employment change in a sector of more than 50%); or increases in with-program unemployment rates exceed historical rates.

Demographics. Rapid population changes can have adverse impacts on housing, public services, utilities, and other resources. In addition, if program-related population growth, predominantly military, is large compared to the baseline military presence, demographic differences in age, marital status, geographic origin, income, and length of residency between the new inmigrants and current area residents may cause the process of community assimilation to become more difficult. The peak military population (personnel plus dependents) in the Great Falls area was estimated at 13,760 persons in 1972. Military population increases over projected baseline levels up to this prior peak are expected to be negligible, since such increases would be within the range of previous experience. Larger impacts that would be classified as low, moderate, or high are the following:

- Negligible Impact -- Military population with the program is less than the 13,760 person prior peak (e.g., Small ICBM-related increases in military population of up to 30% above projected baseline military population in the Great Falls area, of 10,700 persons).

- Low Impact -- Increases in military population above the prior peak (i.e., program-related increase in population is more than 30% but less than 50% of the projected baseline military population).

- Moderate Impact -- Increases in military population measurably above the prior peak (program-related increase in population is more than 50% but less than 75% of the projected baseline military population).

- High Impact -- Increases in military population substantially above the prior peak which makes the assimilation process more difficult (program-related increase in population is more than 75% of the projected baseline military population).

Housing. Housing impacts were evaluated on the basis of increases in demand for housing in the affected communities and the ability of the local housing market to meet the increased demand. Evaluation of housing impacts included the ability of the housing market to supply additional housing as program-related housing requirements exceed available vacancies as well as the potential for overbuilding when short-duration needs are greater than long-duration needs.

The LOIs for the housing element were determined by the degree of change and disruption that would likely occur in the local housing market as a result of temporary and permanent program-related housing requirements and were defined as the following:

- Negligible Impact -- No observable change in the housing market.

- Low Impact -- Vacancies in a community reduced, but not below historical levels; some noticeable tightening of the housing market.

- Moderate Impact -- Vacancies in a community reduced to historically low levels, increased difficulty in finding suitable and affordable housing, and potential use of substandard units.

- High Impact -- Vacancies in a community reduced below historical levels, great difficulty in finding suitable and affordable housing, and likely use of substandard units.

Education. Education impacts were based on the effect of new enrollments on personnel, equipment, and facility needs. Impacts were considered adverse when projected new enrollments resulted in crowded classrooms that would have the effect of diminishing the quality of education according to existing local standards. The additional personnel, equipment, and facility needs associated with program activities were measured relative to baseline conditions, including the effect on classroom sizes (pupil-to-teacher ratios) relative to customary local levels, and a measure of the ability of the school system to accommodate the additional enrollments. The ability to accommodate additional enrollments was based on whether new capital facilities were required, the availability of funding in a timely manner, and sufficient lead time to plan and construct new facilities.

Existing local standards were used to determine the LOIs. The following information shows the 10-year average pupil-to-teacher ratios for the Great Falls, Lewistown, and Conrad school systems. These pupil-to-teacher ratios are the number of students per regular classroom teacher and do not include other certified staff.

	Elementary		Junior High		Senior High	
GFPS	23.3	(K-6)	17.9	(7-8)	19.5	(9-12)
Lewistown	19.2	(K-8)	---	---	16.4	(9-12)
Conrad	16.4	(K-8)	---	---	15.0	(9-12)

Sources: Great Falls Public Schools n.d.[b]; Lewistown Public Schools 1987; Conrad Public Schools 1986.

The LOIs for the education element were determined by the extent to which local school systems or individual neighborhood schools would be able to accommodate additional enrollments, and were defined as the following:

- Negligible Impact -- Schools absorb new enrollments with no change in personnel or facility needs.
- Low Impact -- Small increases in enrollments, representing an increase in the local pupil-to-teacher ratio of fewer than two students.
- Moderate Impact -- Medium increases in enrollments, representing an increase in the local pupil-to-teacher ratio of between two and four students.
- High Impact -- Major increases in enrollments, representing an increase in the local pupil-to-teacher ratio of more than four students.

Public Services. The LOIs for public services were based on the ability of governmental service agencies and other organizations to accommodate the added demand for services resulting from program-related population changes. Personnel, equipment, and facilities were considered as factors establishing the capacity of existing service delivery systems.

In order to establish a benchmark for community service levels, a measure of activity workload defined as service response per employee was calculated for each of the major local government functions. To establish prevailing and reasonable service levels, these measures were based on the most recent (1986) information and historical data, where available. For example, the workload measure used for law enforcement (police or sheriff) was the average number of calls for service per sworn officer.

The LOI for public services was measured by the degree to which the proposed Small ICBM program would cause community services to decrease from projected baseline levels because of changes in service delivery workloads. Discussions with local officials responsible for service delivery, supported by published data recounting the effects of major programs in rural states in the northern tier, provided a basis of measurement that was reasonable. It was determined that increases in public service workloads greater than 10 percent would be considered high since such changes are likely to reduce service response and quality to levels unacceptable to either the provider and/or the recipient. Based on the definition of high impacts and an overall measurement of annual fluctuation in the 3-percent range, the LOIs for public services are the following:

- Negligible Impact -- Annual changes in workload levels of less than 3 percent from baseline levels.

- Low Impact -- Changes in workload between 3 and 6 percent above baseline levels.

- Moderate Impact -- Changes in workload between 7 and 10 percent above baseline levels.

- High Impact -- Changes in workload above 10 percent from baseline levels.

Public Finance. The LOI determination focused on evaluation of program-induced revenue shortfalls of the general fund, special revenue funds, and capital program funds. Revenue shortfalls were chosen as the measure for LOI based on their potential for adverse effects on the ability of jurisdictions to meet their obligations without collecting additional revenues or reducing services to the community. Such shortfalls would result in reduced service levels that could adversely affect public health and safety (e.g., increased response times for the public safety functions). If taxes were raised to maintain customary service levels, an increase in the tax burden on local residents would result.

The governmental funds evaluated (general, special revenue, and capital program funds) account for almost 90 percent of all governmental fund expenditures and revenues and represent the accounts that are supported in part by local property taxes. The remaining funds (special assessment, enterprise, trust, and internal service funds) were not evaluated because they are generally supported by user charges or some similar form of funding. Although the local governments would be expected to experience increased outlays from the remaining funds category, they would not change the overall tax burden of the respective jurisdiction's residents. Debt and debt service requirements were evaluated on a case-by-case basis.

The LOIs were evaluated for program-induced revenue shortfalls, in constant 1986 dollars, with respect to the size of previous shortfalls of these funds. High impacts were defined when program-induced revenue shortfalls exceeded shortfalls previously experienced by a jurisdiction. The remaining levels were scaled down from this criterion.

The highest revenue shortfall experienced by the City of Great Falls was approximately $1.2 million (in constant 1986 dollars) and occurred in FY 1981. The highest shortfall experienced by Cascade County was approximately $1.7 million and occurred in FY 1983.

Revenue shortfalls have been experienced by the Great Falls Elementary School District No. 1 in 3 of the past 7 years. The largest shortfall experienced was approximately $1.5 million and occurred in FY 1984. Revenue shortfalls have been experienced by the Great Falls High School District No. A in 2 of the past 7 years. The largest shortfall experienced was approximately $640,000 and occurred in FY 1984.

The LOIs for public finance are the following:

- Negligible Impact -- Program-induced revenues and expenditures are approximately equal.

- Low Impact -- Program-induced revenue shortfalls are less than those previously experienced.

- Moderate Impact -- Program-induced revenue shortfalls approach those previously experienced.

- High Impact -- Program-induced revenue shortfalls persist and are equal to or greater than shortfalls previously experienced by the jurisdiction.

4.1.1.3 Determination of Significance

The significance of socioeconomic impacts was evaluated in accordance with Council on Environmental Quality (CEQ) regulations. Significance was assessed through evaluation of the context and intensity of impacts. Context includes consideration of the settings (site, local, or regional) and the duration of impacts. The CEQ regulations provide ten items that should be considered in evaluating intensity. Of these ten items, those applicable to the socioeconomic analysis are the following:

- The degree to which the proposed action affects public health or safety.
- The degree to which the effects on the quality of the human environment are likely to be highly controversial.
- The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.
- Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Significance exists if it is reasonable to anticipate a cumulatively significant impact on the environment. Significance cannot be avoided by terming an action temporary or by breaking it down into small component parts.
- Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment.

In addition to these considerations, which are specifically identified in the CEQ regulations, other considerations judged appropriate for socioeconomic impacts are the following:

- The degree to which area residents would be adversely affected by increased demands and prices, especially for housing;
- The degree to which the proposed program would reduce public service levels in the affected communities; and
- The degree to which the proposed program would create excessive fiscal burdens on existing residents.

The definitions of significance were developed by applying these criteria to each element of the socioeconomic analysis.

Economic Base. Growth in jobs and income would be generally beneficial. Measurable displacement of private-sector growth (such as construction) would be adverse and significant if the private sector is not likely to respond in a timely manner to excesses or shortages that may occur. Unemployment changes were used as one indicator of the potential private-sector resource effects. A decrease in unemployment may be indicative of potential shortages, while an increase generally means lower resource utilization.

Demographics. Changes in excess of past fluctuations and baseline projections in urban-rural or military-civilian composition would be considered significant if the demographic characteristics of inmigrants are markedly different from the characteristics of the area residents. Differences in age, marital status, geographic origin, income, and length of residency may increase difficulty in the process of community assimilation.

Housing. Changes in housing demand that cannot be filled by available vacancies or by timely development cf affordable and suitable housing would be considered significant. A shortage of low- and moderate-income housing would cause substantial burdens on both civilian and military families.

Education. Impacts would be considered significant if increases in existing neighborhood school enrollment would result in pupil-to-teacher ratios that are larger than the state standards, thereby threatening accreditation. Resolutions to these problems would require major additions of personnel or facilities for which sufficient funds are not expected to be available. For education, the funding criteria refers to the potential availability of funds for the mitigation of identified impacts. For accreditation, the state standard for the number of students per classroom was defined to be the following: 26 pupils per classroom for grades 1 and 2; 28 pupils per classroom for grades 3 and 4; and 30 pupils per classroom for grades 5 through 12. These pupil-to-teacher ratios assume one teacher per classroom and do not include other certified staff.

Public Services. Impacts would be considered significant if increases in population would reduce service levels of key functions below locally acceptable levels and would require additional personnel or facilities for which sufficient funds are not expected to be available.

Public Finance. Significance was evaluated by assessing program-induced revenue shortfalls, in constant 1986 dollars, with respect to the financial condition of the jurisdictions as measured by past levels of fund balances. Fund balances refer to the year-end cash balances of the general fund, special revenue funds, and capital projects fund after all expenses have been accounted for and all revenues have been received by the jurisdictions. In instances where the revenues received exceeded the expenditures of the jurisdiction, the fund balances would increase over the previous year's levels. In instances where insufficient revenues were accumulated over the year, the fund balances would decrease as the current year's expenses are met by the excess revenue accumulated over the previous years. Fund balances generally decrease as economic conditions deteriorate and fewer tax revenues become available to meet current expenses. Impacts would be significant if program-induced expenditures exceed revenues for 2 or more years and the sum of the shortfalls would cause fund balances to fall below historical levels.

For Cascade County, the lowest fund balance occurred in FY 1985 and measured approximately $2.2 million. Current (FY 1986) balances measure approximately $2.7 million. Impacts would be considered significant when annual program-induced revenue shortfalls total $500,000.

For the City of Great Falls, the lowest fund balance occurred in FY 1980 and measured approximately $4.8 million. Current (FY 1986) balances measure approximately $11.8 million and program-induced revenue shortfalls would total $7 million before impacts would be judged significant. The lowest fund balance in Cascade County occurred in FY 1985 and measured $2.2 million. Current (FY 1986) fund balances measure $2.7 million and program-induced revenue shortfalls would have to sum $500,000 before impacts would be considered significant.

The lowest fund balance of the Great Falls Elementary School District occurred in FY 1985 and measured approximately $4 million. The current (FY 1986) balance measures approximately $4.4 million, and program-induced revenue shortfalls would have to total $400,000 before impacts would be considered significant.

The lowest fund balance of the Great Falls High School District occurred in FY 1985 and measured approximately $2.6 million. The current (FY 1986) balance measures approximately $3.2 million, and program-induced revenue shortfalls would have to total $600,000 before impacts would be considered significant.

4.1.1.4 Assumptions and Assumed Mitigations

Assumptions. All dollars are expressed in 1986 price levels, unless otherwise specified. All references to years are in calendar years, unless otherwise specified. Comparisons between years were adjusted for inflation. The structures of the local and regional economies were assumed to remain largely unchanged from the present time through the late 1990s. Based on recent trends, some variations are expected in the relative growth of major sectors. In particular, trade and services are expected to continue providing an increasing share of total jobs. Agriculture, mining, and manufacturing output and employment were assumed to remain constant, with periodic upturns offsetting declines during the forecast period.

The demographic characteristics of military personnel and dependents associated with the proposed program were assumed to be comparable to persons currently working at Malmstrom AFB Average age, including dependents, was assumed to be 21 years. Fewer than 3 percent were expected to have the same place of residence over a 5-year period. The average size of the military household was expected to be 2.45 persons, or 1.45 dependents per military member. Based on a U.S. Department of Labor study, approximately one-half of military wives are expected to seek work.

It was assumed that the vast majority of workers will live in the largest populated area within a reasonable commuting distance to their worksite, especially the weekly commuters. These areas include the Great Falls urban area, Lewistown, and Conrad.

Accompanied workers are assumed to need a separate unit, whereas unaccompanied construction workers often live together temporarily, and one unit is assumed to accommodate 1.5 workers, on average.

It was assumed that the private housing market will respond to a housing shortage if a long-duration demand occurs and if units can be supplied profitably by the home-building industry.

It was assumed that public education will be made available for all school-age children as required by law, the existing quality of education is the standard for future years, and the number of students per classroom will not be greater than the maximum number allowed by the state. In addition, it was assumed that 16 percent of the inmigrant population in the Great Falls area and 12 percent of the inmigrant population in Lewistown and Conrad are school-age children. These percentage assumptions were made based on data acquired from the Peacekeeper Monitoring Program and reflect the differences in demographic characteristics of the inmigrants in those areas.

It was assumed that public services presently offered in a jurisdiction will continue to be available and the short-duration inmigrant population will demand these services at the same rate as the existing population. The operations personnel and their dependents living on Malmstrom AFB will not require some of the public services at the same rate as that of the existing population because of the services available at the base.

It was also assumed that 10 percent of the short-duration inmigrant population would be considered low income or unsuccessful job seekers and would use a broad range of services such as temporary shelter, food distribution, and human-service referrals. Fourteen percent of the total inmigrant population was assumed to use services such as counseling, support groups, and personal improvement programs offered by the Golden Triangle Mental Health Center.

Major assumptions for the public finance analysis were made for identified federal, state, and local government fiscal policy considerations. The Montana State Legislature's changes to the tax structure of local jurisdictions were assumed to be revenue neutral and state and federal educational-aid programs were assumed to be maintained at current per pupil rates. New residential and commercial development within local jurisdictions was not considered to be subject to the current property tax freeze. Current mill levies were applied from the FY 1990 to FY 2000 period. Federal educational-aid programs (P.L. 81-874) were assumed to remain at current per pupil rates.

Assumed Mitigations. An ongoing monitoring program will be conducted, focusing on key socioeconomic variables, to identify any unforeseen effects of the Small ICBM program. This action will allow timely response by the Air Force to minimize these effects and validate the level of the projected impacts.

The Air Force will continue to provide community in-briefings for all new base personnel. This action will assist personnel in adapting to the Great Falls area.

In accordance with Department of Defense (DOD) Instruction No. 4165.45, the Air Force will provide housing under the following guidelines:

- "Where the local housing market has the capacity to provide suitable rental housing for military families, military-owned, leased or sponsored housing will not be programmed, except for those personnel who must reside on the installation for reasons of military necessity."
- "Where the local housing market is limited or nonexistent or where housing is available but the location, quality, or cost creates an undue hazard or hardship for military families, ... military-owned, leased, or sponsored housing may be provided to meet valid requirements."
- "All reasonable precautions will be taken to avoid harmful impact on local housing markets. In this regard: Military housing will not normally be programmed or built if total assets, both onbase and in the community, exceed 90 percent of the effective requirement for installations (except Service Academies) in the United States ..."

The Small ICBM program will require between 1,230 and 2,000 family housing units depending on the program alternative selected. In fulfilling these needs, the Air Force is committed to utilizing existing community vacancies and private-sector housing development opportunities to the greatest extent possible.

Air Force personnel living offbase are given a housing allowance which is determined primarily by rank, with some consideration for base location. The adequacy of family housing, by Air Force standards, is based on several factors including rank, distance to base, family size, age and sex of children and, for offbase units, a cost not exceeding approximately 20 percent above the monthly housing allowance.

The Great Falls housing market, including both available vacant housing units and new developments built privately and in conjunction with other federal housing programs, will provide for a portion of program housing demand. However, the majority of Air Force families to be located in the Great Falls area will not receive housing allowances sufficient to obtain adequate housing at market prices.

To preclude a shortage of low- and moderate-income housing that could lead to cost increases affecting both civilian and military families, the Air Force will provide sufficient housing through various programs. Ongoing monitoring of housing vacancies, costs, and new development will provide the Air Force with the information necessary for an effective and timely housing program response.

There are several approaches to providing military family housing through the involvement of the private sector that have proved successful over the past few years.

Build-lease housing acquisition is an alternative to construction of housing using appropriated funds. Congress has authorized the DOD to enter into long-term contracts under which private firms build housing complexes and lease them to the government for use by military families. This program, called Section 801 housing (first permitted by Section 801 of the 1984 Military Construction Authorization Act), allows such housing to be built either on or offbase. Present policy is to acquire only offbase projects, but this can be changed on a case-by-case basis. Such housing is fully subject to property taxes imposed by local jurisdictions if built onbase. The DOD has acquired over 16,000 housing units in the United States through this program.

Two other programs, Section 802 and Section 2667 housing, both provide for construction of private projects for rental primarily to military families. The Section 802 program (first permitted by Section 802 of the 1984 Military Construction Authorization Act) allows the government to guarantee a high level of occupancy in an offbase project in return for priority use by military families in any units that become vacant. The housing is privately operated and maintained and fully subject to local property taxes. There have been only 600 housing units provided under Section 802 projects because of limitations in authorizing legislation and the level of rents required to finance and maintain a new project. At Malmstrom AFB, these rents would exceed the ability to pay for most Air Force personnel.

Section 2667 housing (authorized under 10 USC 2667) is built on government land under a long-term land lease from the government to the builder. This program is currently being applied at two other Air Force bases, and could be applied at Malmstrom AFB if additional land were purchased.

The final approach to providing military family housing is directly through the MCP. The development of housing through the MCP is funded by Congress as part of the DOD budget and usually involves the construction of family housing on DOD installations. Since this housing is the property of the federal government, it is not included in the local property tax bases and therefore does not provide revenue through this source.

4.1.2 Impacts of the Proposed Action

Impacts of the Proposed Action were evaluated for the provision of military family nousing either on or offbase. For the Proposed Action, the Air Force would provide up to 1,750 housing units through either available DOD housing programs or the MCP. These housing units would be built on either Malmstrom AFB or in the Great Falls community. For either the onbase or offbase housing option, short-duration impacts on housing would be moderate and not significant, and long-duration housing impacts would be low and not significant. Short-duration, moderate, and not significant impacts would occur for the economic base and public services elements for both housing options. Short-duration, moderate, and significant public finance impacts would occur for the onbase housing option and moderate and not significant impacts would occur for the offbase housing option. Long-duration impacts of the Proposed Action, regardless of the housing option selected, would be moderate and not significant for economic base; moderate and significant for demographics, public services, and public finance; and high and significant for education. A summary of impacts of the Proposed Action and alternatives for the socioeconomic elements and subelements is presented in Figure 4.1.2-1.

4.1.2.1 Economic Base

The proposed program would result in primarily beneficial effects on the economic base in Cascade, Fergus, and Pondera counties though short-duration construction labor and resource impacts would be moderate because of increases in construction employment of up to 30 percent. This short-duration impact would not be considered significant since market response would likely be adequate. Long-duration unemployment impacts would be considered moderate because of an increase in the Cascade County unemployment rate from 6 percent to 6.2 percent. This increase would not be significant because the private sector would be able to respond in a timely manner.

Program-related employment would begin in 1990 with 1,100 direct and 1,250 secondary jobs created in the nine-county deployment area (Table 4.1.2-1). Construction employment by job type is presented in Table 4.1.2-2 for the years 1990 to 1995. Regional employment resulting from the program would then increase to 3,430 direct and 1,350 secondary jobs in 1996. Long-duration job creation resulting from the Proposed Action is projected at 4,350 (3,100 direct and 1,250 secondary) jobs starting in 1999. Hiring of workers from the nine-county ROI for both direct and secondary jobs is expected to peak at 2,300 workers in 1992, declining to 1,260 by 1998. Program-related secondary employment during the construction phase is greater than during the operations phase because of proportionately higher wage and procurement levels during the construction phase. The relatively higher wage levels found during the construction phase may also induce increased employee turnover in existing businesses as existing employees compete for higher-paying construction jobs.

In 1993, about $97 million in annual personal income would be created in the nine-county deployment area because of the Small ICBM program. This would represent approximately 4 percent of the estimated 1993 baseline income of $2.4 billion. This total is expected to fall to $84 million by 1998 ($54 million in income directly associated with program activities and $30 million in secondary income). The total income gain in the ROI would represent approximately 3.4 percent of the estimated 1998 baseline income of $2.5 billion. Per capita income would decrease slightly from $13,153 to $13,074.

Throughout the life of the program, DOD agencies and contractors are expected to purchase a range of goods and services from local businesses, while program personnel would buy most consumer items locally. The Proposed Action is expected to create

Table 4.1.2-1

Employment and Population Changes Resulting From the Proposed Action (1990-2000)

Year	Direct Jobs	Secondary Jobs	Total Jobs	Local[1] Hires	New[2] Population	Weekly[2] Commuters
1990	1,100	1,250	2,350	2,040	770	70
1991	1,120	900	2,020	1,470	1,310	50
1992	2,310	1,590	3,900	2,300	3,750	70
1993	2,710	1,560	4,270	2,200	4,910	50
1994	2,580	1,130	3,710	1,440	5,440	30
1995	2,870	1,120	3,990	1,290	6,610	20
1996	3,430	1,350	4,780	1,470	8,120	20
1997	3,260	1,300	4,560	1,360	7,850	10
1998	3,110	1,250	4,360	1,260	7,600	0
1999	3,100	1,250	4,350	1,260	7,580	0
2000	3,100	1,250	4,350	1,260	7,580	0

Note: [1] Workers hired locally from the nine-county region.
[2] For the Great Falls area only; population changes in other communities are small and temporary.

Table 4.1.2-2

Small ICBM Construction Labor Requirements, by Job Type, for the Proposed Action (Man-Years)

	1990	1991	1992	1993	1994	1995
Carpenter	157	96	218	117	20	1
Cement Mason (Brick)	167	122	64	63	39	3
Drywall Installer	3	2	0	3	1	0
Electrician	45	22	7	18	2	0
Electric Lineman	51	78	54	103	7	0
Ironworker	89	85	59	52	30	2
Laborer	291	213	209	189	79	6
Operating Engineer	19	17	19	13	7	1
Painter	15	11	15	11	3	1
Pipefitter	9	1	12	16	0	0
Plumber	11	2	1	39	1	0
Roofer	42	8	15	8	3	0
Truck Driver	23	30	19	21	15	2
Mechanic	4	3	3	2	1	0
Sheetmetal Worker	17	4	9	36	1	0
Others as Required	36	32	40	26	9	2
Contract Management	98	73	74	72	22	2
TOTAL:	1,080	800	818	790	241	22

Note: Totals may not add due to rounding.

LEVEL OF IMPACT	SIGNIFICANCE	
Adverse Impacts	Not Significant	Significant
Negligible	☐	
Low	∘	•
Moderate	○	●
High	◯	⬤
Beneficial Effects	░	

Note: Some resource elements may have both beneficial effects and adverse impacts.

PROGRAM IMPACTS

ELEMENT/AFFECTED INTEREST	SHORT DURATION								LONG DURATION							
	PROP. ACTION		ALT. 1		ALT. 2		ALT. 3		PROP. ACTION		ALT. 1		ALT. 2		ALT. 3	
	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING
ECONOMIC BASE	░ ○	░ ○	░ ○	░ ○	░ ○	░ ○	░ ○	░ ○	░ ○	░ ○	░ ○	░ ○	░ ○	░ ○	░ ○	░ ○
STATE OF MONTANA	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░
CASCADE COUNTY	░ ○	░ ○	░ ○	░ ○	░ ○	░ ○	░ ○	░ ○	░ ○	░ ○	░ ○	░ ○	░ ○	░ ○	░ ○	░ ○
FERGUS COUNTY	░ ∘	░ ∘	░ ∘	░ ∘	░ ∘	░ ∘	░ ∘	░ ∘								
PONDERA COUNTY	░ ∘	░ ∘	░ ∘	░ ∘	░ ∘	░ ∘	░ ∘	░ ∘								
DEMOGRAPHICS									●	●	●	●	⬤	⬤	●	●
CASCADE COUNTY									●	●	●	●	⬤	⬤	●	●
FERGUS COUNTY																
PONDERA COUNTY																
HOUSING	░ ○	░ ○	░ ○	░ ○	░ ∘	░ ∘	░ ○	░ ○	░ ∘	░ ∘	░ ∘	░ ∘	░ ∘	░ ∘	░ ∘	░ ∘
GREAT FALLS URBAN AREA	░ ○	░ ○	░ ○	░ ○	░ ∘	░ ∘	░ ○	░ ○	░ ∘	░ ∘	░ ∘	░ ∘	░ ∘	░ ∘	░ ∘	░ ∘
LEWISTOWN	░	░	░	░	░	░	░	░								
CONRAD	░	░	░	░	░	░	░	░								
EDUCATION									⬤	⬤	⬤	⬤	⬤	⬤	⬤	⬤
GREAT FALLS PUBLIC SCHOOLS									⬤	⬤	⬤	⬤	⬤	⬤	⬤	⬤
GREAT FALLS PRIVATE SCHOOLS																
LEWISTOWN PUBLIC SCHOOLS																
CONRAD PUBLIC SCHOOLS																

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FIGURE 4.1.2-1 SOCIOECONOMIC IMPACTS ASSOCIATED WITH THE PROPOSED SMALL ICBM PROGRAM IN MONTANA

LEVEL OF IMPACT	SIGNIFICANCE	
Adverse Impacts	Not Significant	Significant
Negligible	□	
Low	◦	•
Moderate	○	●
High	◯	⬤
Beneficial Effects	▨	

Note: Some resource elements may have both beneficial effects and adverse impacts.

PROGRAM IMPACTS

ELEMENT/AFFECTED INTEREST	SHORT DURATION								LONG DURATION							
	PROP. ACTION		ALT. 1		ALT. 2		ALT. 3		PROP. ACTION		ALT. 1		ALT. 2		ALT. 3	
	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING
PUBLIC SERVICES	○	○	○	○	○	○	○	○	●	●	•	•	⬤	⬤	●	●
GREAT FALLS									○	○	◦	◦	◯	◯	○	○
CASCADE COUNTY									●	●	•	•	⬤	⬤	●	●
CASCADE COUNTY PRIVATE SERVICES	○	○	○	○	○	○	○	○	◦	◦	◦	◦	◦	◦	◦	◦
LEWISTOWN																
FERGUS COUNTY	◦	◦	◦	◦	◦	◦	◦	◦								
CONRAD																
PONDERA COUNTY																
PUBLIC FINANCE	●	○	●	○	●	○	●	○	●	●	●	●	●	●	●	●
GREAT FALLS		○		○		○		○	○		○		○		○	
CASCADE COUNTY									●	●	●	●	●	●	●	●
GREAT FALLS ELEMENTARY SCHOOL DISTRICT NO. 1	●		●		●		●			●		●		●		●
GREAT FALLS HIGH SCHOOL DISTRICT NO. A	●		●		●		●			●		●		●		●
LEWISTOWN																
FERGUS COUNTY																
LEWISTOWN ELEMENTARY SCHOOL DISTRICT NO. 1																
LEWISTOWN HIGH SCHOOL DISTRICT NO. 1																
CONRAD																
PONDERA COUNTY																
CONRAD ELEMENTARY SCHOOL DISTRICT NO. 10																
CONRAD HIGH SCHOOL DISTRICT NO. 10																

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FIGURE 4.1.2-1 CONTINUED

$990 million in new spending for goods and services in the deployment area from 1990 through the year 2005. Construction and SATAF activities would generate new regional demands between 1988 and 1998 totaling $190 million. The A&CO and operations-phase activities would produce approximately $800 million in regional purchases between 1991 and the year 2005. Long-duration program-related spending by Air Force personnel and the Malmstrom AFB Contracting Office is expected to total about $60 million per year.

In addition, employment and income would be generated by the proposed program outside the deployment area in other parts of Montana for two reasons. First, contracts for construction and supplies may be awarded outside the nine counties but within the state (such as to firms in Billings or Missoula), creating jobs and income in these areas. Second, economic growth in the nine counties can create opportunities for suppliers and wholesalers elsewhere in the state. Total employment statewide is projected to be 4,710 jobs higher in 1993 and 4,520 jobs higher in the year 2000 as a result of the Proposed Action. Statewide income impacts are projected at about $110 million in 1993 and $90 million in the year 2000, and state income tax revenues would be about $2.3 million higher in 1993 and $1.8 million higher in the year 2000.

Cascade County. Most of the economic impacts of the proposed program would occur in the Great Falls area of Cascade County. Direct employment in the county would begin in 1990 with 1,100 jobs, 860 of which would be at Malmstrom AFB; the remainder of the jobs would be elsewhere in the county (e.g., construction of launch facilities) (Table 4.1.2-3). Construction in the county would phase down gradually after 1990 and phase out by 1995. The A&CO of equipment and facilities would occur between 1992 and 1997. The operations workforce level would build from just a few personnel in 1991 to 3,100 in 1996. Beginning in 1998 (operations phase), 99 percent of Small ICBM direct jobs would be military, with the remaining 1 percent (30 jobs) slated to be civilian positions.

Most of the projected jobs created in the ROI by the Proposed Action would be in Cascade County. Secondary employment in 1993 in the county would total 1,040 jobs, declining slightly to 970 by the year 2000. Cascade County would experience annual income gains starting in 1990 at $54 million, increasing to a peak of $90 million in 1996, and leveling off at $78 million by 1999.

Construction activity would be sizable in 1990 and 1991 compared to the baseline levels. In 1990, construction employment would increase by about 30 percent over the projected baseline levels. Some temporary displacement of other construction activity would probably occur as resources are drawn to the proposed program. This would result in a short-duration, moderate impact for construction resources. Because of the good transportation network serving Great Falls and the rest of the state, any shortages that occur would rapidly be corrected by the normal functioning of the market. Consequently, these short-duration impacts would not be significant. All other sectoral short-duration impacts would be negligible.

Long-duration impacts would be considered moderate because of an increase in the Cascade County unemployment rate from 6 percent to 6.2 percent due to an increase of Air Force spouses in the labor force. This increase would not be significant since it is not large enough that unmanageable burdens on the local economy could be expected. Gains in overall employment and income, as well as reductions in unemployment, would be beneficial.

The manner in which military personnel are housed would influence the pattern of economic impacts in the Great Falls area. Construction of housing onbase would mean a

Table 4.1.2-3

Employment and Population Effects of the Proposed Action on Great Falls, Lewistown, and Conrad, Montana (1990-2000)

	Fiscal Year										
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Employment											
Direct Employment											
Malmstrom AFB	860	780	1,980	2,380	2,420	2,850	3,430	3,260	3,110	3,100	3,100
Great Falls Area	240	280	130	110	--	--	--	--	--	--	--
Lewistown Area	--	30	150	130	110	10	--	--	--	--	--
Conrad Area	--	30	50	90	50	10	--	--	--	--	--
Subtotal:	1,100	1,120	2,310	2,710	2,580	2,870	3,430	3,260	3,110	3,100	3,100
Secondary Employment	1,250	900	1,590	1,560	1,130	1,120	1,350	1,300	1,250	1,250	1,250
Total Program-Induced Employment	2,350	2,020	3,900	4,270	3,710	3,990	4,780	4,560	4,360	4,350	4,350
Local Hires	2,040	1,470	2,300	2,200	1,440	1,290	1,470	1,360	1,260	1,260	1,260
Population											
Great Falls Area											
Baseline Conditions											
Urban Area	73,230	73,410	73,600	73,780	73,970	74,160	74,340	74,530	74,720	74,910	75,100
City Plus Base	67,500	67,900	68,100	68,300	68,400	68,600	68,800	68,900	69,100	69,300	69,500
Military Population	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700	10,700
New Population											
Total	770	1,310	3,750	4,910	5,440	6,610	8,120	7,850	7,600	7,580	7,580
Military	20	670	2,750	4,060	4,810	6,010	7,610	7,580	7,520	7,510	7,510
Population With Small ICBM											
Total, City Plus Base	68,270	69,210	71,850	73,210	73,840	75,210	76,920	76,750	76,700	76,880	77,080
Military	10,720	11,370	13,450	14,760	15,510	16,710	18,310	18,280	18,220	18,210	18,210
Military as Percent of City Plus Base	15.7	16.4	18.7	20.2	21.0	22.2	23.8	23.8	23.8	23.7	23.6
Weekly Commuters	70	50	70	50	30	20	20	10	0	0	0
Lewistown Area											
Baseline Population	7,100	7,100	7,100	7,100	7,200	7,200	7,200	7,200	7,200	7,200	7,300
New Population	--	20	110	100	80	10	--	--	--	--	--
Weekly Commuters	--	--	10	10	10	--	--	--	--	--	--
Conrad Area											
Baseline Population	3,400	3,400	3,500	3,500	3,500	3,500	3,600	3,600	3,600	3,600	3,700
New Population	--	20	30	60	30	10	--	--	--	--	--
Weekly Commuters	--	--	--	10	--	--	--	--	--	--	--

lower level of payments for rent and homeownership in the local economy than that under private-sector housing. Families living onbase would also tend to spend more onbase, particularly at the base exchange and commissary. Income gains to the local economy would generally be greater with military personnel housed offbase.

Fergus County. Between 30 and 150 construction jobs are projected for the Lewistown area (Fergus County) (Table 4.1.2-3). These jobs would be associated with transporter/erector (T/E) road upgrading and construction activities at launch facilities in the eastern portion of the deployment area. A limited number of secondary service and trade jobs (approximately 40-140) would be created by worker and contractor spending during this construction phase. It was assumed for this analysis that construction activity would occur in the area from 1991 to 1995.

The amount of construction projected for this area is large by recent Fergus County standards. However, it would be similar to work previously done in the area by Air Force contractors (on periodic Minuteman upgrade programs). Most labor, supplies, and materials would likely be staged through Great Falls. Consequently, the potential for short-duration, adverse displacement impacts on other construction activities would be considered low because of the minimal sector demands and therefore would not be significant since market response would be adequate. No long-duration impacts are expected.

Pondera County. Up to 90 construction jobs would be created in the Conrad area (Pondera County) (Table 4.1.2-3). These jobs would result from work at the launch facilities and on T/E routes in the area. Support-sector jobs (up to 60) could potentially be created by worker and contractor spending during the construction phase. Current assumptions imply that work would be accomplished in the area between 1991 and 1995.

This level of construction is not large by recent Pondera County standards. Development of a Strategic Training Range facility in 1986 and 1987, antiballistic missile facilities in the early 1970s, and Minuteman system upgrades periodically since 1961 have established local business capabilities to respond to federal construction programs. As with previous efforts, most labor and materials would likely be supplied from Great Falls. Therefore, the potential for short-duration adverse displacement impacts on other construction activities would be low because of the minimal sector demands. Impacts would not be considered significant since market response would be adequate. No long-duration impacts are expected.

4.1.2.2 Demographics

Overall long-duration, moderate impacts on the demographics would occur because of the increase in military population in Cascade County. No short-duration impacts were identified because of the continuity of population inmigration. These impacts would be significant because the demographic characteristics of the military population are considerably different from those of the local civilian population. Many Small ICBM jobs would be filled by local hires from the nine-county region, with local hires peaking at 2,300 in 1992. However, not all employment opportunities would go to the area residents. The Proposed Action would increase the population of the deployment area by nearly 7,600 persons in the operations phase as civilian and military personnel relocate to the area to fill program jobs. Most of these relocating personnel would change their places of residence to communities in the region, and would continuously reside in the area until their work is finished. Others, estimated at about 100 persons, would be long-distance commuters from other parts of the state. Some construction workers would likely be in the communities nearest to the Small ICBM worksites Monday through Friday. They would probably return to their permanent places of residence (such as

Billings, Bozeman, or Helena) on the weekends. This pattern would likely occur because of the temporary nature of employment, which makes a permanent move impractical.

During the operations phase, nearly all new residents (7,510 of 7,580 total) would be military personnel and their dependents. They would begin arriving in 1987 as part of SATAF and would continue to arrive in increasing numbers through 1996. The number of new military personnel and their dependents would then stay at about the 7,510 level for the functional life of the system. The typical duration of military assignments on the program would be about 3 to 4 years, as is currently the case at Malmstrom AFB; therefore, there would also be a fairly continuous turnover of personnel.

The secondary employment (approximately 1,250 jobs during the operation phase) generated by the program is not expected to induce additional population inmigration into the ROI. These jobs would typically be services-related employment and would be filled by a combination of the dependents of the inmigrating military personnel and the existing unemployed labor force.

Cascade County. Most of the population growth associated with the proposed program would occur in Cascade County, particularly in the Great Falls urban area. The number of new, program-related, full-time residents in Great Falls would start at about 770 in 1990, build to a peak of 8,120 in 1996, and stabilize just below this peak at 7,580 by the year 2000 (Table 4.1.2-3). Additional people associated with construction activities, probably less than 100 in number, are expected to be Monday-through-Friday residents of Great Falls during the peak of construction activity. These persons would maintain homes elsewhere in the state and commute weekly to Great Falls.

This pattern of program-related population growth indicates that there would not be an overall "boom-bust" cycle associated with the proposed program. Population changes in the early years of the program would be temporary, and would contain a sizable civilian component as a result of construction and A&CO activities (Figure 4.1.2-2). The increase in operations personnel, almost entirely military, would bring about a relatively steady increase in program-related population even as construction and A&CO activities phase down. There would be no "bust" or down-turn typical of other large construction programs.

During the operations phase, the population impact of 7,580 persons would be composed almost entirely of military personnel and their dependents (7,510 military and 70 civilians). Very few relocating civilian personnel would be needed during the operations phase, since most jobs could be filled by local residents. The military population in Great Falls (personnel and dependents, excluding retirees) associated with current missions and the planned KC-135R air refueling mission is expected to total 10,700 by 1990 and remain at that level through the year 2000. The addition of 7,510 Air Force personnel and dependents by the year 2000 as a result of the proposed program would bring the active-duty military and dependents in Great Falls to about 18,210 persons by the year 2000. This represents a long-duration, moderate impact since program-related population would be 70 percent of the baseline military population level of 10,700 persons. No short-duration impacts were identified.

The highest share of military population in total community population previously experienced in the Great Falls area was 20.4 percent, recorded in 1972. Comparable, though slightly lower, shares were registered in 1966 and again in 1976. A military population of 18,210 in the year 2000 would represent 23.6 percent of Great Falls community population in that year, thereby exceeding the previously experienced

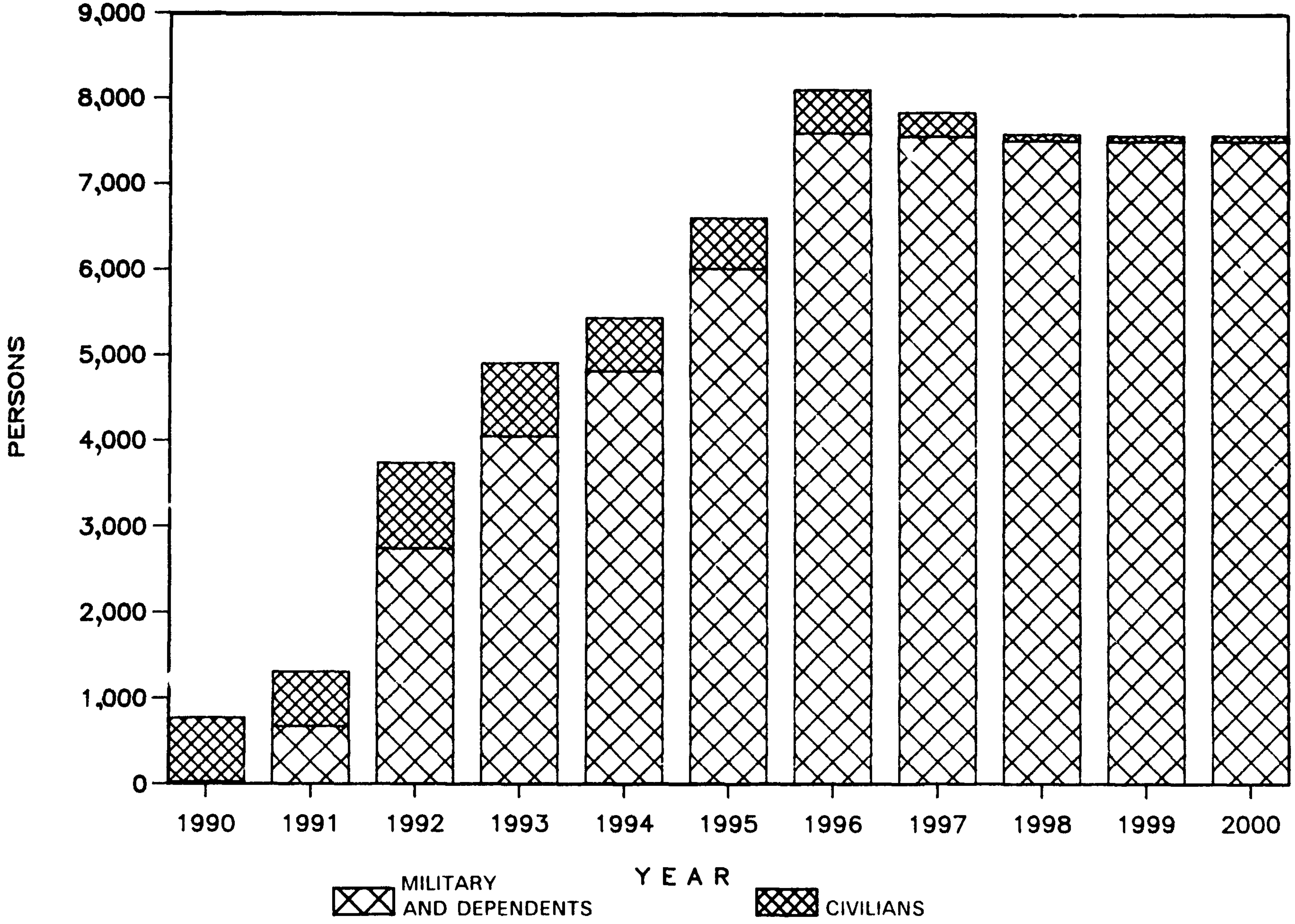

FIGURE 4.1.2-2 MILITARY-CIVILIAN COMPOSITION OF PROGRAM INMIGRATION, 1990-2000

maximum military population share. Moreover, the new military families would differ in their demographic characteristics from nonmilitary families residing in the Great Falls area, just as the current Air Force families differ from the average non-Air Force family. Based on comparisons derived from the 1980 Census, the Air Force population is generally younger than the typical Great Falls resident (median age of Malmstrom AFB personnel and dependents is 21 years compared to 30 years for Great Falls residents). Air Force personnel are generally more mobile and of different geographic origin than Great Falls residents. Only 3 percent of Air Force personnel and their dependents lived in the same house over the 1975 to 1980 period, while 50 percent of Great Falls residents lived in the same house. Only 12 percent of Malmstrom AFB personnel were born in Montana compared to 56 percent for Great Falls residents. Household income is also generally lower for base personnel (median household income in constant 1979 dollars for base personnel was $12,520 compared to $16,290 for Great Falls residents). Assuming that the new base personnel exhibit similar patterns, these differences may increase the difficulty of the community assimilation process, and would constitute a significant impact. The onbase and offbase housing options would not affect the level or significance of demographic impacts.

Fergus County. Lewistown would likely experience a small, temporary population increase while construction activities occur at launch facilities and along roads in the nearby area. Between 20 and 110 new persons would likely be full-time residents of Lewistown and its vicinity during these years. An additional small number of persons (approximately 10) are expected to be residents of the area during the work week, commuting home on weekends.

Compared to the baseline population of Lewistown, numbering about 7,100 persons, these short-duration population effects would be negligible. No observable changes in the social structure or interaction patterns of the community would be expected to occur. Since most new residents would locate in the immediate vicinity of Lewistown, where housing and services would be available, no changes in the urban-rural composition of the area's population would be expected.

Pondera County. Conrad, like Lewistown, would probably have a small population increase during the construction phase. New full-time residents would number between 30 and 60, depending on commuting patterns and residence choices. A small number of additional Monday-through-Thursday residents would also be expected.

Compared to Conrad's baseline population of about 3,500 persons, these short-duration population impacts would be negligible. No changes in urban-rural or military-civilian composition of the population would be expected to result from the program.

4.1.2.3 Housing

For the Proposed Action, with the onbase or offbase housing option, short-duration impacts would be moderate, and long-duration impacts would be low due to housing requirements in Great Falls. However, these impacts would not be significant because the market (private sector with federal government support) would be able to provide adequate housing in the ROI. Beneficial effects would occur due to the increased income generated from the occupancy of available vacant temporary and permanent units.

During the peak construction years of the Proposed Action (1990 and 1991), program-related employment at Malmstrom AFB is expected to bring approximately 340 inmigrant workers and 70 weekly commuters into the Great Falls area. Nearly all of these new workers (390) would be in construction trades with the remainder representing the Air

Force SATAF, including COE, personnel. Based on family accompaniment rates and housing preferences from similar projects, nearly 400 housing units would be needed during this period. Over 40 percent of this requirement is expected to be filled through temporary (hotel/motel) accommodations, while the balance would be provided by available rental apartments and houses within the community. These additional rentals would utilize existing vacancies and provide increased income for the owners of rental and temporary housing.

Between 1992 and 1996, two additional categories of workers, A&CO and military operations personnel, would begin inmigrating into the Great Falls area, requiring over 2,000 housing units. This level of housing requirements would continue throughout the operations phase. Although both of these groups may use temporary hotel/motel accommodations as they enter or leave the area, most would require permanent housing over a period of several years.

Historical income and housing preference data for A&CO contract employees suggest that housing availability in the Great Falls area would not be a problem for this group. They should be able to afford currently available housing in all price ranges and in some cases may stimulate new housing construction. However, the majority of military families with fixed housing allowances would not be able to afford suitable housing comparable to onbase facilities.

If all Air Force personnel were required to seek suitable and affordable housing in the community in the absence of any Air Force housing program, some serious consequences would result. With a majority of military personnel in the lower enlisted grades having an average monthly housing allowance of about $350, the available supply of low- and moderate-priced housing would quickly be occupied, resulting in a shortage of over 1,000 units. Since monthly housing expenditures at this modest level are not sufficient for the development, financing, and construction of new two-, three-, and four-bedroom housing units, the housing shortfall would be offset through the use of unsuitable and potentially substandard housing. The competition for low- and moderate-income housing between military and civilian residents in the Great Falls area would cause hardships for both groups because of increased housing costs and substandard housing conditions. In some cases, Air Force families may displace existing residents, placing an even greater burden on low-income households. The combined effects of insufficient affordable housing, higher housing costs, and potential displacement of low-income families resulted in a predicted high and significant housing impact in the Draft EIS (DEIS). In order to avoid these significant impacts, the Air Force will provide adequate housing for its personnel to offset potential shortages.

For the Proposed Action, the Air Force has programmed for up to 1,750 family housing units to be constructed either on Malmstrom AFB or in the proximity of the base. However, current projections of housing vacancies and potential new construction in Great Falls suggest that only about 1,500 would have to be provided by the Air Force through one of its housing programs. Since these conditions may change, the Air Force will continue to monitor the housing market in the Great Falls area and will increase or decrease the extent of its participation as necessary to prevent adverse housing impacts in the community.

Great Falls Urban Area. Inmigrating program-related military and civilian personnel, both accompanied and unaccompanied, would require housing while working in the Great

Falls urban area. Additional housing would be required Monday through Thursday by weekly commuters. The required housing is expected to fall into two categories:

- Permanent units for sale or rent, consisting of single/multifamily units, mobile homes, and onbase dormitories; and
- Temporary units, consisting of hotel/motel rooms and other temporary facilities, and recreational vehicle pads/tent spaces.

The demand for temporary units would come from weekly commuters and workers who are just arriving in the Great Falls area. Temporary housing facilities would be provided to newly arriving military personnel and their dependents onbase. The program-related offbase demand is expected to begin at 100 hotel/motel rooms and 40 other facilities and would decline to about 10 by the year 2000 and remain at that level (Table 4.1.2-4). Since there are about 400 hotel/motel rooms and 100 other temporary facilities available during the peak season, it is projected that the program-related demand would not have a negative effect on temporary housing markets within the Great Falls urban area.

Most unaccompanied military program-related personnel are required to or prefer to live in dormitory modules onbase. Beginning in 1991, approximately 40 dormitory modules would be required to house 90 unaccompanied military personnel. By 1996, the number of dormitory modules necessary to house 1,180 unaccompanied military personnel would reach about 520 and would remain at that level throughout the operations phase of the proposed program. These units would be provided onbase.

The initial, peak, and long-duration expected supply of and program-related demand for permanent housing units in the Great Falls urban area are displayed in Table 4.1.2-5. The available housing stock represents the total number of units that could be occupied, including both standard and substandard units. Initial construction inmigration-related housing demand, including SATAF and COE employees, is forecast to increase from about 230 units in 1990 to 380 units in 1992, before declining to under 10 units in the final construction year (1998). Demand for permanent housing is forecast to rise from about 160 units in 1991 to a long-duration operations demand level of about 2,010 units, beginning in 1996. During initial construction years, private-market housing supply would be sufficient to fill program-induced demand. As operations personnel inmigrate into the Great Falls area, the Air Force will provide for any shortfall in permanent housing not supplied through the private market.

For the Proposed Action, short-duration, beneficial effects on temporary housing units would be expected because of the income generated through the use of otherwise vacant facilities. Short-duration impacts on the permanent housing market would be market would be moderate because vacancy rates would approach historical lows. Long-duration impacts would be low since housing vacancies would be only slightly reduced. These impacts would not be significant because the local housing market would be able to meet the program-related housing demand in every year. Long-duration, beneficial effects would likely occur for landlords and property owners. No major long-duration impacts are projected for temporary facilities.

City of Lewistown. The construction work on the launch facilities in the Lewistown area is expected to bring a maximum of 40 new households to the City of Lewistown in 1992. These households would seek out a mix of permanent and temporary housing units within the city limits. It is estimated that these workers would require 30 permanent units and 10 temporary units in the peak year (1992). It is estimated that an additional ten

Table 4.1.2-4

Program-Related Demand for Dormitory Modules, Hotel/Motel Rooms, and Other Temporary Facilities in the Great Falls Urban Area (1990-2000)

	1990	1996	2000
Proposed Action and Alternative 3			
Dormitory Modules	0	520	520
Hotel/Motel Rooms	100	20	10
Other Temporary Facilities	40	0	0
Alternative 1			
Dormitory Modules	0	370	370
Hotel/Motel Rooms	100	20	10
Other Temporary Facilities	40	0	0
Alternative 2			
Dormitory Modules	0	600	630
Hotel/Motel Rooms	100	20	10
Other Temporary Facilities	40	0	0

Note: Each dormitory module is assumed to be occupied by an average of 2.26 unaccompanied military personnel. This average was derived using the expected rank composition of the unaccompanied personnel, and the Air Force regulations regarding number of personnel occupying modules by rank. Alternative 3 program-related demands are the same as those for the Proposed Action. The number of long-duration unaccompanied personnel for the Proposed Action and Alternative 3 is expected to be 1,180. For Alternative 1, this number is 834, and for Alternative 2, it is 1,430.

temporary units would be required to house weekly commuters (Monday through Thursday) in the same year. The supply of available vacant permanent units in the City of Lewistown is projected to be adequate to meet this demand with no change in the cost of housing experienced by projected baseline residents. During the peak tourist season in 1992, the supply of temporary housing units would not be exhausted, and since the weekly commuter demand would be primarily from Monday through Thursday, the proposed program is expected to have short-duration, beneficial effects on housing. There would be no long-duration impacts on housing for the City of Lewistown.

City of Conrad. The construction work on the launch facilities near Conrad is expected to reach a peak in 1993. It is expected that about 20 new households would reside in Conrad in that year. These new households would seek out a mix of permanent and temporary housing units within the city limits. It is estimated that these workers would require 15 permanent units and 5 temporary units in 1993. An additional six temporary units would be required to house weekly commuters in that same year. The supply of rental units and the availability of hotel/motel rooms in Conrad is expected to be sufficient to accommodate this short-duration increase in demand. The program-related demand for housing in the City of Conrad is expected to help the local housing market without displacement of any local citizens or major price increases to any current residents; therefore, the short-duration effects of the proposed program on the housing market in Conrad are expected to be beneficial. There would be no long-duration housing impacts on the City of Conrad.

Table 4.1.2-5

Small ICBM Permanent Housing Requirements and Projected Housing Response for Great Falls, Montana (Proposed Action and Alternative 3)

	1990	1996	2000
Program Demand for Permanent Units			
Civilian Households	219	208	23
Military Households	7	2,019	1,991
TOTAL Demand:	226	2,227	2,014
Local Availability			
Community Housing Stock	28,732	29,234	29,590
Total Vacancies[1]	1,416	1,410	1,413
Suitable Vacancies[2]	441	421	422
Baseline Vacancy Rate (%)	4.9	4.8	4.8
Private Market Response	0	283	100
MCP or Housing Program Response	0	1,494	1,494
Impact Vacancy Rate (%)	4.1	3.3	3.3

Notes: [1] Total vacancies include approximately 500 units that are rented or sold awaiting occupancy, held for occasional use, and dilapidated or boarded-up units.

[2] Suitable vacancies represent those available vacant housing units that would be both affordable and large enough to meet the needs of military households.

4.1.2.4 Education

Overall long-duration, high, and significant impacts on education, regardless of the housing option selected, would occur as a result of the proposed program. This is because selected elementary schools are expected to experience enrollment increases that would cause pupil-to-teacher ratios to increase above state and local standards. Short-duration impacts on education in the ROI would be negligible because the school systems can accommodate the increased enrollment.

City of Great Falls. The GFPS system enrollment in 1986-87 was 11,743 regular classroom students with an additional 450 full-time special education students, or a total enrollment of 12,193 students. Without the program, baseline enrollment is projected to increase to approximately 12,649 in 1990-91; 13,187 in 1996-97; and 13,300 in the academic year 2000-01.

The program-related enrollment is projected to be 123 students in 1990-91, increasing to about 1,300 students in 1996-97, and then declining to 1,210 students in 2000-01 (Figure 4.1.2-3). The breakdown for the peak, program-related enrollment is anticipated to be 710 elementary, 166 junior high, 373 senior high, and 50 special education students in the 1996-97 school year. The long-duration enrollment is expected to be 660 elementary students, 155 junior high students, 347 senior high students, and 48 special education students as a result of the proposed program. Long-duration impacts would occur because the program-related enrollment would peak at about 1,300 students in 1996-97 and then stabilize at a slightly lower level.

The GFPS system has a tradition of minimizing the busing of elementary students by having students attend neighborhood elementary schools. Attendance boundaries are changed as the number of elementary school-age children increases or decreases within a neighborhood. Because of the projected elementary enrollment concentration in certain areas of the City of Great Falls, based on the onbase and offbase housing options, the long-duration enrollment increase would be most problematic at the elementary level. Junior high and senior high school students are currently bused to the four secondary schools and this provides more flexibility for enrollment management by facility. There should be adequate facilities for the projected secondary enrollment; however, pupil-to-teacher ratios would be slightly higher than the current local standards.

Depending on where the inmigrant population was assumed to be residing, the overall increase in elementary school enrollment would affect individual schools in the district differently. Based on the onbase and offbase housing options, the following analyses provide the school-level impacts.

Onbase Housing Option. The onbase housing option implies housing built on or in the immediate vicinity of Malmstrom AFB. Out of the projected total of 660 elementary inmigrating students associated with the program during the operations years, 594 would be expected to enroll in Loy Elementary School located west of the base. If the neighborhood school concept for elementary pupils is maintained without additional facilities, this projected enrollment would increase the pupil-to-teacher ratio at Loy Elementary School to around 50-to-1. Even if the neighborhood school concept is not followed, the existing excess capacity in the school system would likely be used by future baseline projected enrollment, including children associated with the KC-135R air refueling mission. Therefore, this projected enrollment increase would create a need for another elementary school located near Malmstrom AFB. Otherwise, class sizes would be much larger than the existing local levels (23 students per teacher at the elementary level). Therefore, the program-related enrollment impacts for the Great Falls schools for the onbase housing option would be high. These long-duration impacts would be persistent and would be significant due to the class sizes exceeding state standards, and would require new personnel and facilities without available funding. The short-duration impacts would be negligible.

Offbase Housing Option. The offbase housing option implies housing dispersed throughout the community, primarily to the west and southwest of the base. In the case where none of the program-related military population would be housed onbase, the projected elementary school enrollments would be distributed more widely among all schools of the Great Falls school districts. The two areas projected to have the greatest increases in population and elementary enrollments are located west and southwest of the base. Elementary schools that would be most likely affected by the offbase housing option would be Chief Joseph, Lewis and Clark, Morningside, Mountain View, and Sunnyside. During the operations phase of the Small ICBM program, the projected additional elementary enrollment for the five schools is 480 students. This increased

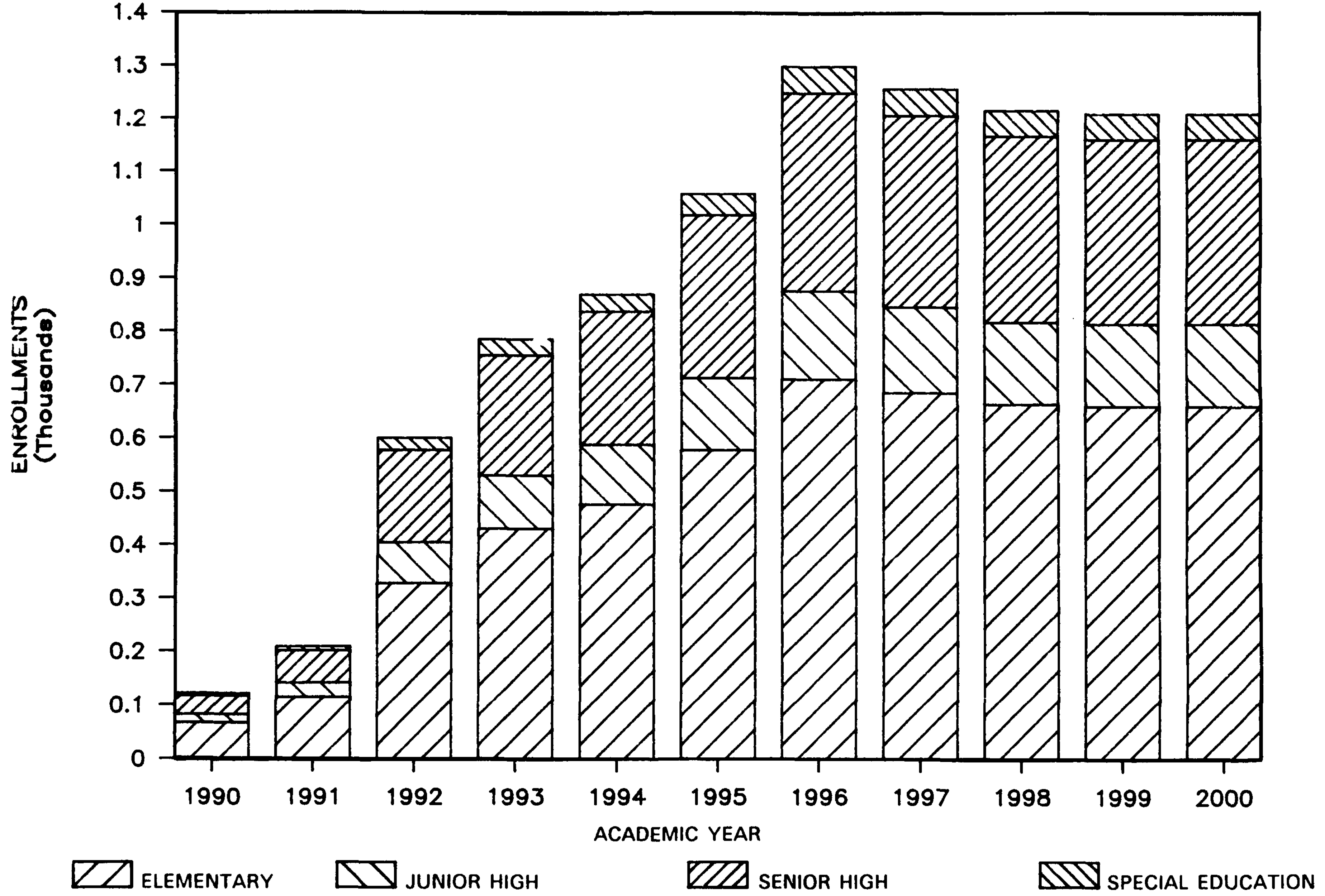

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FIGURE 4.1.2-3 GREAT FALLS PUBLIC SCHOOLS PROJECTED PROGRAM-RELATED ENROLLMENTS BY GRADE LEVEL, 1990- 2000 enrollment would result in serious overcrowding in spite of its distribution among the area schools. The pupil-to-teacher ratios are expected to rise to around 30-to-1 for each of the five schools, which represents an increase of around five pupils per classroom. The projected pupil-to-teacher ratio is larger than the local norm, and would require substantial staffing and some facility modification without available funding. Therefore, the long-duration impacts on Great Falls schools for the offbase housing option would be high. These impacts would be significant due to class sizes exceeding state standards. The short-duration impacts would be negligible.

It is likely that the private schools in Great Falls would experience a slight increase in enrollment from program-related students, thereby reducing public enrollment. However, the existing private schools have excess capacity, and it is not anticipated that the increase would require additional staff, equipment, or facilities. Short- and long-duration impacts would be negligible.

The College of Great Falls and the Vocational Technical Center may also experience increased enrollment because of the Proposed Action. Any program-related increases in enrollment are not expected to result in additional staff, equipment, or facilities.

City of Lewistown. The Lewistown Public School system enrolled 1,631 students in 1986-87, and the enrollment is expected to remain stable for the next several years. Peak-year, program-related students are expected to number approximately 15 in 1992-93. The Lewistown Public School system would be able to accommodate the anticipated program-induced increase in enrollment without increasing staffing, equipment, or facilities. Because the program-related enrollment would be absorbed into the Lewistown Public School system with no observable change in the pupil-to-teacher ratios, the short-duration impacts on the Lewistown Public School system would be negligible. No long-duration impacts are expected.

City of Conrad. The Conrad Public Schools system had 742 students enrolled in the 1986-87 school year. The enrollment at the Conrad school districts is expected to remain stable with the exception of an increase of approximately 20 to 40 students in 1987-88 resulting from an Air Force Strategic Training Range detachment locating in Conrad. Peak-year, program-related enrollment is expected to be about ten students in 1993-94. The Conrad Public School system would be able to accommodate the anticipated program-induced increase in enrollment without increasing staffing, equipment, or facilities. Because the program-related enrollment would be absorbed into the Conrad Public Schools system with no observable change in the pupil-to-teacher ratios, the short-duration impacts on the Conrad Public Schools system would be negligible. No long-duration impacts are expected.

4.1.2.5 Public Services

Short-duration public service impacts, for both the onbase and offbase housing options, would be moderate because of potential increases in emergency service calls of up to 9 percent and an increase in demand for human services in Cascade County; however, impacts would not be significant because existing staff and facilities would be adequate to handle such increases. Overall long-duration impacts on public services, for both the onbase and offbase housing options, would be moderate because of increased calls for service per officer for the Great Falls Police Department and Cascade County Sheriff's Department of approximately 9 percent and because of increased demand for human services in Cascade County. Although public services in the Great Falls area generally have the capacity to absorb the increased demands resulting from the program population, effects on public facilities would be considered significant primarily because this population inmigration is expected to exert additional demands on the Cascade County jail and some human services. The jail facility is currently used in excess of its designed capacity; no funds are currently available for a new or expanded jail. All other jurisdictions would experience long-duration increases in workload of less than 3 percent. The existing facilities of these jurisdictions would be adequate to meet the needs of the respective communities and the resulting program-induced demands.

It is projected that the program would increase baseline population by 10 percent in the Great Falls urban area during the operations phase. Therefore, additional demands would be placed on most public services that are provided in the area. Personnel projections as well as expenditure forecasts were conducted to see the effect the program-induced population increase would have on the respective public service agencies. A more detailed analysis was undertaken for public safety and specific health and human service agencies in the area, since it was expected that these agencies would be affected the most. Impacts were evaluated for both the onbase and offbase housing options; however, for many public services, the location of housing for the inmigrating military population was not important because demand for services would occur regardless of residence location.

City of Great Falls.

Onbase Housing Option. The onbase housing option implies housing built on or in the immediate vicinity of Malmstrom AFB. Program-induced inmigration would require an increase in staffing in order to maintain existing service levels. Projected increases in city employment would range from a few additional workers in 1990 to approximately 21 personnel in 1996, increasing city government employment in that year from 419 to a total of approximately 440. Six additional officers are projected to be needed in the Police Department, and additional personnel would also be required in departments such as Public Works, Library, and Park and Recreation. No additional personnel requirements are projected for the Fire Department. Personnel requirements would decline to a total of 20 persons during the operations phase.

The Great Falls Police Department had 63 officers in March 1987 and responded to approximately 21,000 calls for service in 1986. Staffing levels, for the most part, are tied to population levels. Program-induced population inmigration could be expected to generate additional calls for service.

The number of calls for service per sworn officer was used as a measure of service levels for the Police Department. Military personnel and their dependents who are housed onbase would generate less of a demand for police services since they are under the jurisdiction of the military police. For the onbase housing option, calls for service are projected to be 23,810 in 1995 and 24,230 in 1996 compared to baseline projections of 22,155 and 22,185, respectively. This would lead to an 8-percent increase in calls per officer in 1995 and a 10-percent increase in 1996. This could lead to a reduction in current service levels because of increased response time for some calls. In order to maintain existing service levels, five sworn officers in 1995 and one more in 1996 would be needed above baseline projections. During the operations phase, calls for service are projected to be 24,305 in the year 2000, compared to a baseline projection of 22,425. This would be an 8-percent increase in calls per officer above baseline projections and require an additional six officers above baseline projections to maintain existing service levels. To support the additional personnel, two new patrol vehicles would be needed above the baseline projections from 1995 on. The Police Department holding facility, which would approach capacity under baseline growth, would reach or exceed capacity with the program-induced population inmigration.

The City of Great Falls Fire Department had 68 firefighters in March 1987 and responded to 1,107 fire alarms in 1986. The City of Great Falls, with a current population of 58,400, has firefighting facilities that are estimated by local officials to be capable of serving a population of 80,000. Program-induced population inmigration would be expected to generate additional demands for service in the form of increased fire alarms and lead to instances of increased response times. Staffing levels, however, are more a function of area than population. Additional personnel requirements do not generally coincide with population increases, but rather are based on when population dispersion in the community reaches a critical point in terms of longer response times.

For the onbase housing option, with the majority of military personnel and their dependents residing on or near the base, demands for additional fire protection would be minimal because Malmstrom AFB provides service for the base. Structural fires account for approximately 50 percent of all alarms received by the city Fire Department. The majority of the new structures associated with the program would be onbase and would not be handled by the city Fire Department.

Long-duration impacts on public services in the City of Great Falls, for the onbase housing option, are expected to be moderate because of increases in calls per police officer in the 8-percent range during the operations phase of the program. This effect would not be significant since existing facilities would be able to accommodate this growth. No short-duration impacts were identified.

Offbase Housing Option. The offbase housing option implies housing dispersed throughout the community, primarily to the west and southwest of the base. Program-induced inmigration into the City of Great Falls would require staffing levels to increase by 30 positions above baseline in 1996 in order to maintain existing service levels. With this housing option, military families residing in Great Falls would receive many services from city departments rather than from Malmstrom AFB. Seven additional police officers would be needed and additional personnel would also be needed in other departments such as Public Works, Library, and Park and Recreation. No additional personnel would be required for the Fire Department. Program-induced city employment requirements would decline to 28 positions above baseline projections during the operations phase.

The offbase housing option would lead to the largest increase in the number of calls for service to the Great Falls Police Department since a vast majority of the population would be living in areas where the city police would respond to calls. Calls for service are projected to reach approximately 24,115 in 1995, compared to the baseline projection of approximately 22,154. In order to maintain existing service levels, an additional seven sworn officers above baseline projections would be needed in 1996. Calls for service are projected to reach 24,665 in the year 2000, compared to the baseline projection of 22,425. This 9-percent increase in calls for service per officer would require continuation of seven additional sworn officers above baseline projections to maintain existing service levels.

For the offbase housing option, fire alarms could be expected to increase since a larger portion of the program-induced population influx would reside in areas serviced by the City of Great Falls Fire Department. New housing developments in certain areas (across the river to the north or anywhere east of the base) would require an additional station as well as firefighters and equipment in order to maintain existing service levels. Since the majority of the new residents are not expected to reside in these areas, no new personnel, equipment, or facility requirements are foreseen.

Long-duration impacts would be moderate because of the increased number of calls for service per officer of up to 9 percent as compared to baseline projections. This impact would not be significant since existing facilities would accommodate this growth. No short-duration impacts were identified.

Cascade County. In 1986, Cascade County had 587 government employees in 45 departments. Program-induced population inmigration would result in the need for additional staffing even if the majority of the people reside in the City of Great Falls. For the Proposed Action, with both the onbase and offbase housing options, population growth would require an additional 20 government employees above baseline projections in 1996, declining to 19 government personnel above baseline projections during the operations phase. The Sheriff's and the Surveyor's departments would be expected to hire additional employees. Beginning in 1994 and continuing throughout the life of the program, an additional three deputies would be needed by the Sheriff's Department to maintain existing service levels.

The Cascade County Sheriff's Department had 34 sworn officers in January 1987 and responded to approximately 3,300 calls for service in 1986. Population inmigration associated with the program would be expected to increase demands on the Sheriff's Department that would lead to the deterioration of existing service levels. Even if the majority of the inmigrant population resides within the city limits of Great Falls, as is expected, demands would still be placed on the department. These demands would be manifested by increased time spent in administering the jail, civil lawsuits, and drug-team operations.

In the last 2 years, staffing in the Sheriff's Department has decreased by five sworn deputies and seven administrative positions. In addition, patrol time has decreased due to increased workload in transporting prisoners as well as time spent in court proceedings. Therefore, staffing would have to respond in kind to any additional demands in order to maintain the already low service levels. Calls for service are projected to reach 3,775 in 1996, compared to a baseline projection of approximately 3,460 for that year. This is a 9-percent increase in the number of calls for service per officer above baseline levels for that year. In order to maintain existing service levels, an additional three deputies above baseline projections would be needed for that year. During the operations phase, calls are projected to reach 3,790 in the year 2000 as compared to a baseline projection of 3,495 for that year. This would require continuation of the additional three deputies hired during the buildup phase in order to maintain existing service levels. To support these additional deputies, three extra vehicles would also be needed. In addition, the county jail currently has an average daily population of between 55 and 65 prisoners. If the department adhered to federal regulations, the county jail would have the maximum capacity capped at approximately 45 prisoners. The program-induced population inmigration could be expected to exert additional pressures on the overcrowding problem.

Long-duration impacts on the Cascade County Sheriff's Department are considered to be moderate because of increases in calls for service per officer of up to 9 percent. These effects would be considered significant since the program-induced population inmigration is expected to place additional demands on the Cascade County jail which is already over capacity. No funds are currently available for a new facility.

The Cascade County Fire Council, comprised of 15 fire stations, has between 200 and 300 volunteer firefighters and responds to an average of 180 to 250 fire alarms per year. The majority of the proposed program's inmigrating population would reside in the Great Falls area as opposed to the rural areas that are serviced by the council. Those who do reside in the rural areas are expected to generate some additional demands, but the magnitude would be small, given that brush fires make up a majority of the calls and are not really driven by population increases. Current volunteer staffing levels would be sufficient to respond to any additional demands, though participation rates for volunteers have decreased among the younger population. Program-induced population increases, regardless of the housing option, would not have a noticeable effect on the council since most inmigrants would live in the Great Falls urban area.

Thirty full-time employees staffed the City-County Health Department in 1986. Under baseline conditions, it is expected that two additional staff members would be required to accommodate increases in service demands. No change in facility needs is projected under baseline conditions. For program-related growth, two additional staff members may be required during the early construction years, increasing to four during the operations phase. It is anticipated that the women/infant/children education program would be expanded to handle the increased military population. Other areas of expansion may include the immunization clinics and preschool exam programs.

The City-County Health Department is expected to be supported by both the city, principally through contributions raised by an approximate 4 mill property-tax levy, and the county, through a combination of property taxes, user charges, other taxes, and county-directed federal and state grants. Monies raised in support of the City-County Health Department are generally earmarked for that purpose and are accounted for within special revenue accounts.

The Golden Triangle Mental Health Center is staffed by 63 FTE employees for an eight-county area. With 45 total personnel, the Great Falls office is the largest and is expected to be affected the most by the Proposed Action. The Golden Triangle Mental Health Center is a private, nonprofit organization and is supported by client fees, contracts with state agencies, county contributions, and gifts from private sources. The baseline population growth may require another position for the Great Falls office, but there should be no change in facility requirements. For program-related growth, an additional staff member may be needed to accommodate any increased demand for service, but no additional facility requirements are projected.

The Montana Office of Human Services in Cascade County was staffed by 72 employees in 1986. Under baseline conditions, it is expected that staffing would increase by an additional position, assuming funding levels remain constant. It is not expected that additional baseline facilities would be needed.

The Montana Department of Family Services office in Cascade County is expected to need additional staff in both the construction and operations phases because of the projected increase in caseloads. During the operations phase, the Department of Family Services would continue to be affected because of the required coordination by law between Malmstrom AFB and Department of Family Services representatives for child abuse cases.

During the construction phase, the Proposed Action may attract some unsuccessful job seekers and their families to the Great Falls urban area. It was estimated that up to 10 percent of the total civilian inmigrants may be in this category. As a result of this component of inmigration, some public assistance programs may experience an increase in demand for their services during the construction phase through 1992. There could be some increases in demand for the Aid to Families with Dependent Children program by unsuccessful job seekers migrating into the area. During the construction phase, the increased demand for services may require an additional staff member, but no additional facility needs are projected. In the operations phase, military personnel and their dependents are not expected to have as great a demand for these services as the general population.

Overall long-duration public service impacts for Cascade County would be moderate because of the potential increase in calls for service per officer in the Sheriff's Department of up to 9 percent. Impacts would be significant because of the existing insufficient jail capacity in Cascade County and the unavailability of funds for new facilities. Impacts would be the same for both the onbase and offbase housing options for the Proposed Action. Whether the population resides onbase or offbase, a vast majority would live in areas where services would be provided by either the City of Great Falls or Malmstrom AFB, as opposed to departments under the jurisdiction of Cascade County. No short-duration impacts were identified.

Services Provided by Private Agencies in Cascade County. Malmstrom AFB provides a wide range of health and human services for their personnel including medical care, child and spouse abuse program counseling, child care, and other family services. Therefore, a majority of the additional demands for private agency services would be of short duration because of the presence of unsuccessful job seekers.

During the construction phase, there may be some increases in the use of private service agencies by inmigrating unsuccessful job seekers. However, the increased population and stimulus to the local economy could be expected to generate additional charitable contributions to local service agencies and therefore support some of the needed programs. Some private agencies may have trouble offering all the programs they have traditionally offered if timely funding is not available. However, during the operations phase, only minor increases in demands on private service agencies are expected because of the presence of employed military personnel and their dependents.

The medical community in the City of Great Falls includes two major facilities: Columbus Hospital and Montana Deaconess Medical Center, with occupancy rates of around 50 percent. In addition to these regional medical centers, three nursing homes are located in Great Falls with a 100-percent occupancy. Baseline population projections would require additional staff at both Columbus Hospital and the Montana Deaconess Medical Center, but facilities would be adequate. The nursing homes would require additional staffing and facilities.

The Proposed Action, for both the onbase and offbase housing options, is expected to increase demand for medical services in the Great Falls area. The projected population increase during the construction phase would require health care services at the same rate as that of the existing population. Long-duration inmigrants would consist of military personnel and their dependents and they would not be expected to require health care services at the same rate as that of the existing or baseline populations. The local experience has been that the military and their dependents are generally healthier because of age, emphasis on fitness, and physical screening prior to enlistment. However, obstetrics and gynecology care is used to a greater extent by this group. These facilities should continue to be adequate during program operations. It is not expected that the program would increase the demand for long-duration health care for either elderly or infirm inmigrants.

Columbus and Montana Deaconess plan to accommodate the Malmstrom AFB Health Care Center referrals and should be able to do so for both baseline and Proposed Action conditions. The Malmstrom AFB Hospital is a 20-bed unit that is scheduled to be replaced in 1988 by a newly constructed comprehensive health care center. In addition to the local medical facilities, the Malmstrom Air Force Base Comprehensive Health Care Center may refer patients to regional military facilities such as Fairchild AFB in Spokane, Washington and Fitzsimons Army Medical Center in Denver, Colorado. The specifications of the new center account for the anticipated Malmstrom AFB missions and resulting increase in patient loads.

The population inmigration associated with the program could lead to additional demands placed on the emergency-services sector. Additional traffic- and construction-related activity could cause an increase in calls for service for Bicsak Ambulance and the North Central Mercy Flight. Instances of increased response time or lack of vehicle availability may occur but these situations would be limited. Currently, Bicsak responds to about 10 calls for service per day, down from a 1979 peak of approximately 12 calls per day. The North Central Mercy Flight has been in operation about 5 years and currently responds to approximately one call for service per day. Increases in calls for service of up to 30 percent can be provided with existing personnel and vehicles. Traffic-related accidents make up a large portion of the calls for service. During the construction phase, the largest increases in traffic are expected to occur in 1990 and 1991 and are expected to cause calls for emergency services to increase by 6 percent and 9 percent, respectively, in those 2 years, and would result in a moderate impact. During the operations phase, emergency calls are expected to stabilize at 4 percent above baseline projections.

The Great Falls Community Help Line totaled 13,830 calls during 1986; approximately half were referred to Mercy Home, a facility for battered and abused women. The Help Line is staffed by 1.5 paid full-time personnel and approximately 100 volunteers. Under baseline conditions, it is expected that the number of calls would increase to about 15,000 calls per year and more volunteers would be required to handle the additional demand for service. The Proposed Action, for both the onbase and offbase housing options, is expected to create additional calls for service during the construction and operations phases. As a result of the increased demand for service, it may become necessary to increase the numbers of volunteer hours and/or paid staff by an additional person. Because of projected increased demands for service, it is also likely that the Mercy Home would increase staffing.

Opportunities, Inc. was staffed by 20 full-time and 25 part-time employees in 1986. Under baseline conditions, it is expected that some of the service demands, especially the number of families receiving federal commodities and the number requesting housing referrals, would increase. Because Opportunities, Inc. operates programs that help people make a transition from public assistance to self-sufficiency, it is not expected that the Proposed Action would create a demand on most of the existing service levels except the housing referral program and the federal commodity distribution program. These programs would likely be used by unsuccessful job seekers during the construction phase and possibly the lower-ranked military during the operations phase.

The Salvation Army had a full-time staff of 20 employees during 1986. The baseline projections would require an additional employee to handle the increased demand for services. No new or expanded facilities would likely be needed. The program-related population inmigration during the construction phase, particularly some unsuccessful job seekers and their families, may require the services, including temporary shelter, meals, and thrift store use, offered by the Salvation Army. The shelter was used at 40-percent capacity during 1986, and under baseline conditions would be at 50-percent capacity. Therefore, the Salvation Army has the capacity to accommodate transients needing temporary shelter during the construction phase. The Salvation Army served meals to an average of 70 persons per day in 1986 and has the facilities to serve up to 400 persons a day. Therefore, they should be able to meet short-duration demand if enough funding is available. During the operations phase, additional demands on the Salvation Army are expected to be minimal since military personnel would be the main component of the population influx and would not be expected to use these services extensively. The thrift store would likely increase its inventory under baseline and program-induced conditions; therefore, no shortages in goods available to transients would be expected.

Short-duration impacts on private health and human services would be moderate and not significant. Calls for emergency services are projected to rise by 9 percent during the construction phase. It is expected that the unsuccessful job seekers would place a demand on Salvation Army services, and as a result, a minor degradation in service levels would occur. Long-duration impacts would be low and not significant because of minor increases in demand for health and human-related services and increases in calls for emergency services of approximately 4 percent.

City of Lewistown. Short-duration impacts on public services in the City of Lewistown would be negligible. The population inmigration associated with the construction phase is expected to increase calls for service per officer less than 2 percent during these years and would have a minimal effect on fire services. No long-duration impacts were identified.

Fergus County. Short-duration public services impacts would be low due to projected increases in the number of calls for emergency service of up to 5 percent. These effects would not be considered significant since no additional personnel or facilities would be required. No long-duration impacts were identified.

City of Conrad. Short-duration impacts on public services in the City of Conrad would be negligible. The population inmigration associated with the construction phase is expected to increase calls per officer less than 2 percent during these years and would have a minimal effect on fire services. No long-duration impacts were identified.

Pondera County. Short-duration impacts on county public services would be negligible because increases in the number of calls per officer and the number of emergency calls would be less than 2 percent. No long-duration impacts were identified.

4.1.2.6 Public Finance

Fiscal impacts on local governments in the Great Falls area were evaluated for both housing options. The onbase housing option assumed that military family housing would be constructed onbase and therefore would not contribute to local jurisdictions' property tax base. The offbase housing option assumed that military family housing would be dispersed throughout the community and would contribute to the local jurisdictions' property tax base.

Overall long-duration public finance impacts with the onbase housing option would be moderate and significant because of adverse impacts on Cascade County. Long-duration impacts on the City of Great Falls would be moderate but not significant, while long-duration impacts on the local school districts would be negligible. However, local school districts would experience short-duration, moderate, and significant impacts with the onbase housing option.

Overall long-duration public finance impacts for the offbase housing option would be moderate and significant because of adverse impacts on the local school districts and Cascade County. Long-duration fiscal impacts on the City of Great Falls would be negligible because of the additional revenue generated by offbase housing developed for this housing option. However, the City of Great Falls would experience short-duration, moderate, and not significant impacts with this housing option.

Program-induced changes in local area employment and population would provide additional revenues to local jurisdictions as well as an increase in demand for publicly provided services and subsequently, additional local government expenditures. Revenue increases associated with program activities include additional property-tax collections as housing is developed to support the additional community-based population and employment increases expand the commercial tax base of the jurisdictions. State-shared revenues (principally redistributed excise and state income tax collections) are also expected to increase as the area's economy expands relative to the state's economy. Other miscellaneous revenues such as fine and fee revenues would also contribute small amounts to program-related total revenue increases. The additional expenditures generated by program-related population inmigration would consist of outlays for additional personnel (e.g., additional police officers and sheriff deputies as well as nonuniformed personnel, and instructional and counseling personnel in the area schools), and minor increases in facility maintenance and equipment costs.

The results presented in this analysis reflect the program-induced increases in operating expenditures and revenues of the general fund, special revenue funds, and capital program funds of the counties and cities that are analyzed, and the general funds of the school districts. These funds typically account for the majority of governmental fund expenditures and revenues. Estimated increases in revenues are presented first and are followed by operating expenditures, net impacts, and a summary of any major capital and equipment needs identified in other elements of the analysis. Revenues and expenditures of enterprise funds (e.g., water and sewer plant operations), internal service funds, and special assessment funds are not included as these accounts are generally self-supporting and any increases in expenditures of these accounts (except in the case of major capital or equipment needs) would not contribute to the tax burden of the area residents. Major capital or equipment needs supported by these accounts that would be funded by general obligation bond indebtedness are identified in the summary of major capital and equipment needs.

Finally, the results presented were prepared assuming that the tax reform measures, which were being considered by the Montana State Legislature in the 1987 session, would be revenue neutral. Through the regular (1987) session of the Montana State Legislature, a bill to freeze property taxes on all classes of property was passed though no new revenue sources (e.g., a sales or other similar tax) were implemented to provide alternative revenues to replace foregone property tax revenues as mandated by Initiative 105. Special session action is anticipated and, as applicable, would be evaluated as more information on actual tax reform provisions becomes available.

City of Great Falls. Impacts on public finance in the City of Great Falls were evaluated for both the onbase and offbase housing options.

Onbase Housing Option. Program-induced revenues are estimated to increase gradually over the FY 1990 to FY 1996 period, reaching approximately $1.6 million in FY 1996 and stabilizing at approximately $1.5 million in FY 2000 and thereafter (Table 4.1.2-6). Program-induced expenditures would follow a similar pattern. Assuming expenditures increase in proportion to the estimated growth in population, program-induced expenditures are estimated to grow to $1.7 million by FY 1996 and stabilize at $1.6 million in FY 2000 and thereafter. Because of the limited effect onbase housing development has on the city's tax base, the City of Great Falls is projected to face annual shortfalls in

Table 4.1.2-6

Fiscal Impacts of the Proposed Action With the Onbase and Offbase Housing Options, City of Great Falls FY 1990-2000 (thou.1986$)

	Fiscal Year										
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Baseline											
Revenues/ Expenditures	$22,000.0	$22,100.0	$22,200.0	$22,200.0	$22,300.0	$22,300.0	$22,400.0	$22,400.0	$22,500.0	$22,600.0	$22,600.0
Onbase Housing Option											
Revenues	$149.0	$284.0	$727.0	$975.0	$1,080.0	$1,286.0	$1,573.0	$1,543.0	$1,491.0	$1,483.0	$1,482.0
Expenditures	185.0	282.0	807.0	1,055.0	1,150.0	1,401.0	1,716.0	1,665.0	1,619.0	1,615.0	1,615.0
Net	-37.0	2.0	-80.0	-80.0	-70.0	-116.0	-143.0	-123.0	-128.0	-133.0	-133.0
Offbase Housing Option											
Revenues	$149.0	$284.0	$742.0	$1,044.0	$1,182.0	$1,407.0	$1,726.0	$1,723.0	$1,671.0	$1,663.0	$1,662.0
Expenditures	185.0	282.0	807.0	1,055.0	1,188.0	1,439.0	1,754.0	1,703.0	1,657.0	1,653.0	1,653.0
Net	-37.0	2.0	-64.0	-12.0	-6.0	-33.0	-27.0	19.0	14.0	10.0	9.0

Note: Data reflect revenues and expenditures of general fund, special revenue, and capital project funds. Net values may not reflect differences due to rounding.

revenues over the FY 1992 to FY 2000 period. However, these shortfalls would represent less than 0.5 percent of the city's projected budget over these years. No major city-provided capital outlays are expected with this housing option.

Long-duration fiscal impacts would occur because program-induced revenue shortfalls would persist throughout most of the years during the buildup phase and continue over the life of the program. Impacts would be moderate because the revenue shortfalls would be less than those historically experienced by the city. The impact would not be significant because the shortfalls represent less than 0.5 percent of the city's projected budget over these years and the cumulative effect of the shortfalls ($3.5 million over the operations phase) would not reduce fund balances below historical levels (current balances measure $11.8 million and the historical low measured $4.8 million).

Offbase Housing Option. Program-induced revenues are estimated to increase gradually over the FY 1990 to FY 1996 period, reaching a little over $1.7 million in FY 1996 and stabilizing at slightly below $1.7 million in FY 2000 and thereafter (Table 4.1.2-6). Program-induced expenditures would follow a similar pattern, reaching nearly $1.8 million in FY 1996 and stabilizing at slightly less than $1.7 million in FY 2000 and thereafter. With the offbase housing option, program-induced revenues would exceed expenditures beginning in FY 1997 and would continue to exceed expenditures over the life of the program. However, annual revenue shortfalls ranging up to $60,000 would be experienced over the buildup phase. Facility and equipment needs would remain the same as those required for the onbase housing option.

Because program-induced expenditures exceed revenues in most years over the buildup phase, while program-induced revenues exceed expenditures from FY 1997 and continue over the life of the program, short- and long-duration fiscal impacts would occur. The short-duration impacts would be moderate and not significant because the revenue shortfalls are less than those historically experienced and the cumulative effect of the shortfalls ($180,000 over the buildup phase) would not reduce fund balances below historical levels. The long-duration impacts would be negligible.

Cascade County. Impacts on public finance in Cascade County were evaluated for both the onbase and offbase housing options.

Onbase Housing Option. Program-induced revenues in Cascade County are estimated to increase gradually over the FY 1990 to FY 1996 period, reaching approximately $670,000 in FY 1996 and stabilizing at approximately $640,000 in FY 2000 and thereafter (Table 4.1.2-7). Program-induced expenditures would follow a similar pattern, increasing from $87,000 in FY 1990 to approximately $1 million in FY 1996 and stabilizing at $940,000 in FY 2000 and thereafter. Annual revenue shortfalls ranging from $26,000 to $330,000 are estimated over the FY 1990 to FY 1996 period. These shortfalls would represent approximately 2.8 percent of the county's projected budget in the peak year. The long-duration revenue shortfalls are expected to be slightly lower and are estimated to be approximately $300,000 in FY 2000 and thereafter.

Program-induced population inmigration would exacerbate conditions at the already crowded jail facility, possibly requiring additional expenditures to house prisoners in alternative facilities. No other major capital or equipment needs were identified.

Long-duration fiscal impacts are expected because program-induced revenue shortfalls would persist throughout the buildup phase and continue over the life of the program. These impacts would be moderate because the revenue shortfalls would be less than historically experienced by the county. Long-duration impacts would be significant

Table 4.1.2-7

Fiscal Impacts of the Proposed Action With the Onbase and Offbase Housing Options, Cascade County
FY 1990-2000
(thou.1986$)

	Fiscal Year										
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Baseline											
Revenues/ Expenditures	$11,600.0	$11,700.0	$11,700.0	$11,700.0	$11,700.0	$11,800.0	$11,800.0	$11,800.0	$11,900.0	$11,900.0	$11,900.0
Onbase Housing Option											
Revenues	$61.0	$137.0	$308.0	$427.0	$474.0	$550.0	$669.0	$669.0	$646.0	$639.0	$639.0
Expenditures	87.0	184.0	488.0	612.0	707.0	793.0	995.0	966.0	938.0	936.0	936.0
Net	-26.0	-47.0	-180.0	-185.0	-233.0	-244.0	-326.0	-297.0	-293.0	-297.0	-297.0
Offbase Housing Option											
Revenues	$61.0	$137.0	$323.0	$494.0	$574.0	$669.0	$820.0	$846.0	$822.0	$816.0	$816.0
Expenditures	87.0	184.0	488.0	612.0	707.0	793.0	995.0	966.0	938.0	936.0	936.0
Net	-26.0	-47.0	-165.0	-117.0	-133.0	-124.0	-176.0	-120.0	-116.0	-120.0	-120.0

Note: Data reflect revenues and expenditures of general fund, special revenue, and capital project funds. Net values may not reflect differences due to rounding.

because the cumulative effects of the shortfalls would reduce fund balances below historical levels by FY 1995. Current fund balances of $2.7 million would be reduced to below the historical low of $2.2 million by FY 1994 because the shortfalls would cumulatively total over $500,000 by this year.

Offbase Housing Option. Unlike the onbase housing option, offbase housing development would increase revenues available to the county. Program-induced revenue increases are estimated to reach approximately $850,000 by FY 1997 and stabilize at approximately $820,000 in FY 2000 and thereafter (Table 4.1.2-7). Although program-induced expenditures would remain the same as for the onbase housing option, the estimated revenues for the offbase housing option would still not be sufficient to meet program-induced expenditure demands. Revenue shortfalls ranging up to approximately $180,000 in FY 1996 and $120,000 in FY 2000 and thereafter are estimated. Major capital and equipment needs would remain the same as those for the onbase housing option.

Long-duration fiscal impacts are expected because program-induced revenue shortfalls would persist throughout the buildup phase and continue over the life of the program. These impacts would be moderate because the revenue shortfalls would be less than historically experienced by the county. Long-duration impacts would be significant because the cumulative effect of the shortfalls would reduce fund balances below historical levels by FY 1995. Current fund balances of $2.7 million would be reduced to below the historical low of $2.2 million by FY 1995 because the shortfalls would cumulatively total to more than $500,000 by this year.

Great Falls Public Schools System. Program impacts on school district finances were evaluated separately for the two Great Falls school districts.

Program-induced Elementary School District No. 1 expenditures would be the same for both the onbase and offbase housing options (Table 4.1.2-8). Assuming expenditures increase in proportion to the estimated growth in student enrollments, program-induced district expenditures are estimated to reach approximately $2.3 million in FY 1996 and stabilize at $2.1 million during the operations phase. If a new elementary school is constructed, additional funds would be required. For the offbase housing option, no new construction would be required though expansion or renovation of existing facilities in the vicinity of the base would be required. Current district indebtedness is relatively low and the reserve bonding capacity of the district of over $30 million would be adequate, given voter approval, to meet any costs incurred with new facility construction or expansion.

However, program-induced revenue increases would vary slightly for each housing option. School districts receive federal aid under P.L. 81-874 programs for pupils whose parents live and/or work on federal installations. For the two housing options presented, school districts would stand to receive more federal aid under P.L. 81-874 programs with the onbase housing option than would be recovered in property taxes if the offbase housing option were selected. The annual differences amount to approximately $210,000 during the operations phase ($2,170,000 in program-induced revenues for the onbase housing option versus $1,960,000 for the offbase housing option). Because of the lag between when state foundation monies and property taxes are received by the district and when the additional pupils arrive, revenue shortfalls ranging up to $570,000 in FY 1992 for the offbase housing option and $430,000 for the onbase housing option are estimated. Revenue shortfalls of approximately $180,000 are estimated in FY 2000 and thereafter for the offbase housing option, while revenues and expenditures would be relatively equal for the onbase housing option.

Table 4.1.2-8

Fiscal Impacts of the Proposed Action With the Onbase and Offbase Housing Options, Great Falls Elementary District No. 1 General Fund
School Years 1990-2000
(thou.1986$)

	School Year										
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Baseline											
Revenues/ Expenditures	$23,500.0	$23,700.0	$23,800.0	$24,100.0	$24,200.0	$24,200.0	$24,200.0	$24,200.0	$24,200.0	$24,300.0	$24,300.0
Onbase Housing Option											
Revenues	$67.0	$281.0	$635.0	$1,200.0	$1,468.0	$1,687.0	$2,042.0	$2,278.0	$2,218.0	$2,173.0	$2,170.0
Expenditures	217.0	370.0	1,059.0	1,387.0	1,537.0	1,867.0	2,294.0	2,217.0	2,147.0	2,141.0	2,141.0
Net	-150.0	-89.0	-425.0	-187.0	-69.0	-180.0	-252.0	61.0	71.0	32.0	29.0
Offbase Housing Option											
Revenues	$67.0	$245.0	$492.0	$1,044.0	$1,306.0	$1,476.0	$1,802.0	$2,070.0	$2,009.0	$1,965.0	$1,961.0
Expenditures	217.0	370.0	1,059.0	1,387.0	1,537.0	1,867.0	2,294.0	2,217.0	2,147.0	2,141.0	2,141.0
Net	-150.0	-125.0	-567.0	-343.0	-231.0	-391.0	-492.0	-147.0	-137.0	-176.0	-180.0

Note: Net values may not reflect differences due to rounding.

Long-duration fiscal impacts are expected with the offbase housing option because program-induced revenue shortfalls would persist throughout the buildup phase and continue over the life of the program. No short-duration impacts were identified. Long-duration impacts would be moderate because the revenue shortfalls would be less than historically experienced by the districts. These impacts would be significant because the cumulative effect of the shortfalls would reduce fund balances below historical levels by FY 1992. Current fund balances of $4.4 million would be reduced below the historical level of $4 million by FY 1992 because the shortfalls would cumulatively total over $400,000 by this year. For the onbase housing option, short-duration revenue shortfalls would occur. No long-duration impacts were identified. The impact would be moderate because the shortfalls would be less than historically experienced. The impact would be significant because the shortfalls would reduce fund balances to below historical levels by FY 1992.

Program-induced High School District No. A expenditures would also be the same for both the onbase and offbase housing options. High school district expenditures are estimated to exceed $1.4 million in FY 1996 and stabilize at $1.3 million in FY 2000 and thereafter (Table 4.1.2-9). However, no new high school facilities would be required for either the onbase or offbase housing options.

Like the elementary school district revenues, program-induced high school district revenues would vary slightly for each housing option, ranging from $1.2 million for the offbase housing option to $1.3 million for the onbase housing option in FY 2000 and thereafter. Because of the lag between when state foundation monies and property taxes are received by the district and when the additional pupils arrive, annual revenue shortfalls ranging up to $330,000 in FY 1992 for the offbase housing option and $240,000 for the onbase housing option are estimated. Revenue shortfalls of approximately $90,000 are estimated in FY 2000 for the offbase housing option while revenues and expenditures would be relatively equal for the onbase housing option.

Long-duration fiscal impacts are expected with the offbase housing option because program-induced revenue shortfalls would persist throughout the buildup phase and continue over the life of the program. No short-duration impacts were identified. Long-duration impacts would be moderate because the revenue shortfalls would be less than historically experienced by the districts. The impacts would be significant because the cumulative impact of the shortfalls would reduce fund balances below historical levels by FY 1993. Current fund balances of $3.2 million would be reduced to below the historical low of $2.6 million by FY 1992 because the shortfalls would cumulatively total to over $600,000 by this year. For the onbase housing option, short-duration revenue shortfalls would occur. No long-duration impacts were identified. The impact would be moderate because the shortfalls would be less than historically experienced by the district. The impact would be significant because the cumulative effect of the shortfalls would reduce fund balances to below historical levels by FY 1996.

City of Lewistown. Short-duration impacts on Lewistown would be negligible. No long-duration impacts were identified. Additional city personnel would not be required and the city's capital facilities would be adequate to serve the needs associated with the temporary population increase.

Fergus County. Short-duration impacts on Fergus County would be negligible. No long-duration impacts were identified. Additional county personnel would not be required and the county's capital facilities would be adequate to serve the needs associated with the temporary population increase.

Table 4.1.2-9

Fiscal Impacts of the Proposed Action With the Onbase and Offbase Housing Options, Great Falls High School District No. A General Fund School Years 1990-2000 (thou.1986$)

	School Year										
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Baseline											
Revenues/ Expenditures	$11,800.0	$12,100.0	$12,300.0	$12,300.0	$12,300.0	$12,600.0	$12,800.0	$13,100.0	$12,200.0	$13,100.0	$13,100.0
Onbase Housing Option											
Revenues	$44.0	$173.0	$399.0	$742.0	$906.0	$1,044.0	$1,264.0	$1,404.0	$1,366.0	$1,340.0	$1,338.0
Expenditures	131.0	223.0	639.0	837.0	927.0	1,127.0	1,384.0	1,338.0	1,295.0	1,292.0	1,292.0
Net	-87.0	-50.0	-240.0	-95.0	-22.0	-83.0	-120.0	66.0	71.0	48.0	46.0
Offbase Housing Option											
Revenues	$44.0	$152.0	$313.0	$645.0	$803.0	$911.0	$1,112.0	$1,269.0	$1,232.0	$1,205.0	$1,203.0
Expenditures	131.0	223.0	639.0	837.0	927.0	1,127.0	1,384.0	1,338.0	1,295.0	1,292.0	1,292.0
Net	-87.0	-72.0	-326.0	-191.0	-124.0	-216.0	-272.0	-69.0	-64.0	-87.0	-89.0

Note: Net values may not reflect differences due to rounding.

Lewistown Public Schools System. Short-duration impacts on Lewistown public schools would be negligible. No long-duration impacts were identified. No additional staff or facilities would be required to serve the temporary increases in student enrollments.

City of Conrad. Short-duration impacts on Conrad would be negligible. No long-duration impacts were identified. Additional city personnel would not be required and the city's capital facilities would be adequate to serve the needs associated with the temporary population increase.

Pondera County. Short-duration impacts on Pondera County would be negligible. No long-duration impacts were identified. Additional county personnel would not be required and the county's capital facilities would be adequate to serve the needs associated with the temporary population increase.

Conrad Public Schools System. Short-duration impacts on Conrad public schools would be negligible. No long-duration impacts were identified. No additional staff or facilities would be required to serve the temporary increases in student enrollments.

State of Montana. Annual program-induced personal income increases of approximately $84 million during the operations phase would generate additional state income tax revenue of $1.8 million. Small increases in other tax and nontax revenues would also be expected (e.g., motor vehicle license fees, motor fuel excise taxes, and liquor taxes). The program would not affect severance tax collections (oil and coal severance taxes).

Program-induced population inmigration would represent less than a 1-percent increase over forecasted baseline population levels and result in negligible increases in the demand for state services. Some increases in staffing for selected departments are, however, expected.

4.1.3 Impacts of Alternatives

Three alternatives to the Proposed Action were evaluated. Alternative 1 is defined as 200 Hard Mobile Launcher (HMLs) in pre-engineered buildings at 100 launch facilities, requiring 2,200 direct jobs in the operations phase. Alternative 2 is defined as 250 HMLs in earth-covered igloos at 125 launch facilities, requiring 3,760 direct jobs in the operations phase. Alternative 3 is defined to be 200 HMLs in pre-engineered buildings at 200 launch facilities, requiring 3,100 direct jobs in the operations phase. For the socioeconomic resource elements of housing, education, public services, and public finance, each alternative was analyzed for two scenarios: onbase and offbase housing.

Short- and long-duration impacts for the economic base element would be moderate and not significant for Alternatives 1, 2, and 3. Because Alternative 2 proposes more military personnel than the Proposed Action or Alternatives 1 and 3, the demographic element would have a high and significant impact for Alternative 2 only, compared to moderate and significant for Alternatives 1 and 3. Short-duration impacts on housing would be moderate and not significant for Alternatives 1 and 3 and low and not significant for Alternative 2. For housing, long-duration impacts associated with Alternatives 1, 2, and 3 would be low and not significant. Long-duration education impacts would be high and significant for Alternatives 1, 2, and 3 because of the lack of capacity at Great Falls neighborhood elementary schools. Short-duration impacts on public services for all alternatives would be moderate and not significant. Long-duration impacts on public services for Alternatives 1, 2, and 3 would be low and significant, high and significant, and moderate and significant, respectively. Public finance impacts of the three alternatives would remain the same as for the Proposed Action. The beneficial effects associated with higher employment and lower vacancy rates would occur throughout the life of the program.

4.1.3.1 Economic Base

Alternative 1. Direct employment requirements of Alternative 1 would increase from 1,100 jobs in 1990 to 2,520 jobs in 1996 before leveling off at 2,200 in 1997 (Table 4.1.3-1). These requirements would be about 900 personnel less than those of the Proposed Action by the year 2000 and less in the implementation phases as well, since fewer support facilities would be needed. Total employment (Figure 4.1.3-1), income, and spending would be comparably reduced. The program-related jobs and income would be beneficial effects of this alternative. Short- and long-duration effects on the construction sector for this alternative would be smaller than for the Proposed Action, but would remain moderate and not significant.

Alternative 2. The direct employment requirements of Alternative 2 would increase from 1,140 jobs in 1990 to 4,010 in 1997 and 1998 before stabilizing at 3,760 by the year 2000 (Table 4.1.3-2). These job levels would be about 660 jobs more than those for the Proposed Action by the year 2000. Construction employment is comparably greater than the Proposed Action since more facilities would be needed to support the larger operations workforce (Figure 4.1.3-1). Total employment, income, and spending would consequently be higher than those estimated for the Proposed Action. Therefore, the beneficial economic effects of Alternative 2 would be greater than those of the Proposed Action. However, for Alternative 2, short- and long-duration adverse construction resource impacts would be somewhat greater than those of the Proposed Action, though they would remain moderate and not significant when all areas within the ROI are considered.

Alternative 3. Manpower and resource requirements for Alternative 3 would be virtually equal to those of the Proposed Action. Consequently, the impacts for Alternative 3 would be the same as those presented for the Proposed Action.

4.1.3.2 Demographics

Alternative 1. The long-duration demographic effects of this alternative would be less than the Proposed Action (Figure 4.1.3-2). Total population change in the Great Falls area would peak at 5,890 in 1996, with a long-duration population gain of 5,360 (5,310 of which would be military personnel and dependents). The operations-phase military population change would be about 50 percent greater than the baseline military population, and consequently, result in a moderate impact. Projected total military population is estimated to be 21.4 percent of Great Falls community population, which is higher than the previous maximum of 20.4 percent. Since the demographic characteristics of the new population would be substantially different from the average characteristics of area residents, demographic impacts would be significant. There would be no short-duration impacts.

Alternative 2. Demographic impacts of Alternative 2 would be greater than the Proposed Action (Figure 4.1.3-2). Total population change would peak in 1997 at 9,620 persons, declining to 9,200 by the year 2000 (9,110 of which are military personnel plus dependents). Long-duration impacts would be high, since there would be an 85-percent change above the baseline military population. Impacts would also be significant, since the new population is expected to differ demographically from other area residents and the with-program military share of community population would increase to 25.2 percent. There would be no short-duration impacts.

Table 4.1.3-1

Employment and Population Effects of Alternative 1 for Great Falls, Lewistown, and Conrad, Montana (1990-2000)

	Calendar Year										
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Employment											
Direct Employment											
Malmstrom AFB	850	760	1,760	1,970	1,960	2,180	2,520	2,200	2,200	2,200	2,200
Great Falls Area	250	310	150	120	--	--	--	--	--	--	--
Lewistown Area	--	30	170	140	120	20	--	--	--	--	--
Conrad Area	--	30	50	100	50	10	--	--	--	--	--
Subtotal:	1,100	1,130	2,130	2,330	2,130	2,210	2,520	2,200	2,200	2,200	2,200
Secondary Employment	1,170	820	1,420	1,310	930	860	980	930	890	880	880
Total Program Employment	2,270	1,950	3,550	3,640	3,060	3,070	3,500	3,130	3,090	3,080	3,080
Local Hires	1,940	1,390	2,100	1,920	1,240	1,020	1,100	990	890	890	890
Population											
Great Falls Urban Area											
New Population	760	1,310	3,380	4,050	4,350	4,980	5,890	5,630	5,380	5,360	5,360
Weekly Commuters	70	50	60	50	30	20	20	10	--	--	--
Lewistown Area											
New Population	--	20	120	100	90	10	--	--	--	--	--
Weekly Commuters	--	--	10	10	10	--	--	--	--	--	--
Conrad Area											
New Population	--	20	30	60	30	10	--	--	--	--	--
Weekly Commuters	--	--	--	10	--	--	--	--	--	--	--

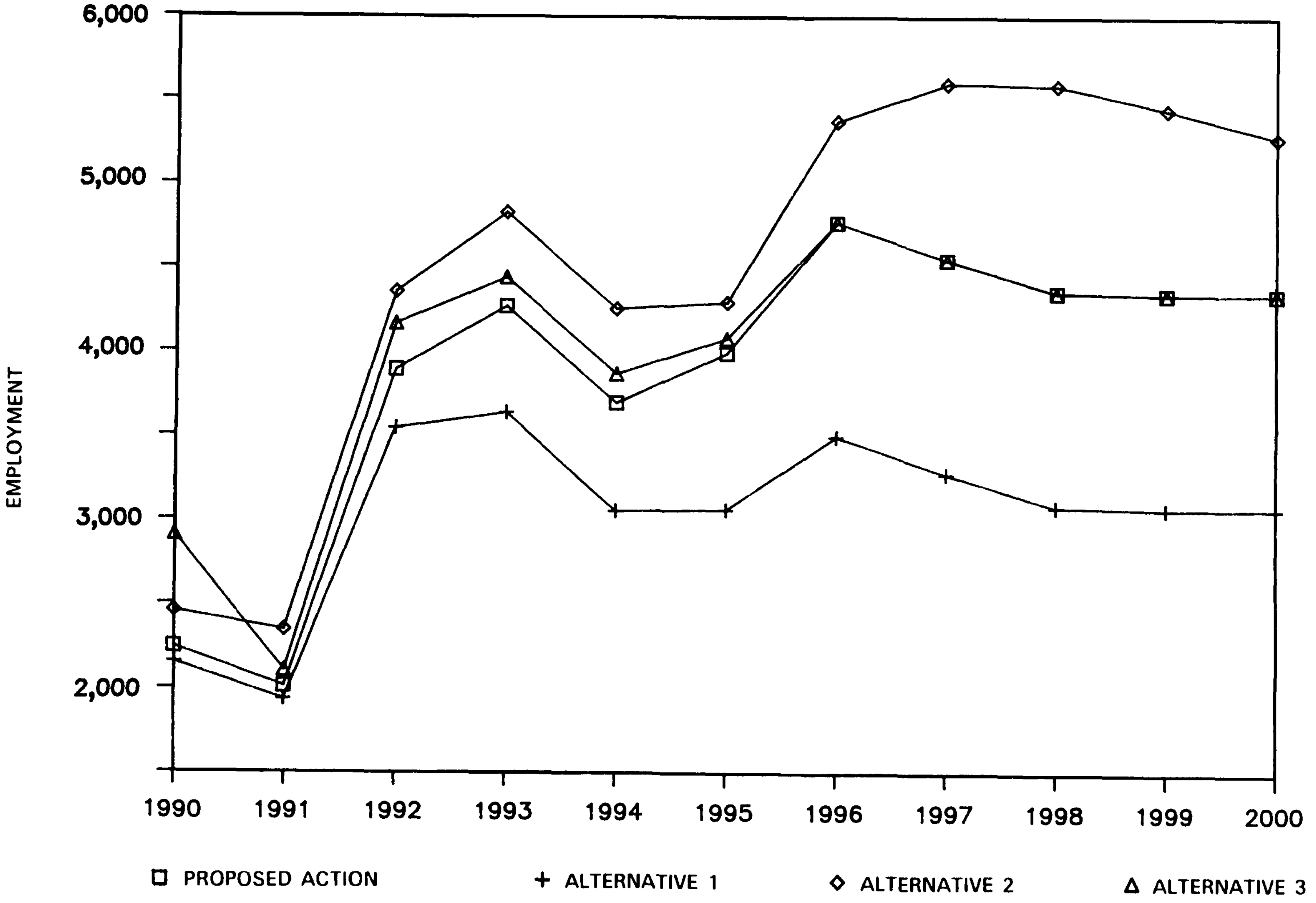

FIGURE 4.1.3-1 1990-2000 TOTAL DIRECT AND SECONDARY EMPLOYMENT FOR THE PROPOSED ACTION AND ALTERNATIVES 1, 2, AND 3

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Table 4.1.3-2

Employment and Population Effects of Alternative 2 for Great Falls, Lewistown, and Conrad, Montana (1990-2000)

	Calendar Year										
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Employment											
Direct Employment											
Malmstrom AFB	880	810	2,050	2,460	2,410	2,850	3,830	4,010	4,010	3,930	3,760
Great Falls Area	260	320	180	150	--	--	--	--	--	--	--
Lewistown Area	--	30	190	170	210	40	--	--	--	--	--
Conrad Area	--	30	30	120	90	30	--		--	--	--
Subtotal:	1,140	1,190	2,450	2,900	2,710	2,920	3,830	4,010	4,010	3,930	3,760
Secondary Employment	1,430	1,160	1,900	1,930	1,540	1,370	1,550	1,590	1,590	1,560	1,520
Total Program Employment	2,570	2,350	4,350	4,830	4,250	4,290	5,380	5,600	5,600	5,490	5,280
Local Hires	2,240	1,780	2,720	2,700	1,940	1,540	1,640	1,690	1,680	1,610	1,530
Population											
Great Falls Urban Area											
New Population	790	1,360	3,830	5,010	5,460	6,730	9,170	9,620	9,610	9,430	9,200
Weekly Commuters	70	60	70	60	20	20	10	10	10	10	--
Lewistown Area											
New Population	--	20	140	130	160	30	--	--	--	--	--
Weekly Commuters	--	--	10	10	20	--	--	--	--	--	--
Conrad Area											
New Population	--	20	20	70	60	20	--	--	--	--	--
Weekly Commuters	--	--	--	10	10	--	--	--	--	--	--

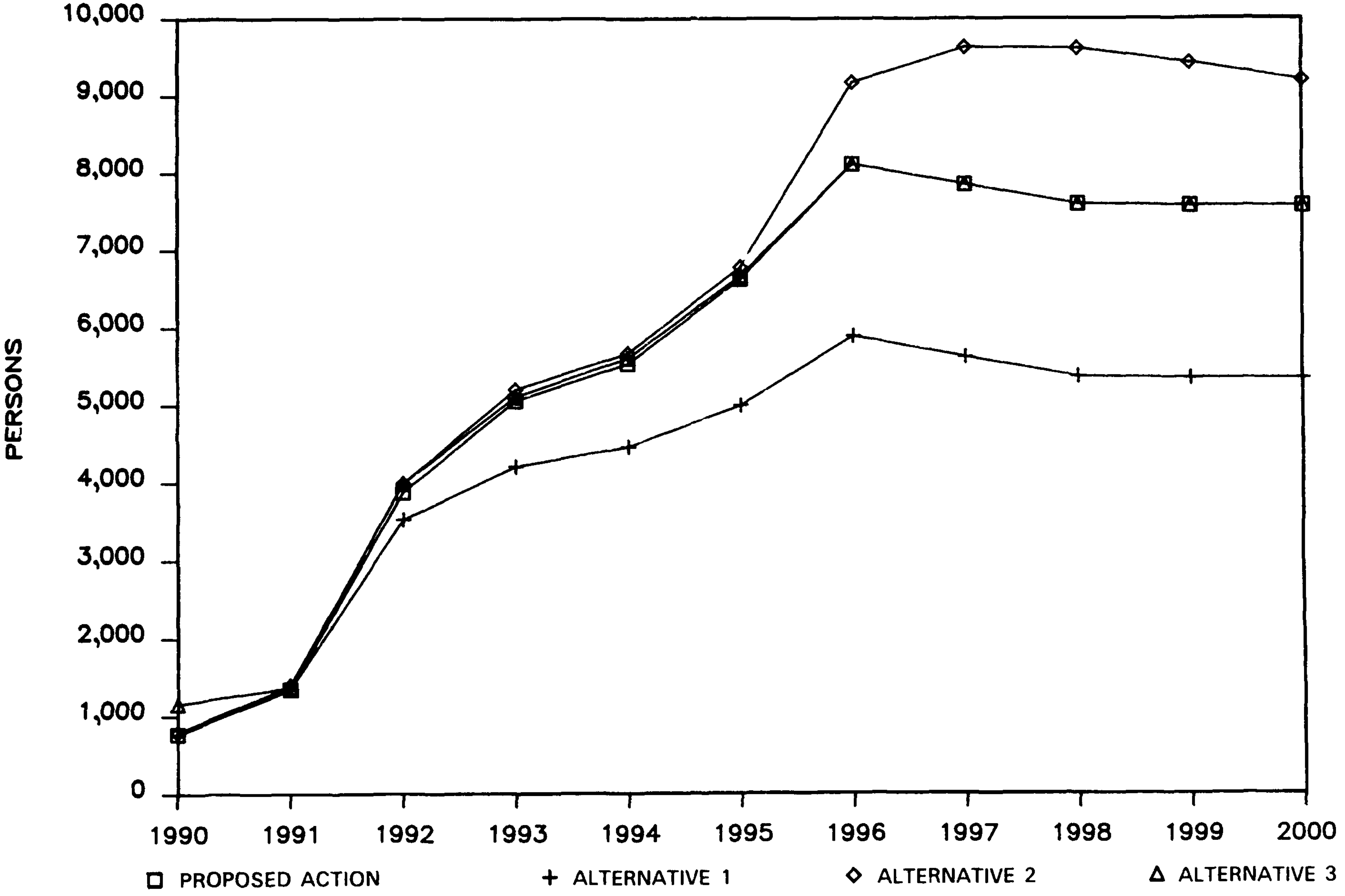

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FIGURE 4.1.3-2 1990-2000 SMALL ICBM POPULATION INMIGRATION FOR THE PROPOSED ACTION AND ALTERNATIVES 1, 2, AND 3

Alternative 3. Population inmigration for Alternative 3 would be virtually equal to the results presented for the Proposed Action. Consequently, long-duration impacts would be moderate and significant. There would be no short-duration impacts.

4.1.3.3 Housing

For Alternatives 1, 2, and 3, no adverse impacts on temporary housing in Great Falls, Lewistown, or Conrad would be expected. However, as operations workers inmigrate into the area, the demand for low- and moderate-income housing would exceed the available supply. This housing shortage would cause hardships for both civilian and Air Force families with increased housing costs and potentially substandard housing conditions. In order to prevent these significant housing impacts, the Air Force will provide additional family housing as required to offset potential shortages. Monitoring of the permanent housing market in Great Falls will determine the actual number of units to be provided by the Air Force. This will assure the greatest possible private-sector participation in the provision of permanent housing while avoiding potential adverse impacts.

Alternative 1. For Alternative 1, short-duration effects on temporary and permanent housing units are expected to be beneficial because of the income generated through the use of otherwise vacant facilities. Short-duration impacts would be moderate and not significant because of the presence of construction, SATAF, A&CO, and operations personnel in 1996 in Great Falls, causing vacancy rates to approach historical lows. Long-duration impacts would be low and not significant.

City of Great Falls. Program-related offbase demand for temporary units is expected to begin in 1989 at about ten hotel/motel rooms. This demand is expected to peak in 1990 at about 100 hotel/motel rooms and 40 other temporary facilities, before falling to about 10 hotel/motel rooms in 1997 and remain at that level thereafter. Since there are about 400 hotel/motel rooms and 100 other temporary facilities available during the peak season, the program-related demands would have a beneficial effect on temporary housing facilities within the Great Falls urban area.

The demand for onbase dormitory modules for Alternative 1 is expected to begin at 40 units in 1991, and rise to 370 units by 1996, continuing at this level during the operations phase.

The long-duration demand for permanent housing units in the Great Falls area for Alternative 1 would be 1,420 units. Up to 1,230 of these units would be provided by the Air Force. However, based on local availability and the possibility of private new construction, only 930 would be provided by the Air Force. An additional 490 units would be provided through the use of vacancies (420) and private new construction (70). The expected supply of and program-related demand for permanent housing units is presented in Table 4.1.3-3. Construction inmigration-related housing demand is forecast to increase from 220 units in 1990 to a peak of 360 units in the year 1992, and then fall to under 10 units in the final construction year (1998). Operations-related housing demand is forecast to rise from about 190 units in 1991, to the long-duration level of about 1,420 units beginning in 1996. The program-related demand for housing would drop available vacancy rates below 2.1 percent beginning in 1992. This rate is expected to decline to 1.4 percent in 1996 before leveling off at 1.5 percent in the operations phase (1998 and thereafter).

Short-duration, beneficial effects on temporary housing units are expected because of the income generated through the use of otherwise vacant facilities. Short-duration impacts on permanent housing would be moderate because vacancy rates would

Table 4.1.3-3

Small ICBM Permanent Housing Requirements and Projected Housing Response for Great Falls, Montana (Alternative 1)

	1990	1996	2000
Program Demand for Permanent Units			
Civilian Households	216	201	17
Military Households	7	1,445	1,407
TOTAL Demand:	223	1,646	1,424
Local Availability			
Community Housing Stock	28,732	29,234	29,590
Total Vacancies[1]	1,416	1,410	1,413
Suitable Vacancies[2]	441	421	422
Baseline Vacancy Rate (%)	4.9	4.8	4.8
Private Market Response (New Construction)	0	253	70
MCP or Housing Program Response	0	934	934
Impact Vacancy Rate (%)	4.1	3.2	3.3

Notes: [1] Total vacancies include approximately 500 units that are rented or sold awaiting occupancy, held for occasional use, and dilapidated or boarded-up units.

[2] Suitable vacancies represent those available vacant housing units that would be both affordable and large enough to meet the needs of military households.

approach historical lows. This impact would not be significant because the local housing market would be able to meet the program-related housing demand in every year. Long-duration impacts on the permanent housing market are expected to be low because vacancy rates would only be slightly reduced. These impacts would not be significant because the local housing market with Air Force funding or construction would be able to meet the housing demand in every year. Long-duration effects would be beneficial to landlords and property owners since the number of vacant units would be reduced.

City of Lewistown. The construction work on the launch facilities in the Lewistown area is expected to bring a peak of about 50 new households to the City of Lewistown in 1992. These households would seek out a mix of permanent and temporary housing units within the city limits. It is estimated that these workers would require 35 permanent units and 15 temporary units in the peak year (1992). An additional ten temporary units may be required to house weekly (Monday through Thursday) commuters in the same year. The supply of available vacant permanent units in the City of Lewistown is projected to be adequate to meet this demand with no change in the cost of housing experienced by projected baseline residents. During the peak tourist season in 1992, the supply of temporary housing units would not be exhausted.

The program-related demand for housing in the City of Lewistown is expected to help the local housing market without any displacement of local citizens or price increases to current residents. Therefore, similar to the Proposed Action, Alternative 1 is expected to have a short-duration, beneficial effect on housing. There would be no long-duration impacts on housing for the City of Lewistown.

City of Conrad. The construction work on the launch facilities near Conrad is expected to reach a peak in 1993. It is expected that about 25 new households would reside in Conrad in that year. It is estimated that these workers would require 15 permanent units and 10 temporary units in 1993. An additional ten temporary units may be required to house weekly commuters in the same year. The supply of rental units and the availability of hotel/motel rooms in Conrad is expected to be sufficient to accommodate this short-duration increase in demand.

The program-related demand for housing in the City of Conrad is expected to help the local housing market without displacement of any local citizens or price increases to any current residents; therefore, similar to the Proposed Action, the short-duration effects of Alternative 1 on the housing market in Conrad would be beneficial. There would be no long-duration housing impacts on the City of Conrad.

Alternative 2.

City of Great Falls. Program-related offbase demand for temporary units is expected to begin in 1990 at about 100 hotel/motel rooms and 40 other temporary facilities before falling to about 10 hotel/motel rooms from 1999 and thereafter. Since there are about 400 hotel/motel rooms and 100 other temporary facilities available during the peak season, it is projected that the program-related demands would have a beneficial effect on temporary housing facilities in the Great Falls urban area.

For Alternative 2, short-duration impacts on temporary housing units are expected and would be beneficial because of the revenues generated through the use of otherwise vacant facilities.

The demand for onbase dormitory modules for Alternative 2 is expected to begin at 40 units in 1991 and rise to an operations-related demand of 630 units by the year 1997.

The long-duration demand for permanent housing units in the Great Falls area with Alternative 2 would be 2,450 units. Up to 2,000 of these housing units would be provided by the Air Force. However, based on local availability and the possibility of private construction, only 1,910 of these units would be supplied by the Air Force. The additional 540 units would be provided through the use of vacancies (420) and private new construction (120). The expected supply of and program-related demand for housing units in the Great Falls area are presented in Table 4.1.3-4. Initial construction-related housing demand is forecast to increase from 230 units in 1990 to a peak of 400 units in 1992, and fall to under 10 units in the final construction year (1998). Operations-related housing demand is forecast to rise from about 160 units in 1991 to the long-duration level of about 2,450 units beginning in 1997. During the construction phase, it is estimated that vacancy rates would fall below 2.3 percent beginning in 1990. In 1996, the available vacancy rate would drop to 1.5 percent and remain at that level during the operations phase.

Table 4.1.3-4

Small ICBM Permanent Housing Requirements and Projected Housing Response for Great Falls, Montana (Alternative 2)

	1990	1997	2000
Program Demand for Permanent Units			
Civilian Households	224	170	32
Military Households	7	2,438	2,413
TOTAL Demand:	231	2,608	2,445
Local Availability			
Community Housing Stock	28,732	29,326	29,590
Total Vacancies[1]	1,416	1,411	1,413
Suitable Vacancies[2]	441	421	422
Baseline Vacancy Rate (%)	4.9	4.8	4.8
Private Market Response	0	283	121
MCP or Housing Program Response	0	1,905	1,905
Impact Vacancy Rate (%)	4.1	3.3	3.3

Notes: [1] Total vacancies include approximately 500 units that are rented or sold awaiting occupancy, held for occasional use, and dilapidated or boarded-up units.

[2] Suitable vacancies represent those available vacant housing units that would be both affordable and large enough to meet the needs of military households.

Short- and long-duration impacts on the permanent housing market would be low because vacancy rates would decrease only slightly. These impacts would not be significant because the local housing market would be able to meet the housing demand in every year. Short- and long-duration, beneficial effects would be generated for landlords and property owners.

City of Lewistown. At its peak, the construction work on the launch facilities in the Lewistown area is expected to bring 55 new households to the City of Lewistown in 1992. It is estimated that these workers would require 40 permanent units and 15 temporary units in 1992 (the peak year). An additional 15 temporary units may be required to house weekly commuters in the same year. The supply of available vacant permanent units in the City of Lewistown is projected to be adequate to meet this demand with no change in the cost of housing experienced by projected baseline residents. During the peak tourist season in 1992, the supply of temporary housing units would not be exhausted.

The program-related demand for housing in the City of Lewistown is expected to help the local housing market without any displacement of local citizens or price increases to current residents. Therefore, Alternative 2 would have a short-duration, beneficial effect on housing. There are no long-duration impacts on housing in the City of Lewistown.

City of Conrad. The construction work on the launch facilities near Conrad is expected to reach a peak in 1993. It is expected that about 30 new households would reside in Conrad in that year. It is estimated that these workers would require 20 permanent units and 10 temporary units in 1993. An additional ten temporary units may be required to house weekly commuters in the same year. The supply of rental units and the availability of hotel/motel rooms in Conrad is expected to be sufficient to accommodate this short-duration increase in demand.

The program-related demand for housing in the City of Conrad is expected to help the local housing market without displacement of any local citizens or price increases to any current residents; therefore, the short-duration impact of Alternative 2 on the housing market in Conrad is expected to be beneficial. There would be no long-duration housing impacts on the City of Conrad.

Alternative 3. Housing requirements for Alternative 3 would be virtually the same as those presented for the Proposed Action; consequently, LOI and significance determinations would remain the same.

4.1.3.4 Education

Alternative 1.

City of Great Falls. Compared to the Proposed Action, Alternative 1, with the onbase housing option, would bring 350 fewer students (Table 4.1.3-5) during the operations phase to the GFPS system since fewer operations personnel would be required. Of the total projected enrollments, slightly more than half, or approximately 472 students, would be expected to be elementary students. Loy Elementary School, located just outside Malmstrom AFB, would be most affected by the program-related enrollments for the onbase housing option. Although fewer students are projected for this alternative, the overall elementary enrollment increase of 425 estimated for Loy Elementary School would seriously overcrowd the school. The increased enrollment represents an additional 18 pupils per classroom, and added to the baseline pupil-to-teacher ratio, would be much higher than local or state maximum standards. Therefore, the long-duration LOI and significance evaluation of Alternative 1, with the onbase housing option, would be similar to the Proposed Action and would remain high and significant. Short-duration impacts would be negligible. The short- and long-duration impact on private schools would be negligible.

For the offbase housing option, approximately 343 of the total projected elementary students would be expected to attend five elementary schools: Chief Joseph, Lewis and Clark, Morningside, Mountain View, and Sunnyside. These projected enrollments would increase the pupil-to-teacher ratios to approximately 29-to-1, which would be higher than local or state standards. Therefore, the long-duration LOI and significance evaluation of Alternative 1, with the offbase housing option, would remain high and significant. The short-duration impacts would be negligible. Both the short- and long-duration impacts on private schools would be negligible.

City of Lewistown. Compared to the Proposed Action, Alternative 1 would bring a few additional students to the Lewistown Public Schools system. However, the short-duration, negligible impact evaluation of the Proposed Action would remain unchanged because of the ability of the Lewistown Public Schools to handle increased enrollments. There would be no long-duration impacts.

Table 4.1.3-5

Great Falls Public Schools Projected Enrollment for the Proposed Action, Alternatives 1, 2, and 3, and Cumulative Impacts 1990-91 Through 2000-01

	1990-91	1991-92	1992-93	1993-94	1994-95	1995-96
Proposed Action	123	210	600	786	870	1,058
Alternative 1	122	210	541	648	696	797
Alternative 2	126	218	613	802	874	1,077
Alternative 3	123	210	600	786	870	1,058
Cumulative Impacts	123	210	659	904	987	1,174

	1996-97	1997-98	1998-99	1999-2000	2000-01
Proposed Action	1,299	1,256	1,216	1,210	1,210
Alternative 1	942	901	861	858	858
Alternative 2	1,467	1,539	1,538	1,509	1,472
Alternative 3	1,299	1,256	1,216	1,210	1,210
Cumulative Impacts	1,416	1,374	1,333	1,330	1,330

City of Conrad. The inmigration projections to Conrad for the Proposed Action and Alternative 1 would be the same. Therefore, the short-duration, negligible impact evaluation of the Proposed Action would remain unchanged. There would be no long-duration impacts.

Alternative 2.

City of Great Falls. Compared to the Proposed Action, Alternative 2, with the onbase housing option, would bring approximately 260 more students (Table 4.1.3-5) to the GFPS system during the operations phase. Slightly more than half of these projected enrollments would be elementary students and therefore, would increase enrollment at Loy Elementary School by approximately 72 percent. This increased enrollment represents an additional 32 pupils per classroom, and added to the baseline pupil-to-teacher ratio, would be much higher than local or state maximum standards. Therefore, the long-duration evaluation of LOI and significance for the Proposed Action of high and significant would be applicable to Alternative 2 with the onbase housing option. Short-duration impacts would be negligible. The short- and long-duration impact on private schools would be negligible.

If no military family housing is built onbase, elementary enrollments are projected to be distributed to schools located west and southwest of Malmstrom AFB. Chief Joseph, Lewis and Clark, Morningside, Mountain View, and Sunnyside elementary schools would be affected. About 580 elementary students out of the 810 projected for the operations years would be expected to attend these five schools resulting in an average pupil-to-teacher ratio of over 31-to-1 for the five schools. This compares to a ratio of 30-to-1 for the Proposed Action with the offbase housing option. Therefore, long-duration impacts would remain high and significant. Short-duration impacts would be negligible. The short- and long-duration impact on private schools would be negligible.

City of Lewistown. Compared to the Proposed Action, Alternative 2 would bring a few additional students to the Lewistown Public School system. However, the short-duration, negligible impact evaluation of the Proposed Action would remain unchanged. There would be no long-duration impacts.

City of Conrad. Compared to the Proposed Action, Alternative 2 may bring a few additional students to the Conrad Public Schools system. However, the short-duration, negligible impact evaluation of the Proposed Action would remain unchanged. There would be no long-duration impacts.

Alternative 3. Education requirements for Alternative 3, for both housing options, are the same as those presented for the Proposed Action; consequently, the LOIs and significance determinations would remain the same as those of the Proposed Action.

4.1.3.5 Public Services

Alternative 1. For Alternative 1, there would be a smaller inmigrant population than that associated with the Proposed Action. This reduction in population would lead to a relative reduction in demands placed on public services in the ROI. The major effects of this reduction would be felt by the jurisdictions of Great Falls and Cascade County. For Alternative 1, with the onbase housing option, Cascade County would need five fewer additional positions as compared to the Proposed Action, including one less deputy in the Sheriff's Department. Changes in impacts in the other cities and counties would be minor. Overall short-duration impacts would remain moderate and not significant. Long-duration impacts would be low because of increases in calls for service per officer for the Cascade County Sheriff's Department and the Great Falls Police Department of up to 6 percent. Impacts would be significant because of the existing overcapacity use of the county jail and lack of funding for a new facility.

For Alternative 1, with the offbase housing option, there would be a smaller increase in demands placed on public services in the City of Great Falls than with the Proposed Action. Calls for service per officer are expected to increase by approximately 6 percent compared to a 9-percent increase with the Proposed Action. Impacts would remain the same as those for Alternative 1 with the onbase housing option.

Alternative 2. For Alternative 2, there would be a larger inmigrant population as compared to the Proposed Action. This increase in population would lead to a relative increase in demands placed on public services in the ROI, especially in the City of Great Falls and Cascade County. For Alternative 2, with the onbase housing option, Cascade County would need three more positions in 1996 as compared to the Proposed Action and five more positions during the operations phase as compared to the Proposed Action, including one additional deputy in the Sheriff's Department. Changes in impacts in the other cities and counties would be minor. Overall short-duration impacts would remain moderate and not significant. Long-duration impacts would be high because of increases in calls for service per officer of greater than 10 percent for the Cascade County Sheriff's Department. Impacts would be significant due to the current lack of capacity in the county jail and the unavailability of funding for a new facility.

For Alternative 2, with the offbase housing option, there would be a larger increase in demands placed on public services in the City of Great Falls than with the Proposed Action. Calls for service per officer are expected to increase by approximately 12 percent compared to a 9-percent increase with the Proposed Action. Impacts would remain the same as those for Alternative 2 with the onbase housing option.

Alternative 3. Public service demands for Alternative 3 would be similar to those presented for the respective housing options for the Proposed Action. Short-duration impacts would remain moderate and not significant, and long-duration impacts would be moderate and significant.

4.1.3.6 Public Finance

Alternative 1. Lower employment and population levels for this alternative as compared to those for the Proposed Action would result in lower service demands and, subsequently, lower expenditure requirements by the potentially affected local government units in the study area. The lower employment and population levels would also effectively result in lower property taxes collected, lower state intergovernmental transfers, and lower revenues from the other nontax revenue sources. Alternative 1 revenues and expenditures would be approximately one-third less than those estimated for the Proposed Action. Revenue shortfalls would also decrease by similar levels. However, the LOI and significance would remain the same for each jurisdiction as those for the Proposed Action.

Onbase Housing Option. Program-induced revenues for the City of Great Falls are estimated to increase gradually over the FY 1990 to FY 1996 period with Alternative 1, reaching approximately $1.1 million by FY 1996 and stabilizing at approximately $1 million in FY 2000 and thereafter (Table 4.1.3-6). Program-induced expenditure increases follow a similar pattern, increasing to approximately $1.2 million by FY 1996 and stabilizing at $1.1 million in FY 2000 and thereafter. Shortfalls of only $37,000 are estimated in FY 1990 and under $100,000 in FY 1992 through FY 2000 and thereafter. These shortfalls would represent less than 0.5 percent of the city's projected budget over these years. Capital facility requirements would remain the same as those for the Proposed Action.

Long-duration fiscal impacts would occur for the City of Great Falls because program-induced revenue shortfalls would persist throughout most of the years during the buildup phase and continue over the life of the program. Impacts would be moderate because the revenue shortfalls would be less than historically experienced by the city. The impact would not be significant because the cumulative effect of the shortfalls would not reduce fund balances below historical levels.

Cascade County program-induced revenues are estimated to increase gradually over the FY 1990 to FY 1996 period, reaching approximately $490,000 in FY 1996 and stabilizing at approximately $450,000 in FY 2000 and thereafter. Program-induced expenditures are estimated to increase to approximately $720,000 by FY 1996 and stabilize at $660,000 in FY 2000 and thereafter. Annual revenue shortfalls ranging from $26,000 in FY 1990 to $230,000 in 1996 are estimated. Long-duration revenue shortfalls are estimated to be approximately $210,000 in FY 2000 and thereafter. Capital facility requirements would remain the same for this alternative as those for the Proposed Action. Long-duration fiscal impacts would occur for the county because program-induced revenue shortfalls would persist over the buildup phase and continue over the life of the program. The impacts would be moderate because the revenue shortfalls would be less than historically experienced. Impacts would be significant because the cumulative effect of the shortfalls would reduce fund balances below historical levels by FY 1994.

Table 4.1.3-6

Fiscal Impacts of Alternative 1 for the City of Great Falls and Cascade County, Montana
FY 1990-2000
(thou.1986$)

	Fiscal Year										
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Onbase Housing Option											
City of Great Falls											
Revenues	$147.0	$284.0	$658.0	$810.0	$868.0	$973.0	$1,145.0	$1,108.0	$1,053.0	$1,048.0	$1,048.0
Expenditures	183.0	282.0	738.0	860.0	913.0	1,065.0	1,232.0	1,183.0	1,137.0	1,133.0	1,133.0
Net	-37.0	2.0	-80.0	-50.0	-45.0	-92.0	-87.0	-75.0	-83.0	-84.0	-85.0
Cascade County											
Revenues	$60.0	$136.0	$281.0	$358.0	$382.0	$419.0	$489.0	$482.0	$455.0	$452.0	$452.0
Expenditures	86.0	184.0	447.0	519.0	550.0	617.0	716.0	687.0	659.0	657.0	657.0
Net	-26.0	-48.0	-166.0	-161.0	-167.0	-198.0	-226.0	-205.0	-205.0	-205.0	-205.0
Offbase Housing Option											
City of Great Falls											
Revenues	$147.0	$284.0	$674.0	$871.0	$949.0	$1,067.0	$1,256.0	$1,235.0	$1,180.0	$1,175.0	$1,175.0
Expenditures	183.0	282.0	738.0	898.0	951.0	1,065.0	1,270.0	1,221.0	1,175.0	1,171.0	1,171.0
Net	-37.0	2.0	-64.0	-27.0	-2.0		-14.0	14.0	5.0	4.0	4.0
Cascade County											
Revenues	$60.0	$136.0	$296.0	$418.0	$462.0	$511.0	$598.0	$606.0	$579.0	$576.0	$576.0
Expenditures	86.0	184.0	447.0	519.0	550.0	617.0	716.0	687.0	659.0	657.0	657.0
Net	-26.0	-48.0	-151.0	-101.0	-88.0	-107.0	-117.0	-81.0	-80.0	-81.0	-81.0

Note: Data reflect revenues and expenditures of general fund, special revenue, and capital projects funds. Net values may not reflect differences because of rounding.

For Great Falls Elementary School District No. 1, program-induced revenues are estimated to increase gradually over the FY 1990 to FY 1997 period, reaching approximately $1.6 million in FY 1997 and stabilizing at $1.5 million in FY 2000 (Table 4.1.3-7). Program-induced expenditures are estimated to peak in FY 1996 at $1.7 million and stabilize at $1.5 million in FY 2000. Because of the lag time between when state foundation monies and property taxes are received by the district and when the additional pupils arrive, revenue shortfalls ranging up to $360,000 in FY 1992 are estimated. During the operations phase, program-induced revenues and expenditures would be approximately equal. Short-duration impacts would be moderate because the revenue shortfalls over the buildup phase are less than historically experienced by the district. The impact would be significant because the cumulative effects of the shortfalls would reduce fund balances below historical levels by FY 1992. Long-duration impacts would be negligible.

For the Great Falls High School District No. A, program-induced revenues are estimated to increase gradually over the FY 1990 to FY 1997 period, reaching approximately $1 million in FY 1997 and stabilizing at $940,000 in FY 2000. Program-induced expenditures are estimated to peak in FY 1996 at $1 million and stabilize at $910,000 in FY 2000. Revenue shortfalls ranging up to $210,000 in FY 1992 are estimated over the buildup phase. During the operations phase, program-induced revenues and expenditures would be approximately equal. Short-duration impacts would be moderate because the revenue shortfalls would be less than historically experienced. Because these shortfalls would reduce fund balances below historical levels by FY 1996, the fiscal impacts for the high school district would be significant. Long-duration impacts would be negligible.

Offbase Housing Option. Program-induced revenues for the City of Great Falls are estimated to increase gradually over the FY 1990 to FY 1996 period reaching approximately $1.3 million in FY 1996 and stabilizing at approximately $1.2 million in FY 2000 and thereafter (Table 4.1.3-6). Program-induced expenditure increases would follow a similar pattern, increasing to approximately $1.3 million by FY 1996 and stabilizing at $1.2 million in FY 2000 and thereafter. With the offbase housing option, program-induced revenues and expenditures during the operations phase would be approximately equal to each other, and long-duration impacts would be negligible. Moderate and not significant impacts are projected during the buildup phase.

Cascade County's program-induced revenues for the offbase housing option are estimated to increase gradually over the FY 1990 to FY 1997 period, reaching approximately $610,000 in FY 1997 and stabilizing at approximately $580,000 in FY 2000 and thereafter. Program-induced expenditures are estimated to increase to approximately $720,000 in FY 1996 and stabilize at $660,000 in FY 2000 and thereafter. Annual revenue shortfalls ranging from $30,000 to $150,000 are estimated over the FY 1990 to FY 1999 period. Long-duration revenue shortfalls are estimated to be approximately $80,000 in FY 2000 and thereafter.

Long-duration fiscal impacts would occur for Cascade County because program-induced revenue shortfalls would persist throughout the buildup phase and continue over the life of the program. Impacts would be moderate because the revenue shortfalls would be less than those historically experienced by the county. The impact would be significant because the cumulative effects of the shortfalls would reduce fund balances below historical levels by FY 1995.

For Great Falls Elementary School District No. 1, program-induced revenues are estimated to increase gradually over the FY 1990 to FY 1997 period, from $70,000 in FY 1990 to approximately $1.5 million in FY 1997 and stabilizing at $1.4 million in FY 2000 and thereafter (Table 4.1.3-7). Program-induced expenditures are estimated

Table 4.1.3-7

Fiscal Impacts of Alternative 1 for the Great Falls Elementary and High School Districts
School Years 1990-2000
(thou,1986$)

	School Years										
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Onbase Housing Option											
Elementary District No. 1											
Revenues	$67.0	$279.0	$591.0	$1,032.0	$1,188.0	$1,304.0	$1,501.0	$1,638.0	$1,574.0	$1,534.0	1,530.0
Expenditures	215.0	370.0	955.0	1,144.0	1,229.0	1,407.0	1,664.0	1,590.0	1,520.0	1,514.0	1,514.0
Net	-148.0	-91.0	-364.0	-112.0	-41.0	-103.0	-163.0	47.0	54.0	20.0	16.0
High School District No. A											
Revenues	$44.0	$172.0	$371.0	$638.0	$32.0	$806.0	$929.0	$1,009.0	$969.0	$945.0	$944.0
Expenditures	130.0	223.0	576.0	690.0	741.0	849.0	1,004.0	960.0	917.0	914.0	914.0
Net	-86.0	-51.0	-206.0	-53.0	-9.0	-43.0	-75.0	49.0	52.0	32.0	30.0
Offbase Housing Option											
Elementary District No. 1											
Revenues	$67.0	$242.0	$468.0	$915.0	$1,066.0	$1,157.0	$1,338.0	$1,493.0	$1,429.0	$1,389.0	$1,386.0
Expenditures	215.0	370.0	955.0	1,144.0	1,229.0	1,407.0	1,664.0	1,590.0	1,520.0	1,514.0	1,514.0
Net	-148.0	-128.0	-486.0	-229.0	-163.0	-250.0	-326.0	-97.0	-90.0	-125.0	-128.0
High School District No. A											
Revenues	$44.0	$150.0	$297.0	$564.0	$655.0	$713.0	$825.0	$915.0	$876.0	$852.0	$850.0
Expenditures	130.0	223.0	576.0	690.0	741.0	849.0	1,004.0	960.0	917.0	914.0	914.0
Net	-86.0	-73.0	-279.0	-126.0	-87.0	-136.0	-179.0	-44.0	-41.0	-62.0	-63.0

Note: Net values may not reflect differences due to rounding.

to peak at $1.6 million in FY 1997 and stabilize at $1.5 million in FY 2000 and thereafter. Revenue shortfalls of up to $490,000 in FY 1992 are estimated over the buildup phase. Shortfalls of approximately $130,000 are estimated in FY 2000 and thereafter. Long-duration, moderate impacts would occur because the program-induced revenue shortfalls are estimated over the buildup phase and continue over the life of the program, but at levels below those historically experienced. Because these shortfalls would reduce fund balances below historical levels by FY 1993, the fiscal impacts would be significant. No short-duration impacts were identified.

For Great Falls High School District No. A, program-induced revenues are estimated to increase gradually over the FY 1990 to FY 1998 period, from $44,000 in FY 1990 to approximately $920,000 in FY 1997 and stabilizing at $850,000 in FY 2000 and thereafter. Program-induced expenditures are estimated to peak at $1 million in FY 1996 and stabilize at $910,000 in FY 2000 and thereafter. Annual revenue shortfalls of up to $280,000 are estimated over the buildup phase. Shortfalls of approximately $60,000 are estimated in FY 2000 and thereafter. Long-duration, moderate impacts would occur because program-induced shortfalls are estimated over the buildup phase and would continue over the life of the program, but at levels below those historically experienced. Because these shortfalls would reduce fund balances below historical levels by FY 1995, the fiscal impacts would be significant. No short-duration impacts were identified.

Alternative 2. Higher employment and population levels for this alternative, with the onbase housing option, would result in higher service demands and, subsequently, higher expenditure requirements. The higher employment and population levels would also result in higher property taxes collected, higher state intergovernmental transfers, and higher revenues from other nontax revenue sources. Program-induced revenues and expenditures would be approximately 20 percent greater than those estimated for the Proposed Action. However, fiscal impacts would remain the same for each jurisdiction as those for the Proposed Action.

Onbase Housing Option. Program-induced revenues for the City of Great Falls with this housing option are estimated to increase gradually over the FY 1990 to FY 1998 period, reaching approximately $1.9 million by FY 1998 and stabilizing at approximately $1.8 million in FY 2000 and thereafter (Table 4.1.3-8). Program-induced expenditure increases would follow a similar pattern, increasing to approximately $2 million by FY 1998 and stabilizing at $2 million in FY 2000 and thereafter. Shortfalls of under $100,000 are estimated in FY 1990 and in FY 1992 to FY 1995 and would be about $150,000 in FY 2000 and thereafter. Capital facility requirements would remain the same for this alternative as those for the Proposed Action.

Long-duration fiscal impacts would occur for the city because program-induced revenue shortfalls would persist throughout most of the years during the buildup phase and continue over the life of the program. Impacts would be moderate because the revenue shortfalls are less than historically experienced by the city. Long-duration impacts would not be significant because the size of the shortfalls would not reduce fund balances below historical levels. No short-duration impacts were identified.

Cascade County program-induced revenues are estimated to increase gradually over the FY 1990 to FY 1998 period, reaching approximately $810,000 in FY 1998 and stabilizing at approximately $780,000 in FY 2000 and thereafter. Program-induced expenditures are estimated to increase to approximately $1.2 million by FY 1997 and stabilize at approximately this level in FY 2000 and thereafter. Annual revenue

Table 4.1.3-8

Fiscal Impacts of Alternative 2 for the City of Great Falls and Cascade County, Montana
FY 1990-2000
(thou. 1986$)

	Fiscal Year										
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Onbase Housing Option											
City of Great Falls											
Revenues	$152.0	$297.0	$747.0	$1,000.0	$1,091.0	$1,311.0	$1,766.0	$1,878.0	$1,882.0	$1,849.0	$1,808.0
Expenditures	189.0	292.0	821.0	1,074.0	1,153.0	1,385.0	1,907.0	2,027.0	2,025.0	1,993.0	1,953.0
Net	-37.0	5.0	-75.0	-74.0	-62.0	-74.0	-141.0	-149.0	-143.0	-143.0	-145.0
Cascade County											
Revenues	$63.0	$144.0	$319.0	$441.0	$483.0	$562.0	$746.0	$808.0	$813.0	$800.0	$781.0
Expenditures	90.0	190.0	496.0	623.0	708.0	806.0	1,108.0	1,196.0	1,195.0	1,175.0	1,150.0
Net	-27.0	-46.0	-178.0	-182.0	-225.0	-244.0	-362.0	-388.0	-382.0	-376.0	-369.0
Offbase Housing Option											
City of Great Falls											
Revenues	$152.0	$297.0	$762.0	$1,069.0	$1,194.0	$1,435.0	$1,926.0	$2,084.0	$2,088.0	$2,055.0	$2,014.0
Expenditures	189.0	292.0	821.0	1,112.0	1,191.0	1,461.0	1,983.0	2,103.0	2,102.0	2,031.0	1,991.0
Net	-37.0	5.0	-59.0	-43.0	3.0	-27.0	-57.0	-19.0	-14.0	24.0	22.0
Cascade County											
Revenues	$63.0	$144.0	$334.0	$509.0	$584.0	$683.0	$903.0	$1,010.0	$1,015.0	$1,002.0	$983.0
Expenditures	90.0	190.0	496.0	623.0	708.0	806.0	1,108.0	1,196.0	1,195.0	1,175.0	1,150.0
Net	-27.0	-46.0	-162.0	-114.0	-124.0	-123.0	-205.0	-186.0	-180.0	-173.0	-167.0

Note: Data reflect revenues and expenditures of general fund, special revenue, and capital projects funds. Net values may not reflect differences because of rounding.

shortfalls ranging from $30,000 in FY 1990 to $390,000 in FY 1997 are estimated. Long-duration revenue shortfalls are estimated to be approximately $370,000 in FY 2000 and thereafter.

Long-duration fiscal impacts would occur in Cascade County because program-induced revenue shortfalls would persist throughout the buildup phase and continue over the life of the program. Impacts would be moderate because the revenue shortfalls are less than historically experienced by the county. The impact would be significant because the cumulative effect of the shortfalls would reduce fund balances below historical levels by FY 1994. No short-duration impacts were identified.

For Great Falls Elementary School District No. 1, program-induced revenues are estimated to increase gradually over the FY 1990 to FY 1998 period, reaching approximately $2.7 million in FY 1998 and stabilizing at $2.6 million in FY 2000 (Table 4.1.3-9). Program-induced expenditures are estimated to peak in FY 1997 at $2.7 million and stabilize at $2.6 million in FY 2000. Because of the lag time between when state foundation monies and property taxes are received by the district and when the additional pupils arrive, revenue shortfalls of up to $430,000 in FY 1992 are estimated during the buildup phase. Long-duration revenues and expenditures are estimated to be approximately equal. Short-duration impacts would be moderate because the revenue shortfalls would be less than historically experienced by the district. The impact would be significant because the cumulative effect of the shortfalls would reduce fund balances below historical levels by FY 1992. Long-duration impacts would be negligible.

For Great Falls High School District No. A, program-induced revenues are estimated to increase gradually over the FY 1990 to FY 1998 period, reaching approximately $1.7 million in FY 1998 and stabilizing at $1.6 million in FY 2000. Program-induced expenditures are estimated to peak in FY 1997 at $1.6 million and stabilize at approximately these levels in FY 2000. Revenue shortfalls of up to $240,000 in FY 1992 are estimated over the buildup phase. Revenues and expenditures would be approximately equal over the operations phase. Short-duration impacts would be moderate because the revenue shortfalls would be less than historically experienced by the district. The impact would be significant because the cumulative effect of the shortfalls would reduce fund balances below historical levels by FY 1996. Long-duration impacts would be negligible.

Offbase Housing Option. Program-induced revenues for the City of Great Falls are estimated to increase gradually over the FY 1990 to FY 1998 period reaching approximately $2.1 million in FY 1998 and stabilizing at approximately $2 million in FY 2000 and thereafter (Table 4.1.3-8). Program-induced expenditure increases would follow a similar pattern, increasing to approximately $2.1 million by FY 1997 and stabilizing at $2 million in FY 2000 and thereafter. With the offbase housing option, program-induced revenues and expenditures during the operations phase are approximately equal to each other, and long-duration impacts would be negligible. Short-duration, moderate, and not significant impacts are estimated during the buildup phase.

Cascade County program-induced revenues for the offbase housing option are estimated to increase gradually over FY 1990 to FY 1997, reaching approximately $1 million in FY 1997 and stabilizing at approximately $980,000 in FY 2000 and thereafter. Program-induced expenditures are estimated to increase to approximately $1.2 million in FY 1997 and stabilize at this level in FY 2000 and thereafter. Annual revenue shortfalls ranging from $27,000 to $210,000 are estimated over the FY 1990 to FY 1999 period. Long-duration revenue shortfalls are estimated to be approximately $170,000 in FY 2000 and thereafter.

Table 4.1.3-9

Fiscal Impacts of Alternative 2 for the Great Falls Elementary and High School Districts
School Years 1990-2000
(thou,1986$)

	School Years										
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Onbase Housing Option											
Elementary District No. 1											
Revenues	$68.0	$291.0	$653.0	$1,227.0	$1,498.0	$1,720.0	$2,188.0	$2,620.0	$2,694.0	$2,683.0	$2,641.0
Expenditures	223.0	384.0	1,082.0	1,415.0	1,542.0	1,901.0	2,590.0	2,717.0	2,714.0	2,664.0	2,599.0
Net	-155.0	-93.0	-429.0	-189.0	-45.0	-181.0	-402.0	-97.0	-20.0	20.0	42.0
High School District No. A											
Revenues	$45.0	$179.0	$410.0	$759.0	$923.0	$1,064.0	$1,358.0	$1,618.0	$1,662.0	$1,654.0	$1,628.0
Expenditures	135.0	232.0	653.0	854.0	931.0	1,147.0	1,563.0	1,640.0	1,638.0	1,607.0	1,568.0
Net	-90.0	-52.0	-243.0	-95.0	-8.0	-83.0	-205.0	-22.0	24.0	47.0	59.0
Offbase Housing Option											
Elementary District No. 1											
Revenues	$68.0	$254.0	$517.0	$1,070.0	$1,333.0	$1,495.0	$1,898.0	$2,386.0	$2,461.0	$2,449.0	$2,406.0
Expenditures	223.0	384.0	1,082.0	1,415.0	1,542.0	1,901.0	2,590.0	2,717.0	2,714.0	2,664.0	2,599.0
Net	-155.0	-130.0	-564.0	-345.0	-209.0	-406.0	-693.0	-331.0	-254.0	-214.0	-193.0
High School District No. A											
District No. A											
Revenues	$45.0	$158.0	$328.0	$661.0	$819.0	$923.0	$1,175.0	$1,466.0	$1,511.0	$1,503.0	$1,476.0
Expenditures	135.0	232.0	653.0	854.0	931.0	1,147.0	1,563.0	1,640.0	1,638.0	1,607.0	1,568.0
Net	-90.0	-74.0	-325.0	-193.0	-112.0	-224.0	-388.0	-173.0	-127.0	-104.0	-92.0

Note: Net values may not reflect differences due to rounding.

Long-duration fiscal impacts would occur for Cascade County because program-induced revenue shortfalls would persist throughout the buildup phase and continue over the life of the program. Impacts would be moderate because the revenue shortfalls would be less than those historically experienced by the county. The impact would be significant because the cumulative effects of the shortfalls would reduce fund balances below historical levels by FY 1995. No short-duration impacts were identified.

For Great Falls Elementary School District No. 1, program-induced revenues are estimated to increase gradually over the FY 1990 to FY 1998 period, reaching approximately $2.4 million in FY 1998 and stabilizing at this level in FY 2000 and thereafter. Program-induced expenditures are estimated to reach $2.7 million in FY 1998 and stabilize at $2.6 million by FY 2000 and thereafter. Revenue shortfalls of up to $560,000 in FY 1992 are estimated over the buildup phase. Shortfalls of approximately $190,000 are estimated in FY 2000 and thereafter. Long-duration, moderate impacts would occur because the program-induced revenue shortfalls are estimated over the buildup phase and would continue over the life of the program, but at levels below those historically experienced. Because these shortfalls would reduce fund balances below historical levels by FY 1992, the fiscal impacts would be significant. No short-duration impacts were identified.

For Great Falls High School District No. A, program-induced revenues are estimated to increase gradually over the FY 1990 to FY 1998 period, reaching approximately $1.5 million in FY 1998 and stabilizing at this level in FY 2000 and thereafter. Program-induced expenditures are estimated to reach $1.6 million in FY 1997 and stabilize at this level in FY 2000 and thereafter. Annual revenue shortfalls of up to $325,000 are estimated over the buildup phase. Shortfalls of approximately $90,000 are estimated in FY 2000 and thereafter. Long-duration, moderate impacts would occur because program-induced shortfalls are estimated over the buildup phase and would continue over the life of the program, but at levels below those historically experienced. Because these shortfalls would reduce fund balances below historical levels by FY 1993, the fiscal impacts would be significant. No short-duration impacts were identified.

Alternative 3. Public finance impacts for Alternative 3 would be the same as those presented for the Proposed Action. Consequently, the LOI and significance determinations would remain the same for each jurisdiction.

4.1.4 Cumulative Impacts

4.1.4.1 Economic Base

Simultaneous deployment of the Small ICBM and Peacekeeper in Rail Garrison programs at Malmstrom AFB would slightly increase the effects of Small ICBM deployment alone. Cascade County employment and income benefits would be larger. Construction-sector effects from 1991 through 1993 would be somewhat exacerbated, but short- and long-duration impacts would remain moderate and not significant. Total regional jobs created by the Small ICBM and Peacekeeper in Rail Garrison (most of which would be in Cascade County) would reach 5,040 in 1993, 5,150 in 1996, and 4,725 by the year 2000.

The Peacekeeper in Rail Garrison program is not expected to have any measurable adverse impacts or beneficial economic effects on Fergus or Pondera counties. Short- and long-duration cumulative impacts would remain moderate and not significant.

4.1.4.2 Demographics

Deployment of the Peacekeeper in Rail Garrison program at Malmstrom AFB is expected to add about 700 people to the military population of the Great Falls urban area. This additional population is not expected to change the level or significance of the area's demographic effects (Table 4.1.4-1). Long-duration cumulative impacts would remain moderate and significant.

4.1.4.3 Housing

Approximately 160 additional construction workers are expected to inmigrate into the Great Falls area as a result of the Peacekeeper in Rail Garrison program. This would increase total worker inmigration from 340, for the Small ICBM alone, to 500 during the 1990 to 1991 period. Because of the short-term nature of their jobs, nearly 40 percent of these workers would be expected to use temporary (hotel/motel) accommodations while the remainder would use available permanent housing. The cumulative demand for temporary housing is not projected to exceed available facilities in Great Falls and would generate beneficial effects through increased occupancy and income.

A total of 190 additional family housing units would be needed for Peacekeeper in Rail Garrison operations personnel. The private housing market is expected to provide about ten new units in the Great Falls area as a result of increased demand from inmigrating Peacekeeper in Rail Garrison-related military personnel. For operations personnel, an additional 150 units would be provided either onbase or offbase by the Air Force through MCP or through private-sector programs in the Great Falls area. The remaining 30 personnel would live in existing offbase housing, decreasing the vacancy rate only nominally. The demand for onbase dormitory modules would increase by 50 because of the Peacekeeper in Rail Garrison program. The short- and long-duration cumulative impact on the housing market in the Great Falls area would be moderate due to reduced vacancy rates. Short- and long-duration, beneficial effects would still occur due to lower vacancies and higher income. These impacts would be not significant since adequate housing could be provided by the local housing market.

Table 4.1.4-1

Population Impacts of the Small ICBM and Peacekeeper in Rail Garrison Programs at Malmstrom AFB (1990-2000)

	Calendar Year					
	1990	1991	1992	1993	1994	1995
Proposed Action	770	1,310	3,750	4,910	5,440	6,610
Rail Garrison	0	0	370	740	730	730
Cumulative	770	1,310	4,120	5,650	6,170	7,340

	Calendar Year				
	1996	1997	1998	1999	2000
Proposed Action	8,120	7,850	7,600	7,580	7,580
Rail Garrison	730	740	730	730	730
Cumulative	8,850	8,590	8,330	8,310	8,310

4.1.4.4 Education

City of Great Falls. Compared to the Proposed Action, the cumulative impacts of the Small ICBM and Peacekeeper in Rail Garrison programs would increase school enrollment by 120 students (Section 4.1.3.4, Table 4.1.3-5), 66 of which are estimated to be elementary school-age children. The LOI and significance evaluation of the Proposed Action would remain unchanged (long-duration, high, and significant impacts).

City of Lewistown. The Lewistown Public Schools system would not be affected by the Peacekeeper in Rail Garrison program. Therefore, the LOI and significance assessment of negligible would remain unchanged.

City of Conrad. The Conrad Public Schools system would not be affected by the Peacekeeper in Rail Garrison program. Therefore, the LOI and significance assessment of negligible would remain unchanged.

4.1.4.5 Public Services

The concurrent basing of the Small ICBM and Peacekeeper in Rail Garrison programs at Malmstrom AFB is expected to bring in an additional 700 people to the Great Falls urban area. This increase in population, above the effects of the Proposed Action, is projected to create the need for two additional personnel in government employment for both the City of Great Falls and Cascade County. No measurable effects are expected to be felt in the other study areas. Short-duration cumulative impacts on public services would remain the same as those for the Proposed Action, moderate and not significant. Long-duration impacts would remain moderate and significant.

4.1.4.6 Public Finance

With concurrent deployment of the Small ICBM and Peacekeeper in the Rail Garrison programs at Malmstrom AFB, revenues and expenditures of the potentially affected jurisdictions would be slightly higher than those for the Proposed Action. Program-induced revenues and expenditures of the city, county, and school districts would increase approximately 9 percent over levels estimated for the Proposed Action. Because of the limited effect onbase development has on the tax base of the jurisdictions and the relatively small employment increases associated with the Peacekeeper in Rail Garrison program relative to the Proposed Action, revenue shortfalls would increase only slightly. Impacts would remain the same as those for the Proposed Action.

4.1.5 Impacts of the No Action Alternative

With the No Action Alternative, socioeconomic activity associated with maintenance of the current Minuteman force and other missions would continue indefinitely at Malmstrom AFB.

Employment and population in north-central Montana are projected to increase gradually through the year 2000 without the Proposed Action or Alternatives 1, 2, and 3. Most of this growth would be concentrated in Great Falls and Helena, with little growth or even modest declines expected in the rural counties. Unemployment rates should decrease to the regional average of 6 percent. The military population (active-duty personnel plus dependents) of the Great Falls urban area should stay at about 10,500 persons, or 15.2 percent of total community population. Some anticipatory growth, followed by decline, could occur if individuals and businesses speculate on the likelihood that the program would be implemented.

The supply of housing units in the Great Falls urban area is expected to increase from about 30,300 units in 1990 to 31,200 units by the year 2000. The vacancy rate for available units is expected to decline slightly from 3.5 percent to 3.1 percent during this period. No increase in housing stock or vacancy rates is projected for either Lewistown or Conrad.

The GFPS system enrollments have steadily decreased since 1976-77, from a total of 16,579 students to a 1986-87 enrollment of 12,193. Enrollments are expected to increase gradually over the next 10 years, to about 13,300 in the year 2000-01. Staffing levels have followed the enrollment trend, and some school buildings have been closed since the peak year of enrollments in 1970-71 at around 20,000 students. Under baseline conditions, it is likely that additional staff would be hired and that one or more empty schools may be reopened to accommodate the increased enrollment.

The enrollment in the Lewistown Public Schools system peaked in 1977-78 at 2,138 students and has steadily declined to an enrollment of 1,631 students in 1986-87. The projected enrollment for the Lewistown Public Schools system would remain stable, if not decrease slightly in the next few years.

The Conrad Public Schools system enrolled around 1,500 students in 1976-77, but enrollments have decreased since that time to 742 students in 1986-87. The enrollments at the Conrad Public Schools system are expected to remain stable with the exception of an increase of approximately 20 to 40 students expected in 1988 as a result of an Air Force Strategic Training Range detachment locating in Conrad.

The City of Great Falls government is projected to need an additional 17 personnel by the year 2000, including 4 additional sworn police officers. Cascade County government is projected to need an additional 14 personnel by the year 2000, including 2 more deputies in the Sheriff's Department. The Cascade County jail would be further burdened by the added use resulting from the population growth. Current staffing and facilities for public services in other jurisdictions under study are projected to be adequate to meet the needs of the communities in the near future.

Revenues and expenditures of the City of Great Falls are estimated to remain around current levels through FY 1988 and gradually increase to historical levels by the 1990s. However, revenues and expenditures of Cascade County are expected to continue to decline if current trends continue. Improvements in the county's fiscal position is assumed to be limited to a stabilization of revenues and expenditures at these lower levels. School district revenue and expenditure levels are assumed to increase slightly as projected enrollments increase, assuming state foundation program monies remain at current per pupil rates.

4.1.6 Potential Mitigation Measures

Mitigations are measures that could be undertaken to reduce or eliminate potential significant program impacts. All, some, or none of the measures identified for socioeconomics may be implemented. For each measure, the agencies that may be involved in implementation are identified. Potential mitigation measures for socioeconomics include the following:

- Package contracts to afford local firms with limited bonding capacities the opportunity to bid on contracts. Contract awards to local firms would reduce population inmigration during the construction phase and enhance local revenues. This approach was used for the Peacekeeper program at F.E. Warren AFB, Wyoming. As a result, around 40 percent of the prime contracts were awarded to Wyoming firms and over 50 percent of all subcontractors used were based in Wyoming (U.S. Army COE and the Federal Highway Administration).

- Provide information to the Montana Job Service about availability of jobs (by type) and the requisite skills needed for them. This information could then be passed on to local offices throughout the state in an effort to reduce the number of job seekers inmigrating into the area (U.S. Air Force contractors and the Montana Job Service).

- Extend community in-briefings to all program-related workers and include information that will assist them in the process of assimilation into the community. The Air Force and local organizations should work together to implement this plan before the construction phase starts. This information should describe the character of the community and its people, cultural opportunities, human service organizations, health care facilities, and recreation areas (U.S. Air Force and local organizations).

- Coordinate the community orientation program with local government, social, and religious organizations. This coordination will ensure a comprehensive program. The Air Force will include community groups in the preparation of its orientation program at the time that the program is developed prior to the operations phase (U.S. Air Force and local agencies).

- Develop measures to accommodate increased school enrollment associated with inmigrating program personnel. Measures are presented to accommodate program-induced school enrollments as they progress from slight increases during early construction years to major increases during operations.

    - Establish a working group to (1) better define the extent and timing of the educational impact problems, (2) research possible alternative solutions to these problems, and (3) suggest preferred mitigations. This working group would include superintendents of schools, the state superintendent of public instruction, and appropriate Air Force and other federal officials and would be appointed as soon as the program begins (State of Montana school officials, U.S. Air Force, and other federal agencies).

    - Hire additional staff to maintain satisfactory pupil-to-teacher ratios. Districtwide elementary teacher requirements are projected to be approximately 25 to 30 additional teachers. This measure would provide staffing levels similar to levels experienced over the past 10 years (GFPS system).

    - Redefine the elementary school attendance boundaries to better utilize existing facilities. This mitigation would retain the neighborhood school concept and would distribute new enrollments more evenly (GFPS system).

    - Purchase additional new school buses, as required, to transport students from Malmstrom AFB to area schools. This measure would be effective in reducing pressure for new facilities around the Malmstrom AFB area but would not support the maintenance of the neighborhood school concept within the GFPS system (GFPS system).

    - Convert the currently vacant Paris Gibson Junior High School to an elementary school. The Paris Gibson Junior High School is currently not utilized for regular classroom purposes. Conversion to an elementary school would be effective in reducing pressure for new facilities around the

Malmstrom AFB area, but would require more busing for elementary enrollments. In relieving the overcrowding of elementary facilities by this conversion, the existing junior high schools may experience some facility constraints (GFPS system).

  - Convert to a middle school concept where grades 6 through 8 would enroll in middle schools, thereby removing grade 6 from overcrowded elementary schools. This would provide the use of over 30 additional classrooms for grades K through 5, but would require that the existing two operational junior high schools and one empty junior high absorb the grade 6 enrollments (GFPS system).
  - Construct an elementary school in Great Falls as necessary to maintain the neighborhood school concept. This school would incorporate facilities for a special education magnet program to serve the base and community at large. For example, Loy Elementary School serves the Malmstrom AFB area; with the onbase housing option, it would experience a projected increase of approximately 600 elementary students during the operations phase which would more than double current enrollment. The GFPS system has a tradition of neighborhood elementary schools. This measure would be effective in maintaining this concept and provide the needed classrooms and facilities required by program-induced enrollment increases (GFPS system).

- Establish a working group to coordinate human service activities among local agencies. This action would be effective for identifying areas of potential increased demands, allow for planning, and would not be too costly. The Air Force would participate in the working group which would be activated as soon as funding for the Small ICBM program is authorized. Other members of this working group would include directors of human service agencies and city and county officials (U.S. Air Force and local human service agencies).

- Supply detailed construction site maps and schedules to emergency services agencies who operate in and around the construction areas. Educate local emergency service agency personnel about the program and potential risk of accidents. This measure would alleviate problems of access to worksites as well as reduce response times. The Air Force should initiate this process before the start of the construction phase (U.S. Air Force).

- Develop educational programs for pertinent social issues. This action may help to prevent problems such as child abuse, domestic violence, and alcoholism. It may also alleviate many of the service demands placed on local agencies. The local agencies would coordinate in developing these programs in the early years of the program. This action may require periodic updates (local service agencies).

- Summarize and distribute information on available human and social services. This action would be effective in optimizing available services, but could place additional demands on local agencies. Currently, Great Falls has a community resource directory, but knowledge of an access to this directory is limited. The local agencies would coordinate in compiling these data during the early years of the program. This action may require periodic updates (local human and service agencies).

- Promote volunteerism by compiling lists of needs by agencies. This action would promote effective use of local talent, increase social awareness, assist in the assimilation process of inmigrants, and build good relations between the base and the community. However, staff time would be needed to coordinate this action. The Air Force and local agencies would coordinate in the promotion of volunteerism on an ongoing basis (U.S. Air Force and local agencies).

- Encourage construction contractors to participate in the local United Way campaign. This action would increase revenue to local human service agencies and would build goodwill between the community and the base. The Air Force would cooperate by presenting the campaign fund materials at meetings such as the preconstruction meetings of construction contractors on an ongoing basis (U.S. Air Force, contractors, and the local United Way).

- Expand onbase human and social service programs for military personnel. This action would reduce many of the service demands on local agencies. The Air Force would make the required expansions in advance of the operations years (U.S. Air Force).

- Expand cooperative agreements with neighboring counties to help alleviate overcrowding in Cascade County jail. This measure would reduce overcrowding at the jail as well as circumvent the need for reduced prison sentences and early releases brought on by the overcrowding. The Cascade County Sheriff's Department should work out the feasibility of this approach with the respective agencies in the area (Cascade County).

- Help promote private construction of a new jail facility. This action would eliminate overcrowding of the jail; the start-up costs would be financed by a third party; and the facility would add to the local tax base. Additional staff would be required to man the new facility. The leasing arrangements would have to be worked out between the private contractors and the county. Tentative plans indicate that construction could begin within 12 months; therefore, any preliminary support to make the project viable needs to be undertaken as soon as possible (local government agencies).

    - Explore P.L. 81-874 Sections 2, 3, and 6 as potential funding sources for affected schools. Section 2 refers to compensation to the local school district by the federal government when land is purchased by the federal government thereby reducing the tax base of the district. Section 3 refers to payments by the federal government to the school districts to compensate for children residing on, or whose parents are employed on, federal property. Section 6 schools are built on federal land, but could be administered by the local public school administration and school board. This program has limited current funding (GFPS system, Montana Office of Public Instruction, and U.S. Air Force).

    - Explore possible classification of students associated with this program into Super A or Super B categories rather than Regular A or Regular B categories as is the present situation. Currently the Regular categories are when between 3 percent and 20 percent of a school district's enrollment qualifies for P.L. 874 funding; the Super categories are when more than 20 percent of a school district's membership qualifies for P.L. 874 funding. The A categories refer to when a student's parents live and work on federal land. The B categories refer to when a student's parent works on federal property. Such a reclassification would lead to priority funding as opposed to residual funding for impact students (GFPS system, DOD, Department of Education, and U.S. Air Force).

  - Pursue funding for new facilities under the School Assistance in Federally Affected Areas Program (P.L. 81-815). This program has very limited current funding. Application is made to the Secretary of Education through the state educational agency (GFPS system, Montana Office of Public Instruction, and U.S. Air Force).

  - Maximize participation in P.L. 81-874 entitlement program by encouraging parents who live or work on federal facilities to respond to school district requests for information. This federal program provides aid to local school districts which have had substantial increases in school enrollments as a result of new or expanded federal activities. For the Peacekeeper program at F.E. Warren AFB, Wyoming, Air Force officials assisted Laramie County School District No. 1 by providing coverage of the P.L. 874 program in the base newspaper, sending a letter to all Air Force Peacekeeper contractors and subcontractors outlining the survey procedures and importance of the P.L. 874 program, and coordinated data requests from the school district as a result of completed 874 surveys with incomplete or questionable information (U.S. Air Force, GFPS system, and Montana Office of Public Instruction).

- Identify and implement new revenue sources. This would capture fiscal benefits associated with program activities (e.g., sales and use taxes). It would also assist in maintaining the financial position depending on the type of tax and extent of the tax base. This decision would be made by local residents and lawmakers and would occur at their discretion (local residents and local government).

- Reduce expenditures. This action would assist in maintaining the financial position of local governments, but would reduce service levels that may be unacceptable to local residents. Local officials would make this decision, on an ongoing basis (local government).

4.1.7 Irreversible and Irretrievable Resource Commitments

The proposed program requires the use of substantial quantities of labor, materials, and other economic resources during both the construction and operations phases. The expected population inmigration and the local procurement of building materials (such as cement, sand, and gravel) may alter some resource characteristics in the deployment area. Although these economic factors, once used by the proposed program, generally cannot be recovered for other purposes, the extent of their use would be small in comparison to total resource availability.

4.1.8 Relationship Between the Local Short-Term Use of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

Regional multicounty socioeconomic consequences of the proposed program on the use of the environment would be minimal during both the construction and operations years. Over the expected life of the proposed program, additional economic activity would enhance productivity in all regions considered.

4.2 Utilities

Deployment of the Small Intercontinental Ballistic Missile (ICBM) program at Malmstrom Air Force Base (AFB) would create direct and indirect impacts on utility systems serving Great Falls and the surrounding area. Direct impacts are the result of program-related construction and operations activities. Indirect impacts would result from the associated population changes. Both beneficial effects and adverse impacts are addressed. The analysis of impacts includes potable water treatment and distribution systems, wastewater systems, solid waste (including hazardous waste) collection and disposal facilities, and energy utilities.

4.2.1 Impact Analysis Methodology

The impact analysis methodology for utilities involved three separate procedures: evaluation of program impacts, determination of levels of impact (LOI), and determination of the significance of impacts. The methodology also included consideration of a number of assumptions and assumed mitigations. Local-level impacts were considered in the cities of Great Falls, Lewistown, and Conrad for potable water treatment and distribution, wastewater, and solid waste. These locations were selected as communities anticipated to have a notable population change as a result of the proposed program, based on the socioeconomic analysis and the experience gained on the installation of the Minuteman system and subsequent upgrades. For energy utilities, impacts were analyzed at a regional level including the service areas of those firms providing electricity, natural gas, and liquid fuels to the deployment area, including the cities previously mentioned. Collective assessments were made for each resource element.

4.2.1.1 Evaluation of Program Impacts

Potable Water Treatment and Distribution. Direct potable water treatment impacts were derived by evaluating types, rates, durations, and locations of water requirements. Indirect potable water treatment rates were estimated using population projections provided by the socioeconomic analysis (Section 4.1.2). Per capita rates were individually developed for Great Falls, Malmstrom AFB, Lewistown, and Conrad after reviewing historical demands (Section 4.9.1.1). These rates were then multiplied by the projected population to obtain an estimate of the potable water treatment capacity needed. Locations of these demands and proposed growth within the Region of Influence (ROI) were included in the impact analysis.

Changes in demand were estimated by comparing demands in the ROI with and without the program. Both direct and indirect demands were included. Demands are expressed in gallons per minute (gpm) or million gallons per day (MGD), and as a percent increase over the projected demands without the program. Any new capacity constructed as part of the proposed program was included in the impact analysis.

Cost changes were calculated by comparing the costs of operations and maintenance (O&M) both with and without the program. Additional costs resulting from the program (e.g., new facilities, equipment, or employees) were determined and included in the impact analysis.

Wastewater. Direct wastewater impacts were derived by evaluating the types, rates, duration, and location of wastewater requirements. Indirect wastewater treatment flows were estimated using population projections provided by the socioeconomic analysis (Section 4.1.2). Per capita wastewater flows were developed from historical data and estimates of future use. These rates were then multiplied by the projected population to obtain an estimate of the wastewater treatment capacity needed. Locations of these demands and proposed growth within the ROI were included in the impact analysis.

Changes in demand were estimated by comparing demands in the ROI with and without the program. Both direct and indirect demands were included. Demands are expressed in gpm or as MGD, and as a percent increase over the projected demands without the program. Any new capacity constructed as part of the proposed program was included in the impact analysis.

Cost changes were calculated by comparing the costs of O&M both with and without the program. Additional costs resulting from the proposed program (e.g., new facilities, equipment, or employees) were determined and were included in the impact analysis.

Solid Waste. Solid waste impacts were derived by evaluating the types, rates, duration, and location of wastes generated as a result of the program. Direct solid wastes generated from construction activities were estimated using an average of 0.6 pounds per construction worker per day. Indirect solid waste generation rates were estimated using population projections provided by the socioeconomic analysis (Section 4.1.2). Per capita waste generation rates were developed from historical data and were multiplied by the projected population to obtain an estimate of the program-related solid waste generation rate. Locations of generation, disposal, and proposed growth within the ROI were determined and were included in the impact analysis.

Changes in the generation rates were estimated by comparing the rates in the ROI with and without the program. Both direct and indirect generation rates were included. Rates were expressed in cubic yards (cy), and as a percent increase over the projected generation rates without the program. Total program-related wastes were evaluated in relation to the remaining capacity of the landfills. A change in capacity was measured as a reduction in the functional service life of the facility.

Estimates of the amount of program-related hazardous wastes generated were developed based on the anticipated operational requirements of the program. Provisions for handling, storage, and disposal were reviewed to determine the adequacy of each of the onbase disposal process components.

Energy Utilities. Direct energy utility impacts were derived by evaluating the use of electricity, natural gas, and liquid fuels in the peak-construction years and during the operations phase. The inventory of existing and planned facilities, distribution systems, and contract rates of supply provided information on the ability of the systems to meet baseline and program-induced demands.

Indirect energy utility impacts were estimated from population projections provided by the socioeconomic analysis (Section 4.1.2). Per capita and energy utility customer use rates were multiplied by the projected population or housing units to obtain an estimate of the new energy demands. A factor of 0.6 kilowatt (kW) per person was used to estimate increased electricity demand and was based on historical usage data and consultations with local power companies. The location of facilities and distribution systems, and the contracted rates of supply within the ROI, were included in the impact analysis, as well as existing conservation programs.

Changes in energy demands were estimated by comparing demands in the ROI with and without the program. Both direct and indirect demands were determined and included in the analysis. Electricity demand is expressed in megawatts (MW), natural gas use is expressed in thousand cubic feet (Mcf), and liquid fuels use is expressed in gallons. Any new capacity, transmission lines, pipelines, or contracts for supply established as part of the program were incorporated into the analysis. Program-related energy use was measured as a reduction in reserve margin or proven resources, or as a percent change to baseline demands. The ability to absorb increases in energy demands and to maintain dependable supply without power outages or service interruptions was an integral part of the impact analysis.

4.2.1.2 Determination of Levels of Impact

Impacts on utilities elements are directly related to increased service populations, population-induced land development, and to specific program-related construction and operations activities. For each of the four elements of the utilities analysis (potable water treatment and distribution, wastewater, solid waste, and energy utilities), program impacts were evaluated either beneficial or adverse. The LOIs were formulated in terms of program-induced change in projected baseline utilities use for those elements where impacts were judged to be adverse. For energy utilities, LOIs were also established for each of the subelements (electricity, natural gas, and liquid fuels). A composite LOI was assigned to the energy utilities element after the relative merits of each subelement LOI was evaluated. The LOIs were defined generally for all utilities elements as the following:

- Negligible Impact -- Program-related demands would create either a minimal or no measurable increase in service requirements; no use of excess system capacity; no changes in operating practices or reliability of service.
- Low Impact -- Program-related demands would create an increase in service requirements that consume a portion of system capacity; minor changes to operating practices; reliability of service would be unaffected.
- Moderate Impact -- Program-induced demands would create an increase in service requirements that approach the system capacity; temporary disruptions of service may occur.
- High Impact -- Program-induced demands would exceed the capacity of the existing utility system; disruptions to the community and degraded service would occur.

4.2.1.3 Determination of Significance

The significance of utilities impacts was evaluated in accordance with Council on Environmental Quality (CEQ) regulations. Significance was assessed through evaluation of the context and intensity of impacts. Context includes consideration of the settings (site, local, or regional) and the duration of the impacts. The CEQ regulations provide ten items that should be considered in evaluating intensity. Of these ten items, the following are applicable to the utilities resource:

- Impacts that may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance, the effect will be beneficial.
- The degree to which the proposed action affects public health and safety.
- The degree to which the effects on the quality of the human environment are likely to be highly controversial.

- The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.

- Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment.

- Whether the action is related to other actions with individually insignificant but cumulatively significant impacts.

In addition to these considerations, which are specifically identified in the CEQ regulations, the following consideration is judged appropriate for the utilities resource:

- The degree to which the action may cause a change in the price of a resource or service, such as water use charges, sewer rates, solid waste collection rates, and electric cooperative energy charges.

On the basis of these intensity considerations and their contexts, impacts were rated as either significant or not significant.

4.2.1.4 Assumptions and Assumed Mitigations

Assumptions. As part of the environmental analysis of potential impacts on utilities systems from the program, several assumptions were made and include the following:

- Per capita water, wastewater, and solid waste generation rates will remain constant over the entire construction and operations phases.

- Current (1986) per capita energy consumption rates will remain constant during the construction and operations phases. This is a conservative assumption since national trends are toward a reduction of per capita energy use.

- The Montana Power Company (MPC) will continue to supply the electrical needs for Malmstrom AFB. Installation of a 115-kilovolt (kV) transmission line and 30-MW substation onbase will be completed prior to the Small ICBM program demands.

- Electrical requirements at the launch facilities, with either pre-engineered buildings or earth-covered igloos, will be 100 kW per site. Requirements will be reduced to 55 kW per site if only one Hard Mobile Launcher (HML) per site is deployed.

- No natural gas will be used for construction activities at the base or in the deployment area.

- Adequate petroleum supply will be available at the regional and national level through the year 2000.

- Fuel consumption for passenger vehicles will follow the historical trend in Montana of 80 percent gasoline and 20 percent diesel fuel.

- Trucks used to haul cement, aggregate, concrete, steel, and metal for construction activities will travel one-way distances of 25 miles, and will make four trips per day. Truck fuel mileage will be 5 miles per gallon (mpg).

- Construction equipment and haul trucks will use diesel fuel, and will operate 260 days per year.

- Operational fuel requirements are based on the number of trips identified in Section 1.5.2, Table 1.5.2-2; fuel use of 4 mpg for diesel vehicles and 10 or 15 mpg for gasoline vehicles. Mileage estimates are based on the following one-way figures between the identified launch facilities and Malmstrom AFB: Proposed Action - 8,519; Alternative 1 - 8,367; Alternative 2 - 10,649; and Alternative 3 - 16,209.

Assumed Mitigations. In analyzing utilities impacts, the following assumed mitigation measures were used:

- Local agencies will plan for and install facility expansions currently required or for baseline growth conditions;

- Energy planning will be coordinated with local and/or regional suppliers to ensure a timely and efficient energy supply;

- Air Force energy conservation design requirements will be incorporated into all new Air Force buildings;

- The upgrading of substations, transformers, and transmission lines in the deployment area required to meet demands at the launch facilities will be accomplished as part of the proposed program;

- The Air Force Spill Prevention and Response Plan will be updated incorporating procedures and cleanup methods necessary if spills occur at the launch facilities/HML enclosures or in transport between Malmstrom AFB and the HML enclosure;

- The Air Force Hazardous Waste Management Plan will be updated to provide additional guidance concerning the classification, handling, storage, and transport of hazardous wastes associated with the Small ICBM program.

4.2.2 Impacts of the Proposed Action

The proposed program would result in no short-duration impacts on potable water, wastewater, and solid waste systems in Great Falls. Program-related demands would gradually increase beginning in 1990, with peak demands occurring in 1996 (Table 4.2.2-1), and then continuing through the operations phase at slightly reduced levels. These long-duration impacts are considered low and not significant because new demands can be met by existing facilities without any additional cost to the consumer or deterioration in their level of service. Short-duration impacts on potable water, wastewater, and solid waste systems in Lewistown and Conrad would occur since minor increases in demand would result from construction workers residing in these cities; however, they are expected to be negligible. No long-duration impacts are expected in these cities since demands would occur over 5 years. Short- and long-duration impacts on energy utilities are expected to be low and not significant. Short-duration impacts would occur as a result of increased demands for diesel fuel during the construction phase; these demands would be met from local supplies. Long-duration, adverse impacts would occur as a result of increased energy demands; these demands would be met from existing facilities without any increased cost to the consumer or deterioration in the level of service. Long-duration, beneficial effects on energy utilities would occur as the

Table 4.2.2-1

Peak-Year, Program-Induced Impacts on Utility Systems in the Region of Influence

		Proposed Action		Alternative 1		Alternative 2		Alternative 3		
		Housing Option		Housing Option		Housing Option		Housing Option		
	Baseline	Onbase	Offbase	Onbase	Offbase	Onbase	Offbase	Onbase	Offbase	Cumulative Impacts
Potable Water in MGD[1]										
Great Falls (1996)	12.88	1.31	1.48	0.95	1.08	1.49[2]	1.70[2]	1.31	1.48	1.43
Percent Increase		10.1	11.5	7.4	8.4	11.6	13.1	10.1	11.5	11.1
Lewistown (1992)	1.90	0.02	--	0.03	--	0.04[3]	--	0.02	--	--
Percent Increase		1.3	--	1.4	--	1.9	--	1.3	--	--
Conrad (1993)	0.56	0.01	--	0.01[4]	--	0.01	--	0.01	--	--
Percent Increase		2.0	--	2.3	--	2.3	--	2.0	--	--
Wastewater in MGD										
Great Falls (1996)	10.0	0.98	1.16	0.75	0.84	1.17[2]	1.17	0.98	1.16	1.07
Percent Increase		9.8	11.6	7.5	8.4	11.7	14.3	9.8	11.6	10.7
Lewistown (1992)	2.32	0.01	--	0.01	--	0.02[3]	--	0.01	--	--
Percent Increase		0.5	--	0.5	--	0.7	--	0.5	--	--
Conrad (1993)	0.35	0.01	--	0.01[4]	--	0.01	--	0.01	--	--
Percent Increase		2.0	--	2.3	--	2.3	--	2.0	--	--
Solid Waste in cy										
Great Falls (1996)	235,400	14,441	20,113	10,653	14,610	17,361[2]	23,800[2]	14,441	20,113	15,784
Reduction in Facility Service Life in Months		6	8	4	6	6	9	6	8	6
Lewistown (1992)	17,300	312	--	338	--	468[3]	--	312	--	--
Reduction in Facility Service Life in Months		<1	--	<1	--	<1	--	<1	--	--
Conrad (1993)	25,600	105	--	105	--	120	--	105	--	--
Reduction in Facility Service Life in Months		<1	--	<1	--	<1	--	<1	--	--

Table 4.2.2-1 Continued, Page 2 of 2

	Baseline	Proposed Action Housing Option Onbase	 Offbase	Alternative 1 Housing Option Onbase	 Offbase	Alternative 2 Housing Option Onbase	 Offbase	Alternative 3 Housing Option Onbase	 Offbase	Cumulative Impacts
Energy										
Electricity in MW										
MPC (1996)	1,567	15.3	14.2	15.1	13.2	16.5	15.9	16.0	14.9	16.4
Percent Increase		1.0	0.9	1.0	0.8	1.1	1.0	1.0	1.0	1.0
Fergus Electric (1996)	22.6	3.8	--	3.5	--	4.5	--	3.5	--	3.8
Percent Increase		16.8	--	15.5	--	19.9	--	15.3	--	16.8
Marias River (1996)	31.1	0.4	--	0.5	--	0.7	--	0.4	--	0.4
Percent Increase		1.3	--	1.6	--	2.3	--	1.4	--	1.3
Sun River (1996)	28.4	1.7	--	1.7	--	2.0	--	2.3	--	1.7
Percent Increase		6.0	--	6.0	--	7.0	--	7.9	--	6.0
Natural Gas in Mcf										
Great Falls Gas (1996)	5,872,000	278,875	--	211,025	--	314,525	--	278,875	--	300,725
Percent Increase		4.7	--	3.6	--	5.3	--	4.7	--	5.1
MPC (1996)	35,600,000	278,875	--	211,025	--	314,525	--	278,875	--	300,725
Percent Increase		0.8	--	0.6	--	0.8	--	0.8	--	0.8
Liquid Fuels in Gallons										
Gasoline (1996)	37,963,000	4,027,800	--	3,041,800	--	4,802,400[2]	--	4,450,200	--	4,347,800
Percent Increase		10.6	--	8.0	--	12.6	--	11.7	--	11.5
Diesel (1991)	4,440,000	1,131,330	--	948,300[4]	--	1,231,000[5]	--	1,131,330	--	1,131,330
Percent Increase		25.5	--	21.3	--	27.6	--	25.5	--	25.5

Notes: Net value may not reflect differences due to rounding.

[1] Peak year is indicated in parentheses.

[2] Peak year is 1997 and percent increase is based on 1997 baseline.

[3] Peak year is 1994 and percent increase is based on 1994 baseline.

[4] Peak year is 1992 and percent increase is based on 1992 baseline.

[5] Peak year is 1993 and percent increase is based on 1993 baseline.

Great Falls Gas Company recovers a portion of its sales. Figure 4.2.2-1 summarizes the impacts on the utilities resource elements.

4.2.2.1 Potable Water Treatment and Distribution

No short-duration impacts for the Great Falls potable water system were identified; long-duration impacts would be low and not significant, regardless of the housing option selected. In Lewistown and Conrad, short-duration impacts would be negligible. No long-duration impacts were identified.

City of Great Falls.

Onbase Housing Option. The onbase housing option implies housing built on or in the vicinity of Malmstrom AFB and utility service provided by the base. Program-related potable water treatment requirements in Great Falls would peak in 1996, with an additional demand totaling 1.31 MGD. This requirement would increase city water demands, including onbase demands, from 12.88 MGD to 14.19 MGD or 10 percent. Maximum daily demands in 1996 would reach approximately 44.4 MGD. Capacity of the treatment plant is 48 MGD and can provide adequate supplies to meet new demands. Programmed pump and filter replacements would continue to improve the reliability of the plant.

Program-related demands at Malmstrom AFB would increase from 1.16 MGD in 1990 to 2.27 MGD in 1996 or 96 percent. Demands throughout the operations phase would remain at 2.27 MGD. The City of Great Falls has the capacity to deliver 3.37 MGD to the base through the two existing pipelines (8- and 12-inch) at 70 pounds per square inch (psi). Maximum day use would increase from 2.9 MGD to 5.7 MGD in 1996. Onbase storage facilities are used to meet maximum daily demands and have 2.8 MGD available to supplement the supply from Great Falls. Yearly demands would reach 780 million gallons (MG) in 1996, which is approximately 70 percent higher than the current yearly contract of 460 MG. To accommodate this new demand, the base would have to renegotiate their contract with the City of Great Falls. Based on the current contract, potable water requirements would increase payments to the city's water fund from $191,000 to $324,000.

Since program-related potable water demands gradually increase from 1990 to a peak in 1996 and then continue through the operations phase, no short-duration impacts were identified on the Great Falls facilities. Long-duration impacts are considered low and not significant because they would consume a portion of the potable water treatment capacity; however, reliability of service would be unaffected.

Offbase Housing Option. The offbase housing option implies housing built throughout the City of Great Falls and connected to utility systems currently servicing the city. Program-related potable water treatment requirements in Great Falls would peak in 1996 with an additional demand totaling 1.48 MGD. This requirement would increase city water demands, including onbase demands, from 12.88 MGD to 14.36 MGD or 11.5 percent. Maximum daily demands in 1996 are projected to reach 44.9 MGD. Demands associated with the offbase housing option are 1.4 percent greater than the onbase housing option due to higher per capita rates for housing located in the city; however, the impacts would not change. Capacity of the treatment plant is 48 MGD, which is adequate for the projected demands. Programmed pump and filter replacements would continue to improve the reliability of the plant.

LEVEL OF IMPACT	SIGNIFICANCE	
Adverse Impacts	Not Significant	Significant
Negligible	☐	
Low	○	●
Moderate	○	●
High	○	●
Beneficial Effects	▨	

Note: Some resource elements may have both beneficial effects and adverse impacts.

PROGRAM IMPACTS

ELEMENT/AFFECTED INTEREST	SHORT DURATION								LONG DURATION							
	PROP. ACTION		ALT. 1		ALT. 2		ALT. 3		PROP. ACTION		ALT. 1		ALT. 2		ALT. 3	
	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING
POTABLE WATER									○	○	○	○	○	○	○	○
GREAT FALLS									○	○	○	○	○	○	○	○
LEWISTOWN																
CONRAD																
WASTEWATER									○	○	○	○	○	○	○	○
GREAT FALLS									○	○	○	○	○	○	○	○
LEWISTOWN																
CONRAD																
SOLID WASTE									○	○	○	○	○	○	○	○
GREAT FALLS									○	○	○	○	○	○	○	○
LEWISTOWN																
CONRAD																
ENERGY	○	○	○	○	○	○	○	○	▨ ○	▨ ○	▨ ○	▨ ○	▨ ○	▨ ○	▨ ○	▨ ○
ELECTRICITY									○	○	○	○	○	○	○	○
MONTANA POWER COMPANY																
FERGUS ELECTRIC COMPANY									○	○	○	○	○	○	○	○
MARIAS RIVER COOPERATIVE																
SUN RIVER COOPERATIVE									○	○	○	○	○	○	○	○
NATURAL GAS									▨	▨	▨	▨	▨	▨	▨	▨
GREAT FALLS GAS COMPANY									▨	▨	▨	▨	▨	▨	▨	▨
MONTANA POWER COMPANY																
LIQUID FUELS	○	○	○	○	○	○	○	○								
GASOLINE																
DIESEL FUEL	○	○	○	○	○	○	○	○								

EM4/2

FIGURE 4.2.2-1 IMPACTS ON UTILITIES ASSOCIATED WITH THE PROPOSED SMALL ICBM PROGRAM IN MONTANA

Program-related demands at Malmstrom AFB would increase from 1.16 MGD in 1990 to 1.44 MGD in 1996 or 24.1 percent. The City of Great Falls has the capacity to deliver 3.37 MGD to the base through the two existing pipelines (8- and 12-inch) at 70 psi. In 1996, maximum day use would increase from 2.9 MGD to 3.27 MGD. Onbase storage facilities are used to meet maximum day demands and have 2.8 MGD available to supplement the supply from Great Falls. Yearly demands would reach 480 MG in 1996, which is approximately 4 percent higher than the current yearly contract of 460 MG. To accommodate this new demand, the base would have to renegotiate their contract with the city.

No short-duration impacts were identified for the Great Falls facilities since program-related potable water demands gradually increase from 1990 to 1996 and then continue through the operations phase. While these demands are 1.4 percent greater than the onbase housing option, the long-duration impacts are still considered low and not significant because they would consume a portion of the potable water treatment capacity; however, reliability of service would be unaffected.

City of Lewistown. Program-related potable water requirements for the Proposed Action would amount to an increase of 0.02 MGD or 1.3 percent in 1992 as a result of the inmigration of construction workers. Average daily use would increase to 1.92 MGD with maximum daily use increasing from 5.55 MGD to 5.76 MGD in 1992. Lewistown has the capacity to deliver 6.9 MGD from Big Springs through two pipelines (16- and 20-inch). This capacity is adequate to meet the increase in average day demands. Short-duration impacts on the potable water system would be negligible since the minimal increase can be met without any change in operating practices. No long-duration impacts were identified because program-related demands occur only over 5 years.

City of Conrad. Program-related potable water requirements for the Proposed Action would amount to an increase of 0.01 MGD or 2.0 percent in 1993 as a result of the inmigration of construction workers. Average daily use would increase to 0.57 MGD with maximum daily use increasing from 1.84 MGD to 1.88 MGD in 1993. Conrad has treatment capacity of 2.85 MGD and access to 3.4 MGD from Lake Frances through two 12-inch pipelines. This capacity is adequate to meet the increase in average daily demands. Short-duration impacts on the potable water system would be negligible since the minimal increase can be met without changing current operating practices. No long-duration impacts were identified since program-related demands are anticipated for only 5 years.

4.2.2.2 Wastewater

Regardless of the housing option selected, no short-duration impacts were identified on the Great Falls facilities; long-duration impacts on these facilities would be low and not significant. In Lewistown and Conrad, short-duration impacts would be negligible and no long-duration impacts were identified.

City of Great Falls.

Onbase Housing Option. Program-related on and offbase wastewater flows to the City of Great Falls treatment facility would peak in 1996. Average daily flows would equal 0.98 MGD or 9.8 percent over the projected baseline of 10.0 MGD. Total treatment requirements, including onbase flows, would increase to 11.0 MGD or 52 percent of the existing capacity. Maximum daily flows in 1996 are projected to reach 20.9 MGD. Treatment plant capacity is 21 MGD, which will be adequate to process flows through the year 2000.

Wastewater flows at Malmstrom AFB would increase from 0.75 MGD to 1.58 MGD by 1996 and continue at this level during the operations phase. Program-related flows represent an 111-percent increase over the projected baseline. To collect the increased onbase flows, additional sewers would have to be constructed to service the new industrial facilities and additional homes and dormitories. In addition, a new lift station would have to be installed on the eastern side of the base to pump wastes from the expanded facilities located there. Capacity of the existing force main and pumping station that deliver sewage to the city is 2.74 MGD. The pumping station would have to be upgraded to transmit the projected flows. The current contract with the City of Great Falls provides for the annual treatment of 300 MG at a cost of $150,000. As of 1996, annual flows would equal 580 MG and, based on the existing contract, revenues collected by the city would increase to $290,000.

Since program-related wastewater flows gradually increase from 1990 to a peak in 1996 and then continue through the operations phase, no short-duration impacts were identified. Long-duration impacts are considered low and not significant because they would consume a portion of the wastewater treatment capacity; however, reliability of service would be unaffected.

Offbase Housing Option. Program-related on and offbase wastewater flows to the city's wastewater system would average 1.16 MGD in 1996 (the peak year). Program-related flows would represent an 11.6-percent increase over the projected baseline of 10 MGD. Total treatment requirements, including onbase flows, would increase to 11.16 MGD or 53 percent of the existing capacity. Maximum daily flows in 1996 would reach approximately 21.2 MGD. Treatment plant capacity is 21 MGD, which will be adequate to process flows through the year 2000.

Wastewater flows at Malmstrom AFB would increase from 0.75 MGD to 0.99 MGD by 1996. Program-related flows represent a 32-percent increase over the projected baseline. To collect the increased onbase flows, additional sewers would have to be constructed to service the new industrial facilities. In addition, a new lift station would have to be installed on the eastern side of the base to pump wastes from the expanded facilities located there. Capacity of the existing force main and pumping station that deliver sewage to the city is 2.74 MGD. These facilities would have adequate capacity to transmit the projected flows. The current contract with the City of Great Falls provides for the annual treatment of 300 MG at a cost of $150,000. As of 1996, annual flows would equal 360 MG, and based on the existing contract, revenues collected by the city would be $180,000.

No short-duration impacts were identified for the Great Falls facilities since program-related wastewater flows gradually increase from 1990 to 1996 and then continue through the operations phase. While these demands are 1-percent greater than the onbase housing option, the long-duration impacts are still considered low and not significant because they would consume a portion of the wastewater treatment capacity; however, reliability of service would be unaffected.

City of Lewistown. In 1992 (peak-construction year), wastewater treatment requirements for the City of Lewistown would increase by 0.01 MGD to 2.33 MGD as a result of program-related inmigration. Maximum daily flows would increase to 3.02 MGD. The city currently has the capacity to treat 2.83 MGD and has treated flows exceeding 5 MGD for short periods of time. This capacity will be adequate to meet the increase in average daily demands. Short-duration impacts on the wastewater system would be negligible because program-related flows would not noticeably affect total daily flows or operating practices. No long-duration impacts were identified since demand would only last for 5 years.

City of Conrad. In 1993 (peak-construction year), wastewater treatment requirements for the City of Conrad would increase by 0.01 MGD to 0.36 MGD as a result of the inmigration of program-related construction workers. Maximum daily flows would increase to 0.45 MGD. Conrad has treatment capacity of 0.60 MGD. This capacity will be adequate to meet the increase in average and maximum daily demands. Short-duration impacts on the wastewater system would be negligible since program-related flows would not noticeably affect total daily flows or operating practices. No long-duration impacts were identified since demands would only last for 5 years.

4.2.2.3 Solid Waste

Regardless of the housing option selected, no short-duration impacts were identified on facilities serving Great Falls and long-duration impacts are expected to be low and not significant. In Lewistown and Conrad, short-duration impacts would be negligible, and no long-duration impacts were identified.

City of Great Falls.

Onbase Housing Option. Solid wastes generated in the Great Falls transportation study area (Mountain West Research-North, Inc. 1985), including Malmstrom AFB, are disposed at either the city's landfill or the landfill operated by Greens Disposal. Solid waste generation from the transportation study area would peak in 1996 at 14,441 cy (28 tons per day [T/day]) or a 6.1-percent increase over the baseline of 235,400 cy. A total of 111,345 cy of program-related wastes would be generated from 1990 to the year 2000. It is currently estimated that the Great Falls and Greens Disposal landfill sites have average lifespans of 15 years. Based on that estimate, program-related solid wastes would reduce the combined lifespan of these sites by 6 months. Both the city and Greens Disposal have adequate equipment to handle the slight overall increase in solid waste generation. Future landfill sites have been programmed by both operators that will provide capacity for an additional 15 years.

Hazardous wastes generated in the ROI outside Malmstrom AFB would not increase as a result of the program, regardless of the housing option selected. These wastes would continue to be shipped directly out-of-state unless Special Resources Management, Inc. is successful in establishing a transfer station in either Billings or Butte, Montana.

Solid waste generation at Malmstrom AFB would peak in 1996 with an increase of 11,476 cy. This represents a 142-percent increase over the annual baseline generation rate of 8,080 cy. An estimate of the wastes generated during the construction phase onbase was included in the analysis as direct program-induced solid wastes. From 1997 onward, annual program-related disposal requirements would decrease slightly to 11,465 cy. Currently, the base contracts with Greens Disposal and a new contract bid are scheduled for 1989.

Periodic maintenance on the 200 HML vehicles would be a source of hazardous wastes. These wastes would amount to 219,800 pounds annually and would consist primarily of battery acid (95,500 lb), antifreeze (58,900 lb), and lubricating oil and transmission and hydraulic fluids (65,400 lb). As the wastes are generated, they would be stored at approved accumulation locations prior to being turned over to the Defense Reutilization and Marketing Office (DRMO). The DRMO takes every opportunity to recycle wastes and to minimize the amount of hazardous waste requiring transport and disposal. Certain used petroleum products may be recycled by private recycling firms. In the past, the base disposed antifreeze into the Great Falls sanitary sewer system through an existing oil-water separator. Future disposal requirements will be met through recycling or disposal with the DRMO.

By 1996, hazardous waste generation from existing missions is anticipated to equal about 57,000 pounds per year. Disposal of battery acid and used petroleum products would increase this amount by 160,900 pounds if all or a portion of the petroleum products cannot be recycled. The DRMO would make arrangements for the storage and removal of these wastes. Current facilities, procedures, and contracts for hazardous waste disposal would be expanded to include hazardous wastes from the Small ICBM program.

No short-duration impacts were identified for waste-handling facilities since program-related wastes gradually increase from 1990 to a peak in 1996 and then continue through the operations phase. Because program-related solid and hazardous waste disposal requirements would be managed with a minimal change in handling and collection, and since the reduction in the combined lifespans of landfill sites for nonhazardous wastes is only 6 months out of 15 years, the long-duration impact is considered low and not significant.

Offbase Housing Option. Solid waste generation for the entire area would peak in 1996 at 20,113 cy (39 T/day) or a 8.5-percent increase over the baseline of 235,400 cy. A total of 154,116 cy of program-related wastes would be generated from 1990 to the year 2000. It is currently estimated that the Great Falls and Greens Disposal landfill sites have average lifespans of 15 years. Based on that estimate, program-related solid wastes would reduce the combined lifespans of these sites by 8 months.

Both the city and Greens Disposal have adequate equipment to handle the slight overall increase in solid waste generation. Since new offbase family housing would be constructed with this option, there may be the need for additional collection routes to service the new homes. Future landfill sites have been programmed by both operators to provide capacity for 15 additional years.

Solid waste generation at Malmstrom AFB would peak in 1996 with an increase of 1,741 cy. This represents a 22-percent increase over the annual baseline demand of 8,080 cy. An estimate of the onbase wastes generated during the construction phase was included in the analysis as direct program-induced solid wastes. From 1997 onward, annual program-related disposal requirements would continue at 1,741 cy. Currently, the base contracts with Greens Disposal, and a new contract bid is scheduled for 1989.

Generation of hazardous waste at the base and in the ROI is not anticipated to differ from the onbase housing option.

Since program-related wastes gradually increase from 1990 to peak in 1996 and then continue through the operations phase, no short-duration impacts were identified on waste-handling facilities. Since program-related solid and hazardous waste disposal requirements would be managed with a minimal change in handling and collection, and because the reduction in the combined lifespans of landfill sites for nonhazardous wastes is only 8 months out of 15 years, the long-duration impacts are considered low and not significant.

City of Lewistown. A total of 910 cy of additional solid waste would be generated from 1991 to 1995. In 1992, with a peak inmigration of 120 construction workers, 312 cy of waste would be generated; this is a 1.8-percent increase in solid waste disposal over the baseline of 17,300 cy. The disposal of the 910 cy would result in less than 1 month's change in service life of the two landfill facilities, operated by Seversons Disposal and Mister "M" Disposal, which serve the area. The existing collection systems are adequate to handle the new demands. Short-duration impacts would be negligible because the minimal increase in waste generation would not noticeably affect the service life of the landfills. No long-duration impacts were identified as a result of the wastes generated from 1991 to 1995.

City of Conrad. A total of 240 cy of additional solid waste would be generated from 1991 to 1995. In 1993, with a peak inmigration of 70 construction workers, 105 cy of waste would be generated; this is a 0.4-percent increase in solid waste disposal for that year. This increase would result in less than 1 month's change in the service life of the city-owned landfill. Since the increase in solid waste generation would not have a noticeable effect on the city's collection and disposal system, short-duration impacts would be negligible. No long-duration impacts were identified as a result of the waste generated from 1991 to 1995.

4.2.2.4 Energy Utilities

Regardless of the housing option selected, overall short- and long-duration impacts are expected to be low and not significant. Short-duration impacts would occur as a result of increased demands for diesel fuel during the construction phase; these demands would be met from local supplies. Long-duration, adverse impacts would occur as a result of increased energy demands; these demands would be met from existing facilities without any increased cost to the consumer or deterioration in the level of service. Long-duration, beneficial effects on energy utilities would occur as Great Falls Gas Company recovers a portion of its sales.

Electricity. Impacts on electrical systems have been evaluated for the MPC, which serves most of the ROI, Malmstrom AFB, and for the Fergus, Marias River, and Sun River rural electric cooperatives.

Montana Power Company.

Onbase Housing Option. The electrical demands associated with the construction and operations phases in Great Falls, Lewistown, Conrad, Malmstrom AFB, and at selected launch facilities would affect the projected peak loads and reserve margins of the MPC. Increases in demand would reach a maximum of 15.3 MW by 1996 and would reduce the 10.4-percent projected reserve margin to 9.3 percent. The load forecasts of MPC include surplus power as well as plans to purchase electricity and upgrade some existing plants. A load increase of 15.3 MW, including 4.1 MW in the deployment area, would not affect the timing or need for major resource acquisitions and the reduced reserve margin would not affect the company's obligation to maintain a 9- to 13-percent reserve margin above peak demand. No short-duration impacts were identified, and long-duration impacts would be negligible.

Malmstrom AFB increased demands are included in the program-induced demands on MPC. By 1990, the projected future baseline demand at Malmstrom AFB will be 10.85 MW. A planned 30-MW substation and 115-kV transmission line may be installed onbase prior to the proposed program replacing the use of the MPC northeast substation. The existing demand will use 36 percent of the new substation capacity. Following the construction phase, onbase demand would increase as a result of new support facilities and housing loads.

Demand would increase at the base by 6.37 MW in 1991. By 1996, when onbase construction is completed and new facilities are operational, total onbase demand would be 21.32 MW and would use 71 percent of the new substation capacity.

Offbase Housing Option. Demand would increase by 14.2 MW, including 4.1 MW in the deployment area, and would reduce the 10.4-percent reserve margin to 10.3 percent. The MPC anticipates a small resource surplus through the year 2000. Planned resource acquisition and use of adequate reserve margins would supplement this surplus. No short-duration impacts were identified, and long-duration impacts would be negligible.

Total onbase demand at Malmstrom AFB would equal 16.67 MW and would use 56 percent of the substation capacity.

Rural Electric Cooperatives. Electricity for construction at the launch facilities would be supplied by power from portable generators. The direct program-induced operational use of electricity at the launch facilities would be approximately 100 kW per site, which includes technical and nontechnical loads. This increased load would more than double the present load at the facilities. The existing transformer capacities are not sufficient to meet the new load, and would have to be upgraded along with associated system upgrades (e.g., conduits and wire sizes).

The capacities of the 50 substations serving the launch facilities range between 1 and 2 megavolt-amperes. Some of the substations would be able to handle the increased loads because of the excess capacity that is a result of overestimated load requirements for the Minuteman missiles. However, a portion of the substations would have to be upgraded to serve the increased demands at those launch facilities identified for proposed program deployment. In addition, the transmission lines at these substations would have to be upgraded. This would be constructed as part of the proposed program. Testing would be conducted to determine which substations need upgrading to serve the increased demands and to ensure that no service interruptions occur to other connected loads (e.g., private homes) at these substations.

The Proposed Action would increase the peak demands of the rural electric cooperatives that serve the launch facilities as identified in Table 4.2.2-2. The impact on Fergus Electric represents an 3.8-MW increase in peak demand or a 16.8-percent increase, and would require an increase in the company's power requirements. For Marias River Electric, the increased load of 0.40 MW represents a 1.3-percent increase in the programmed peak load. For Sun River Electric, the increased load of 1.7 MW represents a 6.0-percent increase in peak demand. This load represents an increase above the projected 0.6-percent annual rise in peak load for the cooperative.

Additional power would have to be acquired through the Central Montana Electric Power Cooperative from Basin Electric Cooperative, the Western Area Power Administration, or MPC thermogeneration plants. Since this power would be more expensive than the current supply from hydrofacilities, the cost to each rural cooperative may increase with the use of this power. The Air Force has already met with the cooperatives and is assisting them in developing a strategy for meeting the program-related demands to the satisfaction of both groups.

No short-duration impacts were identified on the rural electric cooperatives, and long-duration impacts on the Fergus and Sun River systems would be low and not significant because program-related demands would not approach the capacity of the system and its interconnections with its suppliers. Long-duration impacts on the Marias River system would be negligible since the increase is within the range of the programmed annual increases in peak loads for the cooperative.

Natural Gas and Heating. Impacts on natural gas systems have been evaluated for both the Great Falls Gas Company and the MPC.

Table 4.2.2-2

Deployment Area Power Requirements

	Proposed Action	Alternatives		
		1	2	3
Montana Power Company				
Baseline Peak Demand-1996 (MW)	1,567	1,567	1,567	1,567
Launch Facilities	41	43	53	88
Program-Related Demand (MW)	4.1	4.3	5.3	4.8
Percent Increase	0.26	0.27	0.34	0.31
Fergus Electric				
Baseline Peak Demand-1996 (MW)	22.6	22.6	22.6	22.6
Launch Facilities	38	35	45	63
Program-Related Demand (MW)	3.8	3.5	4.5	3.46
Percent Increase	16.8	15.5	19.9	15.3
Marias River				
Baseline Peak Demand-1996 (MW)	31.1	31.1	31.1	31.1
Launch Facilities	4	5	7	8
Program-Related Demand (MW)	0.40	0.50	0.70	0.44
Percent Increase	1.3	1.6	2.3	1.4
Sun River				
Baseline Peak Demand (MW)	28.4	28.4	28.4	28.4
Launch Facilities	17	17	20	41
Program-Related Demand (MW)	1.7	1.7	2.0	2.26
Percent Increase	6.0	6.0	7.0	7.9

Great Falls Gas Company. Regardless of the housing option selected, the total natural gas sales for the Great Falls Gas Company would increase. Differences for the housing options would occur in relation to increased consumption in the city versus the increased consumption at Malmstrom AFB.

With the onbase housing option, the 500 new residential customers in the City of Great Falls would increase sales by 1 percent in 1996 and by 0.5 percent in 1999. Onbase use in the community center and housing units would increase use by a maximum of 80 percent in 1996 with the completion of the housing and other facilities.

With the offbase housing option, natural gas consumption in the City of Great Falls would increase by 4.4 percent in 1996 and by 4 percent in 1999. Onbase use would increase by 7 percent in 1996 with the use of new support facilities.

Regardless of the housing option selected, total sales for Great Falls Gas Company of 278,875 Mcf would represent a maximum increase of 4.7 percent in 1996, and would decline slightly from 1997 onward. The company has a 30-percent excess capacity margin, and would easily supply the increased consumption. Presently, the infrastructure exists for Great Falls Gas Company to supply the increased demands at the base because of the recent decline in onbase natural gas use with the installation of the coal-fired central heat plant. This loss of sales to Malmstrom AFB represented 6 percent of the company's total sales. No short-duration impacts were identified for the Great Falls Gas Company since program-related consumption gradually increases from 1990 to a peak in 1996 and then continues through the operations phase. Since the program-related consumption would recover some of the lost sales from Malmstrom AFB, the long-duration effect is considered beneficial.

Malmstrom Air Force Base. In 1986, a coal-fired, high-temperature water heat plant was installed onbase and replaced 50 percent of the natural gas-fired boilers. Onbase industrial- and commercial-type facilities are heated from the coal-fired central heat plant, while housing units and some other dispersed facilities continue to use natural gas. Peak load on the plant is estimated to be 163 million British thermal units per hour (MBtu/h) by 1990, with a reserve capacity of 95 percent. Regardless of which housing option is selected, the peak load on the heat plant would increase to 233 MBtu/h by 1991. This would reduce the reserve capacity to 73 percent, and require additional capacity to ensure a minimum reserve capacity of 75 percent. By the end of 1995, the peak load would be 270 MBtu/h. With the addition of a fourth 85-MBtu/h boiler, the reserve capacity would be 94 percent, well above the assumed minimum reserve capacity of 75 percent. Additional coal consumption as a result of the new load is estimated to be 38,000 tons per year.

Montana Power Company. The program-induced increase in natural gas sales for MPC represents increased sales to Great Falls Gas Company and increased sales in Lewistown and Conrad. Regardless of the housing option selected, increased sales by MPC would reach a maximum of 0.8 percent in 1996 and 0.7 percent in the year 2000. The MPC retains a 25-year reserve of natural gas, which would adequately supply the increased demands in the ROI. No short-duration impacts were identified, and long-duration impacts on the MPC would be negligible since the program-related demands would not noticeably affect their ability to supply natural gas.

Liquid Fuels. The direct program-related use of gasoline and diesel fuel would result from construction equipment use and support vehicle use during the operations phase. Indirect fuel requirements would result from personal vehicle use associated with the inmigrating population. Liquid fuel impacts have been evaluated for the cities of Great Falls (including Malmstrom AFB), Lewistown, and Conrad. No modifications are currently programmed to the existing fuel storage tanks located at each launch facility.

Direct fuel use attributable to the Proposed Action would begin in 1990 with the start of construction at Malmstrom AFB and in the deployment area. It is estimated that 40,000 gallons of diesel fuel would be used for construction equipment and haul trucks at the base and a similar amount in the deployment area, for a total of 80,000 gallons during 1990. At the peak of construction, approximately 1 MG per year of diesel fuel would be used for construction and haul vehicles at the base and in the deployment area.

Operations-related use of gasoline and diesel fuel would be required for the identified support vehicles. Beginning in 1996, it is estimated that the operations requirements would total 468,000 gallons of gasoline and about 256,000 gallons of diesel fuel per year. Operations requirements for gasoline and diesel fuel use would be contracted by the Defense Fuel Supply Center for delivery to Malmstrom AFB. The contract for gasoline, which is renewed annually, would have to be increased to meet the new requirements associated with the Proposed Action. The present (1987) supplier of ground fuels, Conoco, would have the supply to meet the increased requirements, and delivery to the base would be by the existing tanker truck system, or through a combination of tanker truck and the Yellowstone Pipeline delivery system to the bulk petroleum products storage yard. An additional 4,500-barrel (189,000-gal) fuel storage tank is programmed for construction as part of the HML maintenance area in fiscal year 1991.

City of Great Falls. Indirect fuel requirements in the Great Falls transportation study area (including Malmstrom AFB) would peak in 1996 with the inmigration of 8,120 personnel. The Proposed Action, regardless of the housing option selected, would result in a 10.7-percent increase in the projected baseline use of gasoline in the area, and a 9.8-percent increase in baseline diesel fuel use. During the operations phase, program-induced use associated with the 7,580 inmigrants in Great Falls and at Malmstrom AFB would result in a 9.9-percent increase in projected baseline gasoline use and a 9.1-percent increase in baseline diesel fuel use.

City of Lewistown. The inmigrating population associated with construction in the deployment area would increase gasoline and diesel fuel consumption in the Lewistown area by 1.7 percent in 1992 (the peak year of inmigration). Local retailers would have adequate supply to meet the increased use.

City of Conrad. Inmigrating personnel associated with construction in the Conrad area would increase gasoline and diesel fuel consumption by 2 percent in 1993 (the peak year of inmigration). Local retailers would have adequate supply to meet the increased use.

Regardless of the housing option selected, program-induced gasoline use in the peak-construction year represents a 10.6-percent increase in the projected baseline consumption in the ROI. During the operations phase, program-induced gasoline use would increase baseline use in the ROI by 9.9 percent. Both the short- and long-duration impacts would be negligible because the baseline and program-related gasoline requirements would be supplied by local and regional refineries and the existing distribution network without any changes in operating practices. In addition, the increased use represents a small portion of total gasoline use in Montana, and adequate production facilities and supplies are available to meet the new requirements.

Regardless of the housing option selected, program-induced diesel fuel use in the peak-construction year represents a 25.5-percent increase in the projected baseline use in the ROI. During the operations phase, program-induced diesel fuel use would represent a 13.7-percent increase in the projected baseline use in the ROI. Diesel fuel use during the construction phase represents a measurable increase in local and regional use of diesel fuel. The production facilities and distribution network in the ROI would be adequate to meet the new diesel demands; therefore, the short-duration impact would be low and not significant. The long-duration impact would be negligible because the increase in diesel fuel use during the operations phase represents only a small increase in statewide diesel fuel use, and would not affect the ability of local and regional suppliers to meet diesel fuel demands.

4.2.3 Impacts of Alternatives

Impacts on utility systems for all three alternatives are rated the same as the Proposed Action, either negligible or low and not significant. Peak-year impacts on utility systems in the ROI are identified in Section 4.2.2, Table 4.2.2-1.

4.2.3.1 Potable Water Treatment and Distribution

Alternative 1. The City of Great Falls potable water treatment system, including Malmstrom AFB, would experience a peak increase in average daily water use in 1996 of 0.95 MGD with the onbase housing option as compared to 1.31 MGD for the Proposed Action. Onbase use for Alternative 1 would increase by 0.78 MGD compared to 1.11 MGD for the Proposed Action. The base's interconnections with the city's water system would be adequate to meet the forecasted demands; however, the existing contract would require renegotiation. No short-duration impacts were identified, and long-duration impacts are considered low and not significant since the total demand in 1996 of 13.84 MGD is well within the plant capacity of 48 MGD.

With the offbase housing option, average daily use in 1996 would equal 1.08 MGD compared with 1.48 MGD for the Proposed Action. Onbase use would equal 0.20 MGD. No short-duration impacts were identified, and long-duration impacts are considered low and not significant since the total demand in 1996 of 13.96 MGD is well within the plant capacity of 48 MGD.

Program-related potable water requirements for the City of Lewistown would increase to a peak of 0.03 MGD or 1.4 percent in 1992. This increase is slightly greater than the Proposed Action. Short-duration impacts are considered negligible since program-related demands would be minimal and Lewistown has adequate capacity to meet the increased demands. No long-duration impacts were identified since program-related demands would cease by 1995.

Program-related potable water requirements for Alternative 1 in the City of Conrad would peak in 1992 at 0.01 MGD instead of 1993 and would be slightly greater than the Proposed Action. Short-duration impacts would remain negligible since program-related demand are minimal and Conrad has adequate capacity meet the increased demands. No long-duration impacts were identified since program-related demands would cease by 1995.

Alternative 2. The City of Great Falls potable water treatment system, including Malmstrom AFB, would experience a peak increase in average daily water use in 1997 of 1.49 MGD with the onbase housing option as compared to 1.31 MGD in 1996 for the Proposed Action. Onbase use for Alternative 2 would increase by 1.22 MGD as compared to 1.11 MGD for the Proposed Action. The base's interconnections with the city's water system would be adequate to meet the forecasted demands; however, the existing contract would require renegotiation. No short-duration impacts were identified, and long-duration impacts are considered low and not significant since the total demand is well within the plant capacity of 48 MGD.

With the offbase housing option, average daily use would peak in 1997 equaling 1.7 MGD compared to 1.48 MGD in 1996 for the Proposed Action. Onbase use would equal 0.28 MGD. No short-duration impacts were identified, and long-duration impacts are considered low and not significant since the total demand in 1997 of 14.62 MGD is well within the plant capacity of 48 MGD.

Program-related potable water requirements for the City of Lewistown would increase to a peak of 0.04 MGD or 1.9 percent in 1994. Short-duration impacts are considered negligible since program-related demands are minimal and Lewistown has adequate capacity to meet the increased demands. No long duration impacts were identified since program-related demands would cease by 1995.

Program-related potable water requirements for the City of Conrad would increase to a peak of 0.01 MGD or 2.3 percent in 1993. Short-duration impacts would remain negligible since program-related demands would not require changes to operating practices and Conrad has adequate capacity to meet the increased demands. No long-duration impacts were identified since program-related demands would cease by 1995.

Alternative 3. Potable water treatment requirements are the same as those presented for the Proposed Action; consequently, the LOI and significance ratings do not change.

4.2.3.2 Wastewater

Alternative 1. With the onbase housing option, wastewater flows to the Great Falls treatment plant would increase by 0.75 MGD in the peak year (1996). This flow includes 0.62 MGD from program-related flows at Malmstrom AFB. The additional flows represent a 2.3-percent decrease from the Proposed Action. While program-related wastewater flows would use a portion of the available capacity of the city's treatment plant, they would not adversely affect the operation of the plant or require expansion of any of the systems at the plant. The existing contract between the city and Malmstrom AFB would have to be renegotiated. No short-duration impacts were identified, and long-duration impacts would be low and not significant.

With the offbase housing option, wastewater flows to the Great Falls treatment plant would increase by 0.84 MGD in the peak year (1996). This flow includes 0.17 MGD from program-related flows at Malmstrom AFB. Capacity of the city's treatment plant would be adequate to treat the additional flows. The existing contract between the city and Malmstrom AFB would have to be renegotiated. No short-duration impacts were identified, and long-duration impacts would be low and not significant.

Wastewater flows in the City of Lewistown for Alternative 1 would increase by 0.01 MGD to 2.33 MGD in the peak year (1992). This 0.04-percent increase over the Proposed Action is associated with additional construction activity in the Lewistown area. The city currently has the capacity to treat 2.83 MGD, which is adequate to meet the increase in demands. Short-duration impacts on the wastewater system are considered negligible. No long-duration impacts were identified since program-related flows would cease by 1995.

Wastewater flows in the City of Conrad for Alternative 1 would increase by 0.01 MGD to 0.36 MGD in 1992. This is a 1.4-percent increase over the Proposed Action. The city currently has the capacity to treat 0.6 MGD, which is adequate to meet the increase in demands. Short-duration impacts on the wastewater system are considered negligible. No long-duration impacts were identified since program-related flows would cease by 1995.

Alternative 2. With the onbase housing option, wastewater flows to the Great Falls treatment plant would increase by 1.17 MGD in the peak year (1997). This flow includes 0.96 MGD from program-related flows at Malmstrom AFB. These flows represent a 1.9-percent increase from the Proposed Action. While program-related wastewater flows would use a portion of the available capacity of the city's treatment plant, they would not adversely affect the operation of the plant or require expansion of any of the systems at the plant. The existing contract between the city and Malmstrom AFB would have to be renegotiated. No short-duration impacts were identified, and long-duration impacts would be low and not significant.

With the offbase housing option, wastewater flows to the Great Falls treatment plant would increase by 1.17 MGD in the peak year (1996). This flow includes 0.26 MGD from program-related flows at Malmstrom AFB. While program-related wastewater flows would use a portion of the available capacity of the city's treatment plant, they would not adversely affect the operation of the plant or require expansion of any of the systems at the plant. The existing contract between the city and Malmstrom AFB would have to be renegotiated. No short-duration impacts were identified, and long-duration impacts would be low and not significant.

Wastewater flows in the City of Lewistown for Alternative 2 would increase by 0.02 MGD in 1994, a 0.2-percent increase over the daily flows for the Proposed Action. Total average daily flows would increase to 2.35 MGD. The city currently has the capacity to treat 2.83 MGD, which is adequate to meet the increase in demands. Short-duration impacts on the wastewater system would be negligible. No long-duration impacts were identified since program-related flows would cease by 1995.

Wastewater flows in the City of Conrad for Alternative 2 would increase by 0.1 MGD in 1993, a 0.3-percent increase over the Proposed Action. Total average daily flows would increase to 0.36 MGD. The city currently has the capacity to treat 0.6 MGD, which is adequate to meet the increase in demands. Short-duration impacts on the wastewater system are considered negligible. No long-duration impacts were identified since program-related flows would cease by 1995.

Alternative 3. Wastewater treatment requirements are the same as those presented for the Proposed Action; consequently, the LOI and significance ratings do not change.

4.2.3.3 Solid Waste

Alternative 1. With the onbase housing option, solid waste generation in the Great Falls transportation study area, including Malmstrom AFB, would peak in 1996 at 10,653 cy. This amount represents a 1.6-percent decrease over the Proposed Action. Onbase solid waste generation would peak in 1996 with an increase of 8,026 cy. This represents a decrease of 42 percent from the Proposed Action. A total of 85,440 cy of program-related wastes would be generated in the Great Falls/Malmstrom AFB area between 1990 and the year 2000. This would reduce the combined lifespan of the two landfills by 4 months. Generation of hazardous wastes in the ROI is not expected to vary from the Proposed Action regardless of the housing option selected. The amount of hazardous waste generated at Malmstrom AFB should not change for this alternative since the number of HMLs and maintenance activities remain basically the same as the Proposed Action. No short-duration impacts were identified, and long-duration impacts would be low and not significant.

With the offbase housing option, solid waste generation in the same area would peak in 1996 with an increase of 14,610 cy. This represents a 1.1-percent decrease from the Proposed Action with the offbase housing option. Onbase solid waste generation would peak in 1996 with an increase of 1,243 cy. Between 1990 and the year 2000, a total of 166,560 cy of program-related waste would be generated. This amount would reduce the combined lifespan of the two landfills by 6 months. No short-duration impacts were identified, and long-duration impacts would be low and not significant.

Alternative 1 would increase solid waste generation by 338 cy or 2 percent in the City of Lewistown in 1992. A total of 936 cy of program-related solid wastes would be generated between 1991 and 1995. These amounts are slightly greater than the Proposed Action; however, the short-duration impact would remain negligible. Capacity of the landfills servicing Lewistown would be reduced by less than 1 month as a result of the disposal of program-related wastes from 1991 to 1995; no long-duration impacts were identified.

Alternative 1 would have the same impacts as the Proposed Action for the City of Conrad.

Alternative 2. With the onbase housing option, solid waste generation in the Great Falls transportation study area, including Malmstrom AFB, would peak in 1997 at 17,361 cy. This increase is about 2,900 cy greater than the Proposed Action. Onbase solid waste generation would peak in 1996 with an increase of 13,150 cy. This is a 15-percent increase over the Proposed Action. A total of 129,027 cy of program-related wastes would be generated in the Great Falls/Malmstrom AFB area between 1990 and the year 2000. This would reduce the combined lifespan of the two landfills by 6 months. With an additional 50 HMLs stationed in the ROI, hazardous waste generation would increase by 25 percent over the Proposed Action. The base would continue to follow its guidelines in the Hazardous Waste Management Plan and use its onbase storage facility prior to shipping the wastes to approved treatment and disposal facilities. No short-duration impacts were identified, and long-duration impacts would be low and not significant.

With the offbase housing option, solid waste generation in the same area would peak in 1997 with an increase of 23,800 cy. This represents a 1.3-percent increase over the Proposed Action with the offbase housing option. Onbase solid waste generation would also peak in 1997 with an increase of 2,130 cy. A total of 175,500 cy of program-related wastes would be generated reducing the combined lifespan of the two landfills by 9 months. No short-duration impacts were identified, and long-duration impacts would be low and not significant.

Alternative 2 would increase solid waste generation by 468 cy or 2.7 percent in the City of Lewistown in 1994. A total of 1,352 cy of additional wastes would be generated between 1991 and 1995. These amounts are slightly greater than the Proposed Action; however, the short-duration impact would remain negligible. Capacity of the landfills servicing Lewistown would be reduced by less than 1 month as a result of the disposal of program-related wastes from 1991 to 1995; no long-duration impacts were identified.

Alternative 2 would increase waste generation by 120 cy or 0.5 percent in the City of Conrad in 1993. A total of 315 cy of additional waste would be generated in Conrad between 1991 and 1995. These amounts are 0.1 percent greater than the Proposed Action; however, the short-duration impact would remain negligible. Capacity of the landfill servicing Conrad would be reduced by less than 1 month as a result of the disposal of program-related wastes from 1991 to 1995; no long-duration impacts were identified.

Alternative 3. Solid waste disposal requirements are the same as those presented for the Proposed Action; consequently, the LOI and significance ratings do not change.

4.2.3.4 Energy Utilities

Electricity.

Alternative 1. With the onbase housing option, demands on the MPC system would increase by a maximum of 15.1 MW in 1996. This would reduce the projected reserve margin of 10.4 percent to 9.3 percent. This change is 1.1 percent less than the change associated with the Proposed Action. If offbase housing is constructed, the demands would be 13.2 MW. These demands would not affect resource planning, service reliability and quality, or customer rates. No short-duration impact was identified, and the long-duration impact would remain negligible.

Alternative 1 would increase the peak demands of the rural cooperatives serving the launch facilities. Peak demand for Fergus Electric would increase by 3.5 MW or 15.5 percent and would necessitate a change in the amount of power purchased by the cooperative and may affect the purchased price as well. The long-duration impact would be low and not significant. For Marias River Electric, peak demand would increase by 1.6 percent, and the long-duration impact would remain negligible. Peak demand for Sun River Electric would be increased by 6 percent, and would require changes in the amount of power purchased by the cooperative and may increase the purchased price as well. This increase is the same as that for the Proposed Action; therefore, the long-duration impact would remain low and not significant. No short-duration impacts were identified for the rural electric cooperatives.

Alternative 2. With the onbase housing option, demands would increase on the MPC system by a maximum of 16.7 MW in 1997. This would reduce the projected 10.3-percent reserve margin to 9.2 percent. This change is 1.1 percent greater than the change associated with the Proposed Action. If offbase housing is constructed, demands would decrease to 16.1 MW. Resource planning would provide the necessary requirements to meet the demands. The reduction in the company's obligated reserve margin should not affect service reliability or quality. No short-duration impacts were identified, and the long-duration impact would remain negligible.

Alternative 2 would increase Fergus Electric's projected peak load of 22.6 MW by 4.5 MW or 19.9 percent, as compared to a 16.8-percent increase with the Proposed Action. The cooperative has planned resource requirements based on a 1-percent average annual compound growth rate in peak demand. The program-induced increase would create the need for additional peak-load capacity, and would necessitate changes to the cooperatives purchased power requirements from Central Montana Electric. The purchase price may also be affected by the increased demand, but demands would not approach the capacity of the system and its interconnections with its suppliers. Therefore, the long-duration impact would be low and not significant.

Alternative 2 would increase Marias River Electric's projected peak demand of 31.1 MW by 0.7 MW or 2.3 percent, a 1-percent increase above the Proposed Action. There would be no change to the long-duration, negligible impact rating. Alternative 2 would increase Sun River Electric's projected peak demand of 28.4 MW by 2.0 MW or 7 percent, which is 1-percent greater than the Proposed Action. The company's projected resource requirements would have to be altered to account for the program-induced load. This would create changes in the quantity of power that they would purchase from Central Montana Electric, and may affect the price that Sun River pays for the power. The long-duration impact would be low and not significant. No short-duration impacts were identified on the rural electric cooperatives.

Alternative 3. With the onbase housing option, demands on the MPC system would increase by a maximum of 16.0 MW in 1996. This alternative would reduce the MPC projected reserve margin of 10.4 percent to 9.3 percent, which is slightly less than that associated with the Proposed Action. If offbase housing is constructed, demands would increase by 14.9 MW. No short-duration impacts were identified and the long-duration impacts would remain negligible regardless of the housing option. Alternative 3 would create increases on the peak demands of the rural cooperatives supplying the launch facilities. With the use of 200 launch facilities, loads at each facility with one HML are estimated to be 50 kW per HML and 5 kW for the crew quarters, for a total of 55 kW per launch facility.

Fergus Electric's peak demand would be increased by 3.46 MW or 15.3 percent as a result of this alternative. This change is 1.5 percent less than the change associated with the Proposed Action. The increase in peak demand would necessitate changes to the cooperative's power requirements and purchases, and may affect the price paid by the cooperative, but demands would not approach the capacity of the system and its interconnections with its suppliers. The long-duration impact would be low and not significant. Marias River Electric's peak demand would increase by 0.44 MW or 1.4 percent as a result of Alternative 3, a 0.1-percent increase above the change associated with the Proposed Action. This would not affect the cooperative's power requirements and purchases, as they project an annual increase in peak demand of 2.6 percent. The long-duration impact would remain negligible. Sun River's peak demand would increase by 2.26 MW or 7.9 percent with this alternative, 1.9 percent above the change associated with the Proposed Action. This would necessitate changes to the cooperative's power purchases, and may affect the price paid for the power; therefore, the long-duration impact would be low and not significant. No short-duration impacts were identified for the rural electric cooperatives.

Natural Gas and Heating.

Alternative 1. Regardless of the housing option selected, total sales for the Great Falls Gas Company would increase by a maximum of 3.6 percent in 1996 and 3 percent in the year 2000. These increases are 1.1 percent less than those associated with the Proposed Action and would result in a negligible impact. Alternative 1 would increase sales to MPC by a maximum of 0.6 percent in 1996 and by 0.5 percent in the year 2000. These increases are 0.2 percent less than those associated with the Proposed Action. No short-duration impacts were identified, and the long-duration impact would be negligible. Long-duration impacts would also be beneficial since program-related consumption would recover some of the lost sales at Malmstrom AFB.

Alternative 1 would increase the peak load on the Malmstrom AFB central heat plant to 233 MBtu/h by 1991. By 1995, the peak load would be 270 MBtu/h. With the addition of a fourth 85-MBtu/h boiler, the reserve capacity would be 94 percent, well above the required reserve capacity of 75 percent.

Alternative 2. Regardless of the housing option selected, total sales for Great Falls Gas Company would increase by a maximum of 5.3 percent in 1996 and by 4.4 percent in the year 2000. These increases are similar to those for the Proposed Action, and would help the company to recover a majority of the lost sales to Malmstrom AFB. This long-duration effect is considered to be beneficial. Alternative 2 would increase sales to MPC by a maximum of 0.8 percent in 1996 and in the year 2000. These increases are similar to those associated with the Proposed Action and would not change the negligible long-duration impact rating. No short-duration impacts were identified.

Alternative 2 would increase the peak load on the Malmstrom AFB central heat plant to 233 MBtu/h in 1991 and to 270 MBtu/h by 1995. With the addition of a fourth 85-MBtu/h boiler, reserve capacity would be 94 percent in 1995, well above the required 75-percent reserve capacity.

Alternative 3. Natural gas requirements for Alternative 3 are the same as those presented for the Proposed Action; consequently, the LOI and significance determinations would remain the same as the Proposed Action.

Liquid Fuels.

Alternative 1. The program-induced gasoline use in the peak year (1996) would represent a 8.0-percent increase in the projected baseline use in the ROI. During the operations phase, program-induced gasoline use would increase the projected use in the ROI by 7.5 percent. These increases are about 2.6 percent less than the Proposed Action. The baseline and program-induced gasoline requirements would be supplied by local and regional refineries and the existing distribution network. The short- and long-duration impacts are considered negligible since there are adequate production facilities and supplies available in the ROI to meet the new gasoline use.

Program-induced diesel fuel use for Alternative 1 in the peak-construction year (1992) represents a 21.3-percent increase in the projected baseline use in the ROI. During the operations phase, program-induced diesel fuel use represents a 11.2-percent increase in the projected baseline use in the ROI. Diesel fuel use during the construction phase for this alternative would be 4.2 percent less than the Proposed Action; however, it represents a measurable increase in local and regional use of diesel fuel. The production facilities and distribution network in the ROI would be adequate to meet the new diesel fuel demands; therefore, the short-duration impact would be low and not significant. The long-duration impact is considered negligible because the increase in diesel fuel use during the operations phase is 2.5 percent less than the Proposed Action; however, it would not affect the ability of local and regional suppliers to meet the diesel fuel demands.

Alternative 2. The program-induced gasoline use in the peak year (1997) would represent a 12.6-percent increase in the projected baseline use in the ROI. During the operations phase, program-induced gasoline use would increase the projected use in the ROI by 12.9 percent. These increases are about 2 percent greater than the Proposed Action; however, the baseline and program-induced gasoline requirements would continue to be supplied by local and regional refineries and the existing distribution network. The short- and long-duration impacts are considered negligible since there are adequate production facilities and supplies available in the ROI to meet the new gasoline use.

Program-induced diesel fuel use for Alternative 2 in the peak-construction year (1993) would represent a 27.6-percent increase in the projected baseline use in the ROI. During the operations phase, program-induced diesel fuel use would represent a 16.8-percent increase in the projected baseline use in the ROI. Diesel fuel use during the construction phase for this alternative is 2.1 percent greater than the Proposed Action and represents a measurable increase in local and regional use of diesel fuel. The production facilities and distribution network in the ROI would be able to meet the new diesel demands; therefore, the short-duration impact would be low and not significant. The increase in diesel fuel use during the operations phase is 3 percent greater than the Proposed Action; however, it would not affect the ability of local and regional suppliers to meet the diesel fuel demands. Therefore, the long-duration impact is considered negligible.

Alternative 3. The program-induced gasoline use in the peak year (1996) would represent an 11.7-percent increase in the projected baseline use in the ROI. During the operations phase, program-induced gasoline use would increase the projected use in the ROI by 11.1 percent. These increases are 1.1 percent greater than the Proposed Action due to increased use during the operations phase. The baseline and program-induced gasoline requirements would continue to be supplied by local and regional refineries and the existing distribution network. There are adequate production facilities and supplies available in the ROI to meet the new gasoline use; therefore, the short- and long-duration impacts are considered negligible.

Program-induced diesel fuel use for Alternative 3 in the peak-construction year (1991) would represent a 25.5-percent increase in the projected baseline use in the ROI. During the operations phase, program-induced diesel fuel use would represent an 18.7-percent increase in the projected baseline use in the ROI. Diesel fuel use during the construction phase is similar to the Proposed Action and represents a measurable increase in local and regional use of diesel fuel. The production facilities and distribution network in the ROI would be able to meet the new diesel demands; therefore, the short-duration impact would be low and not significant. The increase in diesel fuel use during the operations phase is slightly higher than the Proposed Action; however, the increase would not affect the ability of local and regional suppliers to meet the diesel demands. Therefore, the long-duration impact is considered negligible.

4.2.4 Cumulative Impacts

The concurrent deployment of the Small ICBM and Peacekeeper in Rail Garrison programs would add additional personnel at Malmstrom AFB and require new construction amounting to approximately 285,000 square feet. These additions would commence in 1991 and be completed by 1993. The effects of this program in conjunction with the Proposed Action on the utilities resources of the City of Great Falls and Malmstrom AFB are discussed in the following sections.

4.2.4.1 Potable Water Treatment and Distribution

Impacts on the City of Great Falls potable water treatment system would peak in 1996 as water use increases by 1.43 MGD or 11.1 percent. Of the increase, 1.21 MGD would be attributable to demands at Malmstrom AFB. Demands associated with Peacekeeper in Rail Garrison basing would increase average daily demands by 1.0 percent over the Proposed Action. Total average daily use for the entire system would reach 14.3 MGD.

No short-duration impacts were identified, and long-duration impacts would be low and not significant since the program-related increase would use only a portion of the available capacity of the Great Falls treatment facility. In addition, the base's interconnections with the city's water system can supply 3.37 MGD, which would be adequate to meet average daily demands. The base's contract with the city allows for the annual use of 460 MG. During the operations phase, annual use would increase to 870 MG requiring renegotiation of the existing contract.

The potable water systems of Lewistown and Conrad would not be affected as a result of the Peacekeeper in Rail Garrison program.

4.2.4.2 Wastewater

Wastewater flows to the Great Falls treatment plant would increase by 1.07 MGD to a peak of 11.08 MGD by 1996. The additional flows represent a 0.9-percent increase over the Proposed Action. Wastewater flows at Malmstrom AFB would increase by 0.91 MGD in 1996 and continue at this level during the operations phase. Capacity of the existing pump station and force main that deliver sewage to the city is 2.74 MGD and the treatment plant capacity equals 21 MGD. These facilities have adequate capacity to transmit and process the projected flows. The current contract with the City of Great Falls provides for the annual treatment of 300 MG at a cost of $150,000. As of 1996, annual flows would equal 605 MG, and costs, based on the existing contract, would increase to $302,500.

No short-duration impacts were identified, and long-duration impacts would be low and not significant since program-related wastewater flows would use only a portion of the available capacity of the city's treatment plant and would not adversely affect the operation of the plant or require expansion of any of the systems at the plant. The existing contract between the city and Malmstrom AFB would have to be renegotiated.

The wastewater systems of Lewistown and Conrad would not be affected as a result of the Peacekeeper in Rail Garrison program.

4.2.4.3 Solid Waste

The cumulative effects on solid waste generation in Great Falls, the surrounding area, and at Malmstrom AFB would peak in 1996 with an additional 15,784 cy. This increase is 0.6 percent greater than the Proposed Action. Program-related onbase waste generation would peak in 1996, and 12,428 cy of additional wastes would be generated. This is a 8.3-percent increase over the Proposed Action. Total program-related solid wastes generated in the Great Falls/Malmstrom AFB area between 1990 and the year 2000 would be 122,319 cy. This would reduce the remaining service life of the two landfills by 5.5 months.

Generation of hazardous wastes in the ROI is not expected to vary from the Proposed Action. However, the amount of hazardous waste generated at Malmstrom AFB with the Peacekeeper in Rail Garrison program may be greater. No short-duration impacts were identified for solid waste-handling facilities. Because program-related solid and hazardous waste disposal requirements would be managed with a minimum change in handling and collection, and since the reduction in the combined lifespans of the landfill sites is only 5.5 months out of 15 years, the long-duration impact is considered low and not significant.

Solid waste generation at Lewistown and Conrad would not be affected by the Peacekeeper in Rail Garrison program.

4.2.4.4 Energy Utilities

Electricity. The Small ICBM and Peacekeeper programs would cumulatively increase demand on MPC by a maximum of 16.4 MW in 1996. This would reduce the projected 10.4-percent reserve margin by 1.1 percent. This change is similar to the Proposed Action, and no short-duration impact was identified. Long-duration impacts would remain negligible.

The cumulative effects of the Small ICBM and Peacekeeper in Rail Garrison programs would increase the projected peak load of Fergus Electric by 16.8 percent, the same as that for the Proposed Action. This increase would necessitate changes in the amount of power purchased by the cooperative and may have the effect of increasing the price paid for power by the cooperative. The long-duration impact would be low and not significant. The cumulative effects of the two programs on the peak demand for Marias River would be similar to that of the Proposed Action. Because the 1.3-percent increase would not create the need for additional power purchases, the long-duration impact would be negligible. For Sun River Electric, the cumulative effects of the two programs would increase peak demand by 6 percent, the same as that for the Proposed Action. Because this would necessitate changes in the amount of power purchased by the cooperative, and may also affect the price paid for power by Sun River, the long-duration impact would be low and not significant. No short-duration impacts were identified for any of the four suppliers of electrical power.

Natural Gas. The cumulative effects would result in an increase in sales for the Great Falls Gas Company of a maximum 5.1 percent in 1996, and 4 percent in the year 2000, similar to the Proposed Action. This would help to recover a majority of the reduced sales to Malmstrom AFB as a result of the installation of the onbase central heat plant. No short-duration impacts were identified; the long-duration effect on the Great Falls Gas Company would be beneficial. The increase in total sales of 300,725 Mcf for MPC would be slightly greater than the Proposed Action and would amount to a maximum of 0.8 percent in 1996 and in the year 2000. No short-duration impacts were identified, and long-duration impacts would remain negligible. The cumulative effects on the heating load at Malmstrom AFB would amount to a peak load of 239 MBtu/h by 1991, reducing the reserve capacity to 71 percent. By the end of 1995, peak load would be 275 MBtu/h. These increases in peak load are slightly higher than the Proposed Action. With the installation of an additional 85-MBtu/h boiler in 1991, there would be sufficient reserve capacity to meet any peak loading requirements.

Liquid Fuels. The cumulative effects of the Small ICBM and Peacekeeper in Rail Garrison programs would result in a 11.5-percent increase over projected baseline gasoline use in the ROI in the peak year (1996). During the operations phase, program-induced gasoline use would increase the projected use in the ROI by 10.9 percent. The baseline and program-induced gasoline requirements would be supplied by local and regional refineries and the existing distribution network. There are adequate production facilities and supplies available in the ROI to meet the new gasoline use; therefore, the short- and long-duration impacts would be negligible.

Cumulative effects of the Small ICBM and Peacekeeper in Rail Garrison programs during the construction phase would represent a 25.5-percent increase in the projected baseline diesel fuel use in the ROI. During the operations phase, program-induced diesel fuel use would represent a 14.4-percent increase in the projected baseline use in the ROI. The impact on diesel fuel use during the construction phase is the same as the Proposed Action and represents a measurable increase in local and regional use of diesel fuel. The production facilities and distribution network in the ROI would be able to meet the new diesel fuel demands; therefore, the short-duration impact would be low and not significant. The increase in diesel fuel use during the operations phase is slightly higher than the Proposed Action, but it would not affect the ability of local and regional suppliers to meet the diesel fuel demands. Therefore, the long-duration impact would be negligible.

4.2.5 Impacts of the No Action Alternative

With the No Action Alternative, activities associated with maintenance of the current Minuteman program would continue indefinitely at Malmstrom AFB.

4.2.6 Potential Mitigation Measures

No mitigation measures are recommended for utilities beyond those assumed in Section 4.2.1.4.

4.2.7 Irreversible and Irretrievable Resource Commitments

Direct program energy requirements for the construction and operations phases represent the only irreversible and irretrievable resource commitment of energy resources required for the program.

4.2.8 Relationship Between the Local Short-Term Use of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

The quantities of energy required for proposed program construction and operations phases are small in a local and regional context. The use of these resources now would not materially affect their availability for future use. The proposed program would not affect future energy development.

4.3 Transportation

The deployment of the proposed Small Intercontinental Ballistic Missile (ICBM) program at Malmstrom Air Force Base (AFB) has the potential to increase congestion and delay on transportation systems. As a result, the impact analysis process for transportation included consideration of roads, public transportation, railroads, and commercial airports. Emphasis is placed on impacts affecting the road/highway system.

4.3.1 Impact Analysis Methodology

The impact analysis methodology for transportation involved three separate procedures: evaluation of program impacts, determination of levels of impact (LOI), and determination of the significance of impacts. The methodology also included consideration of a number of assumptions and assumed mitigations. Impacts were evaluated at the site and local levels and a collective assessment was made for each resource element. For roads, local-level impacts were evaluated for principal arterial streets in Great Falls, Lewistown, and Conrad, and on primary, secondary, and county roads in the deployment area. Site-level impacts on roads were evaluated for potential construction sites along the transporter/erector (T/E) route network. For public transportation, local-level impacts were evaluated for the City of Great Falls. For railroads and airports, impacts were evaluated at the local level for Great Falls, Lewistown, and Conrad.

4.3.1.1 Evaluation of Program Impacts

Roads. The analysis of the effects of the proposed program on roads is centered on the potential impacts of direct and indirect worker commuting. Proposed program impacts on roads were examined in terms of peak-hour commuting levels of service (LOS) (Section 3.3.2.2, Table 3.3.2-1). The analysis involved an estimation of the number of workers and inmigrants that would use specific lengths of roads/highways, conversion of these program-induced commuters to peak-hour traffic volumes, and estimation of the resultant with-program LOS.

Program manpower estimates and their classes of activity (construction, assembly and checkout [A&CO], operations, etc.) were obtained from the proposed program description. Both direct and indirect transportation impacts were addressed in this study. Direct transportation impacts were derived from program-induced traffic such as commuting by construction and operations personnel, construction traffic, and Hard Mobile Launcher (HML) maintenance movements. Indirect transportation impacts were induced by traffic generated by worker dependents, service and utilities operations, and indirect employment.

Program-related travel patterns were evaluated on the basis of proposed program work locations, work schedules, and vehicle occupancies. A detailed phasing schedule for launch facility modifications and road improvements will be developed as part of the siting process. For purposes of this environmental analysis, a general phasing schedule was assumed. Road and launch facility construction closest to the base would be accomplished first and then gradually move farther from the base. The most direct routes from population centers to the worksites were then determined, and the corresponding program-induced traffic was assigned to the road/highway system. Commuters were converted to trips through application of ridership factors. For this analysis, all workers were assumed to commute by passenger car, with a ridership of 1.1 passengers per vehicle for up to 10 miles, 1.35 passengers per vehicle for distances between 10 and 15 miles, and 1.55 passengers per vehicle for longer distances. These factors are derived from information in the National Cooperative Highway Research Program Report 187, Quick Response Urban Travel Estimation Techniques and Transferable Parameters User's Guide (Transportation Research Board 1978) and are found to be reasonable values for these distance ranges.

Travel patterns by inmigrants within population centers, particularly within Great Falls, were estimated for the program years by using the procedures for traffic assignment described in the Transportation Research Board report. The number of additional inmigrant vehicle trips was combined with baseline traffic projections to determine impacts on the urban road system. Traffic assignments were made only on principal arterials within the urban limits. These principal arterials were identified by the federal-aid urban system. The resulting then-year LOS was subsequently calculated and compared to the without-program conditions. The LOS for arterial streets was determined using the procedures in the Highway Capacity Manual (Transportation Research Board 1985). These procedures provided the basis for evaluating the degree of congestion on roads in terms of the increase in number of vehicles (including heavy commercial vehicles) and evaluating the effects of increased queue and delays and reduction in safety levels.

Public Transportation. The analysis of the effects of the proposed program on public transportation was centered on the ability of the public transit system to service the demands of the program-induced population. Program-related public transit demand was estimated based on the projected population and housing demands identified by the socioeconomics analysis. These were then added to future without-program conditions, and the resulting total transit demand was compared to the future or planned baseline capacity of the public-transit system.

Railroads. The analysis of the effects of the proposed program on railroads was centered on the potential change in rail-transport demand brought about by specific program requirements, particularly the movement of heavy construction and operations equipment and materials. Program-related rail demands were obtained from the proposed program description and were added to future without-program conditions. The resulting transport system total demand was then compared to the future or planned baseline capacity of the rail-transport system.

Airports. The analysis of the effects of the proposed program on airports was centered on the potential change in air-transport demand and its effect on airport facilities. Program-related air passenger traffic and freight demands were added to future without-program conditions. The resulting total air-transport demands were then compared to the future or planned baseline capacity of the air-transport system.

4.3.1.2 Determination of Levels of Impact

The effect of program-induced traffic on the quality of transportation service would have different levels of intensity. The measure of quality, or LOI, would vary in relation to the ratio of the rate of flow to the capacity of the transportation facility. The LOIs are defined in the following sections for each of the transportation elements.

Roads. For roads, the change in the intensity of the quality of service is measured by changes in the traffic LOS. The LOI assignments are related to the changes in motorist safety and satisfaction associated with changes in the LOS rating or with appreciable increases in volume at degraded service levels. For example, a change from LOS A to B results in comparatively little inconvenience, delay, or hazard. By contrast, a change from LOS E to F results in breakdown conditions: the level of annoyance is high, delays are severe, and the potential for collisions is sharply increased. An appreciable impact may be produced even without a change in LOS rating if the roadway section is already at a degraded LOS rating (LOS D, E, or F) and additional traffic will result in annoyance, slowing, and increased hazard. An increase in the amount of heavy vehicles in the traffic stream could also change the LOS rating. Impacts are considered negligible if the volume of traffic attributable to the proposed program is not appreciable (i.e., is less than what would occur in 2 yr of normal growth), regardless of the occurrence of a calculated change in LOS. The operational conditions along freeways and multilane roads, two-lane highways, and urban arterial streets under each LOS letter score are described in Section 3.3.2.2, Table 3.3.2-1.

The measurement of the changes in quality of service at arterial sections is also expressed in terms of changes in the arterial LOS. The same LOI assignments using LOS changes were applied for measuring effects of increased queue lengths, delays, and service operations on arterial streets.

The LOIs reflecting these considerations are characterized as follows:

- Negligible Impact -- No change would occur in LOS for categories A, B, or C, even with the addition of appreciable volumes of traffic. Although traffic volumes may increase, the motorist would perceive no essential difference in traffic operations.

- Low Impact -- The LOS would decline from A to B or B to C, or appreciable volume is added at LOS D. The motorist might perceive a slight change in traffic operations.

- Moderate Impact -- The LOS would decline from A to C, C to D, or D to E, or appreciable volume is added at LOS E. The motorist would perceive a noticeable decrease in the quality of service of traffic operations.

- High Impact -- The LOS would decline from A to D, A to E, A to F, B to D, B to E, B to F, C to E, C to F, D to F, or E to F, or appreciable volume is added at LOS F. The motorist would perceive a decided decrease in service quality of traffic operations, or existing LOS F conditions would be extended in duration and/or worsened.

Public Transportation. For local passenger bus transit, the quality of service is measured by scheduling, passenger comfort, and ease of travel. For taxis, the quality of service is measured by response time, travel time, and size of fleet. Comfort is largely determined by the degree of crowding in the bus, or the number of passengers who are forced to stand rather than sit. At some stage, capacity can be exceeded and additional buses or taxis should be placed in service. Additional buses could offer a higher level of passenger comfort, but along with additional taxis, might have a slight adverse effect on overall traffic flow. The LOIs for public transportation are as follows:

- Negligible Impact -- Change in public-transit demand that would cause an increase in the number of passengers but would require no bus schedule modifications or no increase in taxi response time or travel time.

- Low Impact -- Change in public-transit demand that would require modifications to bus schedules but all passengers would be seated, or that would cause an increase in taxi response and travel times. No additional buses or taxis would be required.

- Moderate Impact -- Change in public-transit demand that would require bus schedule changes with standees at peak hours, or that would cause increases in taxi response and travel times. Additional taxis may be added to the fleet.

- High Impact -- Change in public-transit demand where buses would be at full capacity, or increases in taxi response time would be beyond reasonable customer acceptable levels. Additional buses and taxis would be required.

Railroads. For railroads, the LOIs were measured by changes in the various aspects of rail operations, such as frequency of service, number and capacity of trains, holding facilities and railyards, and system of operations. The LOIs for railroads are the following:

- Negligible Impact -- Change in rail-transport demand that would result in no change in current schedules or no increase in regular services, such as freight handling, are needed.

- Low Impact -- Change in rail-transport demand that would require schedule changes with no additional manpower needed to handle additional freight. No additional physical facilities would be required.

- Moderate Impact -- Change in rail-transport demand that would require additional manpower and modifications to schedules and system of operations to handle additional freight. No additional physical facilities would be required.

- High Impact -- Change in rail-transport demand that would require additional manpower and the use of all present capacity of holding facilities, railyards, and other physical facilities to handle additional freight. Enlargement or relocating of facilities would be necessary.

Airports. For airports, the LOIs were measured by changes in air operations, safety, and landside facilities such as terminal building and aircraft and vehicular parking facilities. The LOIs for airports are the following:

- Negligible Impact -- Change in air-transport demand that would require no increases in airport operations or terminal facilities.

- Low Impact -- Change in air-transport demand that would require changes in schedules but no additional manpower or terminal facilities would be required to handle additional passengers and freight.

- Moderate Impact -- Change in air-transport demand that would require additional manpower and modifications to schedules and systems of operations with no additional terminal facilities required.

- High Impact -- Change in air-transport demand that would approach airport capacity, requiring changes in projected baseline operations procedures and expansion of terminal facilities at the present airport site.

4.3.1.3 Determination of Significance

The significance of transportation impacts was evaluated in accordance with Council on Environmental Quality (CEQ) regulations. Significance was assessed through evaluation of the context and intensity of impacts. Context includes consideration of the settings (site, local, or regional) and the duration of the impacts. The CEQ regulations provide ten items that should be considered in evaluating intensity. Of these ten items, the following are applicable to the transportation resource:

- Impacts that may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial.
- The degree to which the proposed action affects public health or safety.

In addition to these considerations, which are specifically identified in the CEQ regulations, the following consideration is judged appropriate for the transportation resource:

- The degree to which the LOS would be reduced below minimum desirable design standards requiring facility improvements with related capital expenditures.

On the basis of these considerations, the following criteria were developed for evaluating the significance of impacts on each transportation resource element.

Roads. An impact was considered significant if the LOS is affected at or reduced to LOS D or lower for more than 1 hour per day because of program-related traffic. The 1-hour criterion reflects a daily duration of impact beyond the usually accepted standard for road design and analysis. The LOS criterion also reflects motorists' exposure to conditions below minimum desirable design standards. An impact was also considered significant if substantial queuing and delays would occur, particularly when motorists are unable to overtake or pass slow-moving vehicles such as the HML transporter convoy. Both factors imply associated impacts on safety, and potential demands for facility improvements with related capital expenditures.

Public Transportation. An impact was considered significant if it could result in an increase in the number of passengers over a continuous extended period of time which would require additional vehicles or modifications in schedule and service.

Railroads. An impact was considered significant if it could result in increased railroad traffic for a continuous extended period of time which would require modification to facilities or could begin to affect train traffic beyond the program area.

Airports. An impact was considered significant if it could result in increased operations over a continuous extended period of time which would require modifications to the system of operations and terminal facilities.

4.3.1.4 Assumptions and Assumed Mitigations

Assumptions. During the construction phase, most of the traffic will center around the major cities of Great Falls, Lewistown, and Conrad, and the corresponding construction sites at the base and in the deployment area. This will include the movement of construction equipment, deliveries of materials and supplies, and commuting by construction workers, their dependents, and other inmigrants. Based on the construction scenario described in Chapter 1.0, Program Overview, a general phasing schedule was developed to better assign traffic on the roads/highways. Depending on the areas where construction is likely to occur, workers were assumed to commute from the nearest population centers of Great Falls, Lewistown, or Conrad. Construction workers at the base were expected to reside in Great Falls. The assignment of construction workers and the movement of construction equipment, materials, and supplies were then developed based on this construction program. Of the total number of construction workers, an average of 70 percent is expected to be filled by local hires, about 10 percent by weekly commuters from elsewhere in Montana, and about 20 percent by relocating workers either from outside or within the state. Aggregate sources within 30 miles of each construction site were identified and the shortest routes between the two were selected for analysis.

In addition to construction of program facilities, portions of the public road system currently used and designated as Minuteman T/E routes connecting Malmstrom AFB to the launch facilities will be improved. Some launch facility access roads will be widened and the turning radius of the intersection will be increased to accommodate the HML. Road and bridge construction will cause some temporary disturbances along the public right-of-way such as the storage of construction equipment and material stockpiles. A formal process involving the Federal Highway Administration (FHWA), state and local transportation agencies, Military Traffic Management Command (MTMC), and the Air Force will determine specific road improvements, location, and resources. In the interim, estimates were made regarding anticipated changes required to accommodate the Small ICBM program on existing T/E routes. Proposed improvements may include upgrading of two-lane paved and gravel roads, widening of intersections and some cattle guards, the replacement or extension of drainage culverts, and the reconstruction of bridges evaluated as incapable of accommodating the HML. Existing road and bridge upgrades were assumed to occur on roads leading to the launch facilities which are to be constructed during the year.

Assembly and installation of the missile and the reentry vehicle onto the HML will occur at Malmstrom AFB. The operational HML will then be moved to the launch facility under constant surveillance that will include security and safety escort forces providing traffic and public interface control. The A&CO of the HML enclosure at the launch facility will be supported from the base. Materials and personnel will be shuttled to and from the launch facility with commercially available transport vehicles.

During normal operations, each HML will remain stationary and will not move except for maintenance at Malmstrom AFB, which is anticipated to occur once per year per HML. Vehicle types and trip frequencies expected to occur during the operations phase are shown in Section 1.3.2, Table 1.3.2-1.

Operations personnel were assumed to reside at Malmstrom AFB or in the Great Falls area. All Site Activation Task Force and A&CO personnel were assumed to reside in the Great Falls area. Traffic commuting to the base was then assigned to principal arterial streets based on the projected distribution of housing as determined by the land use and housing analyses.

Assumed Mitigations. Normal construction procedures and practices will be exercised. Interruptions to daily traffic at road and bridge construction sites will be minimized through the use of detours or alternating direction of traffic by leaving a single lane open. Alternate routes will be used where available. In some instances, temporary detour roads with temporary bridges will be built near the bridge construction sites.

Increased maintenance work on deployment area roads may be required during the operations phase to support the proposed program. The local agencies presently maintaining the roads will continue to be responsible. The Air Force, however, will pay the local agencies concerned for any extraordinary maintenance work on the roads to accommodate program operations requirements.

4.3.2 Impacts of the Proposed Action

Overall long-duration impacts on roads would range from low to high depending on the housing option selected (Figure 4.3.2-1). These impacts would be significant for both housing options. Long-duration impacts would also be beneficial as the result of road and bridge improvements. Short-duration impacts would be high and significant for both housing options. All short- and long-duration impacts on public transportation, railroads, and airports would be negligible.

4.3.2.1 Roads

Overall short-duration impacts on roads would be high for both housing options due to increased congestion and delays including the further aggravation of service along roads already providing degraded service levels. Impacts would be significant because of the reduction in LOS below minimum desirable standards. Long-duration impacts on roads in Great Falls for the offbase housing option would remain high because of increased congestion and delays generated by operations personnel commuting to the base. Impacts would be significant because the reduction in LOS would continue over an extended period of time. Long-duration impacts on roads in Great Falls for the onbase housing option would be negligible because only a few operations personnel would commute to the base during the peak traffic hours. On deployment area roads, long-duration impacts would be low and significant. Impacts would be low because traffic volumes on deployment area roads are low and the LOS would not be reduced below minimum desirable standards during the peak traffic hours. However, impacts are considered significant because of the queuing and delays that would occur along the main roads leading to the base due to the HML transporter convoy. Overall long-duration impacts on roads would be low for the onbase housing option because of impacts on deployment area roads and high for the offbase housing option because of impacts on urban roads in Great Falls. In both cases, impacts would be significant. Long-duration impacts would have beneficial effects as a result of road and bridge improvements. Both short- and long-duration impacts on roads in Lewistown and Conrad would be negligible.

Employment opportunities generated by construction and operations activities would result in a sizable influx of people into the area and a corresponding increase in traffic. This traffic increase would be most pronounced in Great Falls because of the additional program-related population. Adverse impacts would occur when increases in traffic cause delays and inconvenience to motorists or where road improvements are needed to accommodate the anticipated traffic.

For the Proposed Action, onbase construction would start in 1990 with 785 workers making an estimated 715 passenger-car equivalent trips to the base during the peak hour. Technical and personnel support facility construction would continue until 1993. Total direct construction employment is estimated to generate additional passenger-car equivalent trips of 480, 800, and 680 in 1991 through 1993, respectively. Onbase construction activities are expected to be completed by 1994. In addition, operations personnel residing onbase are expected to generate about 10 passenger-car equivalent trips starting in 1991, increasing to 265 trips in 1996 and thereafter.

LEVEL OF IMPACT	SIGNIFICANCE	
Adverse Impacts	Not Significant	Significant
Negligible	☐	
Low	∘	•
Moderate	○	●
High	◯	⬤
Beneficial Effects	▨	

Note: Some resource elements may have both beneficial effects and adverse impacts.

PROGRAM IMPACTS

ELEMENT/AFFECTED INTEREST	SHORT DURATION								LONG DURATION							
	PROP. ACTION		ALT. 1		ALT. 2		ALT. 3		PROP. ACTION		ALT. 1		ALT. 2		ALT. 3	
	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING
ROADS	⬤	⬤	⬤	⬤	⬤	⬤	⬤	⬤	▨ •	▨ ⬤	▨ •	▨ ⬤	▨ ●	▨ ⬤	▨ •	▨ ⬤
DEPLOYMENT AREA	∘	∘	∘	∘	∘	∘	∘	∘	▨ •	▨ •	▨ •	▨ •	▨ •	▨ •	▨ •	▨ •
GREAT FALLS	⬤	⬤	⬤	⬤	⬤	⬤	⬤	⬤		⬤		⬤	●	⬤		⬤
LEWISTOWN																
CONRAD																
PUBLIC TRANSPORTATION																
RAILROADS																
AIRPORTS																

EM4/3

FIGURE 4.3.2-1 IMPACTS ON TRANSPORTATION ASSOCIATED WITH THE PROPOSED SMALL ICBM PROGRAM IN MONTANA

Deployment area construction would begin in 1990 with 215 workers making an estimated 160 passenger-car equivalent trips to the site during the peak hour. Construction activity would increase in intensity during 1991 through 1993, with an average of 330 workers making 245 trips during the peak hour, diminishing to 150 workers making 110 trips in 1994. All deployment area construction activities area expected to be completed by the fall of 1995. Construction activities would peak in 1993 with the modification of 30 launch facilities. Table 4.3.2-1 shows peak-hour trip estimates of construction and operations personnel by year.

Additional heavy vehicles would be needed to facilitate construction activities and to transport construction materials and aggregate. The estimated daily movements of heavy construction vehicles such as haul trucks and construction equipment are shown in Table 4.3.2-2. The additional heavy vehicle traffic that is expected to occur during the peak hour is based on an 8-hour day. The heavy vehicles were allocated in proportion to the estimated workforce likely to commute from each of the three major communities of Great Falls, Lewistown, and Conrad, where increases in population would likely occur.

Maintenance and security vehicles required during the operations phase include crew replacement, security, refueling, safety, and service utility vehicles. The frequency of trips generated by these vehicles, including HML movements to the base for maintenance, are given in Section 1.3.2, Table 1.3.2-1.

City of Great Falls.

Onbase Housing Option. With the construction of military family housing onbase, short-duration impacts on roads would be high because additional traffic would produce adverse effects on the 15th Street bridge, River Drive (U.S. 87 Bypass), and 10th Avenue South (portions of which are already at a degraded LOS). Impacts would be significant because of the reduction in LOS below minimum desirable standards. Long-duration impacts would be negligible because additional traffic by operations personnel residing offbase, who are expected to commute via 10th Avenue South, could use alternate routes such as 1st Avenue North and Central Avenue.

Those construction workers and operations personnel residing offbase would most likely reside in the southern (south of 10th Avenue South) and northern (Black Eagle area) sectors of the city, with some also expected to reside in the east-central part of the city near the base. They are expected to commute to the base via 10th Avenue South, 2nd Avenue North, 15th Street, and U.S. 87 Bypass (River Drive and 57th Street). Three access points to the base were considered: the commercial gate through 10th Avenue North, the main gate through 2nd Avenue North, and the south gate along U.S. 87/89 where most construction workers are expected to commute to the worksites. Consequently, the largest change in LOS related to base construction would occur along 10th Avenue South and U.S. 87 Bypass.

An estimated 785 construction workers are expected to reside in Great Falls in 1990, generating 715 passenger-car equivalent trips per day. In addition, 25 heavy construction vehicles would travel to the base during the peak hour. This could affect the section of 10th Avenue South between 2nd Street and 13th Street, which is estimated to change from LOS E to F; the section between 13th Street and 26th Street, which is expected to further degrade at LOS F; and the sections between 26th Street and 38th Street, and 38th Street and 57th Street, which could drop from LOS C to E and B to C. The LOS along 15th Street from the Black Eagle area to River Drive is expected to drop from LOS C to D with accompanying congestion occurring on the bridge. River Drive between 15th Street and 10th Avenue North, and 2nd Avenue North between 38th Street and 57th

Table 4.3.2-1

Estimated Number of Peak-Hour Vehicle Trips Made by Construction and Operations Personnel by Calendar Year

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Proposed Action											
To Malmstrom AFB											
Onbase Housing Option	715	490	845	755	525	470	565	410	270	265	265
Offbase Housing Option	715	625	1,450	1,655	1,595	1,825	2,155	2,000	1,865	1,855	1,855
To Deployment Area (Construction Only)	160	250	240	245	110	15	0	0	0	0	0
Alternative 1											
To Malmstrom AFB											
Onbase Housing Option	705	470	765	665	495	450	490	335	200	190	190
Offbase Housing Option	705	605	1,305	1,385	1,320	1,430	1,610	1,455	1,320	1,310	1,310
To Deployment Area (Construction Only)	160	270	270	265	120	20	0	0	0	0	0
Alternative 2											
To Malmstrom AFB											
Onbase Housing Option	730	515	910	820	495	390	550	660	650	550	430
Offbase Housing Option	730	655	1,520	1,725	1,585	1,800	2,365	2,475	2,470	2,370	2,250
To Deployment Area (Construction Only)	170	280	320	325	225	55	0	0	0	0	0
Alternative 3											
To Malmstrom AFB											
Onbase Housing Option	715	490	845	755	525	470	565	410	270	265	265
Offbase Housing Option	715	625	1,450	1,655	1,595	1,825	2,155	2,000	1,865	1,855	1,855
To Deployment Area (Construction Only)	160	250	240	245	110	15	0	0	0	0	0

Table 4.3.2-2

Heavy Construction Traffic for the Small ICBM Program Proposed Action and Alternatives

	1990	1991	1992	1993	1994	1995
Proposed Action						
Malmstrom AFB						
Haul Trucks	32	72	24	24	24	--
Construction Equipment per Day	175	141	112	104	48	--
Deployment Area						
Haul Trucks	184	208	152	152	96	16
Construction Equipment per Day	197	246	273	214	108	19
Alternative 1						
Malmstrom AFB						
Haul Trucks	32	72	24	24	24	--
Construction Equipment per Day	175	141	112	104	48	--
Deployment Area						
Haul Trucks	184	208	152	152	96	16
Construction Equipment per Day	104	154	211	168	78	16
Alternative 2						
Malmstrom AFB						
Haul Trucks	32	72	24	32	32	--
Construction Equipment per Day	176	152	128	121	55	--
Deployment Area						
Haul Trucks	192	208	152	160	104	16
Construction Equipment per Day	147	234	307	285	171	44
Alternative 3						
Malmstrom AFB						
Haul Trucks	32	72	24	24	24	--
Construction Equipment per Day	175	141	112	104	48	--
Deployment Area						
Haul Trucks	184	208	152	152	96	16
Construction Equipment per Day	197	246	273	214	108	19

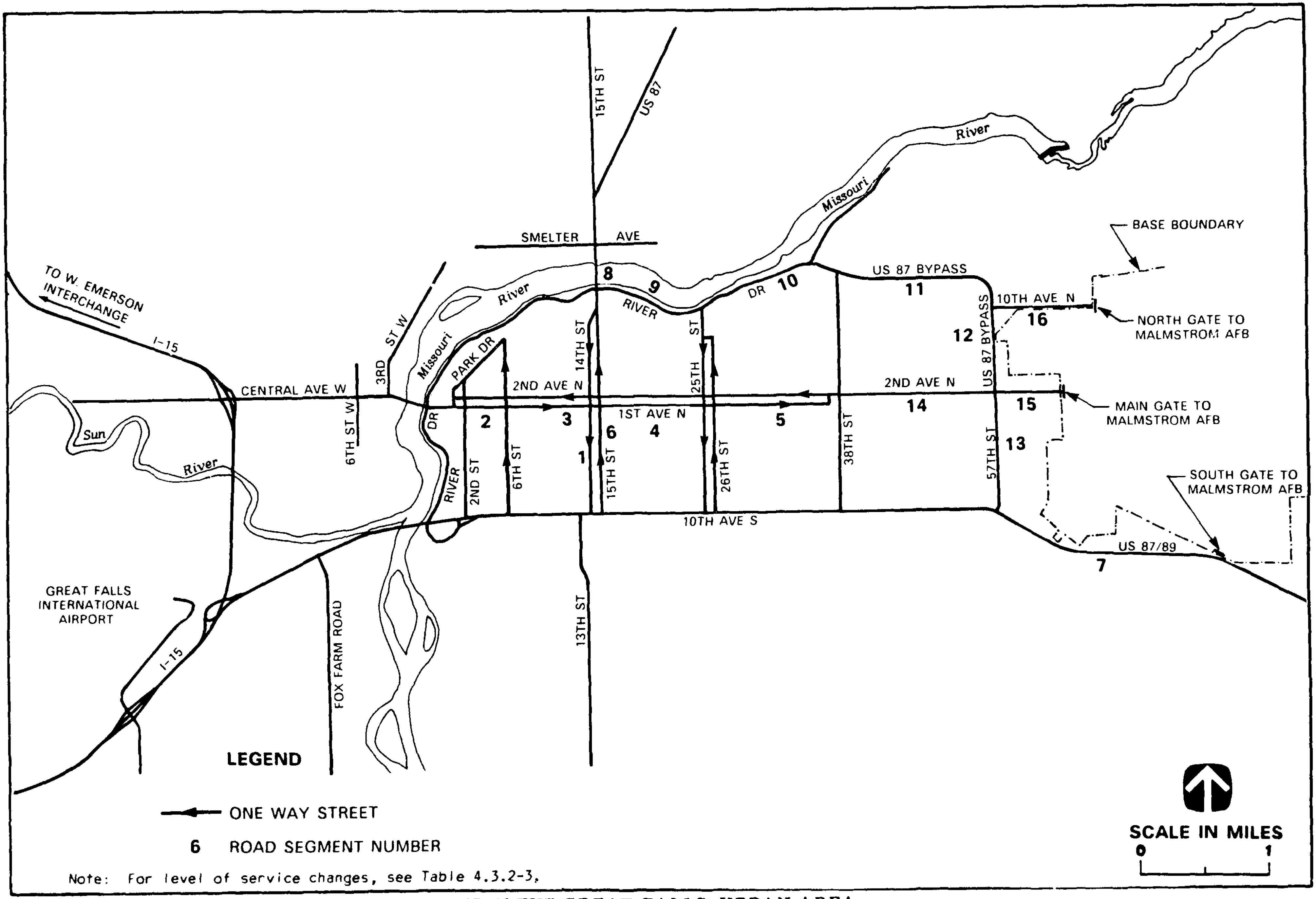
Street, could also drop from LOS A to B. Slight increases in queue lengths and delays could occur at the entrance to the main gate even if most of the construction workers use the south gate along U.S. 87/89. Service levels along this section of U.S. 87/89 are expected to change from LOS B to C. These changes in LOS would result in high impacts. These conditions would continue over the construction phase and would represent a short-duration, significant impact.

During the operations phase, the 290 personnel residing offbase would generate 265 passenger-car equivalent trips to the base during the peak hour. Most of these personnel are expected to reside in the area south of 10th Avenue South and therefore would commute to the base via this street. However, by the year 2000, sections of 10th Avenue South are projected to be at LOS E and F even without the program. The additional peak-hour, program-generated traffic that is expected to use this route could commute to the base via alternate routes such as 1st Avenue North and Central Avenue without causing an adverse impact on the urban traffic conditions. Traffic flow within the base would increase, but, as part of the proposed program, onbase roads would be improved. Long-duration impacts in Great Falls, for the Proposed Action with onbase housing, would therefore be negligible. Long-duration changes in LOS during the operations phase along selected urban road segments in Great Falls are shown in Figure 4.3.2-2 and Table 4.3.2-3.

Offbase Housing Option. This housing option assumes that military family housing would be dispersed throughout the Great Falls area. Most of the construction and operations personnel would reside in Great Falls. This would generate a greater traffic impact than the onbase housing option, resulting in both short- and long-duration, high traffic impacts in Great Falls because of further degradation of service along the 15th Street bridge, River Drive (U.S. 87 Bypass), and 10th Avenue South. Short- and long-duration impacts would be significant because of the reduction in LOS below minimum desirable standards continuing over an extended period of time.

Until 1992, program impacts would be the same as the onbase housing option, but thereafter, greater population increases are expected to occur within Great Falls as a result of more operations personnel residing offbase. An additional 1,450 passenger-car equivalent trips to the base would be induced within Great Falls during the peak hour in 1992, increasing to 2,155 in 1996, and leveling at 1,855 in the year 2000. During the construction phase, these would result in changes in service operations from LOS C to F along 15th Street from Smelter Avenue (Black Eagle area) to River Drive, from LOS A to C along River Drive from 15th Street to 10th Avenue North, from LOS A to C and B to D along 2nd Avenue North from 38th Street to the main gate, and from LOS B to E along 57th Street from 2nd Avenue North to 10th Avenue South. Appreciable increases in queue length and delay at the base main gate would occur even if most of the construction workers use the south gate along U.S. 87/89. These conditions would persist to the year 2000, including the further degradation of service to LOS F along 57th Street between 10th Avenue South and 2nd Avenue North, and along 10th Avenue South, which is already at LOS F. Figure 4.3.2-2 and Table 4.3.2-3 show long-duration changes in LOS along selected urban road segments in Great Falls. This would result in both short- and long-duration, high, and significant impacts for this housing option.

City of Lewistown. The City of Lewistown is expected to be affected by deployment area construction activities which would start in 1991 under the assumed scenario with an estimated 30 workers making some 25 passenger-car equivalent trips to the worksites during the peak hour. This is estimated to increase to 110 trips during the peak hour in 1992, decreasing to 100 in 1993, 80 in 1994, and 10 in 1995. Consequently, only a slight increase in traffic is expected to occur along sections of Main Street (part of



Note: For level of service changes, see Table 4.3.2-3.

FIGURE 4.3.2-2 SELECTED ROAD SEGMENTS IN THE GREAT FALLS URBAN AREA

Table 4.3.2-3

Program-Related Long-Duration Changes in Level of Service Along Selected Road Segments in the Great Falls Urban Area

Road Section	Map Number	Proposed Action		Alternative 1		Alternative 2		Alternative 3		Cumulative Impacts
		Onbase Housing	Offbase Housing	Onbase Housing	Offbase Housing	Onbase Housing	Offbase Housing	Onbase Housing	Offbase Housing	
6th Street										
From 10th Avenue South to 1st Avenue North	1	B-B	B-C	B-B	B-C	B-B	B-C	B-B	B-C	B-B
1st Avenue North										
From Park Drive to 6th Street	2	D-D	D-D	D-D	D-D	D-D	D-D	D-D	D-D	D-D
From 6th Street to 15th Street	3	C-C	C-D	C-C	C-D	C-C	C-D	C-C	C-D	C-C
From 15th Street to 26th Street	4	A-A	A-B	A-A	A-B	A-A	A-B	A-A	A-B	A-A
From 26th Street to 37th Street	5	A-A	A-B	A-A	A-B	A-A	A-B	A-A	A-B	A-A
15th Street										
From 10th Avenue South to 1st Avenue North	6	B-B	B-C	B-B	B-C	B-C	B-C	B-B	B-C	B-C
U.S. 87/89										
From 57th Street to South Gate of Malmstrom AFB	7	B-B	B-D	B-B	B-D	B-C	B-D	B-B	B-D	B-C
15th Street										
From Smelter Avenue to River Drive	8	C-C	C-F	C-C	C-F	C-D	C-E	C-C	C-F	C-D

Table 4.3.2-3 Continued, Page 2 of 2

Road Section	Map Number	Proposed Action		Alternative 1		Alternative 2		Alternative 3		Cumulative Impacts
		Onbase Housing	Offbase Housing	Onbase Housing	Offbase Housing	Onbase Housing	Offbase Housing	Onbase Housing	Offbase Housing	
River Drive/U.S. 87 Bypass										
From 15th Street to 25th Street	9	A-A	A-D	A-A	A-D	A-A	A-D	A-A	A-D	A-A
From 25th Street to 38th Street	10	B-B	B-D	B-B	B-D	B-B	B-D	B-B	B-D	B-B
From 38th Street to 10th Avenue North	11	A-A	A-C	A-A	A-C	A-A	A-C	A-A	A-C	A-B
57th Street/U.S. 87 Bypass										
From 10th Avenue North to 2nd Avenue North	12	A-A	A-C	A-A	A-C	A-A	A-C	A-A	A-C	A-A
From 2nd Avenue North to 10th Avenue South	13	B-B	B-F	B-B	B-F	B-C	B-F	B-B	B-F	B-C
2nd Avenue North										
From 38th Street to 57th Street (U.S. 87 Bypass)	14	A-A	A-B	A-A	A-B	A-B	A-B	A-A	A-B	A-B
From 57th Street (U.S. 87 Bypass) to Main Gate	15	B-B	B-C	B-B	B-C	B-B	B-C	B-B	B-C	B-C
10th Avenue North										
From 57th Street (U.S. 87 Bypass) to Commercial Gate	16	A-A	A-C	A-A	A-C	A-A	A-C	A-A	A-C	A-B

U.S. 87) with no change in service levels. This represents both a short- and long-duration, negligible impact on roads in Lewistown.

City of Conrad. The City of Conrad is expected to be primarily affected by deployment area construction activities which would start in 1991 under the assumed scenario with an estimated 30 workers making 25 passenger-car equivalent trips to the worksites during the peak hour. This is estimated to increase to 40 peak-hour trips in 1992 and 70 in 1993, decreasing to 40 in 1994 and 10 in 1995. This would result in a slight increase in peak-hour flow along Main Street (part of Business Route 15) but with no change in service level. This represents a short- and long-duration, negligible impact on roads in Conrad.

Deployment Area Roads. Short-duration impacts along the T/E route network would be low and not significant because projected traffic volumes would be low and the LOS would not be reduced below minimum desirable standards. Long-duration impacts would be low because traffic volumes are low and would be significant because of the queuing and delays that would occur during the movement of the HML transporter convoy to and from the base. Long-duration impacts would also be beneficial as a result of road and bridge improvements.

During the construction phase, changes in service operation levels on rural roads would be principally affected by movement of construction workers, materials, and equipment, and the interference to traffic flow caused by road and bridge improvements along T/E routes. Total additional trips generated by the program in 1990 were estimated at 160 during the peak hour, an average of 245 in 1991 through 1993, 110 in 1994, and 15 in 1995. Traffic impacts on rural roads were evaluated based on an allocation of construction workers commuting from the three major communities of Great Falls, Lewistown, and Conrad, which are likely to receive a majority of the program-induced population.

In addition, movement of construction equipment and haul trucks would increase traffic along the T/E route network. Heavy construction traffic estimates for the Proposed Action and alternatives are provided in Table 4.3.2-2. Total daily program estimates were distributed to the three general areas of construction activity (around Great Falls, Lewistown, and Conrad) according to the estimated workforce in each general area.

Substantial changes in service operation levels would occur mainly on the main highways where commuting to the different construction sites could occur simultaneously during the peak hour. Consequently, the LOS is expected to change only on sections of U.S. 87 and U.S. 89 around Great Falls and Lewistown. U.S. 89, west of Vaughn, is projected to change from LOS B to C; U.S. 87/89, east of Great Falls to Belt, would drop from LOS B to C; and the section of U.S. 87 from Belt to Lewistown would drop from LOS A to B. Therefore, short-duration impacts on rural roads during the construction phase would be low and not significant.

Information obtained from continuous traffic recorders within the region shows only normal seasonal fluctuations and no distinct or marked increase in traffic flow from vehicles used during the harvest season. Grain is usually hauled to storage bins in the locality and shipped to the market when the rates are good. Therefore, it is anticipated that program-related traffic would result in minimal adverse impacts on the movement of agricultural products in the region.

The Proposed Action requires that the existing T/E routes be able to accommodate the specifications of the HML, including adequate surface condition and width. In order to support the Small ICBM traffic operations, a number of road and bridge improvements have been identified as part of the Proposed Action. For purposes of this analysis, it was assumed that some intersections would have to be widened, some culverts may have to be replaced, and 124 bridges would need to be improved. Eight of these bridges are located along Interstate 15, 83 are along federal-aid primary highways, 20 are along federal-aid secondary highways, 12 are along local roads, and 1 is on a city street in Great Falls.

Construction activities to upgrade the T/E routes, including certain bridges, would have short-duration, low, and not significant impacts but would have long-duration, beneficial effects. Only a short-duration delay around road and bridge improvement sites would occur, but long-duration, beneficial impacts would result from the upgrading of these facilities.

During the operations phase, program-related traffic to the deployment area would include occasional HML movements to the base and crew replacement, security, refueling, service utility, safety, and patrol vehicles. The sections of the T/E route network that would most probably be affected by operations vehicles would be the main roads leading to the base, particularly Interstate 15, U.S. 87, and U.S. 89, where commuting could occur simultaneously. Farther from the base, these vehicles would disperse on the deployment area road network to the launch facilities and therefore would result in less traffic on these roads. The frequency of movements of these vehicles is presented in Section 1.3.2, Table 1.3.2-1. Along U.S. 87/89 between the U.S. 87 Bypass (57th Street) in Great Falls and Montana State Highway 227, an additional 275 vehicle trips per day would be generated by crew replacement and service vehicles. Similarly, an additional 235 vehicle trips per day would occur along Interstate 15 between Great Falls and Vaughn (junction with U.S. 89). These would reduce the LOS along this section of U.S. 89 from B to C and along Interstate 15 from A to B, resulting in a low impact because of operations traffic to the deployment area.

The presence of program-related military operations vehicles on the road would create additional interference with the existing traffic flow and could increase delays and reduce driving comfort and road safety levels. However, the LOS criteria developed have considered these conditions and traffic studies have shown that as the number of vehicles on the road increases, travel speeds tend to decrease, reducing the probability of fatal traffic accidents. Current Minuteman operations data show that military vehicles traveled about 5.95 million miles in 1985, with 30 accidents recorded, and 6.12 million miles in 1986, with 23 accidents. Of the 30 vehicular accidents recorded in 1985, only 2 involved a Minuteman transporter-erector convoy vehicle and there were no fatalities; none were recorded in 1986. All of the accidents were the result of either bad weather or mechanical failures.

With the Proposed Action, it is estimated that military operations vehicles would generate an additional 7.26 million miles per year. It is expected that an increase in accidents would result from increased travel on deployment area roads. With the increased amount of road maintenance and snow removal activities that the Air Force would implement as part of the Proposed Action, bad weather accidents are expected to be reduced. In addition, the possibility exists that, as a mitigation measure, buses or vans would be used to transport crews to the launch facilities, further reducing the vehicle mileage.

Launch facilities proposed for deployment were based on a detailed assessment of the sites and the number of HMLs to be deployed. For the Proposed Action, 100 launch facilities were identified and the access routes from each launch facility to Malmstrom AFB were determined. Figure 4.3.2-3 shows the potential frequency of annual HML

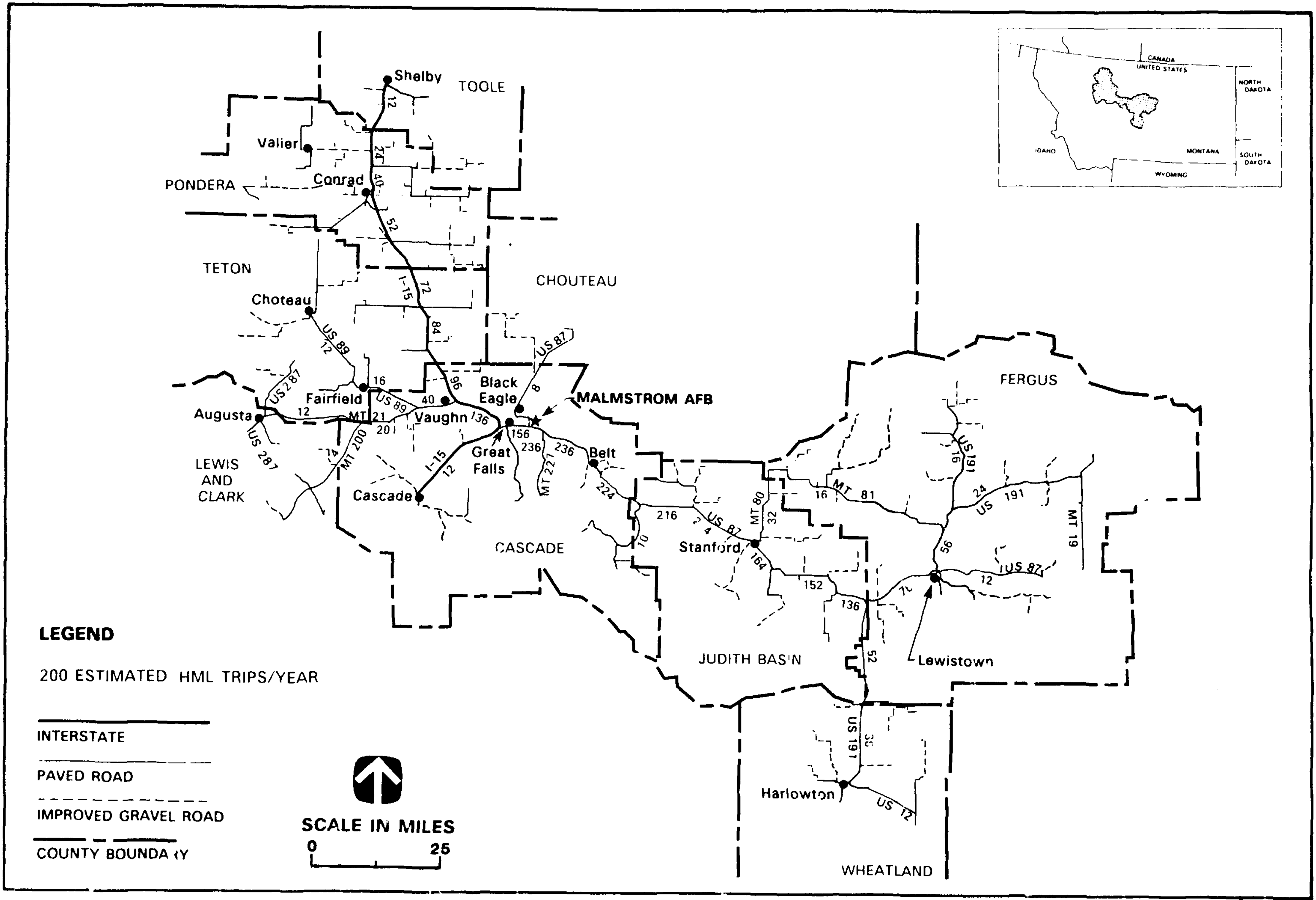


FIGURE 4.3.2-3 ESTIMATED HARD MOBILE LAUNCHER TRIPS PER YEAR ALONG MAJOR TRANSPORTER/ERECTOR ROUTES FOR THE PROPOSEL ACTION

transporter trips occurring along major primary highways in the deployment area. The HML transporter would travel in a convoy with the following operational characteristics:

- The convoy would normally consist of the HML transporter and two escort vehicles, one leading and one following the transporter. A federal marshall would lead the convoy and direct and control traffic.
- The normal convoy speed on paved roads would be approximately 45 miles per hour (mph), an improvement over the existing Minuteman transporter-erector vehicle speed.
- Public traffic would be blocked by a federal marshall to allow the HML transporter convoy free passage on lightly traveled county gravel roads.
- The HML transporter convoy could be required to slow down to 5 mph on some bridges to be determined at a later date by the Montana Department of Highways. Other road features such as railroad crossings would be handled on a case-by-case basis.

The movement of the HML transporter convoy over public roads could create some traffic interference and inconvenience to motorists depending on the type and grade of road, time of day, amount of public traffic, driver characteristics, and weather conditions. The presence of oversized and heavy vehicles such as the HML transporter convoy would cause drivers to reduce their speeds. This would generate queues and delays, particularly along sections of main highways leading to Malmstrom AFB, such as U.S. 87/89. Some degree of annoyance is expected to occur on narrow two-lane roads because road users may be required to stop along shoulders for added safety. The greatest delay would occur on narrow bridges when the convoy slows to 5 mph. Most of these delays would occur on low-volume country roads where the overall degree of comfort, convenience, and safety (implicit in the LOS) would not be reduced below substandard level. Traffic volumes in the deployment area would be low, and only a small increase in hourly flow is expected. Only minor reductions in service levels would occur resulting in a low impact. In addition, the relative infrequency of HML vehicle movement on the majority of deployment area roads (Figure 4.3.2-3) and the ability of public vehicles to pass the HML transporter convoy on Interstate 15 would result in a low impact. However, the formation of queues behind the slow-moving HML transporter convoy and the increased delays and inconvenience experienced by the road users is considered to be a significant impact on deployment area roads. Consequently, long-duration impacts on deployment area roads would be low and significant.

Increased maintenance work on deployment area roads may be required during the operations phase to support the proposed program. The local agencies presently maintaining the roads would continue to be responsible. However, the Air Force will reimburse the local agencies for any extraordinary maintenance work on the roads needed to accommodate program-related operations requirements. In addition, some sections of deployment area roads that are not able to accommodate the HML would need improvement. Currently, the Air Force is coordinating with the MTMC, the FHWA, the Montana Department of Highways, and local and county agencies on road and bridge improvements that will be implemented by the Air Force as part of the Proposed Action. These would even improve road traffic service levels, resulting in a beneficial effect. These improvements would also lessen the long-duration impacts on deployment area roads.

4.3.2.2 Public Transportation

Demand for public transportation in Great Falls is expected to result from increases in program-induced population. The projected demand for bus and taxi service by the program-induced population is likely to be small and could easily be handled within the current capacity of the public transit system. The short- and long-duration impacts on public transportation would therefore be negligible.

It is unlikely that the current or anticipated public transportation service is adequate to attract program employee work trips. Bus routes are very limited and the long intervals between buses offer a poor transportation alternative for commuters. Program-related employees may occasionally use taxi service for convenience, and this may increase taxi demand. This increase is estimated to be low and would therefore not substantially affect taxi response and service within Great Falls. Income levels of program-related employees indicate a low demand for intercity bus service. The increased level of economic activity would probably result in limited demand increases. In general, the short- and long-duration impacts on public transportation within Great Falls would be negligible.

4.3.2.3 Railroads

The existing rail system is operating well below capacity and could handle additional program-related shipments such as reentry vehicles, HMLs, and construction materials. At the Burlington Northern railyard in Great Falls, any anticipated increase in use can readily be handled within its operating capacity. This represents both a short- and long-duration, negligible impact on railroads.

4.3.2.4 Airports

Great Falls International Airport. Increases in air traffic operations at Great Falls International Airport could occur as a result of corporate and private air traffic such as program-related manufacturers and contractors, government agencies, and high technology companies, and the additional use of helicopters and small aircraft by contractors. Great Falls International Airport is operating at well below capacity and therefore is expected to handle any anticipated additional air traffic without construction of new or expanded facilities. Short- and long-duration impacts on air traffic would be negligible since there would be no restrictions on overflights beyond those normally applied by the Federal Aviation Administration.

Other Area Airports. Because of their location within the deployment area, air traffic at Conrad (Pondera County) Airport and Lewistown Municipal Airport could also increase as a result of program-related uses of air facilities, especially by helicopters and small aircraft by contractors. However, these are considered to be minimal and would not require the construction of new or expanded facilities. Both short- and long-duration impacts on air traffic at these airports would be negligible.

4.3.3 Impacts of Alternatives

Overall short-duration impacts on roads would be high and significant for all alternatives regardless of the housing option selected (Section 4.3.2, Figure 4.3.2-1). Long-duration impacts for the onbase housing option would be low and significant for Alternatives 1 and 3 but moderate and significant for Alternative 2. For the offbase housing option, long-duration impacts would be high and significant for all alternatives. Long-duration impacts for all alternatives would be beneficial because of road and bridge improvements. All short- and long-duration impacts on public transportation, railroads, and airports would be negligible.

4.3.3.1 Roads

Alternative 1.

Onbase Housing Option. Alternative 1 would require fewer construction and operations personnel than the Proposed Action, resulting in less additional traffic on the roads during the peak hour. From 1990 to 1991, the estimated manpower requirements are almost the same as the Proposed Action, and would therefore result in the same LOI. From 1992, manpower requirements are smaller than the Proposed Action, generating less additional program-induced traffic. Approximately 765 additional passenger-car equivalent trips would be made during the peak hour in 1992, decreasing to 450 in 1995, and leveling at 190 in the year 2000, when they are all induced by operations personnel. During the construction phase, service levels would decrease from LOS C to D along 15th Street from Smelter Avenue to River Drive, from LOS A to B along River Drive from 25th Street to 38th Street, from LOS A to B along 2nd Avenue North from 38th Street to 57th Street, and from LOS B to C along 57th Street from 10th Avenue South to 2nd Avenue North. Service levels along 10th Avenue South would drop from LOS E to F between 2nd Street and 13th Street, and would further degrade to LOS F between 15th Street and 26th Street. These levels are expected to persist through 1996 resulting in a short-duration, high, and significant impact. Beyond 1998, impacts on roads would be reduced because only about 190 passenger-car equivalent trips would be made to the base. As with the Proposed Action, the long-duration impact on roads in Great Falls for Alternative 1 would be negligible.

Commuting to the deployment area is estimated to be slightly greater than for the Proposed Action. Table 4.3.2-1 (Section 4.3.2.1) shows the estimated peak-hour vehicle trips made by construction workers in the deployment area. However, the increase does not reduce the LOS lower than that of the Proposed Action. Short-duration impacts would therefore be low and not significant. Impacts on deployment area roads are expected to be the same as the Proposed Action since total vehicle mileage of 7.26 million generated during the operations phase is only slightly less than that of the Proposed Action. Long-duration impacts would be low and significant because of the queuing and delays experienced by motorists while traveling behind the slow-moving HML transporter convoy. Long-duration impacts would be beneficial as a result of road and bridge improvements. Short- and long-duration impacts on roads in Lewistown and Conrad would be negligible.

Offbase Housing Option. With no military housing provided onbase, most of the operations personnel would reside in Great Falls and would generate greater traffic impacts than with the onbase housing option. This would result in both short- and long-duration, high, and significant impacts in Great Falls because of the further degradation of service operations along the 15th Street bridge, River Drive (U.S. 87 Bypass), and 10th Avenue South.

Program impacts would be the same as the Proposed Action, with the offbase housing option, even if additional commuting by construction and operations personnel is somewhat less. By 1992, an estimated 1,305 additional passenger-car equivalent trips to the base would be induced within Great Falls during the peak hour. This would increase to 1,610 passenger-car equivalent trips to the base in 1996, and would level at 1,310 in the year 2000 and thereafter. These would result in a persistent change in service operations from 1992 through the year 2000 and thereafter. Changes in service operations during the construction phase would occur along 15th Street from Smelter Avenue to River Drive (LOS C to E), along River Drive from 15th Street to 25th Street (LOS A to B), along 2nd Avenue North from 38th Street to the Malmstrom AFB main gate (LOS A to C and B to D), and along 57th Street from 2nd Avenue North to 10th Avenue South (LOS B to E). Appreciable increases in queue length and delay at the base main gate would occur even if most levels of the construction workers use the south gate along U.S. 87/89. Changes in service during the operations phase for selected road segments are shown in Table 4.3.2-3 (Section 4.3.2.1). These conditions, together with the further degradation of service along 10th Avenue South (already at LOS F), would result in both short- and long-duration, high, and significant impacts for this housing option.

Commuting to the deployment area would not be affected by the housing option selected. The impact on deployment area roads would therefore be the same as the onbase housing option. Short-duration impacts would be low and not significant; long-duration impacts would be low and significant. Long-duration impacts would have beneficial effects because of road and bridge improvements. Short- and long-duration impacts on roads in Lewistown and Conrad would be negligible.

Alternative 2.

Onbase Housing Option. Alternative 2 with onbase military family housing would require a slightly larger number of construction and operations personnel than the Proposed Action and therefore would result in more additional traffic on the roads during the peak hour. Assignment of these workers in the community and on the principal arterials of Great Falls increases the volume of traffic and reduces the service levels. During the construction phase, changes in LOS for Alternative 2 are expected to be the same as the Proposed Action. During the operations phase, about 430 passenger-car equivalent trips are expected to be made to the base resulting in the reduction of service from LOS C to D along 15th Street from Smelter Avenue to River Drive. Consequently, short-duration impacts on roads in Great Falls for Alternative 2 would be high and significant; long-duration impacts would be moderate and significant.

Commuting to the deployment area during the peak hour for this alternative is estimated to be greater than the Proposed Action. Table 4.3.2-1 (Section 4.3.2.1) shows the estimated peak-hour vehicle trips made by construction workers in the deployment area by calendar year. During the operations phase, greater vehicle mileage (9 million) would be generated annually to access 125 launch facilities from Malmstrom AFB than the Proposed Action. This, however, would not further reduce the LOS than that of the Proposed Action. Therefore, Alternative 2 would have the same impacts as the Proposed Action: short-duration, low, and not significant impacts; and long-duration, low, and significant impacts. The long-duration, beneficial effects of road and bridge improvements would remain. Short- and long-duration impacts on roads in Lewistown and Conrad would be negligible.

Offbase Housing Option. With no military housing provided onbase, most of the operations personnel would reside in Great Falls and would generate a greater traffic impact than with the onbase housing option. This would result in both short- and long-duration, high, and significant impacts in Great Falls because of the further degradation of service operations along the 15th Street bridge, River Drive (U.S. 87 Bypass), and 10th Avenue South.

Alternative 2 impacts would be the same as the Proposed Action, with the offbase housing option, even if additional commuting by construction and operations personnel is somewhat greater than the Proposed Action. By 1992, an estimated 1,520 additional passenger-car equivalent trips to the base would be induced in Great Falls during the peak hour. This would increase to 2,475 passenger-car equivalent trips to the base in 1997, and would level at 2,250 in the year 2000 and thereafter. Compared to the Proposed Action, with the offbase housing option, about 395 additional trips would be generated in the operations phase during the peak hour. These would result in the persistent change in service operations from 1992 to the year 2000 and thereafter. Changes in service levels during the construction phase would occur along 15th Street from Smelter Avenue to River Drive (LOS C to E), along River Drive from 15th Street to 25th Street (LOS B to C), along 2nd Avenue North from 38th Street to the Malmstrom AFB main gate (LOS A to C and B to D), and along 57th Street from 2nd Avenue North to 10th Avenue South (LOS B to E). Appreciable increases in queue length and delay at the base main gate would also occur even if most of the construction workers use the south gate along U.S. 87/89. Changes in service levels for selected road segments during the operations phase are presented in Table 4.3.2-3 (Section 4.3.2.1). These conditions, together with the further degradation of service along 10th Avenue South (already at LOS F), would result in both short- and long-duration, high, and significant impacts for this housing option.

Commuting to the deployment area would not be affected by the housing option selected. Therefore, the impact on deployment area roads would be the same as the onbase housing option. Short-duration impacts would be low and not significant; long-duration impacts would be low and significant. Long-duration effects would be beneficial because of road and bridge improvements. Short- and long-duration impacts on roads in Lewistown and Conrad would be negligible.

Alternative 3.

Onbase Housing Option. Alternative 3 would require the same number of construction and operations personnel as the Proposed Action; therefore, the impacts on roads in Great Falls would be the same as the Proposed Action. Short-duration impacts on roads in Great Falls would be high and significant; long-duration impacts would be negligible. On deployment area roads, short-duration impacts would be low and not significant, and long-duration impacts would be low and significant. During the construction phase, commuting to the deployment area during the peak hour for this alternative would be the same as the Proposed Action. During the operations phase, the same number of personnel would be involved even if all 200 launch facilities are supported from Malmstrom AFB. However, greater military operations vehicle mileage (13.8 million) would be generated than the Proposed Action; this would not reduce the LOS lower than that of the Proposed Action. The queuing and delays generated by the slow-moving HML transporter convoy are still expected to occur. The long-duration, beneficial effects of road and bridge improvements would remain. Short- and long-duration impacts on roads in Lewistown and Conrad would be negligible.

Offbase Housing Option. With no military housing provided onbase, Alternative 3 would also generate the same number of commuter trips to the base as the Proposed Action with the offbase housing option. Both short- and long-duration impacts on roads in Great Falls would be high and significant. On deployment area roads, short-duration impacts would be low and not significant; long-duration impacts would be low and significant. Long-duration effects would be beneficial because of the road and bridge improvements. Short- and long-duration impacts on roads in Lewistown and Conrad would be negligible.

4.3.3.2 Public Transportation

Alternative 1. The number of construction and operations personnel residing offbase for Alternative 1 would be smaller than the Proposed Action. This would result in lower demand for the use of buses and taxis than the Proposed Action. Therefore, short- and long-duration impacts on public transportation for Alternative 1 would be negligible for both housing options.

Alternative 2. The number of construction and operations personnel residing offbase would be greater than the Proposed Action. A higher demand for the use of public transportation would be generated by Alternative 2, with the onbase housing option, than with the Proposed Action. The projected demand would still be within the available capacity of the bus and taxi systems in Great Falls and would not require additional vehicles or require a major change in service operations and schedules. Alternative 2 would therefore have a short- and long-duration, negligible impact on public transportation for both housing options.

Alternative 3. As with the Proposed Action, short- and long-duration impacts on public transportation would be negligible for both housing options.

4.3.3.3 Railroads

Alternative 1. Program-induced demand for rail transportation is expected to be the same as the Proposed Action. Both short- and long-duration impacts on railroads would therefore be negligible.

Alternative 2. Program-induced demand for rail transportation would be slightly greater than the Proposed Action due to the greater number of HMLs proposed for Alternative 2. This, however, is not expected to require additional terminal or control facilities or even a major change in service operation and schedules. Alternative 2 would also have short- and long-duration, negligible impacts on railroads.

Alternative 3. As with the Proposed Action, short- and long-duration impacts on railroads would be negligible.

4.3.3.4 Airports

Both short- and long-duration impacts on airports for Alternatives 1, 2, and 3 would be negligible as with the Proposed Action. Only slight changes in air transport demand would result but without the need for modifications in schedules or levels of operation or the need for new facilities.

4.3.4 Cumulative Impacts

4.3.4.1 Roads

Concurrent deployment of the Small ICBM and Peacekeeper in Rail Garrison programs would generate an additional increase in traffic from Rail Garrison-related personnel starting in 1992 under the assumed scenario. An additional 145 vehicle trips made by Peacekeeper in Rail Garrison personnel are expected during the peak hour in 1992. This would increase to 280 additional vehicle trips in 1993 and 300 in 1996 and thereafter. This, in addition to the traffic generated by the Proposed Action, would further exacerbate the LOS along the principal arterials leading to the base. Short-duration impacts on roads in Great Falls would therefore remain high and significant as with the

Proposed Action. During the operations phase, the additional traffic generated by the Peacekeeper in Rail Garrison operations personnel would reduce the LOS from C to D along 15th Street from Smelter Avenue to River Drive and from E to F along 10th Avenue South from 6th Street to 13th Street. These LOS changes would result in long-duration, moderate impacts. These impacts would be significant because of the reduction in LOS below minimum desirable standards continuing over an extended period of time.

Short-duration impacts on deployment area roads would be the same as for the Proposed Action: low and not significant. Long-duration impacts would also remain low and significant. Long-duration effects would be beneficial as a result of road and bridge improvements. The cumulative short- and long-duration impacts on roads in Lewistown and Conrad would also be negligible.

4.3.4.2 Public Transportation

An increase in the use of public transportation in Great Falls would be generated by the additional Peacekeeper in Rail Garrison personnel. However, the total cumulative demand for the use of public transportation would still be low and could easily be accommodated within the current capacity. The cumulative short- and long-duration impact on public transportation would therefore be negligible.

4.3.4.3 Railroads

The short- and long-duration impacts on railroads of the Proposed Action were considered to be negligible. Since only cumulative effects of the additional personnel required for the Peacekeeper in Rail Garrison program were considered, the short- and long-duration impacts on railroads would still be negligible. If Malmstrom AFB is selected as a Peacekeeper in Rail Garrison program location, a separate environmental impact statement would be prepared and impacts on railroads would be addressed specifically.

4.3.4.4 Airports

A slight increase in the use of airport facilities would also be generated but this would still be minimal to require any changes in the level of operations. The cumulative short- and long-duration impact on airports would still be negligible.

4.3.5 Impacts of the No Action Alternative

Road traffic demand through the year 2000 was estimated based on population projections made by the socioeconomics analysis. A study of the population projections, historical trends of daily traffic flows, and planning horizons (indicated in the comprehensive plans of cities and counties in the region) formed the basis of estimating traffic trends without the program. It is estimated that there would be low road traffic demand with the No Action Alternative. Although traffic volumes would increase during these years, there would be no change in LOS categories and motorists would perceive no significant change in traffic operations except along 10th Avenue South in Great Falls, which is projected to be at LOS F.

Assuming existing T/E routes continue to be used, their physical conditions would remain essentially unchanged and adequate for Minuteman operations activities.

4.3.6 Potential Mitigation Measures

Potential mitigations are measures that could be undertaken to reduce or eliminate program impacts. All, some, or none of the measures identified for transportation may be implemented. For each measure, the agencies that may be involved in implementation are identified. Potential mitigation measures for transportation include the following:

- Schedule work hours for program-related employees to avoid commuting during normal traffic peak hours and encourage ride sharing. This mitigation would be effective in controlling peak-hour traffic flow increases and therefore reduce congestion and delay without additional cost to the Air Force and its contractors (U.S. Air Force and its contractors).

- Institute transportation management measures, such as reversible traffic flows, one-way street couplets, installation of traffic signals, and signal coordination, to relieve congestion on urban streets (City of Great Falls and Cascade County).

- Use buses to transport crew members to launch control facilities and then further dispersal to the launch facilities. This would reduce the number of vehicles on the main roads from Malmstrom AFB (U.S. Air Force).

- Widen roads where warranted to avoid conflicts between oncoming traffic and the HML transporter convoy based on projected traffic volumes and the frequency of HML convoy movements. This would reduce traffic delays and allow oncoming public vehicles to travel at normal speeds (MTMC, FHWA, and Montana Department of Highways).

- Construct turnouts and/or passing lanes on HML transporter routes where significant delays are anticipated because of high to moderate traffic volumes combined with steep grades and a high frequency of HML transporter movements. This would allow public vehicles to pass the HML transporter convoy and also other slow-moving and/or oversized vehicles (MTMC, FHWA, and Montana Department of Highways).

- Improve 10th Avenue South, use other existing routes, or construct a bypass to reduce traffic congestion and delays along 10th Avenue South. The construction of a bypass may be a costly alternative but would provide for an alternate T/E route and would avoid further delays to motorists traveling along 10th Avenue South (U.S. Air Force, MTMC, FHWA, Montana Department of Highways, and City of Great Falls).

- Schedule HML transporter convoy movements during off-peak traffic hours when the HML transporter convoy would create lesser additional traffic delay problems. This would avoid increasing congestion and delay during peak traffic hours (U.S. Air Force, Montana Department of Highways, Cascade County, and City of Great Falls).

- Schedule HML transporter movements to avoid less than acceptable road conditions such as freeze thaw, heavy rain/snow, and/or poor visibility. This would avoid the occurrence of traffic accidents due to poor weather or road conditions (U.S. Air Force and Montana Department of Highways).

- Provide greater maintenance and missile component changeout capabilities at HML enclosures to reduce HML travel times and trip frequencies and weight of vehicles since only the missile would be transported to Malmstrom AFB. The HML would remain at the launch facility. Selected launch facilities throughout the deployment area would be involved. This would reduce traffic delays and accident potential associated with HML maintenance movements to Malmstrom AFB. Security implications, cost, and maintenance effectiveness considerations may offset the advantages of this mitigation.

- Advertise the schedule for major road and bridge improvements to allow the affected public the opportunity to avoid routes that may cause avoidable delays and annoyance. This mitigation would be effective in reducing potential conflicts at construction sites and therefore increase safety and convenience levels. Although alternate routes may be longer, overall travel delays to motorists could be reduced (FHWA and the Montana Department of Highways).

- Provide greater maintenance and missile component changeout capabilities at HML enclosures to reduce HML travel times and trip frequencies and weight of vehicles since only the missile would be transported to Malmstrom AFB. The HML would remain at the launch facility. Selected launch facilities throughout the deployment area would be involved. This would reduce traffic delays and accident potential associated with HML maintenance movements to Malmstrom AFB. Security implications, cost, and maintenance effectiveness considerations may offset the advantages of this mitigation.

4.3.7 Irreversible and Irretrievable Resource Commitments

The increase in vehicular traffic, most particularly heavy commercial vehicles associated with the proposed program, would result in accelerated deterioration of the physical condition of the roads as well as the service levels on those roads. Considering that deficient roads and bridges would be improved, there would be no irreversible or irretrievable resource commitments for transportation.

4.3.8 Relationship Between the Local Short-Term Use of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

Short-duration program-generated traffic would result in some decrease in the comfort, convenience, and safety afforded regional users of primary roads, and some economic losses to travelers and shippers. The associated road and bridge construction and the increased road maintenance levels on deployment area roads would improve traffic flow in the region and would be beneficial in terms of driver safety, reduced maintenance costs, and vehicle operating costs. In terms of the natural environment, minimal disturbance is expected after completion of program activities.

4.4 Land Use

Deployment of the Small Intercontinental Ballistic Missile (ICBM) program at Malmstrom Air Force Base (AFB) has the potential to modify some existing land uses at a site and/or local level within the Region of Influence (ROI). The land use resource analysis consists of two elements: urban and rural land use. The rural land use element is divided into two subelements: land use and inhabited structures within explosive safety zones.

4.4.1 Impact Analysis Methodology

The impact analysis methodology for land use involved three separate procedures: evaluation of program impacts, determination of levels of impact (LOI), and determination of the significance of impacts. The methodology also included consideration of a number of assumptions and assumed mitigations. Impacts were evaluated at the site and local levels and a collective assessment was made for each resource element. Site-level impacts on rural land use were evaluated at launch facilities and along transporter/erector (T/E) routes. Local-level impacts on urban land use were evaluated for the cities of Great Falls, Lewistown, and Conrad.

4.4.1.1 Evaluation of Program Impacts

Urban Land Use. The construction of new housing on vacant developable land in the urban areas of Great Falls, Lewistown, and Conrad would be the predominant land use impact. Any increase in business, commerce, industrial or other related activities generated as a result of the proposed program is anticipated to be absorbed through the use of existing office, store, and building space together with land already platted to accommodate any new construction. The analytical methods used to evaluate program-induced impacts are similar to those used for determining projected conditions. The amount of land needed to accommodate the program-induced inmigration in the above-mentioned communities was projected using per capita standards. A qualitative professional judgment was made to determine whether the program-related impacts can be absorbed within the existing zoning ordinances and be consistent with the adopted city-county comprehensive plans. The land use analysis was predicated on the premise that local decision-makers would enforce existing plans, policies, and ordinances; therefore, future development would be compatible with existing plans, policies, and ordinances.

Land required for future residential use was estimated. The amount of various types of residential housing needed for the program-related population was multiplied by accepted density factors from each jurisdiction's adopted development standards (i.e., zoning ordinance or subdivision ordinance) and/or the adopted community comprehensive plan. The amount of vacant developable land needed for residential expansion was then determined for each urban area. Residential densities used for analysis are 4.8 units per acre gross for single-family residential, 6 units per acre gross for mobile home parks, and 10 units per acre gross for multiple-family residential.

Densities for single-family residential were based on Great Falls, Lewistown, and Conrad development standards and/or comprehensive plans. The density for multiple-family residential was derived through the use of the low range identified for garden apartments described in the Residential Development Handbook by the Urban Land Institute (1982) and development standards of the previously mentioned jurisdictions. In estimating residential land use, the required change in the supply of housing units (single-family, multiple-family, and mobile home), based on housing projections developed in the socioeconomics analysis, was multiplied by density factors determined from local conditions and practices (units per acre gross). The expansion of residential housing may result in a need for additional commercial and industrial facilities. Growth may occur through the expansion of existing facilities, through the establishment of new facilities at new locations, or a combination of both. Vacant land absorption was then determined for each community, taking into consideration historical trends and annexation policies.

Future land uses at Malmstrom AFB were determined through an analysis performed for the base comprehensive plan and other documents developed for the Small ICBM program. Expansion of government-built housing, where planned in offbase locations, was also discussed within urban land use.

Rural Land Use. Lands required for use in the expansion of launch facilities and the improvement of T/E routes and bridges were addressed. The number of private and public surface landowners was also identified.

The required explosive safety zones were analyzed at distances of 1,250 feet, 1,425 feet, and 1,795 feet from potential Hard Mobile Launcher (HML) locations. The size of expansion of the explosive safety zones would depend on the type of HML enclosure and other siting constraints. The existing Minuteman explosive safety zones are 1,200 feet from the silo door. Since occupied structures are prohibited within explosive safety zones, the number of structures in these expanded zones was considered in evaluating LOI and significance. Inhabited structures include residences, commercial and industrial structures, and schools.

Land uses within potential launch facility expansion areas and expanded restrictive easements were also rated for LOI. The land use types include rangeland, forest, dry-farmed cropland (cultivated land that is not irrigated), and irrigated cropland. The detailed land use ROI did not contain any feedlots or grain elevators.

Land uses in the deployment area were analyzed based on interpretation of aerial photographs and existing maps such as those published by the U.S. Geological Survey, the U.S. Soil Conservation Service, the U.S. Forest Service, and local governments. Structures, utilities, roads, and easements were included where appropriate. Rural land use, except in specific locations adjacent to urban areas undergoing conversion, is expected to remain relatively similar to the current variety of uses.

4.4.1.2 Determination of Levels of Impact

Urban Land Use. The LOIs for urban land use were determined by the rate of urbanization of vacant developable land and its consistency with the adopted comprehensive plan. Projections of urban expansion were based on the premise that urban growth is accomplished through absorption of vacant developable land designated by the comprehensive plan combined with policies of the plan that govern its use. Therefore, growth is planned through infill of vacant land within the urbanized area as well as on vacant land conterminous to the developed area. The rate of urbanization is measured in two ways: the amount of utilization of vacant developable land and the percent increase of development over the current amount of developed land.

The LOIs for urban land use are the following:

- Negligible Impact -- The proposed program would result in no noticeable change in the rate of urbanization or development patterns beyond the baseline projections, or would cause only minor reductions in the supply of vacant developable land (60 acres or less or 2%, whichever is less): growth would be consistent with the adopted comprehensive plan.

- Low Impact -- The proposed program would cause expansion of urban land use beyond the baseline projections that would reduce the supply of vacant developable land (60-320 acres or 2-10%, whichever is less) but the development would be consistent with the adopted comprehensive plan.
- Moderate Impact -- The proposed program would cause expansion of urban land use that would substantially reduce or deplete the supply of vacant developable land (320-640 acres or 10-20%, whichever is less), and may be inconsistent with the adopted comprehensive plan.
- High Impact -- The proposed program would cause expansion of urban land use that may deplete the supply of vacant developable land (over 640 acres or over 20%, whichever is less), and may require development outside of planned service areas. The new urban growth would be inconsistent with the adopted comprehensive plan.

Rural Land Use. Rural land use would be affected to the extent that program deployment and the expanded explosive safety zones alter rural land use in the vicinity of the launch facilities. The LOI criteria have been developed both at the regional and individual launch facility levels.

The LOIs for rural land use were determined by the amount, type, and duration of direct and indirect land use projected for the proposed program in relation to the character of the area where the impact would occur. Direct program impacts include potential interruptions or changes in existing uses and restrictions on current and future land uses.

Indirect impacts include interruption of agricultural activities adjoining T/E routes as a result of potential reduction in access to farms, ranches, and markets.

Where an inhabited structure is located within the expanded explosive safety zone, there are three possible options:

- The owner may sell his or her residence and the associated farm improvements to the Air Force while retaining ownership of the land subject to the Air Force restrictive easement. The Air Force would pay fair market value for the structures and the reduction in the value of the property resulting from the easement. These values would be determined by independent appraisers familiar with the local realty market. The Air Force would commission and pay for the appraisal. Relocation benefits would also be paid as authorized by law. The owner would be given the opportunity to repurchase the house and improvements at salvage value.
- The owner may sell the house only and retain the farm complex and other uninhabited buildings. The proceeds can be used to build a new residence outside the explosive safety zone.
- The owner who wishes to remain in his or her present residence may request to do so. The Air Force would process a request for exemption to the Secretary of the Air Force. The Secretary of the Air Force has the discretion to grant an exemption to the landowner after a case-by-case analysis of the risks to the landowner in allowing the residence to remain within the explosive safety zone. Each homeowner who receives an exemption must acknowledge in writing that he or she understands the requirement for the explosive safety zone, that the Air Force is willing to acquire the structures

and provide relocation assistance as provided by law, and that he or she desires to remain in spite of the potential risks.

The LOIs for rural land use are the following:

- Negligible Impact -- For overall impacts, little change in land use and character of the area or in agricultural productivity (no more than 100 acres [about 610,000 acres in ROI] of irrigated cropland or 200 acres of dry-farmed cropland/rangeland [about 5,500,000 acres in the ROI] are disturbed). For local-level impacts, no relocation of inhabited structures takes place, and/or the disturbed land use type is rangeland.

- Low Impact -- For overall impacts, an interruption or restriction of land use that would not change the character of the area but would result in some interference with agricultural productivity (between 100-500 acres of irrigated cropland or 200-1,000 acres of dry-farmed cropland/rangeland are disturbed and/or relocation or removal of inhabited structures amounts to 1-10 inhabited structures [28 persons] in the ROI). For local-level impacts, one to four structures at any launch facility would be relocated, and/or the land use type to be disturbed is dry-farmed cropland.

- Moderate Impact -- For overall impacts, an interruption or restriction of land use that would change the character of the area and/or would decrease agricultural productivity on a temporary basis (between 500-1,000 acres of irrigated cropland or 1,000-2,000 acres of dry-farmed cropland/rangeland are disturbed or the relocation or removal of 11-50 inhabited structures [29-150 persons] takes place in the ROI). For local-level impacts, five to nine structures at any launch facility would be relocated, or the land use type to be disturbed is irrigated cropland or forest.

- High Impact -- For overall impacts, a permanent change in land use and character of the area affecting agricultural productivity (more than 1,000 acres of irrigated cropland or more than 2,000 acres of dry-farmed cropland/rangeland or more than 1% of the total acreage devoted to irrigated cropland or dry-farmed cropland or the relocation or removal of inhabited structures amounting to more than 50 structures or 150 persons takes place in the ROI). For local-level impacts, more than ten structures at any launch facility would be relocated, or a school, a grain elevator, or commercial feedlot may be disturbed.

4.4.1.3 Determination of Significance

The significance of land use impacts was evaluated in accordance with Council on Environmental Quality (CEQ) regulations. Significance was assessed through evaluation of the context and intensity of impacts. Context includes consideration of the settings (site, local, or regional) and the duration of the impacts. The CEQ regulations provide ten items that should be considered in evaluating intensity. Of these ten items, the following are applicable to the land use resource:

- The degree to which the proposed action affects public health or safety;

- The degree to which the effects on the quality of the human environment are likely to be highly controversial; and

- Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment.

As an example, the uncontrolled development of housing outside of planned service areas, where sewer and other utility hookups are not available and services are not provided, could pose a threat to public health and could be inconsistent with local growth management plans and policies.

In addition to these considerations, which are specifically identified in the CEQ guidelines, the following considerations are also appropriate for the land use resource:

- The degree to which the action compels residential land development in ways not expressly intended and is therefore inconsistent with the adopted comprehensive plan or zoning regulations; and
- Whether the action would affect inhabited structures within the explosive safety zone.

These intensity considerations and their contexts were used to rate impacts as either significant or not significant.

4.4.1.4 Assumptions and Assumed Mitigations

Assumptions. The following assumptions were made for urban land use:

- Future development will be located where it will be compatible with existing uses, be consistent with adopted comprehensive plans and policies, and be in compliance with local zoning ordinances and development regulations;
- Current local housing preferences will prevail during the baseline growth period;
- Temporary population growth resulting from construction activities will create demand for additional space at mobile home parks and/or additional development of this type of housing (this might include some speculative development); and
- Areas will be avoided that have severe development constraints such as floodplains and locations under low-level air routes.

The following assumptions were made for rural land use:

- Construction activities on all T/E routes will require some temporary access beyond existing rights-of-way (ROW) of public entities (state, counties, and cities) and adjoining agricultural land use may be affected temporarily. In those instances where agricultural activities encroach on the ROWs, impacts resulting from construction activities in the ROWs were not considered.
- Program construction activities could occur at any time during the year.

Assumed Mitigations. The following mitigation measures were assumed for the land use analysis:

- Fair market value and relocation benefits will be paid, as legally mandated under the provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (Public Law 91-646), to those persons, businesses, and/or institutions required to vacate explosive safety zones (Section 4.4.1.2);
- The government will pay fair market value for any crops destroyed or taken out of production on private or leased lands as a result of program construction;
- Disturbed areas shall have erosion-control measures implemented;
- The Air Force will participate in cooperative planning with federal, state, and local governmental agencies; and
- Alternate routes shall be provided prior to and during road construction.

4.4.2 Impacts of the Proposed Action

Deployment of the Small ICBM program would affect the communities of Great Falls (including Malmstrom AFB), Lewistown, and Conrad, and the rural areas of the ROI. Overall long-duration impacts on urban land use associated with the onbase housing option would be negligible. The long-duration impacts associated with the offbase housing option would be low and not significant. No short-duration impacts are expected for urban land use. Overall short- and long-duration rural land use impacts would be low and not significant (Figure 4.4.2-1).

4.4.2.1 Urban Land Use

The long-duration impacts on urban land use are expected to be concentrated within the Great Falls urban area. There are no expected short-duration impacts on the cities of Great Falls, Lewistown, or Conrad. Long-duration impacts would involve construction on vacant developable land, followed by ongoing human use. The long-duration impacts associated with the onbase housing option would be negligible. The long-duration impacts associated with the offbase housing option would be low and not significant.

City of Great Falls. The Great Falls urban area would receive the largest amount of population growth associated with the Small ICBM program. The adopted city-county comprehensive plan has designated 10,516 acres for residential land uses. Approximately 7,331 acres are currently developed, leaving approximately 3,185 acres for future residential growth.

Onbase Housing Option. For the onbase housing option, military family housing would be constructed on an expanded portion of the base. Because the portion of Malmstrom AFB located west of the runway is essentially occupied with existing facilities and because of safety considerations and preservation of the base mission, there is no vacant developable land available onbase for additional housing. The onbase housing option includes the expansion of the base northward to include approximately 330 acres of land for residential purposes. Onbase housing was assumed to be built at 5.3 dwelling units per acre gross. The land is currently vacant and used for dry-farmed agriculture.

LEVEL OF IMPACT	SIGNIFICANCE	
Adverse Impacts	Not Significant	Significant
Negligible	☐	
Low	◦	•
Moderate	○	●
High	◯	⬤
Beneficial Effects	░	

Note: Some resource elements may have both beneficial effects and adverse impacts.

PROGRAM IMPACTS

ELEMENT/AFFECTED INTEREST	SHORT DURATION								LONG DURATION							
	PROP. ACTION		ALT. 1		ALT. 2		ALT. 3		PROP. ACTION		ALT. 1		ALT. 2		ALT. 3	
	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING
URBAN LAND USE										◦		◦		○		◦
GREAT FALLS										◦		◦		○		◦
LEWISTOWN																
CONRAD																
RURAL LAND USE	◦	◦	◦	◦	◦	◦			◦	◦	◦	◦	◦	◦	●	●
MALMSTROM AFB									◦	◦	◦	◦	◦	◦	◦	◦
LAUNCH FACILITIES	◦	◦	◦	◦	◦	◦									●	●
DEPLOYMENT AREA ROADS	◦	◦	◦	◦	◦	◦	◦	◦								

EM4/4

FIGURE 4.4.2-1 IMPACTS ON LAND USE ASSOCIATED WITH THE PROPOSED SMALL ICBM PROGRAM IN MONTANA

PROGRAM IMPACTS	NUMBER OF LAUNCH FACILITIES													
	SHORT DURATION							LONG DURATION						
	NOT SIGNIFICANT				SIGNIFICANT			NOT SIGNIFICANT				SIGNIFICANT		
	NEGLIGIBLE	LOW	MODERATE	HIGH	LOW	MODERATE	HIGH	NEGLIGIBLE	LOW	MODERATE	HIGH	LOW	MODERATE	HIGH
RURAL														
PROPOSED ACTION	23	74	3					23	74	3				
ALTERNATIVE 1	22	76	2					22	76	2				
ALTERNATIVE 2	29	92	4					29	92	4				
ALTERNATIVE 3	55	136	9					50	127	8		12	1	2

EM4/5

FIGURE 4.4.2-2 SUMMARY OF SITE IMPACTS ON RURAL LAND USE ASSOCIATED WITH PROPOSED SMALL ICBM CONSTRUCTION AND OPERATIONS AT LAUNCH FACILITIES IN MONTANA

According to the adopted city-county comprehensive plan, this land is within the developing urban area of Great Falls. On the north side of the railroad tracks, the land is classified as industrial. If these lands are acquired by the base prior to construction, they would fall within the Malmstrom AFB jurisdiction and would be developed in accordance with their plans. It is anticipated that Air Force personnel living offbase would be absorbed by development currently occurring in Great Falls. No vacant developable land under the Great Falls planning jurisdictions would be used for residential purposes. Therefore, the long-duration impacts associated with the onbase housing option would be negligible.

Offbase Housing Option. For this option, housing for military families would be constructed in the community rather than onbase. This would result in a demand of 291 acres of the vacant developable land designated as residential in the city-county comprehensive plan. This would reduce residential vacant developable land by 9 percent and expand the existing residential land use by 4 percent. The proposed program would be consistent with the adopted city-county comprehensive plan. The long-duration impact would be low because the program would not substantially reduce the supply of vacant developable land. The impact would not be significant since it is consistent with the city-county comprehensive plan.

City of Lewistown. The City of Lewistown and adjacent areas of Fergus County contain approximately 2,300 acres of vacant developable land according to the city-county comprehensive plan adopted by the Lewistown City-County Planning Board. The socioeconomic analysis estimates between 20 and 110 new persons would likely become full-time residents of Lewistown and surrounding communities during the construction phase. It is anticipated that the program-related inmigration would be absorbed by development currently occurring in Lewistown.

The proposed program is expected to result in no noticeable change in the rate of urbanization beyond baseline projections. Little or no vacant developable land is anticipated to be used. Therefore, the long-duration impacts would be negligible.

City of Conrad. The City of Conrad and adjacent areas of Pondera County contain 435 acres of vacant developable land according to the adopted Conrad-Pondera Comprehensive Plan. The socioeconomic analysis estimates that between 20 and 60 persons may become full-time residents of Conrad during the construction phase. It is anticipated that program-related inmigration would be absorbed by development currently occurring in Conrad.

The proposed program is expected to result in no noticeable change in the rate of urbanization beyond baseline projections and little or no vacant developable land would be utilized for new development. Therefore, the long-duration impacts would be negligible.

4.4.2.2 Rural Land Use

Rural land use impacts are based on an analysis of two subelements: land use affected by construction activities adjacent to the launch facilities, and land use within the expanded explosive safety zones. Overall short- and long-duration rural land use impacts would be low and not significant.

Launch Facilities. For the Proposed Action, 100 launch facilities would be used for deployment of two HMLs per site. Currently, each launch facility is inside a fenced area and occupies from 1 to 3.3 acres. Launch facilities may be enlarged by 0.1 to 1.6 acres, with the existing security fence relocated and extended to enclose the expanded area.

During construction activities, a total of 3 acres may be temporarily disturbed at each launch facility. The expansion would include the construction of two earth-covered igloos and a crew support facility. In addition, some launch facility access roads would be widened to provide for HML movements.

The launch facilities are all located in sparsely populated rural areas. The land use around 97 launch facilities is dominated by dry-farmed cropland/rangeland. Two launch facilities are surrounded by irrigated croplands and one launch facility is located in a forest.

Existing Minuteman explosive safety zones within the Malmstrom AFB ROI consist of a 1,200-foot radius around each launch facility. The construction of the HML enclosure would result in the expansion of the launch facility explosive safety zones to 1,250 feet. The establishment of expanded explosive safety zones would require the acquisition at fair market value of additional restrictive easements. Each restrictive easement would give the Air Force the right to prohibit the use, maintenance, and erection of habitable buildings (inhabited structures); the right to prohibit the use of firearms and explosives; the right to prohibit burning as a means or method of clearing or maintaining the land; and the right to have access to the land under restrictive easement for the purpose of ensuring that compliance with the conditions of the easement are practiced. The restrictive easements do not in any way restrict the use of the land for agricultural, ranching, mining, or drilling activities, provided the exercise of these activities does not violate the conditions of the easement.

The 100 launch facilities identified for the Proposed Action contain no inhabited structures within their 1,250-foot explosive safety zones. The establishment of additional restrictive easements would require the acquisition of approximately 34 acres of land per launch facility. The total land subject to additional restrictive easement would be approximately 3,400 acres. During the construction phase, as much as 255 acres of land could be disturbed. Overall short-duration land use impacts of the Proposed Action would be low and not significant since more than 200 acres of dry-farmed cropland/rangeland would be disturbed at 100 launch facilities. Overall long-duration impacts would be negligible (Figure 4.4.2-2).

In order to facilitate construction in these areas, it will be necessary to obtain right-of-entry onto privately owned land. Each landowner will be contacted prior to construction in order to negotiate right-of-entry agreements. These agreements will provide for compensation of lost crops and native rangeland. The agreements will also provide for the reclamation of the land, as nearly as practical, to its original condition.

Deployment Area Roads. During the construction phase some land would be disturbed as a result of construction activities on all T/E routes where temporary access beyond existing ROWs of public entities (state, counties, and cities) would be required. The Defense Access Roads needs process would determine whether acquisition of land for ROW purposes would be necessary. Dry-farmed cropland would be expected to receive the largest amount of acreage disturbance since 53 percent of the land along the ROWs of T/E routes is composed of this land use followed by rangeland with 32 percent. Irrigated cropland and woodland would be expected to have more acreage disturbed than their percentage of land use would generally indicate (irrigated cropland 9% and woodland 2%) since these land uses are more prevalent on or near riparian areas where detours around bridge and culvert improvements would be expected to occur.

Agricultural activities along the T/E routes occur in the springtime between April 1 and May 15 for planting of spring crops, the summer months for harvest of hay, and from

September 15 to October 25 for harvesting of grains and the planting of winter wheat. Livestock, predominantly cattle, are moved periodically during the year for pasture rotation and the road network is used to transport livestock to the market. Impedance resulting from modification of the T/E routes would have some short-duration, adverse impacts on these seasonal activities in certain localized areas on an intermittent basis.

Overall short-duration impacts on the T/E route modifications would be low and not significant because the impacts would not change the character of the area but would result in some interference with agricultural productivity.

The overall long-duration impacts of the T/E route modifications would be negligible since the disturbed land located outside of the ROWs would be returned to existing land uses. The T/E route modifications would be expected to avoid built-up land uses (3%); therefore, no relocation of people would occur.

Malmstrom Air Force Base. The HML vehicle operations training area would be constructed on the east side of Malmstrom AFB on 350 acres of land. The land use consists of dry-farmed cropland devoid of any structures. The adopted comprehensive plan of the Great Falls City-County Planning Board has not given the land any specific land use designation.

Some technical and personnel support facilities would be constructed on about 100 acres of an expanded portion of the base located north of the present base boundary and east and adjacent to the proposed onbase family housing area. The land is currently vacant and is used for dry-farmed agriculture and some limited grazing of livestock (Section 3.4.3.1, Figure 3.4.3-1). An armory, integrated support complex, security police consolidated group, and an open-space storage area are proposed for the eastern half of the expansion area. The Pow-Wow Recreation Area and its recreational lake and ballfields would be relocated to the western half of the expansion area adjacent to the proposed military family housing area. If military family housing is provided onbase, it would result in the acquisition of an additional 330 acres of land on the north side of the base (Section 4.4.2.1).

Since the Proposed Action would permanently eliminate 450 acres of dry-farmed cropland, the overall long-duration impacts would be low and not significant as the total cropland removed amounts to less than 1 percent of the total dry-farmed acreage of Cascade County. There would be no short-duration impacts since the entire 450 acres would be used over the operations phase.

4.4.3 Impacts of Alternatives

Urban land use would not change in the cities of Lewistown and Conrad; therefore, only urban land use for the City of Great Falls is discussed. The long-duration impacts on urban land use for all alternatives would be negligible like those for the onbase housing option of the Proposed Action. The long-duration impacts of the offbase housing option of Alternatives 1 and 3 are the same as the offbase housing option of the Proposed Action, low and not significant. The offbase housing option of Alternative 2 would be moderate and not significant. No short-duration impacts are expected on urban land use for all alternatives.

For overall rural land use, Alternatives 1 and 2 have essentially the same impacts as the Proposed Action (both short- and long-duration impacts would be low and not significant). For Alternative 3, short-duration impacts would be negligible; however, long-duration impacts would be moderate and significant since 35 inhabited structures would be within the 1,425-foot explosive safety zone of 14 launch facilities identified for this alternative.

4.4.3.1 Urban Land Use

Approximately 3,185 acres are designated for future residential growth in the city-county comprehensive plan of Great Falls. The onbase housing option would not require any vacant developable land outside the base. The estimated amount of vacant developable land, located outside the base, required for the offbase housing option is the following:

- Offbase housing option of Alternative 1 - 205 acres;
- Offbase housing option of Alternative 2 - 333 acres; and
- Offbase housing option of Alternative 3 - 291 acres.

Alternative 1. This alternative would site onbase military housing at the same location as the Proposed Action; however, only 230 acres would be used, which is a reduction of 100 acres from the Proposed Action. The difference in acres consumed between the onbase housing option of the Proposed Action and the onbase housing option of Alternative 1 is minor; the long-duration LOI and significance ratings are the same as the Proposed Action, negligible.

For the offbase housing option, housing for military families would be constructed in the community rather than onbase. This would result in a demand of 205 acres of vacant developable land designated as residential in the city-county comprehensive plan. This would reduce residential vacant developable land by 6 percent and expand the existing residential land use by 3 percent. The proposed program would be consistent with the adopted comprehensive plan. The long-duration impact would be low and not significant as with the offbase housing option of the Proposed Action.

Alternative 2. This alternative would site onbase military housing at the same location as the Proposed Action; however, 380 acres would be used, which is an increase of 50 acres over the Proposed Action. The difference in developed acres between the Proposed Action and this alternative is minor; therefore, the long-duration LOI and significance ratings would remain the same as for the Proposed Action (negligible).

For the offbase housing option, housing for military families would be constructed in the community rather than onbase. This would result in a demand of approximately 333 acres of vacant developable land designated as residential in the city-county comprehensive plan. This would reduce residential vacant developable land by 10 percent and expand the existing residential land use by 5 percent. The offbase housing option would be consistent with the adopted comprehensive plan. The long-duration impact would be moderate because the offbase housing option would substantially reduce the supply of vacant developable land. This impact would not be significant since it is consistent with the comprehensive plan.

Alternative 3. Land use requirements for Alternative 3, with both housing options, would be the same as those for the Proposed Action; consequently, the long-duration LOI and significance determinations would remain the same: negligible for the onbase housing option and low and not significant for the offbase housing option.

4.4.3.2 Rural Land Use

Alternative 1. Alternative 1 would require the construction of pre-engineered buildings. A total of approximately 80 acres of land would be acquired in fee simple in order to accommodate the pre-engineered buildings at 100 launch facilities. The use of a pre-engineered building would require an explosive safety zone of 1,795 feet. None of the 100 launch facilities proposed for Alternative 1 contain inhabited structures within the expanded safety zone. The expansion of the explosive safety zone for this alternative would require the acquisition of additional restrictive easements of approximately 134 acres around each launch facility. Approximately 13,400 acres of land would be subject to additional restrictive easements.

Construction-phase activities would result in the disturbance of approximately 220 acres. The dry-farmed cropland category would have the largest amount of acreage disturbed, amounting to 160 acres. Rangeland would have 57 acres of short-duration disturbance and 3 acres of irrigated cropland and forestland would be disturbed. Long-duration disturbance would be considerably smaller.

The short-duration impacts of Alternative 1 would be rated low and not significant since more than 200 acres of dry-farmed cropland/rangeland would be disturbed at 100 launch facilities. Long-duration impacts would be negligible.

Alternative 2. For Alternative 2, a total of 125 launch facilities would be used with two HMLs per site. The launch facility improvements are the same as those of the Proposed Action, the only difference would be the addition of 25 launch facilities. A total of approximately 145 acres of land would be acquired in fee simple in order to accommodate the igloos at all 125 sites. The explosive safety zone for this alternative is the same as that of the Proposed Action; therefore, approximately 34 acres of land around each of the 125 launch facilities would require the acquisition of restrictive easements. Approximately 4,200 acres of land would be subject to additional restrictive easements. None of the 125 launch facilities proposed for Alternative 2 contain inhabited structures within the expanded explosive safety zone.

The additional 25 launch facilities would result in a short-duration loss of 54 additional acres of dry-farmed cropland, 8 additional acres of rangeland, and 3 additional acres of irrigated cropland and forestland with a total of 320 acres for the 125 launch facilities. The 125 identified launch facilities contain no inhabited structures within the 1,250-foot explosive safety zone. Short-duration impacts would remain the same as those of the Proposed Action, low and not significant, since more than 200 acres of dry-farmed cropland/rangeland would be disturbed at 125 launch facilities. The long-duration impacts would also be the same as those of the Proposed Action (negligible).

Alternative 3. For Alternative 3, all 200 launch facilities would be used with one HML in a pre-engineered building deployed per launch site. Approximately 95 acres of land would be acquired in fee simple. The explosive safety zone would be expanded to 1,425 feet from the enclosure instead of 1,250 feet as with the Proposed Action. The expansion of the explosive safety zone would require the acquisition of an additional 47 acres of restrictive easements around each launch facility. Approximately 9,400 additional acres of land would be subject to additional restrictive easements. Short-duration impacts would be negligible. Since Alternative 3 would use all 200 launch facilities, the 15 launch facilities with 35 inhabited structures in the expanded 1,425-foot explosive safety zones would have to be relocated. Therefore, overall long-duration impacts would be moderate since more than ten inhabited structures would require relocation outside of the expanded explosive safety zones (Table 4.4.3-1). Long-duration impacts would be significant since the action would affect inhabited structures within the explosive safety zone.

Table 4.4.3-1

Site-Level Impacts at Launch Facilities With Occupied Structures Within the 1,425-Foot Explosive Safety Zone (Alternative 3)

Launch Facility	Residences	Other[1]	LOI	Significance
A-6	10	0	High	Significant
A-8	2	0	Low	Significant
D-11	2	0	Low	Significant
E-3	2	0	Low	Significant
H-5	1	0	Low	Significant
H-6	1	0	Low	Significant
I-10	1	0	Low	Significant
J-6	-	1(school)	High	Significant
J-10	3	0	Low	Significant
M-5	1	1	Low	Significant
M-7	3	3	Moderate	Significant
N-8	1	0	Low	Significant
Q-15	1	0	Low	Significant
S-33	1	0	Low	Significant
S-34	1	0	Low	Significant
TOTAL:	30	5		

Note: [1] Other structures include commercial buildings and one school.

4.4.4 Cumulative Impacts

4.4.4.1 Urban Land Use

The Peacekeeper in Rail Garrison basing activity would be concentrated at Malmstrom AFB and vicinity. Therefore, urban land use impacts are analyzed for the Great Falls urban area.

The concurrent deployment of Small ICBM and Peacekeeper in Rail Garrison programs would require 30 additional acres of privately owned land to site 160 multiple-family units for onbase housing or a similar requirement of community land if housing is built offbase. The overall long-duration impacts would be low and not significant like those of the Proposed Action.

4.4.4.2 Rural Land Use

The Peacekeeper in Rail Garrison basing mode would require an explosive safety zone of 3,700 feet around the four train enclosures. The establishment of an explosive safety zone for the Peacekeeper in Rail Garrison would require the acquisition of new restrictive easements on approximately 194 acres of private land adjacent to the south boundary of the base. The land use outside the base under consideration for restrictive easements is composed of dry-farmed cropland and is devoid of all inhabited structures. The Peacekeeper in Rail Garrison program is not expected to affect rural land use with the exception of the restrictions listed in Section 4.4.2.2.

4.4.5 Impacts of the No Action Alternative

For the No Action Alternative, the Air Force would continue to maintain existing Minuteman ICBMs. The scope of such activities would not cause changes in either the urban or rural areas. For the urban areas of Great Falls, Lewistown, and Conrad, land use changes would occur as a result of normal community growth. The growth of these communities is expected to be modest. For rural land use, current land uses are expected to continue. There would probably be some decrease in dry-farmed cropland acreage due to the encouragement of the Federal Farm Program to retire the erodible and/or unproductive lands from cultivation, whereby the land eventually would revert to rangeland or timber. However, the character of the ROI is not expected to change from its present appearance.

4.4.6 Potential Mitigation Measures

No mitigation measures are recommended for the land use resource beyond the assumed mitigations discussed in Section 4.4.1.4 for the Proposed Action, Alternative 1, and Alternative 2. Additional mitigation measures are identified for Alternative 3 since all 200 launch facilities would be used for deployment. Potential mitigation measures for rural land use include the following:

- Adjust HML enclosure layouts where possible to ensure that the explosive safety zones do not require the relocation of existing inhabited structures.
- In those instances where the explosive safety zones of launch facilities contain existing inhabited structures, these launch facilities would be dropped from consideration for HML deployment. The HMLs would be relocated to other launch facilities which are capable of deploying two HMLs per site and would result in no relocation of inhabited structures, where possible.

4.4.7 Irreversible and Irretrievable Resource Commitments

For urban land use, use of land for expansion of housing can be considered a resource commitment for the life of the residential buildings. Such a use would not cause an irretrievable commitment as land can be retrieved through the removal of improvements.

For rural land use, removal of 610 acres of irrigated croplands, dry-farmed croplands, and forest and rangelands would result in commitment to new land use for the life of the program (350 acres for HML vehicle operations training area, 160 acres for expanded launch facility area, and 100 acres for an expanded technical and personnel support facility). This would not be considered an irreversible or irretrievable commitment of land.

4.4.8 Relationship Between the Local Short-Term Use of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

Development of vacant developable lands would occur sooner due to program requirements, and this more intensive use would enhance the long-term productivity of the land as a community resource.

Agricultural losses at the launch facilities, HML vehicle operations training area, and recreation area may limit the production of forage, hay, and timber on a small scale. The provisions of the Federal Farm Program of the U.S. Department of Agriculture would appear to prevent the actual loss of production of grains (wheat, barley, oats, and corn). In instances of actual loss to operators, the loss would be compensated. With regard to inhabited structures, fair market value and relocation benefits would be paid, as legally mandated, to those persons, businesses, and/or institutions required to vacate explosive safety zones.

4.5 Recreation

Deployment of the Small Intercontinental Ballistic Missile (ICBM) program at Malmstrom Air Force Base (AFB) would increase the use of local recreation facilities in Great Falls and resource-based recreation areas in north-central Montana. Therefore, program-related impacts on both regional and local recreation have been evaluated in this analysis.

4.5.1 Impact Analysis Methodology

The impact analysis methodology for recreation involved three separate procedures: evaluation of program impacts, determination of levels of impact (LOI), and determination of the significance of impacts. The methodology also included consideration of a number of assumptions and assumed mitigations. Regional recreation impacts were analyzed for the north-central Montana Region of Influence (ROI); however, site-level impacts were evaluated for specific recreation areas. Local recreation impacts were analyzed for the communities of Great Falls, Lewistown, and Conrad. In addition, a discussion of the impacts on the tourism industry is included in the regional recreation section.

4.5.1.1 Evaluation of Program Impacts

Regional Recreation. Regional recreation areas could be affected by increased recreation use resulting from program-induced populations. Increased use, particularly during seasonal and holiday weekends, could reduce the quality of the recreational experience and create unsafe and unhealthful conditions when use exceeds the carrying capacity of such areas. The baseline analysis identified recreation areas within approximately 150 travel miles of Great Falls and projected use for various recreation activities at these areas. Potential impacts on regional recreation areas were determined by evaluating increased recreation use for various activities in terms of the ability of the areas to absorb increases in use without a decrease in the quality of the recreational experience.

The determination of the increase in recreation demand resulting from program-induced population growth involved two basic steps: calculating total induced recreation participation by activity for the region and allocation of the demand by activity to individual recreation areas within the ROI. Increased recreation use was calculated using per capita participation rates for each activity from a 1985 outdoor recreation needs survey conducted for the Montana Department of Fish, Wildlife and Parks (MDFWP).

Program-related population growth would begin in 1990 and would continue to increase until 1996 or 1997, when it would decrease slightly and then level off. Two forecast years were selected for analysis: the peak-population year and the steady-state year. The peak-population year represents the year (1996 for the Proposed Action, Alternative 1, and Alternative 3, and 1997 for Alternative 2) when program-related population would be highest, and the steady-state year represents the operations phase (year 2000) when inmigrant population would level off after construction and assembly and checkout activities are completed.

The increased demand for recreation attributed to program-related population growth was estimated by multiplying the forecasted peak-year and steady-state year population levels by appropriate participation rates. To account for the difference in the demographic characteristics between the existing population and the program-related inmigrant population (i.e., younger-age population), per capita activity participation rates for three age cohorts (18 to 24, 25 to 34, and 35 to 44 years old [Table 4.5.1-1]) were used to determine increased recreation demand. Few persons 45 years or older are expected to inmigrate to the Great Falls urban area as a result of the proposed program. Although the age-cohort participation rates were derived in the MDFWP survey at the statewide level, it was assumed that they reflect recreation participation in Region 4 since the composite participation rates at the statewide level and for Region 4 are generally similar for most activities.

Based on the age distribution for Malmstrom AFB in the 1980 Census of Population (U.S. Bureau of Census 1982b), the distribution of the program-related inmigrant population by the three age cohorts was the following: 18 to 24 years -- 33 percent, 25 to 34 years -- 22 percent, and 35 to 44 years -- 10 percent. The small number of persons 45 years or older expected to inmigrate were included in the 35 to 44 age cohort. The remaining inmigrant population was assumed to be less than 18 years old. The projected age cohort population totals were multiplied by the participation rates for each age cohort and then

Table 4.5.1-1

Montana Outdoor Recreation Participation Rates [1]

Activity	Montana[2]	Region 4[2,3]	Age 18-24	Age 25-34	Age 35-44	Median[4] Days
Camping	51.9	54.4	72.9	62.4	55.4	8
Hunting	37.6	36.8	40.0	47.2	40.6	10
Backpacking	14.4	12.3	22.1	20.2	16.3	6
Horseback Riding	22.3	20.6	33.6	30.1	23.9	6
Off-Road Vehicle Use (4x4)	24.1	19.0	41.4	25.8	25.7	7
Off-Road Vehicle Use (All-Terrain Vehicles)	11.5	11.9	30.7	14.9	10.1	10
Picnicking	74.8	77.1	78.6	83.9	79.7	6
Fishing	56.4	57.3	58.6	65.5	61.2	12
Motorboating	32.6	33.6	46.4	37.6	32.6	5
Waterskiing	14.5	16.2	32.9	20.5	14.5	4
Swimming[5]	42.3	43.1	70.7	59.6	44.6	7
Rafting	18.1	14.6	31.4	26.1	18.1	3
Canoeing	11.4	7.9	19.3	17.7	12.0	4
Snowmobiling	16.3	19.0	31.4	21.1	14.5	5
Cross-Country Skiing	18.6	12.3	19.3	26.4	21.7	7
Downhill Skiing	18.8	17.8	37.9	28.9	17.8	6

Notes: [1] Participation rates derived from The Montana Outdoor Recreation Needs Survey (University of Montana 1986).

[2] Percent of population 18 years or older estimated to participate in activity at least once during the year.

[3] MDFWP Administrative Region 4.

[4] Median number of days participation in activity occurs.

[5] Swimming in lakes, streams, rivers, or ponds.

summed to determine the total increase in recreation demand attributed to program-related population growth for each activity. Because participation rates were not available for the 0 to 17 age cohort, the total induced demand was increased by a professionally judged 5 percent to account for recreation use by this age cohort (approximately 90% of the 0-17 age cohort is projected to be less than 14 years old and over 70% percent is estimated to be less than 10 years old).

The total program-induced demand for each activity was then allocated to specific recreation areas based on available historical use data, discussions with regional recreation officials, and professional judgment. Program-induced demand was reduced by approximately 5 percent for most activities to account for participation in activities by the program-induced population at recreation areas outside the ROI. Total induced demand was adjusted further to account for participation in activities in the ROI outside of the established recreation areas considered in this analysis. This recreation use would occur primarily on private lands or on undeveloped public lands (i.e., federal, state, or local). The amount of recreation projected to occur on these lands varied by activity. Recreation impacts were based on an overall assessment of increased use at each recreation area and the ability of each area to absorb the increased use.

Local Recreation. The components of the local park and recreation systems in the affected communities were analyzed using the methodology discussed in Section 3.5.2.3. Inmigrant populations in the peak-population year and the steady-state year were added to the projected baseline population for those years to determine total demand for parkland and recreation facilities. Based on program-induced population projections, the peak-population year for Great Falls would be 1996 for the Proposed Action, Alternative 1, and Alternative 3, and 1997 for Alternative 2. The peak-population year for Lewistown and Conrad would be 1992 and 1993, respectively, for the Proposed Action, Alternative 1, and Alternative 3; for Alternative 2, the peak-population year for Lewistown and Conrad would be 1994 and 1993, respectively. The steady-state year would occur in the year 2000 for Great Falls. Operations-phase population increases are not projected for Lewistown or Conrad.

Per capita facility and parkland acreage ratios for the peak-year and steady-state populations were then determined and compared to existing ratios to determine the impact of the proposed program on local recreation. Existing ratios were based on an estimated 1986 population of approximately 70,300 for the Great Falls urban area, 58,400 for the City of Great Falls, 6,900 for Lewistown, and 3,100 for Conrad. Impacts were assessed on additional parkland acreage and recreation facilities needed to maintain baseline ratios.

The younger inmigrant population is expected to participate in recreation activities at higher levels than the existing population. In addition, though military personnel, particularly those living on Malmstrom AFB, have access to various base recreation facilities, it is expected that these personnel and their dependents would also use the facilities provided by the City of Great Falls and participate in the various activities offered by the city's program such as recreation leagues.

4.5.1.2 Determination of Levels of Impact

Regional Recreation. The LOIs for regional recreation were based on increases in visitation at recreation areas within the ROI. Changes in visitation pressure were associated with program-related increases in population and the relative ability of recreation areas to absorb increases in recreation use. Although recreation opportunities are available year-round, recreation use tends to be concentrated at specific times of the year depending on the activity. These peak-use periods, generally holidays and seasonal weekends (e.g., summer, winter, or activity-specific seasons such as hunting), typically account for a majority of the use. Problems such as overcrowding, activity conflicts, traffic congestion, littering, loss of serenity, and law enforcement are all linked to increases in visitation and can result in declines in the quality of the recreational experience and potential health and safety problems. Declines in the quality of the recreational experience can be both perceived and actual (e.g., decrease in hunter or angler opportunity or success).

The extent that increased visitation would decrease the quality of the recreational experience determines the changes in the operation and management of recreation areas (e.g., upgrading/expansion of facilities or restricting access through use of permits or reservation requirements) required to maintain existing recreational qualities.

The LOIs for regional recreation are the following:

- Negligible Impact -- Minimal increase in visitation pressure that recreation areas in the ROI would be able to absorb without a decline in the quality of the recreational experience.
- Low Impact -- Increased visitation pressure would result in occasional crowding of recreation areas and a noticeable decline in the quality of the recreational experience. Increased recreation use would contribute to the crowding of recreation areas primarily during peak-use periods.
- Moderate Impact -- Increased visitation pressure would result in frequent crowding of recreation areas and an appreciable decline in the quality of the recreational experience. Increased recreation use would contribute to the crowding of recreation areas during both peak-use and some nonpeak-use periods.
- High Impact -- Increased visitation pressure would result in regular crowding of recreation areas and a substantial decline in the quality of the recreational experience.

Local Recreation. The LOIs for local recreation were defined in terms of the decline in the level of service provided by the existing recreation system (i.e., facilities, programs, staffing, and parkland) resulting from an increase in the demand for local recreation services. The extent that the capacity of the existing system is exceeded determined the expansion of the system (e.g., additional parkland, facilities, staffing, and/or programs) that would be required to maintain existing levels of service. Capacity was evaluated in terms of the ability of the local system to maintain a balanced neighborhood distribution of parkland and facilities in the community and provide recreation services without limiting or restricting use of facilities or placing limitations on participation in recreation programs. The LOIs for local recreation are the following:

- Negligible Impact -- Minimal increase in demand for recreation services that does not exceed capacity of the existing system; no decline in the level of service provided.
- Low Impact -- Increased demand for recreation services that approaches the capacity of the existing system with a slight decline in the level of service provided; no parkland or facility deficiencies occur.

- Moderate Impact -- Increased demand for recreation services that exceeds the capacity of the existing system with a noticeable decline in the level of service provided; minor parkland and facility deficiencies occur.

- High Impact -- Increased demand for recreation services that exceeds the capacity of the existing system with a substantial decline in the level of service provided; major parkland and facility deficiencies occur.

4.5.1.3 Determination of Significance

The significance of recreation impacts was evaluated in accordance with Council on Environmental Quality (CEQ) regulations. Significance was assessed through evaluation of the context and intensity of the impacts. Context includes consideration of the settings (site, local, or regional) and the duration of the impacts. The CEQ regulations provide ten items that should be considered in evaluating intensity. Of these ten items, the following are applicable to the recreation resource:

- Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas;

- The degree to which the effects on the quality of the human environment are likely to be highly controversial; and

- The degree to which the proposed action affects public health or safety.

Public health and safety may be affected if increased use of recreation areas results in overcrowded conditions and delays or reductions in the maintenance of facilities that may create unsafe conditions and increase the potential for injury.

In addition to these considerations, which are specifically identified in the CEQ regulations, the following consideration is judged appropriate for the recreation resource:

- Whether the action creates a need for institutional responses in the form of capital expenditures for the development of new facilities.

Should recreation opportunities become exhausted, the need to provide new recreation lands or facilities may require extensive institutional response such as raising taxes or floating a bond issue.

4.5.1.4 Assumptions and Assumed Mitigations

Assumptions. The following assumptions were applied in assessing impacts on regional recreation:

- An ROI based on a 150-mile travel distance (approximately 3 hr) from the potentially affected population center will capture most of the regional recreation demand generated by the program-induced population;

- Program-induced population will participate in various recreation activities with the same frequency as current residents of the region; and

- Approximately 95 percent of the total program-induced demand for most activities will generally occur at regional recreation areas within the ROI.

The following assumption was applied in assessing impacts on local recreation:

- Existing parkland, recreation facilities, recreation programs, and staffing levels are adequate to provide a balanced recreation system, given current budgetary constraints.

Assumed Mitigations. The following mitigation measure was assumed for the regional recreation analysis:

- The Air Force, in association with state and federal natural resource agencies, will develop an environmental awareness program to be presented (with both printed materials and a multimedia presentation) to Air Force and contractor personnel. This program will be designed to inform the program-related inmigrants about precautions (and applicable regulations) necessary to preserve the unique environment of the region and preserve the goodwill of the residents. The environmental awareness program will include a description of recreation, biological, and cultural resources in the region and measures to be taken to prevent disturbance to or damage of these resources. The program will also provide a description of agricultural practices in the region and procedures to follow to avoid unnecessary interruptions and disturbances to local agriculture.

  The environmental awareness program may be effective in minimizing potential indirect impacts on recreation, biological, agricultural, and cultural resources and reducing the potential for conflicts with private landowners and illegal hunting and fishing occurrences. In addition, the environmental awareness program will include information to assist inmigrants in assimilating into the community. This information will include an overview of the cultural and recreation opportunities, special interest groups and clubs, health care facilities, and human service organizations available in the Great Falls area.

4.5.2 Impacts of the Proposed Action

Long-duration impacts on regional recreation for the Proposed Action would be low because increased recreation use would contribute to the crowding of some recreation areas during peak-use periods, resulting in a noticeable decline in the quality of the recreational experience. Impacts would not be considered significant since infrequent crowding of some recreation areas would not require a major institutional response to provide additional facilities or affect public health and safety. Long-duration impacts on local recreation for the Proposed Action would be moderate because program-induced demand for recreation facilities and programs may result in or contribute to facility shortages, resulting in a noticeable decline in the level of service provided. Impacts would be significant because development of additional facilities would require extensive institutional response to provide additional facilities (Figure 4.5.2-1). Since program-related population growth would begin in 1990, continue to increase until 1997, and remain at essentially that level during the operations phase, short-duration impacts on regional or local recreation are not expected.

4.5.2.1 Regional Recreation

Increased recreation use in the ROI would result in long-duration, low, and not significant impacts on regional recreation. Impacts would be low because overall use at most recreation areas in the ROI is generally high only during peak-use periods. Increased use

LEVEL OF IMPACT	SIGNIFICANCE	
Adverse Impacts	Not Significant	Significant
Negligible	☐	
Low	∘	•
Moderate	○	●
High	◯	⬤
Beneficial Effects	▨	

Note: Some resource elements may have both beneficial effects and adverse impacts.

PROGRAM IMPACTS

ELEMENT/AFFECTED INTEREST	SHORT DURATION								LONG DURATION							
	PROP. ACTION		ALT. 1		ALT. 2		ALT. 3		PROP. ACTION		ALT. 1		ALT. 2		ALT. 3	
	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING
REGIONAL RECREATION									∘	∘	∘	∘	∘	∘	∘	∘
LOCAL RECREATION									●	●	●	●	●	●	●	●
GREAT FALLS									●	●	●	●	●	●	●	●
LEWISTOWN																
CONRAD																

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FIGURE 4.5.2-1 IMPACTS ON RECREATION ASSOCIATED WITH THE PROPOSED SMALL ICBM PROGRAM IN MONTANA would contribute to the crowding of some recreation areas during these periods, resulting in a noticeable decline in the quality of the recreational experience. However, because of the proximity of Giant Springs State Park to Great Falls and Malmstrom AFB, increased recreation use may contribute to the crowding of this recreation area during both peak-use and some nonpeak-use periods resulting in a moderate impact. Impacts would not be considered significant since infrequent crowding of some recreation areas would not require a major institutional response to provide additional facilities or affect public health and safety. Impacts would be the same regardless of the housing option selected.

Program-induced population growth is projected to increase recreation use in the ROI from approximately 4 to 8.5 percent (depending on the activity) above baseline projections by 1996, and from 3.5 to 7.5 percent by the year 2000. The projected increase in use for various activities is shown in Table 4.5.2-1. However, the relative increase in use at some individual recreation areas for various activities may be greater, since recreation use is not evenly distributed throughout the ROI.

Within the ROI, the largest increase in recreation use would occur in the Lewis and Clark National Forest, primarily the Jefferson Division in the Little Belt, Snowy, and Highwood mountains. It is projected that a majority of the total increased recreation use in the national forest would occur in the Jefferson Division because of its proximity to Great Falls. Activities expected to receive the largest increase in use include fishing (increase of 2,900 activity days), hunting (6,000 activity days), downhill skiing (6,000 activity days), cross-country skiing (5,500 activity days), camping (9,300 activity days), off-road vehicle (ORV) use (12,800 activity days), and snowmobiling (4,800 activity days). The increase in use above baseline totals for this recreation area is projected to be 5 to 9 percent for each of these activities. The increase in use above baseline totals for other activities is projected to be 4 percent or less.

Increases in recreation use for the Jefferson Division would have a low and not significant impact on regional recreation. The increased use that is expected to occur may result in a noticeable decline in the quality of the recreational experience. The Jefferson Division is heavily used for certain activities such as hunting and camping; use for snowmobiling, ORVs, and cross-country skiing is also increasing. Much of the increased use can be expected to occur during periods when use of the national forest is at its highest for these activities (e.g., holiday weekends, hunting season, or winter sports season). Of particular concern in the Jefferson Division is increased hunting use in the Little Belt Mountains, specifically for antlered bull elk. Currently, hunting pressure in this area is approaching levels where the MDFWP is considering implementing special permit hunting (i.e., quota system) for this area. Special permit hunting would result in a decrease in hunter opportunities in this area and would increase hunting pressure in other areas of the region with open hunting regulations. Additional hunting pressure resulting from the program-induced population may contribute to the need for changes in the regulations for this area.

The Rocky Mountain Division of the Lewis and Clark National Forest is also expected to receive a large increase in recreation use, particularly in the Gibson Reservoir and Teton River Headwaters areas. Activities expected to receive the largest increased use include fishing (600 activity days), hunting (3,700 activity days), backpacking (2,400 activity days), camping (3,700 activity days), horseback riding (2,900 activity days), snowmobiling (600 activity days), and boating (900 activity days). The increase in use above baseline for each of these activities is projected to be 4 to 8 percent. The increase in use for other activities above baseline totals is projected to be 3 percent or less. Impacts are projected to be low and not significant for the Rocky Mountain Division because this area

Table 4.5.2-1

Estimated Program-Induced Recreation Use in the Region of Influence for the Proposed Action and Alternative 3 (In Activity Days[1])

Activity	Baseline		Proposed Action and Alternative 3		Net Change		Percent Change	
	1996[2]	2000[2]	1996[3]	2000[3]	1996	2000	1996	2000
Camping	620,400	634,400	648,500	660,500	28,100	26,100	4.5	4.1
Hunting	523,700	535,400	546,100	556,300	22,400	20,900	4.3	3.9
Backpacking	105,000	107,400	111,500	113,400	6,500	6,000	6.2	5.6
Horseback Riding	175,900	179,800	185,700	188,900	9,800	9,100	5.6	5.1
Off-Road Vehicle Use (4x4)	189,300	193,500	201,700	205,100	12,400	11,600	6.6	6.0
Off-Road Vehicle Use (All-Terrain Vehicles)	169,300	173,100	181,000	184,000	11,700	10,900	6.9	6.3
Picnicking	658,300	673,100	683,800	696,800	25,500	23,700	3.9	3.5
Fishing	978,500	1,000,500	1,017,200	1,036,500	38,700	36,000	4.0	3.6
Motorboating	239,100	244,400	250,000	254,600	10,900	10,200	4.6	4.2
Waterskiing	92,200	94,300	97,700	99,400	5,500	5,100	6.0	5.4
Swimming[4]	429,300	439,000	452,500	460,600	23,200	21,600	5.4	4.9
Rafting	62,300	63,700	66,700	67,800	4,400	4,100	7.1	6.4
Canoeing	45,000	46,000	48,700	49,400	3,700	3,400	8.2	7.4
Snowmobiling	135,200	138,200	141,900	144,400	6,700	6,200	5.0	4.5
Cross-Country Skiing	122,500	125,300	130,700	132,800	8,200	7,500	6.7	6.0
Downhill Skiing	152,000	155,400	162,000	164,700	10,000	9,300	6.6	6.0

Notes: [1] Based on participation rates (Table 4.5.1-1) from The Montana Outdoor Recreation Needs Survey (University of Montana 1986). Baseline totals were calculated using MDFWP Region 4 rates and program-induced totals were calculated using rates for the 18 to 24, 24 to 34, and 35 to 44 year old age cohorts.

[2] Total annual participation in activity days based on an estimated population (18 years or older) of approximately 142,300 for 1996 and 145,500 for the year 2000 for MDFWP Region 4.

[3] Total annual participation in activity days based on an estimated population (18 years or older) of approximately 147,500 for 1996 and 150,400 for the year 2000 in MDFWP Region 4 (program-induced populations of 5,270 and 4,900, respectively).

[4] Swimming in lakes, streams, rivers, or ponds.

is also heavily used for certain activities during peak-use periods, and increased use may contribute to existing crowded conditions at these times, resulting in a noticeable decline in the quality of the recreational experience.

Holter and Canyon Ferry lakes are projected to receive increased boating and waterskiing use. Increases in boating (2,900 and 1,300 activity days, respectively) and waterskiing (2,100 and 700 activity days, respectively) are expected to result in a 5-percent or less increase in use above baseline totals. Camping would also increase at these lakes (3,900 and 1,400 activity days, respectively), as would fishing (1,100 and 2,300 activity days, respectively) and swimming (7,000 and 2,400 activity days, respectively). These lakes are very popular recreation areas, particularly for water-based activities, and are generally crowded on most summer and holiday weekends. Increased use during the peak-use periods would result in low and not significant impacts at these areas.

Picnicking and general day-use activities would increase at Giant Springs State Park, near Great Falls. The park is heavily used by both residents of Great Falls (including Malmstrom AFB personnel) and by visitors from outside the Great Falls area. The demand for use of the group picnic area and other areas of the park is expected to increase by approximately 8 percent above baseline as a result of program-induced population growth. Heaviest use of the park occurs during the summer months, but weather permitting, use by Great Falls residents occurs year-round. Increased use of the park during the peak-use and some nonpeak-use periods would result in moderate and not significant impacts at the park.

State recreation areas along the Missouri River and fishing access sites at various lakes (particularly Ackley Lake, Newlan Creek Reservoir, Nilan Reservoir, Pishkun Reservoir, and Willow Creek Reservoir) in the ROI would receive increased recreation use, primarily for fishing (100-900 activity days). It is projected that fishing use would increase from 4 to 7 percent above baseline at these recreation areas, particularly the state recreation areas associated with the Missouri River Recreation Road. Boating would also increase, as well as camping and waterskiing at some of these areas. Many of these areas receive heavy use on holiday and summer weekends, and increased use may contribute to a noticeable decline in the quality of the recreational experience, resulting in low and not significant impacts.

Benton Lake National Wildlife Refuge and Freezeout Lake Wildlife Management Area are projected to receive increased use (1,000 and 1,500 activity days, respectively) for hunting, primarily migratory and small game-bird hunting. Increased use is projected to be 5 percent or less, but would be concentrated at times of the year when these areas are already heavily used (e.g., hunting season), resulting in low and not significant impacts at these areas.

The Smith and Missouri rivers are expected to receive most of the floating activity in the ROI. It is projected that each river would receive approximately 1,800 and 4,000 activity days of increased use, respectively. Impacts would be low and not significant because increased use would most likely occur during the late spring and early summer months when floating activity is highest, and would contribute to a noticeable decline in the quality of the recreational experience. Currently, management regulations are being considered by the MDFWP for the Smith River. These regulations would restrict the number of floaters on the river (the river is not very wide and has no public access points for the 61-mi float distance) and may require the implementation of a reservation system if demand for recreation use increases beyond established capacity limits. Additional floating pressure resulting from the program-induced population may contribute to the need to implement such regulations.

The relative increase in use above baseline totals at other recreation areas in the ROI is projected to be 6 percent or less; therefore, impacts would range from negligible to low and not significant at these areas.

Tourism. Deployment of the Small ICBM program in north-central Montana would not result in any direct impacts on the state's tourism industry. Potential transportation and visual resource impacts (i.e., impacts on persons traveling in the region) of the program are discussed in Sections 4.3 and 4.6, respectively. Deployment of the system may have a potential indirect effect on tourism in the region and for the state as a whole. The proposed program may have an adverse effect on how Montana is perceived by potential tourists because of media attention focused on the deployment of the system and its peacetime operation (though the system may be an attraction for some individuals). However, because the amount and type of national and regional media attention given to the program cannot be ascertained at this time, estimates of the potential effects on the tourism industry, if any, cannot be specifically determined.

The deployment of other missile systems in the past (e.g., Peacekeeper missiles in Wyoming) has not resulted in a large amount of media attention. General media coverage of the deployment and peacetime operation of the system would not likely result in a noticeable effect on tourism in the region or state and any decrease would likely be of short duration. However, given the scenario that extensive media coverage does occur, deployment of the system could result in an adverse effect on the state's travel promotion efforts.

4.5.2.2 Local Recreation

Long-duration impacts on local recreation for the Proposed Action would be moderate and significant for the City of Great Falls, and negligible for the cities of Lewistown and Conrad. Overall impacts on local recreation are based on those determined for the City of Great Falls. Long-duration impacts for Great Falls would be moderate because program-induced demand for recreation facilities and programs may result in or contribute to facility shortages, resulting in a noticeable decline in the level of service provided. Impacts would be significant because development of additional facilities would require extensive institutional response to provide additional facilities. Long-duration impacts for Lewistown and Conrad would be negligible because existing facilities and programs are adequate to accommodate the program-induced demand for recreation services. Short-duration impacts on local recreation are not expected.

City of Great Falls. Regardless of whether most of the permanent population growth occurs at Malmstrom AFB (onbase housing option) or in the community (offbase housing option), the additional use of recreation facilities and programs provided in Great Falls and additional parkland requirements would result in moderate and significant impacts on local recreation, unless the local recreation system is expanded to meet program-induced demands. Long-duration impacts would occur because the recreation demand identified during the peak-population year would essentially remain at the same level throughout the operations phase.

Program-related population growth in the Great Falls urban area is projected to result in a 10.9-percent (8,120 inmigrants) increase in population above baseline projections by 1996, declining to 10.1 percent (7,580 inmigrants) by the year 2000. Parkland and recreation facilities in Great Falls would receive increased use from the inmigrant population. To maintain existing per capita ratios for recreation facilities, additional softball (2 fields), golf (9 holes), tennis (6 courts), and swimming (1 pool) facilities would be needed in the peak-population year (1996). Table 4.5.2-2 provides a summary of the

Table 4.5.2-2

Parkland and Recreation Facility Requirements in Great Falls for the Proposed Action and Alternatives 1996

	Baseline Supply (1986)	Projected Requirements[1, 2]				Net Requirements[3]			
		Proposed Action and Alternative 3	Alternative 1	Alternative 2	Cumulative Impacts	Proposed Action and Alternative 3	Alternative 1	Alternative 2	Cumulative Impacts
Neighborhood Parkland (acres)	280	328	320	335	331	48	40	55	51
Softball Fields	8	9.4	9.1	9.6	9.4	2	2	2	2
Golf Holes	27	31.7	30.8	32.4	32.0	9	9	9	9
Tennis Courts	32	37.5	36.5	38.2	37.8	6	5	7	6
Swimming Pools	4	4.7	4.6	4.8	4.7	1	1	1	1

Notes: [1] Based on projected population for the Proposed Action and Alternative 3 of 82,420 (8,120 program-related inmigrants) in 1996 for the Great Falls urban area; 80,190 (5,890 inmigrants) for Alternative 1; 84,120 (9,620 inmigrants) for Alternative 2; and 83,150 (8,850 inmigrants) for the Small ICBM and Peacekeeper in Rail Garrison programs (cumulative impacts).

[2] Based on existing per capita ratios (1986 population of 70,300) of 251:1 for neighborhood parkland; 8,800:1 for softball fields; 2,600:1 for golf holes; 2,200:1 for tennis courts; and 17,600:1 for swimming pools.

[3] Net requirements (i.e., projected requirement - baseline supply) have been rounded to full facility increments (e.g., 1.4 softball fields would require 2 fields and 4.7 golf holes would require a 9-hole increment).

neighborhood parkland and recreation facility requirements for the peak-population year (1996). Local recreation impacts would occur because certain facility shortages, in particular, softball and golf, may exist in the local recreation system and the program-related population growth would increase demand for these facilities. These baseline facility shortages would be exacerbated, resulting in a noticeable decline in the level of service provided by the recreation system, unless additional facilities are provided. The need for additional tennis and swimming facilities may be reduced or eliminated depending on the location of new housing in the community. If new housing is built in areas of the city currently having limited residential development and few or no neighborhood recreation facilities, additional facilities may be required as a result of the program-induced growth. Impacts would be significant because the development of additional facilities would require extensive institutional response in the form of capital expenditures for construction of these facilities.

To maintain existing per capita ratios for developed parkland, approximately 130 acres of additional parkland would be needed to provide new facilities (approximately 80 acres) and for development of new neighborhood parks (approximately 50 acres). Development of new facilities (e.g., golf and softball) would likely occur on undeveloped parcels already owned by the city. New neighborhood parks may be needed depending on the housing option selected. Because those areas of Great Falls projected to receive a majority of the new housing development (e.g., the area west of Malmstrom AFB and east of the city's corporate limits and the area south of 10th Avenue South and east of the Missouri River) currently have only a small amount of parkland acreage because of limited residential development, additional parkland would need to be developed to meet specific neighborhood needs for the offbase housing option. Land would generally be acquired through land dedication when new subdivisions are built, but development would still be necessary. New neighborhood parks would not likely be required for the onbase housing option because most of the population growth would occur at Malmstrom AFB. Impacts on parkland for the offbase housing option would be moderate because there would be a noticeable decline in the level of service provided by the recreation system without the development of additional neighborhood parks. Impacts would be significant because a fiscal response would be required to develop such parkland. Parkland impacts for the onbase housing option would be negligible.

The city would need to expand its recreation program as a result of the increased population. The addition of the younger-age inmigrant population to the Great Falls urban area would require the expansion of city recreation leagues (for softball, basketball, and volleyball) and other program components to accommodate the expected increase in demand. Expansion of the city recreation leagues would require more facilities (e.g., softball fields and gymnasiums). Development of additional parkland and expansion of the city's recreation program may require the addition of two to three full-time employees to administer, operate, and maintain the park and recreation system. Additional part-time staff would also be required and may be able to satisfy some full-time staff requirements.

Cities of Lewistown and Conrad. Construction-phase activities near Lewistown and Conrad would produce modest population increases for a short period of time. Population increases in Lewistown are forecast to occur over a 5-year period, peaking in 1992 with 110 continuous and 10 commuting inmigrants. Increases in Conrad are also forecast to occur over a 5-year period, peaking in 1993 with 60 continuous and 10 commuting inmigrants. Program-related population increases would not create an appreciable demand for additional parkland, facilities, and staffing beyond that already provided for within the communities. The available facilities and parkland acreage for both

Lewistown and Conrad (Section 3.5.3.2) are adequate to accommodate the program-induced demand for recreation services. Therefore, long-duration impacts would be negligible in both of these communities.

4.5.3 Impacts of Alternatives

Long-duration impacts on regional recreation for Alternatives 1, 2, and 3, regardless of the housing option selected, would be low and not significant because increased recreation use would contribute to the crowding of some recreation areas during peak-use periods, resulting in a slight decline in the quality of the recreational experience. Long-duration impacts on local recreation for all three alternatives would be the same as the Proposed Action because program-induced demand for recreation facilities and programs may result in or contribute to facility shortages, resulting in a noticeable decline in the level of service provided. Short-duration impacts on regional and local recreation are not expected.

4.5.3.1 Regional Recreation

Alternative 1. Program-induced population growth for Alternative 1 is projected to increase total recreation use in the ROI from approximately 3 to 6 percent (depending on the activity) above baseline totals by 1996 and from 2.5 to 5 percent by the year 2000. As a result of the smaller inmigrant population for Alternative 1, program-induced recreation use in the ROI would be approximately 27 percent lower for Alternative 1 than for the Proposed Action in the peak-population year and 29 percent lower in the steady-state year (Table 4.5.3-1). Therefore, increased use at individual recreation areas would be lower for all activities, specifically in the Lewis and Clark National Forest and at other heavily used recreation areas in the ROI. However, long-duration impacts on regional recreation would remain low and not significant, though the smaller increase in use would reduce the potential for a decline in the quality of the recreational experience at these areas.

Alternative 2. Program-induced population growth for Alternative 2 is projected to increase total recreation use in the ROI from approximately 4.5 to 9.5 percent (depending on the activity) above baseline totals by 1997 and from 4.5 to 9 percent by the year 2000. As a result of a larger inmigrant population for Alternative 2, program-induced recreation use in the ROI would be approximately 19 percent higher for all activities for Alternative 2 than for the Proposed Action in the peak-population year and 22 percent higher in the steady-state year (Table 4.5.3-1). However, though the increased use at individual recreation areas would be higher, long-duration impacts would remain low and not significant as for the Proposed Action.

Alternative 3. Impacts of Alternative 3 would be the same as those of the Proposed Action.

4.5.3.2 Local Recreation

Alternative 1. Program-related population growth in the Great Falls urban area would result in an approximate 7.9-percent increase (5,890 inmigrants) above baseline totals by 1996 declining to a 7.1-percent increase (5,360 inmigrants) by the year 2000. Impacts of Alternative 1 would be the same as those of the Proposed Action for both housing options. Recreation facility and neighborhood parkland requirements (Section 4.5.2.2, Table 4.5.2-2) for the offbase housing option necessary to maintain existing per capita ratios would be similar, resulting in a moderate and significant impact. New neighborhood parkland would not be needed for the onbase housing option because most

Table 4.5.3-1

Estimated Program-Induced Recreation Use in the Region of Influence for Alternatives 1 and 2 and Cumulative Impacts (In Activity Days [1,2])

	Alternative 1				Alternative 2				Cumulative Impacts			
	Net Change		% Change[3]		Net Change		% Change[3]		Net Change		% Change[3]	
	1996	2000	1996	2000	1997	2000	1997	2000	1996	2000	1996	2000
Camping	20,500	18,500	3.3	2.9	33,300	31,800	5.3	5.0	30,700	28,700	4.9	4.5
Hunting	16,300	14,800	3.1	2.8	26,600	25,400	5.1	4.7	24,400	23,000	4.7	4.3
Backpacking	4,800	4,300	4.6	4.0	7,700	7,300	7.3	6.8	7,100	6,600	6.8	6.1
Horseback Riding	7,100	6,500	4.0	3.6	11,600	11,100	6.6	6.2	10,700	10,100	6.1	5.6
Off-Road Vehicle Use (4x4)	9,000	8,200	4.8	4.2	14,700	14,100	7.7	7.3	13,500	12,700	7.1	6.6
Off-Road Vehicle Use (All-Terrain Vehicles)	8,500	7,800	5.0	4.5	13,900	13,300	8.2	7.7	12,800	12,000	7.6	6.9
Picnicking	18,500	16,800	2.8	2.5	30,200	28,800	4.6	4.3	27,800	26,000	4.2	3.9
Fishing	28,100	25,600	2.9	2.6	46,000	43,900	4.7	4.4	42,300	39,600	4.3	4.0
Motorboating	7,900	7,200	3.3	2.9	13,000	12,400	5.4	5.1	11,900	11,200	5.0	4.6
Waterskiing	4,000	3,600	4.3	3.8	6,400	6,200	6.9	6.6	6,000	5,600	6.5	5.9
Swimming[4]	16,900	15,300	3.9	3.5	27,600	26,300	6.4	6.0	25,400	23,700	5.9	5.4
Rafting	3,200	2,900	5.1	4.6	5,100	5,000	8.1	7.8	4,800	4,500	7.7	7.1
Canoeing	2,700	2,400	6.0	5.2	4,400	4,200	9.7	9.1	4,000	3,800	8.9	8.3
Snowmobiling	4,800	4,400	3.6	3.2	7,900	7,600	5.8	5.5	7,300	6,900	5.4	5.0
Cross-Country Skiing	5,900	5,400	4.8	4.3	9,700	9,200	7.9	7.3	8,900	8,300	7.3	6.6
Downhill Skiing	7,300	6,600	4.8	4.2	11,900	11,400	7.8	7.3	10,900	10,300	7.2	6.6

Notes:

[1] Based on participation rates (Table 4.5.1-1) from The Montana Outdoor Recreation Needs Survey (University of Montana 1986). Totals were calculated using rates for the 18 to 24, 25 to 34, and 35 to 44 year old age cohorts.

[2] Recreation use based on estimated program-induced population (18 years or older) of approximately 3,830 for 1996 and 3,480 for the year 2000 for Alternative 1; 6,250 (1997) and 5,970 (year 2000) for Alternative 2; and 5,750 (1996) and 5,390 (year 2000) for the Small ICBM and Peacekeeper in Rail Garrison programs (cumulative impacts).

[3] Percent change based on increase in recreation use above baseline totals (Table 4.5.2-1).

[4] Swimming in lakes, streams, rivers, or ponds.

population growth would occur at Malmstrom AFB. Program-induced population growth in Lewistown and Conrad would be similar to the Proposed Action; therefore, long-duration impacts on local recreation would be negligible in these locations.

Alternative 2. Program-related population growth in the Great Falls urban area would result in an approximate 12.9-percent increase (9,620 inmigrants) above baseline totals by 1997 and decline to a 12.3-percent increase (9,200 inmigrants) by the year 2000. Impacts of Alternative 2 would be identical to those of the Proposed Action for both housing options. Recreation facility and neighborhood parkland requirements (Section 4.5.2.2, Table 4.5.2-2) for the offbase housing option necessary to maintain existing per capita ratios would be similar. Long-duration impacts would be moderate and significant. New neighborhood parkland would not be needed for the onbase housing option because most of the population growth would occur at Malmstrom AFB. Program-induced population growth in Lewistown and Conrad would be similar to the Proposed Action; therefore, long-duration impacts on local recreation in these two cities would be negligible.

Alternative 3. Impacts of Alternative 3 would be the same as those of the Proposed Action for both housing options.

4.5.4 Cumulative Impacts

4.5.4.1 Regional Recreation

If the Small ICBM and Peacekeeper in Rail Garrison programs are implemented concurrently, program-related population growth is projected to increase recreation use in the ROI from approximately 4 to 9 percent (depending on the activity) above baseline totals by 1996 and from 4 to 8.5 percent by the year 2000. The cumulative recreation use would be approximately 9 percent higher than the Proposed Action in the peak-population year and 10 percent higher in the steady-state year (Section 4.5.3.1, Table 4.5.3-1). Although the increased use for individual recreation areas would be slightly higher, the cumulative long-duration impacts of the Small ICBM and Peacekeeper in Rail Garrison programs would remain low and not significant.

4.5.4.2 Local Recreation

If the Small ICBM and Peacekeeper in Rail Garrison programs are implemented concurrently, program-related population growth above baseline totals would be approximately 11.9 percent (8,850 inmigrants) by 1996, declining to 11.1 percent (8,310 inmigrants) by the year 2000 in the Great Falls urban area. Recreation facility and neighborhood parkland requirements (Section 4.5.2.2, Table 4.5.2-2) for the offbase housing option necessary to maintain existing per capita ratios are similar to those of Alternative 2, resulting in a long-duration, moderate, and significant impact. New neighborhood parkland would not be needed for the onbase housing option because most of the population growth would occur at Malmstrom AFB. Program-related population growth in Lewistown and Conrad would be similar to that of the Proposed Action. Therefore, long-duration impacts on local recreation would be negligible in these cities.

4.5.5 Impacts of the No Action Alternative

Baseline population in the ROI is expected to increase by approximately 8 percent from 1986 to 1996 and by approximately 12 percent by the year 2000. In terms of increased regional recreation use, participation in individual activities is projected to increase proportionally to population growth with the highest absolute increases in use occurring in fishing and hunting activities. The various land divisions of the Lewis and Clark National Forest would continue to be the most heavily used recreation areas in the ROI for most activities. However, the Holter Lake and Canyon Ferry Lake recreation areas would continue to receive the highest use for water-based recreation activities such as boating and waterskiing. The proportion of use for each activity that would occur at individual recreation areas within the ROI is expected to remain about the same, though use would be higher in absolute terms.

Baseline forecasts for the Great Falls urban area show a population increase of about 4,000 or approximately 5.6 percent from 1986 to 1996 and an increase of 4,800 or slightly less than 6.8 percent by the year 2000. Approximately 60 percent of the baseline growth is associated with the new KC-135R air refueling mission at Malmstrom AFB. Great Falls would not have an adequate supply of some recreation facilities during this period. To accommodate increased demand, the city would need to construct additional softball and golf facilities and would need to develop additional neighborhood parkland in areas where growth is expected to occur. Parkland would be acquired through the land dedication provision of Montana's land platting regulations as additional subdivisions are developed. Staffing may need to be increased by approximately one to two persons to handle the expected expansion of the city's park and recreation system. Lewistown and Conrad have sufficient parkland and facilities to accommodate baseline growth.

4.5.6 Potential Mitigation Measures

No mitigation measures are recommended for regional recreation beyond those assumed in Section 4.5.1.4.

Mitigation measures for local recreation that could be undertaken to reduce or eliminate potential significant program-related impacts include the following. All, some, or none or these measures may be implemented.

- Construct/develop new recreation facilities and parkland. This action would provide additional facilities to accommodate increased demand. The cost for some facilities such as a golf course or softball complex may be high. The City of Great Falls would be responsible for this action, and it would be implemented as the need arises.

- Adjust scheduling of facility use or perform minor upgrading of facilities. This action would accommodate increased demand by providing for more hours of use by changing the hours of operation or by adding lights to specific recreation facilities. The City of Great Falls would be responsible for this action, and it would be implemented as necessary.

- Place time limitations on use of facilities. This action would allow more people to use facilities but limits the length of use. Implementation of this mitigation may be publicly unacceptable. This action could be limited to time periods when use of the facilities is highest. The City of Great Falls would be responsible for this action, and it would be implemented as necessary.

- Expand cooperative agreements for use of city and school district recreation facilities. The City of Great Falls and the Great Falls Public Schools (GFPS) system currently have a cooperative agreement for use of some school district athletic facilities (e.g., gymnasiums). This agreement could be expanded to include additional school district demand resulting from the program. The City of Great Falls and the GFPS system would implement this action.

4.5.7 Irreversible and Irretrievable Resource Commitments

Impacts on regional and local recreation would not result in any irreversible and irretrievable resource commitment of resources.

4.5.8 Relationship Between the Local Short-Term Use of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

There would be no impact on maintenance and enhancement of long-term productivity as a result of short-term use of recreation areas or facilities.

4.6 Visual Resources

The construction of proposed Small Intercontinental Ballistic Missile (ICBM) facilities at Malmstrom Air Force Base (AFB) and the deployment area would affect visual resources. The visual resources analysis includes consideration of both rural areas and Malmstrom AFB.

4.6.1 Impact Analysis Methodology

The impact analysis methodology for visual resources involved three separate procedures: evaluation of program impacts, determination of levels of impact, and determination of the significance of impacts. The methodology also included consideration of a number of assumptions and assumed mitigations. Impacts were evaluated at the site level and a collective assessment was made. For visual resources, site-level impacts were evaluated for launch facilities at Malmstrom AFB and other construction sites.

4.6.1.1 Evaluation of Program Impacts

Visual resources would be affected to the extent that program deployment would alter the landscape as a result of construction of facilities and the clearing of existing vegetation from the land. The methodology used to identify these impacts was derived from the U.S. Bureau of Land Management's (BLM) Visual Resources Management (VRM) guidelines. An important part of the VRM process is to categorize program areas by visual sensitivity and their distance from viewers. For the Small ICBM analysis, it was assumed that any launch facility to receive a Hard Mobile Launcher (HML) enclosure which is not visible from or within 0.5 mile of scenic or heavily traveled highways (highways with more than a 1985 average annual daily traffic [AADT] of 1,000) would be so distant from viewers and have so few viewers that the impact on highway travelers would be negligible. There are 179 launch facilities that fall in this category, and 21 launch facilities that do not. These 21 are identified as areas of intensive study and are the principal subject of the following impact analysis. In addition, the analysis discusses potential visual impacts related to roads and bridges, Malmstrom AFB, occupied residences within 2,000 feet of launch facilities, and tourists.

For the Small ICBM visual resources analysis, photographs of the deployment area, landform maps, and geographical descriptions from various sources were used to divide the deployment area into four landscape characteristic provinces (LCPs), as described in Section 3.6.3. The methodology then involved the rating of the degree of visual contrast between program facilities and each element of the existing landscape. The extent to which the proposed program may adversely affect the visual quality of the landscape depends on the degree of contrast expected to occur between program facilities and the three existing landscape features found in each LCP: landform, vegetation, and structures. Each of these features consists of four elements: form, line, color, and texture (U.S. Bureau of Land Management 1986).

To determine the contrast rating of each feature at each LCP, one launch facility photograph from each LCP, representing the typical landscape of that LCP, was used to prepare with-program simulation drawings. Since there are no launch facilities visible from scenic or heavily traveled highways in the Foothills LCP, only three simulations were prepared: Mountains, Rolling Uplands, and Planar Uplands LCPs. These simulations were then used to define the degree of contrast for each element of each feature.

The four elements are defined and numerically weighted as follows:

Form.	The mass or shape of an object or objects which appear unified (4).
Line.	The path that the eye follows when perceiving abrupt differences in form, color, or texture, or when objects are aligned in a one-dimensional sequence (3).
Color.	The property of reflecting light of a particular intensity and wavelength to which the eye is sensitive (2).
Texture.	The aggregation of small forms or color mixtures into a continuous surface pattern, the parts of which do not appear as discrete objects (1) (U.S. Bureau of Land Management 1986).

The four degrees of contrast ratings are defined and numerically weighted as follows:

None.	The element contrast is not visible or perceived (0).
Weak.	The element contrast can be seen but does not attract attention (1).
Moderate.	The element contrast begins to attract attention and dominate the characteristic landscape (2).
Strong.	The element contrast demands attention, will not be overlooked, and is dominant in the landscape (3) (U.S. Bureau of Land Management 1986).

After the degree of contrast was judged, their weights (0-3) were multiplied by the weights of each element (1-4) to obtain the contrast score for each element of each feature. The feature scores for each LCP were then totaled and averaged to obtain the contrast rating for each LCP.

Other program impacts on visual resources could result from improvements to roads and bridges, construction of program facilities at Malmstrom AFB, and residences located less than 2,000 feet from launch facilities. Temporary visual impacts from road and bridge construction and construction at Malmstrom AFB are considered negligible if construction activity is more than 0.5 mile from heavily traveled highways. Similarly, impacts are considered negligible if only isolated residences are within the viewshed of construction activity at the launch facilities. These actions were reviewed and impacts are discussed in Section 4.6.2.

4.6.1.2 Determination of Levels of Impact

Using the impact analysis methodology discussed in Section 4.6.1.1, there could be a maximum contrast rating score of 30 for each feature at any LCP location as shown below.

Element	Weight	X	Degree of Contrast	=	Score
Form	4		Strong 3		12
Line	3		Strong 3		9
Color	2		Strong 3		6
Texture	1		Strong 3		3
Maximum Score:					30

The BLM contrast rating guidelines state that any contrast rating score in excess of 21 is extreme. On the basis of these considerations, the following criteria were developed to assess impacts as negligible, low, moderate, or high:

- Negligible Impact -- Visual intrusions would not be noticeable and no mitigation would be necessary; contrast rating score <7.
- Low Impact -- Visual intrusions would be noticeable, but with the use of assumed mitigations they would not be objectionable; contrast rating score between 7 and <14.
- Moderate Impact -- Visual intrusions, even with assumed mitigations, would be objectionable to some viewers; contrast rating score between 14 and 21.
- High Impact -- Visual intrusions would be objectionable to a large number of viewers; contrast rating score greater than 21.

4.6.1.3 Determination of Significance

The significance of visual resources impacts was evaluated in accordance with Council on Environmental Quality (CEQ) regulations. Significance was assessed through evaluation of the context and intensity of impacts. Context includes consideration of the settings (site, local, or regional) and the duration of the impacts. All impacts on visual resources are in the context of the site and the region (deployment area). Both short- and long-duration impacts were considered. The CEQ regulations provide ten items that should be considered in evaluating intensity. Of these ten items, the following are applicable to visual resources:

- Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas;
- The degree to which the effects on the quality of the human environment are likely to be highly controversial; and
- The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.

In addition to these considerations, which are specifically identified in the CEQ regulations, the following considerations are also appropriate for visual resources:

- The degree of visual contrast between the program facilities and existing landscape; and
- The degree to which the program's visual impacts could be considered unsightly due to the extent of changes to the visual environment.

4.6.1.4 Assumptions and Assumed Mitigations

Assumptions. The following assumptions were made for the visual resources analysis:

- Only those program facilities that will be visible from and located less than 0.5 mile from any highway with an AADT of 1,000 or more in 1985, or a scenic highway, will have sufficient exposure to public view to impose a visual impact other than negligible; and

- The findings of the BLM degree of contrast rating methodology represent the extent of public concern regarding the degradation of visual resources.

Assumed Mitigations. It was assumed that the following mitigations will be included in the Proposed Action:

- Landforms disturbed by the program will be restored to their original character consistent with good grading practices, and revegetated with appropriate plant species. Such practices will help reduce plant recovery time and visual impacts.
- Standard dust suppression methods will be used during the construction phase. Such methods will also reduce visual impacts by allowing continued visibility of the landscape.
- New onbase facilities will be designed to visually blend with existing architecture to the extent appropriate. Such designs will reduce visual impacts by lessening visual contrasts.

4.6.2 Impacts of the Proposed Action

Overall short- and long-duration impacts of the Proposed Action on visual resources would be negligible (Figure 4.6.2-1). Site-level, short-duration impacts at 13 launch facilities would be moderate and not significant, and impacts at the remaining 87 launch facilities would be negligible because they are outside the area of intensive study. Site-level, long-duration impacts at the same 13 launch facilities would be low and not significant, and impacts at the remaining 87 launch facilities would be negligible (Figure 4.6.2-2). Figure 4.0-1 (Section 4.0) presents the visual resources LOI at each of the launch facilities in the deployment area for the Proposed Action and each of the alternatives. Visual impacts of other program activities would be negligible.

The visual impacts of four types of program actions have been considered: (1) placement of earth-covered igloos at existing launch facilities, (2) improvement of roads and bridges in the deployment area, (3) development of onbase facilities at Malmstrom AFB, and (4) the visual effect of new Air Force construction on residents and tourists in the deployment area.

Earth-Covered Igloos at Existing Launch Facilities. One hundred existing Minuteman launch facilities are proposed to contain two earth-covered igloos to shelter two HMLs. These igloos would be covered with several feet of earth topped by aggregate, which would slope toward ground level on all sides except for the entry door end, which would be of vertical formed concrete. The two igloos would be placed about 50 feet apart, and each would appear to be a mound of earth about 25 feet high, 100 feet wide, and 165 feet long. Further descriptions of these facilities are found in Section 1.3.3.2.

Only 13 of the Minuteman launch facilities visible from scenic highways and highways with an AADT of 1,000 (as identified in Section 3.6.3.2) would be used by the Proposed Action. Simulation drawings of the proposed igloos as they would appear in a typical landscape in each LCP were prepared (Figures 4.6.2-3 through 4.6.2-5) and contrast evaluations were made. Although program contrast scores for the Mountains LCP were judged to be moderate, none of the 13 Proposed Action launch facilities would be located there. Six launch facilities would be located in the Rolling Uplands LCP and seven in the Planar Uplands LCP. Table 4.6.2-1 describes the degree of contrast ratings for each element of the landscape features at each of the three LCPs which would have at

LEVEL OF IMPACT	SIGNIFICANCE	
Adverse Impacts	Not Significant	Significant
Negligible	☐	
Low	○	●
Moderate	○	●
High	○	●
Beneficial Effects	▨	

Note: Some resource elements may have both beneficial effects and adverse impacts.

ELEMENT/AFFECTED INTEREST	PROGRAM IMPACTS							
	SHORT DURATION				LONG DURATION			
	PROPOSED ACTION	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	PROPOSED ACTION	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3
VISUAL RESOURCES								
MALMSTROM AFB								
LAUNCH FACILITIES								
T/E ROUTES								

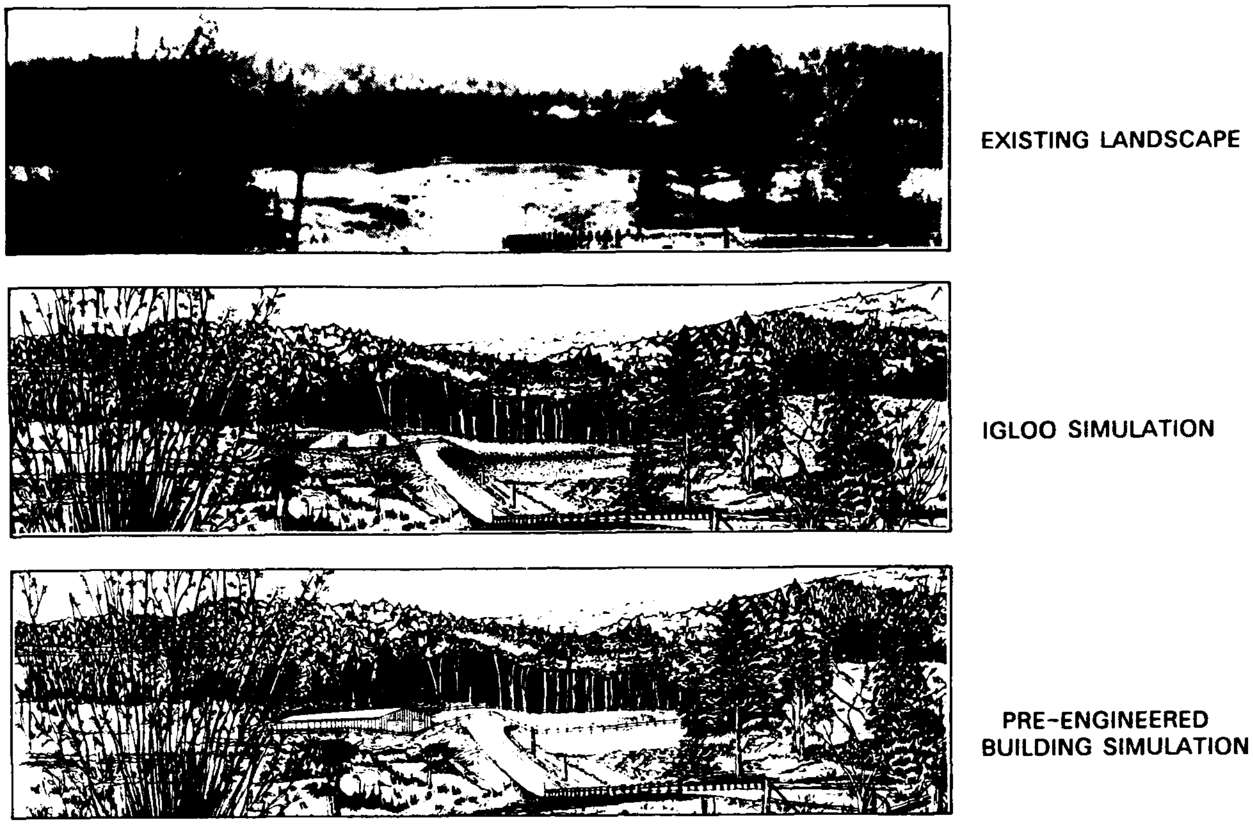
EM4/6

FIGURE 4.6.2-1 IMPACTS ON VISUAL RESOURCES ASSOCIATED WITH THE PROPOSED SMALL ICBM PROGRAM IN MONTANA

PROGRAM IMPACTS	NUMBER OF LAUNCH FACILITIES													
	SHORT DURATION							LONG DURATION						
	NOT SIGNIFICANT				SIGNIFICANT			NOT SIGNIFICANT				SIGNIFICANT		
	NEGLIGIBLE	LOW	MODERATE	HIGH	LOW	MODERATE	HIGH	NEGLIGIBLE	LOW	MODERATE	HIGH	LOW	MODERATE	HIGH
VISUAL RESOURCES														
PROPOSED ACTION	87		13					87	13					
ALTERNATIVE 1	89	11						100						
ALTERNATIVE 2	108		17					108	17					
ALTERNATIVE 3	179	20	1					199		1				

EM4/18

FIGURE 4.6.2-2 SUMMARY OF SITE IMPACTS ON VISUAL RESOURCES ASSOCIATED WITH PROPOSED SMALL ICBM CONSTRUCTION AND OPERATIONS AT LAUNCH FACILITIES IN MONTANA

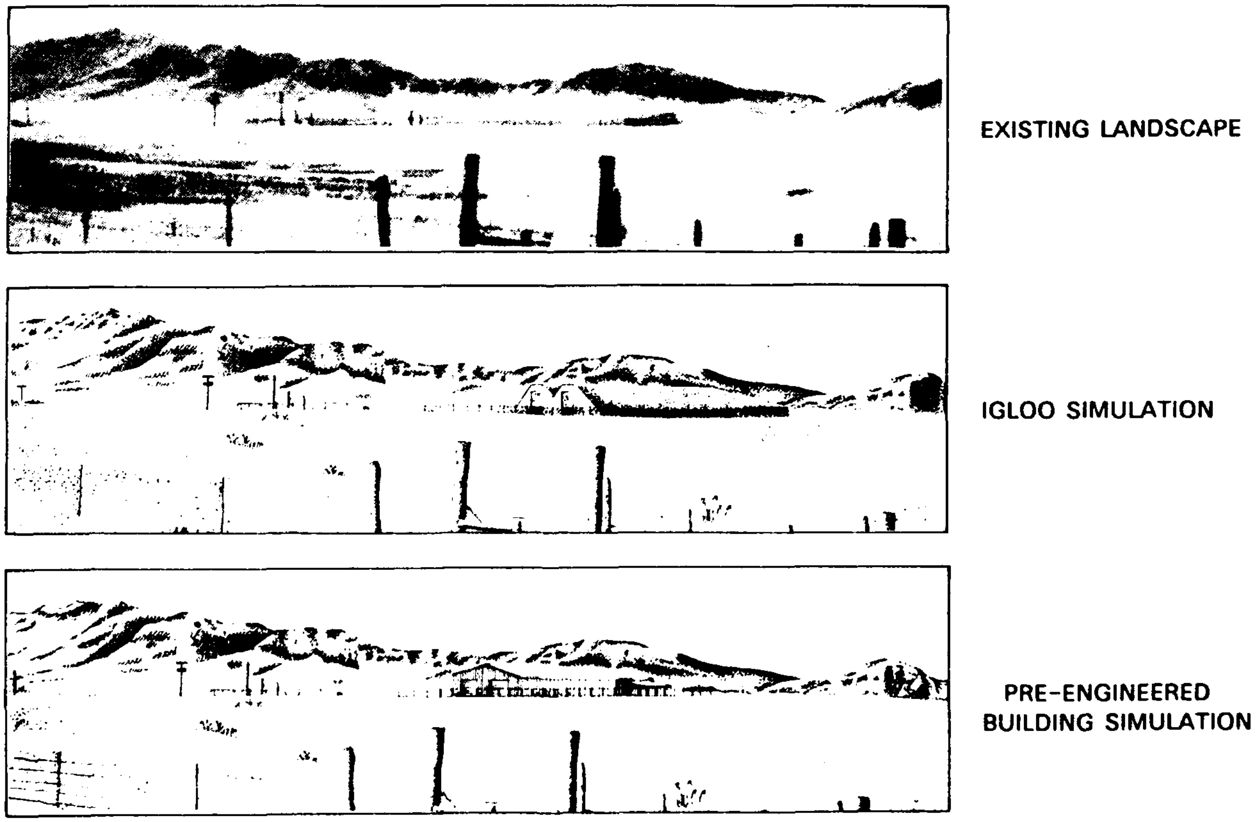


EXISTING LANDSCAPE

IGLOO SIMULATION

PRE-ENGINEERED BUILDING SIMULATION

FIGURE 4.6.2-3 LAUNCH FACILITY A-6, MOUNTAINS LANDSCAPE CHARACTERISTIC PROVINCE



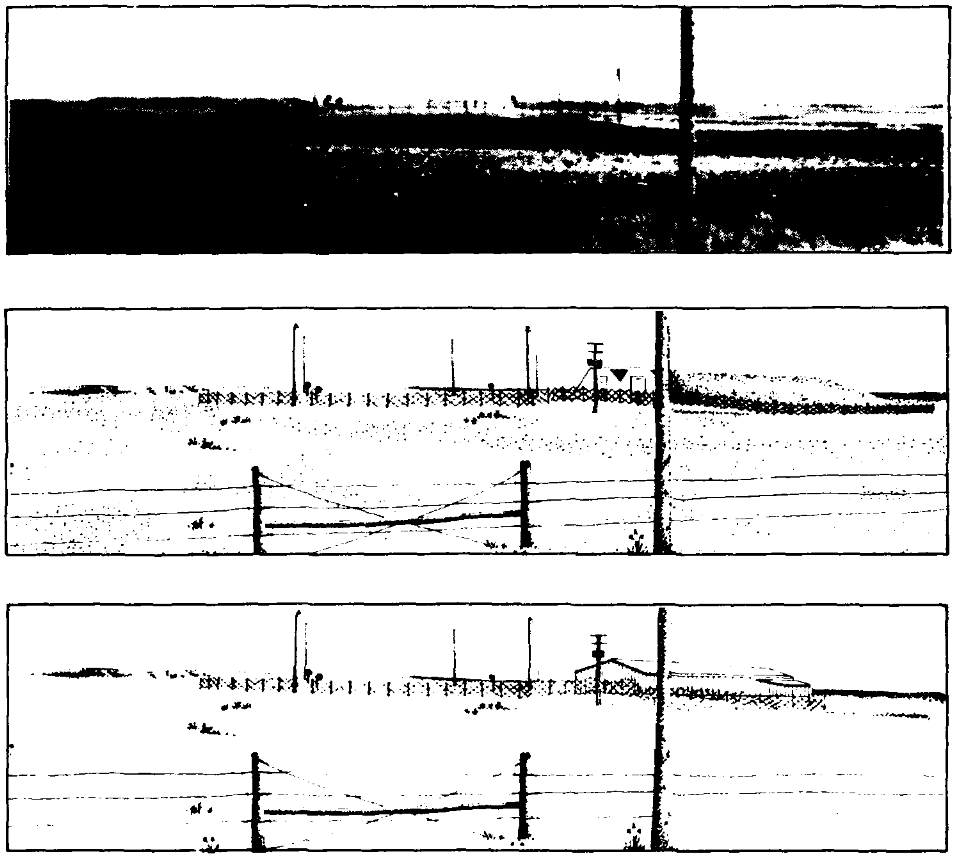
EXISTING LANDSCAPE

IGLOO SIMULATION

PRE-ENGINEERED BUILDING SIMULATION

FIGURE 4.6.2-4 LAUNCH FACILITY G-2, ROLLING UPLANDS LANDSCAPE CHARACTERISTIC PROVINCE

EM4-VR/1 EM4-VR/2



EXISTING LANDSCAPE

IGLOO SIMULATION

PRE-ENGINEERED BUILDING SIMULATION

EM4-VR/3

FIGURE 4.6.2-5 LAUNCH FACILITY Q-20, PLANAR UPLANDS LANDSCAPE CHARACTERISTIC PROVINCE

Table 4.6.2-1

Proposed Small ICBM Program
Degree of Contrast Ratings for North-Central Montana by Landscape Characteristic Province
(Proposed Action and Alternative 2)

Features		Mountains LCP[1]			Rolling Uplands LCP			Planar Uplands LCP		
Elements		Degree of Contrast		Score	Degree of Contrast		Score	Degree of Contrast		Score
Landform										
Form	4X	medium	2	8	none	0	0	weak	1	4
Line	3X	medium	2	6	none	0	0	weak	1	3
Color	2X	strong	3	6	weak	1	2	weak	1	2
Texture	1X	medium	2	2	weak	1	1	weak	1	1
Subtotal:				22			3			10
Vegetation										
Form	4X	weak	1	4	weak	1	4	weak	1	4
Line	3X	weak	1	3	weak	1	3	weak	1	3
Color	2X	weak	1	2	weak	1	2	weak	1	2
Texture	1X	weak	1	1	weak	1	1	weak	1	1
Subtotal:				10			10			10
Structures										
Form	4X	medium	2	8	weak	1	4	weak	1	4
Line	3X	medium	2	6	weak	1	3	weak	1	3
Color	2X	medium	2	4	weak	1	2	weak	1	2
Texture	1X	medium	2	2	weak	1	1	weak	1	1
Subtotal:				20			10			10
TOTAL Scores:				52			23			30
Averaged Scores (Total÷3)				17.33 (moderate)			7.67 (low)			10.00 (low)

Note: [1] LCP = Landscape characteristic provinces are areas where the features of the landscape (landform, vegetation, and structures) are similar.

least 1 of the 21 area of intensive study earth-covered igloos. No such launch facilities are located in the Foothills LCP. Short-duration impacts would be somewhat greater because of the presence of construction vehicles and activities and resulting fugitive dust. All impacts would be in the context of the launch facility site.

Road and Bridge Improvements. Road and bridge improvements would take place along most of the transporter/erector routes. This road work would look like any other road construction and visual intrusion would be temporary, with most cleared areas grown over within 1 or 2 years. Both short- and long-duration impacts would be negligible.

Malmstrom Air Force Base. Construction activities at Malmstrom AFB would include the clearing of vegetation for building sites, road systems, and earth movement for construction of various support and deployment facilities. The HML vehicle operations training and maintenance area buildings would be limited to a maximum of about 35 feet in height, and would look similar to existing Minuteman support facilities. The proposed site for these facilities is approximately 35 acres and is located about 0.75 mile from U.S. 87/89 near the southeastern boundary of the base (Section 1.3.5, Figure 1.3.5-2), and for the most part is below the line-of-sight from U.S. 87/89. Even from the few locations on the highway where the program support facilities could be seen, their visibility would be low on the horizon and therefore not noticeable to the casual observer. An area of 350 acres adjoining the southeast boundary of the base, about 0.6 mile from U.S. 87/89, would be cleared for the HML vehicle operations training area. The only anticipated visual effect of this action would be fugitive dust created by HML movements. Because of the intervening terrain, the HML vehicles would seldom be visible from U.S. 87/89. For these reasons, both short- and long-duration impacts on visual resources at Malmstrom AFB would be negligible.

Deployment Area Residents and Tourists. The presence of Small ICBM facilities in the deployment area would affect two other types of viewers: persons who live near proposed program facilities and tourists who come to or pass through Montana at least partly because of its scenic landscapes. There are 34 occupied residences located within 2,000 feet of 23 proposed launch facilities that could have their visual environment slightly changed by the construction of the proposed HML enclosures, depending on intervening topography. Effects on visual resources would result not only from the construction and grading activities previously described, but also from the greater activity generated by additional construction vehicles and grading equipment. Furthermore, because the Minuteman system has been in place for over 20 years and because evidence of its deployment is not readily visible, there is little awareness, especially by tourists, that a missile field exists there. With the construction of HML enclosures, and the added movement of the HML and military vehicles, both local residents and tourists would become more aware of the existence of missile deployment in the area. This means that the scenic resources of north-central Montana may be diminished to some extent beyond that created by the physical placement of enclosures and additional traffic on rural roadways. This effect would be more important to local residents than to tourists because their numbers are greater and their home community environment would be affected. These effects would have long-duration, negligible impacts because few residents would live near the launch facilities and because only a few launch facilities (21 out of 100 launch facilities) would be visible to tourists.

Short-duration impacts on visual resources would result from the movement of construction vehicles and equipment, the storage of construction materials, and fugitive dust caused by the movement of equipment. Such short-duration impacts in combination with the impacts of operations-phase activity would be moderate and not significant.

4.6.3 Impacts of Alternatives

Three program alternatives are being considered in addition to the Proposed Action. Like the Proposed Action, overall short- and long-duration impacts of the alternatives on visual resources would be negligible.

Alternative 1. For Alternative 1, a total of 100 of the launch facility sites would be used to deploy 200 HMLs (2 per site). Overall short- and long-duration impacts of Alternative 1 would be negligible (Section 4.6.2, Figure 4.6.2-1). Short-duration impacts at 11 of the launch facility sites would be low and not significant, and impacts at the remaining 89 sites would be negligible because they would be outside the area of intensive study. Long-duration impacts would be negligible at all 100 sites (Section 4.6.2, Figure 4.6.2-2). The HMLs would be enclosed in 70-foot by 130-foot by 30-foot-high pre-engineered, corrugated metal, gable-roofed buildings instead of earth-covered igloos. Simulation drawings of the proposed pre-engineered buildings as they would appear in a typical landscape in each LCP were prepared (Section 4.6.2, Figures 4.6.2-3 through 4.6.2-5) and contrast evaluations were made. Because there would be only minimal earth grading, landform contrasts would be weak. In addition, no vegetation would be planted at the launch facility sites; therefore, only weak vegetation contrasts would result from site clearing. The large pre-engineered buildings would be obvious to passersby. However, they would look very much like many agricultural storage buildings found throughout the deployment area. Table 4.6.3-1 describes the degree of contrast ratings for each element of the landscape features at each of the three LCPs that would have at least one of the 21 area of intensive study HML enclosures. The visual impacts of other program activities would be the same as for the Proposed Action.

Alternative 2. For Alternative 2, a total of 250 HMLs would be placed at 125 launch facility sites, and would be enclosed in earth-covered igloos, as with the Proposed Action. Overall short- and long-duration impacts of Alternative 2 would be negligible (Section 4.6.2, Figure 4.6.2-1). Simulation drawings of the earth-covered igloos are shown in Section 4.6.2, Figures 4.6.2-3 through 4.6.2-5, and degree of contrast ratings are shown in Table 4.6.2-1. Short-duration impacts at 17 of the launch facility sites would be moderate and not significant, and impacts at the remaining 108 sites would be negligible because they would be outside the area of intensive study. Long-duration impacts would be low and not significant at the same 17 sites and negligible at the remaining 108 sites (Section 4.6.2, Figure 4.6.2-2). Visual impacts of other program activities would be the same as for the Proposed Action.

Alternative 3. For Alternative 3, one HML would be placed at each of 200 launch facility sites, and would be enclosed in 40-foot by 130-foot by 30-foot-high pre-engineered, corrugated metal, gable-roofed buildings. Overall short- and long-duration impacts of Alternative 3 would be negligible (Section 4.6.2, Figure 4.6.2-1). Short-duration impacts at one launch facility (A-6) would be moderate and not significant, 20 would have low and not significant impacts, and impacts at the remaining 179 facilities (outside the area of intensive study) would be negligible. Long-duration impacts would be moderate and not significant at launch facility A-6 and negligible at the remaining 199 facilities (Section 4.6.2, Figure 4.6.2-2). The single-wide pre-engineered buildings for Alternative 3 would be similar to the simulator drawings of the pre-engineered buildings for Alternative 1 shown in Figures 4.6.2-3 through 4.6.2-5. Degree of contrast ratings are shown in Table 4.6.2-2 (Section 4.6.2). Visual impacts of other program activities would be the same as for the Proposed Action.

Table 4.6.3-1

Proposed Small ICBM Program
Degree of Contrast Ratings for North-Central Montana by Landscape Characteristic Province
(Alternatives 1 and 3)

Elements		Mountains LCP			Rolling Uplands LCP			Planar Uplands LCP		
		Degree of Contrast		Score	Degree of Contrast		Score	Degree of Contrast		Score
Landform										
Form	4 x	weak	1	4	none	0	0	none	0	0
Line	3 x	weak	1	3	none	0	0	none	0	0
Color	2 x	weak	1	2	none	0	0	none	0	0
Texture	1 x	weak	1	1	none	0	0	none	0	0
Subtotal:				10			0			0
Vegetation										
Form	4 x	weak	1	4	weak	1	4	weak	1	4
Line	3 x	weak	1	3	weak	1	3	weak	1	3
Color	2 x	weak	1	2	weak	1	2	weak	1	2
Texture	1 x	weak	1	1	weak	1	1	weak	1	1
Subtotal:				10			10			10
Structures										
Form	4 x	strong	3	12	none	0	0	none	0	0
Line	3 x	strong	3	9	none	0	0	none	0	0
Color	2 x	strong	3	6	none	0	0	none	0	0
Texture	1 x	medium	1	1	none	0	0	none	0	0
Subtotal:				28			0			0
TOTAL SCORES:				48			10			10
Averaged Scores (Total ÷ 3)				16 (moderate)			3.33 (negligible)			3.33 (negligible)

4.6.4 Cumulative Impacts

There are no other known major programs in the Small ICBM offbase deployment area that would add to the visual impacts created by the proposed program. The Peacekeeper in Rail Garrison program at Malmstrom AFB could have some effect on visual resources. The Peacekeeper in Rail Garrison facilities are proposed to be located about 2,000 feet southeast of the base runway, and about 2,500 feet (at the closest point) north of U.S. 87/89. The facilities would consist of rail lines, a Weapons Storage Area, and a series of earth-covered train shelters. These shelters would be about 1,200 feet long, 100 feet wide, and about 25 feet high. They would appear to be a series of parallel linear mounds. The entire Peacekeeper in Rail Garrison facility would require an area of about 90 acres.

The ground elevation of the shelters would be about 30 feet lower than U.S. 87/89 (at the closest point). There is also an area between U.S. 87/89 and the proposed Peacekeeper in Rail Garrison facility that is about 20 feet higher than the highway. Therefore, at the closest point, the facilities would not be visible from the highway. The Peacekeeper in Rail Garrison facilities could be visible without intervening topography from about 3,000 feet east of the south gate on U.S. 87/89; however, the distance at this point would be about 6,000 feet, and the facilities would be unnoticeable. For these reasons, the Peacekeeper in Rail Garrison system at Malmstrom AFB would not add to the short- and long-duration, negligible impacts on visual resources projected for the Small ICBM system.

4.6.5 Impacts of the No Action Alternative

The No Action Alternative would allow the rural setting of the deployment area to remain undisturbed. The elements of line and texture would continue to dominate the landscape. At Malmstrom AFB, there will be a minor visual change resulting from the introduction of support facilities for the KC-135R air refueling mission to be in place by 1988.

4.6.6 Potential Mitigation Measures

No mitigation measures are recommended for visual resources beyond the assumed mitigations discussed in Section 4.6.1.4.

4.6.7 Irreversible and Irretrievable Resource Commitments

No irreversible and irretrievable resource commitments are identified for visual resources.

4.6.8 Relationship Between the Local Short-Term Use of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

Implementation of the Proposed Action would create short-term disruptions to visual quality in the deployment area because of soil and vegetation disturbances and visual contrasts created between program structures and the existing landforms. Over the long term, soil and vegetation conditions would improve and diminish the short-duration impacts.

4.7 Cultural and Paleontological Resources

The proposed deployment of the Small Intercontinental Ballistic Missile (ICBM) system at Malmstrom Air Force Base (AFB) has the potential to affect cultural and paleontological resources. Impacts were evaluated separately for four elements: prehistoric, historic, Native American, and paleontological resources.

4.7.1 Impact Analysis Methodology

The impact analysis methodology for cultural and paleontological resources involved three separate procedures: evaluation of program impacts, determination of levels of impact (LOI), and determination of the significance of impacts. The methodology also included consideration of a number of assumptions and assumed mitigations. Impacts were evaluated at the site level for launch facilities, transporter/erector (T/E) routes, and Malmstrom AFB. A collective assessment was made for each resource element relative to the north-central Montana region. Impacts on cultural resources that are eligible for the National Register of Historic Places (NRHP) also have importance at the state and national levels. Impacts on paleontological resources at specific launch facilities were estimated using the drilling logs from original launch facility construction conducted in the early 1960s. The depth of geologic units at each location was used in conjunction with the proposed expansion layouts and the engineering drawings (as builts) for each launch facility to determine if expansions would affect important fossil-bearing formations.

4.7.1.1 Evaluation of Program Impacts

The impact analysis methodology was similar for all types of resources except that the evaluation procedures varied somewhat, depending on the types of data available for different resource elements. Most of the study area has not been surveyed for cultural and paleontological resources, so impact evaluations were based on a sensitivity analysis. Existing data were used to project resource probabilities for the entire study area. Impacts were determined by assessing the likelihood that important resources would be affected, the relative susceptibility of those resources to damage, and the kinds of effects expected. The sensitivity ratings were summarized on map overlays which were compared to program impact areas. Both direct and indirect impacts were considered, and beneficial effects were noted where applicable. Sensitivity ratings were considered in the facilities identification process. Subsequent to the identification of proposed facilities, field studies were conducted to identify site-specific impacts. Surface surveys to identify all types of cultural and paleontological resources were conducted at most launch facilities, at the Hard Mobile Launcher (HML) vehicle operations training area, the proposed housing expansion area, and along a sample of T/E routes. The survey results were largely negative indicating that site-specific impacts are lower than had been estimated. The evaluation of impacts on prehistoric and historic resources focused on NRHP-eligible properties. Identification of potentially eligible site types was coordinated with the Montana State Historic Preservation Office (SHPO). Cultural and paleontological resources are nonrenewable; physical damage results in a permanent loss of information. Therefore, with the exception of some types of effects on Native American resources, impacts would be of long duration regardless of whether they occur during the construction or operations phase of the program. Some beneficial effects would result from the analysis and modeling of prehistoric resource distributions, but overall impacts on nonrenewable resources are considered to be adverse.

4.7.1.2 Determination of Levels of Impact

Impacts on prehistoric, historic, and paleontological resources would occur primarily as a result of construction-related ground disturbance. Sources of impacts include activities such as expansion of launch facilities, road improvements, bridge replacement, and expansion of aggregate sources. Impacts may also include vandalism and unauthorized artifact collecting resulting from the presence of a greater number of people in the vicinity of sites. All such disturbances are considered to be adverse and permanent because they can eliminate or reduce a site's qualification for the NRHP or its research potential. The LOIs were determined by projecting the relative numbers and kinds of resources likely to be affected. The severity of an impact was also considered in its effect on NRHP eligibility or future research potential.

Native American resources are affected by physical disturbances, but they may also be affected in other ways. The privacy resulting from isolation is an important aspect of some sacred sites. The suitability of such areas for ritual use can be adversely affected by visual and auditory intrusions, in addition to physical disturbance. Some sacred areas may be desecrated simply by the presence of non-Indians. For other kinds of resources, impacts may result from short-term interruption of Native American use of resource areas. In such instances, temporary or reversible impacts contribute to lower LOIs than would be identified for permanent impacts. The LOIs vary according to the proximity of a resource to the impact area, and to the relative religious importance of different site types.

Prehistoric Resources. The LOI was keyed to the proportion of impact areas affecting predicted high sensitivity zones (Section 3.7.2.2). For prehistoric resources, the following LOIs were identified:

- Negligible Impact -- No NRHP-eligible resources are likely to be affected.
- Low Impact -- High sensitivity zones occur in less than 30 percent of the impact areas. Few NRHP-eligible sites are likely to be affected, and they make up a small portion of sites of a given type in the study area.
- Moderate Impact -- High sensitivity zones occur in 30 to 74 percent of the impact area, and some NRHP-eligible sites are likely to be affected.
- High Impact -- High sensitivity zones comprise at least 75 percent of the impact area, and many eligible sites are likely to be affected. The loss of resources would substantially limit the research potential of the remainder of the resource base in the study area.

Historic and Architectural Resources. Because all historic resources in the study area have not been recorded, the LOI is based on proximity to known resources as an indicator of the potential to affect additional, unrecorded sites. Most effects could be expected to be the result of physical disturbance, but visual impacts to the context of historic resources were also considered. The only available guidelines for evaluation were those used by the Montana Department of Highways. For minor road widening, an area 150 feet on each side of the construction activity is considered to be potentially affected visually. In the case of more extensive construction, the area of concern is extended to 250 feet; the latter figure was used in the present analysis. For historic and architectural resources, the following LOIs were identified:

- Negligible Impact -- No NRHP-eligible resources are likely to be affected.
- Low Impact -- Few NRHP-eligible resources are likely to be affected, and they make up a relatively small percentage of a given site type in the study area. Nearby unoccupied structures may be affected as a result of increased public use of the area.
- Moderate Impact -- NRHP-eligible resources are known to occur within 1 mile of direct impact areas, and associated unrecorded sites may be affected.
- High Impact -- A large proportion of NRHP-eligible resources of a given type within the study area is likely to be destroyed, damaged, or altered. Known NRHP-eligible properties occur within the direct impact area.

Native American Resources. The LOIs were estimated by measuring the proximity of impact areas to different types of known or projected resources. It was assumed that existing data on known sites would provide a minimal estimate of Native American resources likely to be affected and that physical features may represent only points within a larger sacred area. Native American input to the analysis was solicited by consulting a number of tribes having historical associations with the deployment area. The level of concern over program impacts varied by tribe and by site type. Construction activities visible or audible from very important religious sites could cause higher impacts than activities occurring on or adjacent to a less important site type. In order to accommodate such variability, known or projected resources were buffered for the purposes of measuring proximity. The following general guidelines were defined during consultations with Native American religious specialists. Potentially high impacts were identified within a distance of 2 miles from a known burial ground, the most sensitive site type in the study area. Moderate impacts were identified when impact areas were within 1 mile of a known site with a ceremonial feature (e.g., medicine wheel, ceremonial tipi, or vision-quest structure). When impact areas were within 5 miles of known sites with sacred significance, low impacts were identified in recognition of the potential for encountering additional such sites in the area. Negligible impacts were recorded for areas where no resources are known or projected to occur. For Native American resources, the following LOIs were identified:

- Negligible Impact -- No projected changes in the resource would occur.
- Low Impact -- Program effects may cause a slight reduction in the quality of traditional use resources that may be restored or that are available elsewhere. No change in the suitability of sacred areas for religious purposes would occur.
- Moderate Impact -- Program effects may lead to either a reduction in the quality of resources or a reversible change in access to or the suitability of a resource for religious purposes.
- High Impact -- Program effects may cause irreversible or long-term reduction in resource quality that reduces its suitability for sacred or other traditional uses.

Paleontological Resources. The LOI determinations for paleontological resources relate directly to the types of fossils occurring in the geologic units in the impact areas and to the amount of disturbance that would occur. The following LOIs were identified for paleontological resources:

- Negligible Impact -- Affected geologic units do not contain fossils.
- Low Impact -- Affected geologic units contain fossils having little scientific research potential.
- Moderate Impact -- Important geologic resources are known or projected to occur in impact areas, but their distribution indicates avoidance may be possible.
- High Impact -- Important paleontological localities are known within the disturbed area. The size and/or configuration of the area to be affected suggests that avoidance may be difficult.

4.7.1.3 Determination of Significance

The significance of cultural and paleontological resource impacts was evaluated in accordance with Council on Environmental Quality (CEQ) regulations. Significance was assessed through evaluation of the context and intensity of impacts. Context includes consideration of the settings (site, local, or regional) and the duration of the impacts. The CEQ regulations provide ten items that should be considered in evaluating intensity. Of these ten items, the following are applicable to cultural and paleontological resources:

- Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas;
- The degree to which the effects on the quality of human environment are likely to be highly controversial;
- The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration;
- Whether the action is related to other actions with individually insignificant but cumulatively significant impacts;
- The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the NRHP or may cause loss or destruction of significant scientific, cultural, or historical resources; and
- Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment.

In addition to these considerations, which are specifically identified in the CEQ regulations, the following considerations were judged appropriate for archaeological resources:

- Whether the Proposed Action affects the research potential of a property relative to regional research priorities; and
- Relative rarity of specific site types.

On the basis of these considerations, criteria were developed to assess impacts as significant or not significant.

Prehistoric and Historic Resources. Potential impacts on prehistoric or historic resources were considered significant if either of the following conditions apply:

- The proposed program could substantially add to existing disturbance of resources in the Region of Influence (ROI); or
- The proposed program may adversely affect NRHP-eligible resources or may cause loss or destruction of important scientific, cultural, or historic resources.

Identifiable but not significant impacts could occur if the affected sites are not likely to be eligible for the NRHP. The condition most likely to produce this result is extensive previous disturbance which has eliminated a site's research potential.

Native American Resources. Impacts on Native American resources were considered significant if professional judgment indicated that either of the following conditions could occur as a result of the proposed program:

- A potential for affecting sites important for their position in the Native American physical universe or belief system; or
- The possibility of reduced access to traditional use areas or sacred sites.

Additionally, where a documented history of Native American concern for sacred sites was identified, this history was considered noteworthy, and was a contributor to the significance determination because of the increased likelihood that Native Americans may identify previously unknown sacred sites in the area.

Paleontological Resources. The NRHP criteria for identifying eligible resources are not relevant to paleontological materials. The level of importance of various types and frequencies of fossil occurrences is related to their relative rarity, depositional integrity, and research potential. Impacts were considered significant if they affected deposits with high research potential, defined as areas with a formation containing:

- Numerous vertebrate fossils, particularly if they represent a diverse assemblage;
- Associated vertebrate and invertebrate or plant fossils; and
- Vertebrate fossils representing comparatively rare species.

4.7.1.4 Assumptions and Assumed Mitigations

Assumptions. Activities will be directed, when possible, to minimize harm to prehistoric resources listed in or eligible for the NRHP. Additionally, all properties under Air Force jurisdiction affected by the program will be located and inventoried, and those appearing to be eligible for the NRHP will be nominated.

Spiritual or religious leaders of Native American groups will be consulted to identify sacred areas which can be avoided during planning. Provisions will be made for Native Americans to monitor construction in areas they have identified as sensitive.

Consultations will be held to determine procedures to be followed in the event that Native American burials are encountered during construction.

Assumed Mitigations. Assumed mitigation measures for eligible resources consist of avoidance through facility redesign. Consultation with the Advisory Council on Historic Preservation (ACHP) and the Montana SHPO pursuant to the ACHP regulations, Protection of Historic Properties (Code of Federal Regulations 1983b, 36 CFR 800), and other applicable regulations, has resulted in a Programmatic Agreement (PA) (Appendix B.2). The PA obligates the Air Force to prepare a Cultural Resources Management Plan (CRMP). The CRMP will specify proposed mitigation measures to be implemented if resources cannot be avoided (Section 4.7.6). For prehistoric and historic resources, the CRMP identifies important historical associations and research questions, the kinds and amounts of data necessary to address the research questions, and specific mitigation methods appropriate for various situations. The CRMP will also prescribe mitigation measures for paleontological resources, as well as Native American concerns.

4.7.2 Impacts of the Proposed Action

The proposed program is likely to result in impacts on all resource elements (Figure 4.7.2-1). Prehistoric resources would be affected by construction-related ground disturbance throughout the study area, but most impacts would occur in the vicinity of river and stream crossings. The number of sites likely to be affected is low relative to the overall regional-level resource base. Impacts would be significant because some NRHP-eligible sites are likely to be affected. Historic and architectural resources would also experience low and significant impacts. Some historically important bridges are likely to require upgrading or replacement. In addition, vacant historical structures may be affected indirectly through increased vandalism. Impacts on Native American resources would be low because few sensitive areas occur in the vicinity of existing facilities. Any impacts would be significant because of the religious or heritage importance of sensitive areas. The main concern would be the possibility of encountering burials during construction. Impacts on paleontological resources would be moderate and significant because of the potential for affecting internationally important fossil assemblages. The housing options would not affect the LOIs for any resource element. All identified impacts are considered to be of long duration.

4.7.2.1 Prehistoric Resources

Regional-level impacts of the Proposed Action on prehistoric resources would be low and significant. Site-level impacts at Malmstrom AFB would be low and not significant. Overall impacts at launch facilities would be low and significant (Figure 4.7.2-2). Overall impacts resulting from bridge improvements would be moderate and significant because of the potential to affect buried resources along major drainages. Impacts from road construction would be low and significant because 8 percent of the construction would occur in the vicinity of rivers where buried sites are most likely to occur. The data syntheses and predictive modeling used to project baseline conditions have been identified by some area professionals as a benefit to the scientific community.

Malmstrom Air Force Base. The Proposed Action includes the construction of Small ICBM facilities and the acquisition of 100 acres for miscellaneous facilities, 330 acres for additional housing, and 350 acres for the HML vehicle operations training area. Although the housing expansion and HML vehicle operations training areas are presently under cultivation, cultural resources remain. Lithic scatters and campsites (as opposed to tipi ring sites) may retain considerable research potential in spite of agricultural disturbance. Surface and shallow subsurface archaeological sites located in the HML

LEVEL OF IMPACT	SIGNIFICANCE	
Adverse Impacts	Not Significant	Significant
Negligible	☐	
Low	∘	•
Moderate	○	●
High	◯	⬤
Beneficial Effects	▨	

Note: Some resource elements may have both beneficial effects and adverse impacts.

PROGRAM IMPACTS

ELEMENT/AFFECTED INTEREST	SHORT DURATION				LONG DURATION			
	PROPOSED ACTION	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	PROPOSED ACTION	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3
PREHISTORIC RESOURCES					•	•	•	•
MALMSTROM AFB					∘	∘	∘	∘
LAUNCH FACILITIES					•	•	•	•
T/E ROUTES					•	•	•	•
BRIDGES					●	●	●	●
HISTORIC RESOURCES					•	•	•	•
MALMSTROM AFB					∘	∘	∘	∘
LAUNCH FACILITIES					•	•	•	•
T/E ROUTES					•	•	•	•
BRIDGES					●	●	●	●
NATIVE AMERICAN RESOURCES					•	•	•	•
MALMSTROM AFB								
LAUNCH FACILITIES								●
T/E ROUTES								
BRIDGES					•	•	•	•
PALEONTOLOGICAL RESOURCES					●	●	●	●
MALMSTROM AFB								
LAUNCH FACILITIES					•	•	•	●
T/E ROUTES					●	●	●	●
BRIDGES					●	●	●	●
AGGREGATE SOURCES					●	●	●	●

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FIGURE 4.7.2-1 IMPACTS ON CULTURAL RESOURCES ASSOCIATED WITH THE PROPOSED SMALL ICBM PROGRAM IN MONTANA

PROGRAM IMPACTS	NUMBER OF LAUNCH FACILITIES													
	SHORT DURATION							LONG DURATION						
	NOT SIGNIFICANT				SIGNIFICANT			NOT SIGNIFICANT				SIGNIFICANT		
	NEGLIGIBLE	LOW	MODERATE	HIGH	LOW	MODERATE	HIGH	NEGLIGIBLE	LOW	MODERATE	HIGH	LOW	MODERATE	HIGH
PREHISTORIC														
PROPOSED ACTION												30	53	17
ALTERNATIVE 1												30	52	18
ALTERNATIVE 2												40	63	22
ALTERNATIVE 3												61	101	38
HISTORIC AND ARCHITECTURAL														
PROPOSED ACTION								91				8	1	
ALTERNATIVE 1								92				7	1	
ALTERNATIVE 2								117				7	1	
ALTERNATIVE 3								185				11	4	
NATIVE AMERICAN														
PROPOSED ACTION								93				6	1	
ALTERNATIVE 1								94				5	1	
ALTERNATIVE 2								117				6	2	
ALTERNATIVE 3								186				11	2	1
PALEONTOLOGICAL														
PROPOSED ACTION								45	29			3	23	
ALTERNATIVE 1								45	29			3	23	
ALTERNATIVE 2								56	40			3	26	
ALTERNATIVE 3								76	69			5	49	1

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FIGURE 4.7.2-2 SUMMARY OF SITE IMPACTS ON CULTURAL AND PALEONTOLOGICAL RESOURCES ASSOCIATED WITH PROPOSED SMALL ICBM CONSTRUCTION AND OPERATIONS AT LAUNCH FACILITIES IN MONTANA vehicle operations training area may be disturbed or destroyed through crushing from the weight of the HML and/or the churning of the surface from the wheels. Scraping of the surface by the HML undercarriage may also disturb sites.

Malmstrom AFB contains areas in sensitivity Zones 1, 2, and 4. Four sensitivity zones (Figure 3.7.3-2) were derived from the predictive model (Section 3.7.3.1) and provided the initial basis for assessing impacts. Zone 4 is the highest sensitivity zone, located along drainages and in areas of moderate relief near water. Site types in this zone consist of buried or stratified camps and processing sites as well as large stone circle sites and open camps. Zones 2 and 3 are classified as medium sensitivity zones located in areas of transitional slope. Site types in these zones include stone circle sites, camps, and processing sites. Zone 1 is the lowest sensitivity zone located in areas of high or moderate relief and areas with nearby water. Small campsites and limited activity sites occur in Zone 1.

The Proposed Action consists of constructing housing on 330 acres north of the base. The acreage to be acquired occurs in a high sensitivity zone, but no prehistoric sites were located during a recent inventory. Site-specific impacts for this area would be negligible. Small ICBM facilities would occur in developed areas in the base proper, in previously disturbed areas east and southeast of the existing flightline, and in acquired acreage north of the base. This acreage occurs in Zones 1 and 4. Sites located in Zone 4 have a higher likelihood of being important and impacts at these locations may be high and significant. The HML vehicle operations training area would consist of 350 acres acquired on the eastern edge of the base in previously cultivated areas (sensitivity Zone 2). Subsequent to initial impact assessments, cultural resources surveys were conducted in the proposed base expansion areas. Two small prehistoric campsites have been identified in cultivated fields just east of the base but it is unlikely that they retain important research potential. They have not been tested or evaluated for NRHP eligibility. Overall impacts of the Proposed Action would be low because small campsites are common in the ROI. Impacts would not be significant because it is doubtful whether any identified sites would be eligible for the NRHP.

Launch Facilities. New ground disturbance for launch facility expansion, whether temporary or permanent, would have long-duration impacts on prehistoric resources. Acquired areas would encompass portions of adjacent agricultural and grazing lands which may already have experienced varying degrees of minor surface disturbance. However, subsurface portions of sites in these areas may still be intact.

Initial impact analysis indicated that 17 launch facilities occur in sensitivity Zone 4 (Table 4.7.2-1), which may contain buried campsites or processing sites, large stone circle sites, and campsites. Impacts at these 17 launch facilities were projected as potentially high and significant because these zones have the highest probability of containing potentially eligible sites. Fifty-three facilities occur within medium sensitivity zones (Table 4.7.2-1: Zones 2 and 3) which have a lower probability of containing potentially eligible sites. Site types located in these zones may include stone circle sites, campsites, and processing sites. Site-specific impacts would be moderate and significant. Thirty launch facilities occur in sensitivity Zone 1, which has the lowest probability of containing eligible sites. Small campsites and limited activity sites most likely occur in this zone. Site-specific impacts on these launch facilities would be low and significant. Because 17 percent of the launch facilities identified for the Proposed Action are located in high sensitivity zones, impacts would be low and significant.

Table 4.7.2-1

Distribution of Launch Facilities Within Prehistoric Resource Sensitivity Zones

Sensitivity Zone	Percent in Study Area	Proposed Action	Alternative 1	Alternative 2	Alternative 3
4	25.0	17.0	18.0	17.6	19.0
3	16.7	21.0	20.0	18.4	18.0
2	28.0	32.0	32.0	32.0	32.5
1	30.3	30.0	30.0	32.0	30.5
TOTAL:	100.0%	100.0%	100.0%	100.0%	100.0%

Subsequent site-specific analysis (field survey) has been completed at most launch facilities, and few resources were identified. Intensive surface survey was conducted at 123 selected launch facilities. They were chosen to include all 38 facilities in areas predicted to be highly sensitive for prehistoric resources. In addition, because the predictive model has not yet been adequately tested, approximately half of the facilities in the other site-likely areas (sensitivity Zones 2 and 3) were surveyed. An area of about 2 acres encompassing the proposed launch facility expansion was surveyed at each location studied. Survey crews were tasked to identify prehistoric, historic, and paleontological resources, and to record any historic structure close enough to be affected by visual impacts. The survey crew was accompanied by a Native American monitor who evaluated each location for its sacred or cultural importance.

Prehistoric resources were identified at only one (R-22) of the 123 launch facilities studied. This result is indicative of (1) relatively low site densities in the ROI, (2) prior agricultural disturbance, and (3) the small size of the launch facility expansion areas. Because of the scale of the predictive model analysis, sensitivity was projected in 1-mile-square units. The survey of a 2-acre parcel within a square-mile block does not provide an adequate sample of the area within that block. Even though some surveys were conducted, the model results were still used as the basis for LOI determinations because all launch facilities have not yet been studied. However, the results of surveys undertaken so far strongly suggest that the projected impacts represent a worst case. Actual impacts would be much lower because so few resources would be affected.

The site at R-22 is a habitation or village containing approximately 20 tipi rings and other associated rock features. It is undisturbed by land modification and is potentially eligible for the NRHP. The potential exists for additional sites to be identified at those launch facilities not yet studied. Nevertheless, the total number of sites likely to be affected relative to the regional resource base is low. Therefore, launch facility impacts would be low. Impacts would be significant because at least one site (at R-22) is potentially eligible for the NRHP.

Deployment Area Roads. A variety of road upgrades are likely to occur, including widening of roads and intersections and structural improvements to road surfaces. Road segments crossing rivers and streams would also have various effects depending on whether the bridges are widened or replaced, and whether detour crossings or construction staging areas would be required. Impact areas along roads are narrow strips previously disturbed by initial road construction and maintenance. Archaeological reconnaissance by Air Force contractors indicates that previous disturbance in road easements has greatly reduced the potential for encountering NRHP-eligible sites except in those areas where buried deposits are likely. However, resources located beyond the road right-of-way may have only minimal surface disturbance and good site integrity. Buried archaeological deposits on floodplains and terraces (i.e., at bridge crossings) may have excellent site integrity. Sites in both types of settings may be eligible.

The distribution of potential T/E route upgrade areas varies by county and sensitivity zone. For the Proposed Action, no T/E route upgrades are scheduled for Judith Basin and Toole counties. Wheatland County has the highest proportion of road segments occurring in sensitivity Zone 4 (43.9%). Chouteau and Pondera counties are the least sensitive with between 79.8 percent and 100 percent of the road segments occurring in sensitivity Zone 1. Because of the greater probability that buried, undisturbed sites may occur in sensitivity Zone 4, site-specific impacts would be high and significant for the 8.3 percent of the road segments located in that zone. About 42.4 percent of roads occur in sensitivity Zones 2 and 3. Impacts along these road segments would be moderate and not significant because sites are likely to occur near the surface and would have been disturbed in the road rights-of-ways. Site-specific impacts on the 49.3 percent of the roads in sensitivity Zone 1 would be low and not significant because heavily disturbed surface sites are not likely to be eligible. Because the cumulative percentage of road segments in sensitivity Zone 4 (8.3%) is less than 30 percent, overall impacts from road construction would be low. These impacts would be significant because of the potential for encountering buried NRHP-eligible sites.

Eighty-two of the 124 bridges that may be improved for the Proposed Action cross rivers or drainages. Most of these (55%) cross drainages in sensitivity Zone 4. The results of previous research in the area indicate a 20-percent probability of locating prehistoric sites at any given point along a river. Site-specific impacts at river or drainage crossings located in sensitivity Zone 4 would be high and significant because of the increased probability of encountering buried sites which would be eligible for the NRHP. Site-specific impacts at the 28 drainage crossings in sensitivity Zones 2 and 3 would be moderate and significant. Site-specific impacts at the nine drainage crossings in Zone 1 would be low and significant. The remaining 42 bridges cross stockpasses, canals, highways, and railroads. Because such features could not have conditioned prehistoric settlement the way drainages did, bridges over them generally occur in areas of lower sensitivity. Previous construction disturbances further reduce the likelihood of encountering important intact resources in the vicinity of these latter bridges. Overall impacts resulting from bridge construction would be moderate because the cumulative percentage of bridges located in sensitivity Zone 4 is 55 percent. Impacts would be significant because of the high probability of locating buried NRHP-eligible sites.

Expansion of some aggregate sources would be an indirect effect of the Proposed Action resulting from the procurement of construction materials. Aggregate materials would be used in construction of the HML enclosures at the launch facilities and for road resurfacing and widening. Specific aggregate sources have not been identified, but most existing sources occur in high sensitivity zones along drainages.

4.7.2.2 Historic and Architectural Resources

Overall impacts on historic and architectural resources as a result of the Proposed Action would be low and significant. Impacts of construction, including possible base expansion to the north and east, would be low and not significant. Launch facility construction impacts would range from low to moderate and significant, depending on which launch facilities are proposed for deployment (Figure 4.7.2-2). Road upgrades would have low and significant impacts; bridge modifications would cause moderate and significant impacts.

Malmstrom Air Force Base. Impacts on historic and architectural resources at Malmstrom AFB are expected to be low and not significant because few NRHP-eligible structures have been identified. No historic sites have been recorded in the housing construction or HML vehicle operations training areas. While it is possible that subsurface historic materials may be discovered, it is not likely because of the age of the base and the lack of documentary evidence for earlier historic occupations in the base area. An onbase survey in June 1987 located a World War II radar station as the single historic site. This station is less than 50 years old and, therefore, is not presently eligible for inclusion in the NRHP. The only structure at the site is a small, cinder-block building unlikely to be eligible for historic or architectural reasons. The site was recorded, providing information necessary for evaluation for eligibility by the SHPO.

A portion of the Great Falls Portage National Historic Landmark (state site no. 24CA238) is located on Malmstrom AFB. Included within the discontiguous landmark boundary are several buildings in the Weapons Storage Area (WSA) as well as a transmission line, radar station, and cultivated fields, all of which have affected its visual setting. The new buildings planned in connection with the 350-acre parcel for the HML vehicle operations training area are about the same distance from the landmark as the existing WSA buildings. Therefore, it appears unlikely that the HML vehicle training operations would further affect the offbase visual setting.

Four buildings on Malmstrom AFB old enough to be eligible for the NRHP would be affected by the Small ICBM program: numbers 1308, 280, 210, and 205. However, on the basis of preliminary evaluation, these buildings do not appear to be eligible for the NRHP. They can be characterized as typical of World War II construction, built hastily with available materials and intended to last only a limited time. Consultation with the SHPO would be necessary to determine their significance and the nature of effect, but it is expected to result in a determination of not eligible.

Launch Facilities. A possibility of low and significant impacts on eligible properties exists. A file search of state site records failed to identify any historic sites in the vicinity of launch facilities. Subsequent field surveys of 123 launch facilities have located only two historic sites, and they mainly occur outside actual construction areas. The study area has not been completely surveyed, and very little data are available. It is possible but unlikely that discoveries of historic sites could be made during preconstruction clearance activities. At the site level, no launch facilities have been rated as having a high LOI, and only one is moderate and significant. These low ratings were based on their proximity to known NRHP sites or historic districts and in recognition of the potential that additional unrecorded resources may occur in the vicinity. Even low impacts on NRHP-eligible structures would be significant because integrity of design elements is reduced. Indirect impacts on nearby structures are also likely. Historic sites were identified at launch facilities B-7 and K-4 but their eligibility for the NRHP has not yet been determined.

No visual impacts on historic resources are expected to result from launch facility expansion. In several surveys of the launch facilities, no probable NRHP-eligible properties were identified near enough to the impact areas to be affected. Historic structures have been identified within 2,000 feet of impact areas at 26 launch facilities.

Of these, only three occur within 250 feet of construction areas. The three historic structures include a storage shed, a grain bin, and a barn, none of which are likely to be eligible for the NRHP.

Deployment Area Roads. The nature of the proposed program (e.g., using only existing roads) virtually eliminates the possibility of impacts on structures such as buildings in areas outside of the base. Low indirect impacts may occur as a result of increased visits to ghost towns, historic districts, and old mining communities on roads maintained year-round. Population growth would increase the number of program-related construction personnel, tourists, and individuals seeking recreation who would encounter historic sites. These low impacts would be significant because some portions of the proposed program area, such as Utica, Vaughn, and Winifred, each with NRHP-eligible historic districts which are located near or along T/E routes, are more vulnerable than others. In addition, ghost towns and mining communities occur throughout the area between Winifred and Lewistown.

Evaluation of state bridge inventories revealed 152 bridges in the study area old enough to qualify for the NRHP. Twenty of these have been scheduled for improvement; they are either too narrow or structurally unsound for HML use. These bridges require some type of upgrading and must, therefore, be evaluated for NRHP eligibility. Six of the bridges scheduled for improvement have been either repaired or upgraded since their original construction, which implies that their integrity has been damaged; they may no longer be considered eligible. Of the remaining 14 bridges, 8 are timber stringers (probably not eligible), 5 are tee beam, and 1 is a steel girder and floor beam. Table 4.7.2-2 lists the six bridges potentially eligible for the NRHP and one which has already been determined to be eligible. At the site-specific level, moderate or high and significant impacts would occur on NRHP-eligible bridges. For example, the timber stringer bridge (P00009043+03091) on U.S. 287 in Teton County has been evaluated and found eligible for the NRHP. It is eligible because it is the only bridge of this type in the state. It has been designated as a bridge scheduled for improvement because of its width, even though it may be lacking in structural soundness. Upgrading would destroy its integrity; therefore, the impact would be high. The impact would be significant at the site level because it is the only bridge of this type in the state.

No adverse visual impacts on historic resources are expected to result from road construction. A field survey was conducted recently along a 12-percent sample of the T/E routes, primarily in those areas most likely to require road upgrades. A total of 105 historic structures were observed within one-eighth mile of the roads, but only two were close enough to roads (i.e., within 250 ft) to suggest a potential visual impact. The sites are isolated ranch outbuildings which, by themselves, would probably not be considered eligible for the NRHP.

Historic irrigation and canal systems, some of which date to the late nineteenth century, are concentrated primarily in Pondera, Teton, Cascade, and Wheatland counties, and would not be affected by the proposed program.

4.7.2.3 Native American Resources

Overall program impacts on Native American resources would be low and significant. With the exception of burials and burial grounds, the sometimes ephemeral aspect of sacred and ceremonial areas creates impacts of a different nature from those expected for more clearly defined historic, archaeological, and paleontological resources. The presence of non-Indian individuals, vandalism, or inadvertent disturbance can have a high and significant impact because the sacred aspect of the area could be irreversibly damaged.

Table 4.7.2-2

Bridges Potentially Eligible for the National Register of Historic Places

Bridge No.[1]	Highway	County[2]	Feature Crossed	Type[3]	Date	Status[4]
L07561003+02001	CR 561[5]	CA	Shaw Canal, west of Simms	TBM	1934	2
P00060082+03731	US 87	CA	Southeast of Great Falls	TBM	1941	2
U05205000+04681	US 89	CA	Burlington Northern Railroad	TBM	1934	2
P00057082+02191	US 87	FG	Mill Ditch	TBM	1922	2
P00009043+01451	US 287	LC	North Fork Sun River, northeast of Augusta	SGFB	1936	2
P00021002+06271	I-15	PD	Canal South of Conrad	TBM	1931	2
P00009043+03091	US 287	TT	Floweree Canal, northeast of Augusta	TS	1936	1

Notes: [1] Federal Highway Administration bridge number.
[2] CA = Cascade; FG = Fergus; LC = Lewis and Clark; PD = Pondera; TT = Teton.
[3] Type: TBM = tee beam; TS = timber stringer; SGFB = steel girder floor beam.
[4] Status: 1 = Determined eligible for NRHP; 2 = potentially eligible.
[5] CR = County road

Malmstrom Air Force Base. Impacts on Native American resources at Malmstrom AFB as a result of housing expansion and at the HML vehicle operations training area are expected to be negligible. Malmstrom AFB was constructed in 1942 and has been in continuous use as a military installation. No sacred or ceremonial areas have been identified onbase, and none are projected to occur. Malmstrom AFB does not have topographic attributes (e.g., buttes, springs, or rock outcrops) which would have likely attracted Native American use for sacred or traditional purposes in the past.

Launch Facilities. Launch facilities identified for the Proposed Action were recently evaluated by a Native American religious specialist. The identification and involvement of an appropriate tribal representative was the result of a long process of consultation with a variety of Native Americans. None of the proposed launch facilities were identified as sensitive for either religious or heritage reasons; therefore, impacts would be negligible.

Deployment Area Roads. Upgrading is planned only for existing roads and is not expected to occur outside of the easement. The most likely sacred site type that might be affected is burials found during construction, and these would have been disturbed during original construction. Consultation with Native American groups indicates that easements disturbed by previous construction are not of general concern as potential sacred areas. Impacts on T/E routes would be negligible. Impacts of bridge upgrades would be low because subsurface materials are more likely to be encountered along major drainages, but, if they are burials, the impact would be significant because of the sacred nature of burials in the Native American world view.

4.7.2.4 Paleontological Resources

Overall program impacts on paleontological resources as a result of the Proposed Action would be moderate and significant. Internationally famous paleontological localities and formations occur within the Malmstrom AFB deployment area. Program impacts would affect the most famous formations in central Montana, the Two Medicine and Hell Creek formations and the Bear Gulch Limestone. Onbase construction activities, including possible base expansions, would produce negligible impacts. Launch facility construction impacts would be low and significant. Upgrades of roads and bridges would cause moderate and significant impacts (Figure 4.7.2-2). Impacts on vertebrate fossils would be significant, while impacts on geologic units containing only invertebrates would not be significant.

Malmstrom Air Force Base. Impacts on paleontological resources at Malmstrom AFB as a result of housing expansion and at the HML vehicle operations training area would be negligible. The base and proposed housing expansion area are located on Quaternary glacial till which usually does not contain fossils.

Launch Facilities. Sensitivity rankings for paleontology based on geologic units and the fossils they contain are more fully explained in Section 3.7.3.4. High rankings are given to those geologic units containing numerous, important vertebrate fossils. Low rankings are given to units with invertebrate fossils or no fossils. At launch facilities where additional expansion would occur, overall LOIs would be low with the Proposed Action because most impacts would occur on geologic units containing important fossils or the addition to launch facilities would affect nearby formations. Impacts would be considered significant because the remaining impacts could affect vertebrate fossils (Section 4.0, Figure 4.0-1).

Of the 100 launch facilities identified for the Proposed Action, 45 would cause no impacts and are considered negligible. Of those 45, 1 is located on the Kibbey Formation which contains no fossils (Zone 1). Construction plans at the other 44 would require fill rather than excavation so that no fossil-bearing formation would be affected. Twenty-nine launch facilities occur on marine Mississippian or Cretaceous geologic units which contain no vertebrate fossils (Zone 2). Low and not significant impacts would occur at those locations. Three launch facilities occur on the Telegraph Creek Formation which has occasional vertebrate fossils (Zone 3). Impacts would be low and significant in these cases. Twenty-three of the 100 proposed launch facilities are on important vertebrate fossil-bearing geologic units (Zone 4). Two of these 23 launch facilities (E-6 and E-11) are on the Judith River Formation, two (G-9 and T-48) are on the Two Medicine Formation, and two (L-3 and L-5) are on the Hell Creek Formation. The remaining 17 launch facilities are on various Quaternary deposits, the Kootenai, Bearpaw, and Eagle formations. Localities within these significant formations contain concentrations of well-preserved and unique fossils, designated as Zone 5 in this analysis. No launch facilities identified for the Proposed Action occur in such areas. However, access roads near launch facility N-5 could cut through surface exposures of the highly significant Bear Gulch Limestone, which has been recorded at the surface downslope of the launch facility.

Deployment Area Roads. Additional impacts in the deployment area would occur in road upgrade segments, bridge upgrades, and aggregate source areas (Section 4.0, Figure 4.0-2). Road upgrade impacts on paleontological resources would be moderate because most impacts would occur on important geologic units (Zone 4). Significant impacts would occur because these geologic units contain vertebrates. Less than 1 percent of T/E routes which may need improvements occur on known concentrated localities containing well-preserved and unique fossils, such as the Willow Creek Anticline area, west of Choteau. Impacts on these areas would be high and significant. Fifty-one percent of all proposed T/E route improvements are located in Zone 4 areas or those important geologic units containing vertebrate fossils. Geologic units in Zones 2 and 3 with invertebrate fossils or sparse vertebrate fossils comprise 20 percent of the proposed road improvements. Impacts in these areas would be low and not significant. Areas of negligible impacts or those in Zone 1 account for 28.5 percent.

Impacts on paleontological resources differ from those of archaeological resources, particularly in scale and context. The scale of paleontological resources is larger and deeper than those of archaeological resources. Impacts due to road upgrades may completely eliminate an archaeological site. The same size impact may expose and only partially destroy fossils. The context of these resources also differs due to size. Fine or microscopic context describes archaeological resources while larger context is found in paleontological areas.

Bridge upgrades are expected to have moderate impacts for paleontological resources because of their location on Quaternary alluvium. Impacts would be significant because this area contains important vertebrate fossils. Impacts caused by detours around 33 bridges scheduled for improvement would be moderate and significant.

Impacts from use of aggregate sources are considered indirect and could cause moderate impacts on paleontological resources because of their location. Specific aggregate source areas have not been selected; however, most possible source areas occur within Quaternary terrace gravels and alluvium. The impacts would be significant because the fossils in Quaternary deposits may be vertebrate. These units are known to contain a sparse distribution of Pleistocene and recent-age mammals which may be avoided because of the sparse fossil distribution.

4.7.3 Impacts of Alternatives

A comparison of alternatives reveals similarities in the LOI projected for each of the elements. Overall program impacts are lowest for Alternative 1, which is rated low and significant for all elements except paleontological resources, for which impacts would be moderate and significant. Alternative 2 is ranked slightly higher than Alternative 1, but the LOI is still predicted to be low and significant with the exception of paleontological resources, which is expected to be moderate. The greatest impact would occur for Alternative 3 for all elements, with a range from low and significant to moderate and significant. Among the elements, site-specific impacts at launch facilities range from low to high depending on the density and sensitivity of resources, and the possibility of avoidance.

4.7.3.1 Prehistoric Resources

Alternative 1. Overall impacts for Malmstrom AFB with this alternative would be the same as those of the Proposed Action, low and not significant. Proposed launch facilities and roads are slightly different for this alternative, but the LOI and significance ratings for disturbance would still be low and significant.

Alternative 2. This alternative involves an increase in the number of launch facilities from 100 to 125, creating an increase in land acquisition for expansion from 300 to 375 acres. With this alternative, only 22 launch facilities in high sensitivity zones were identified and impacts would still be low and significant because the overall percentage would be 17.6 percent. Surveys completed to date indicate that impacts at launch facilities would be the same as those of the Proposed Action. Roads and bridges selected for upgrades vary from the Proposed Action but LOI and significance ratings for disturbance would still be the same.

Alternative 3. So few prehistoric sites have been identified in the impact areas surveyed that it is unlikely that many would be affected even if all 200 launch facilities were used. Although effects are likely to be somewhat higher than those of the Proposed Action and other alternatives, overall impacts would still be low and significant. Although the number of roads and bridges requiring upgrading is higher for this alternative, overall impacts would still be the same. The LOI and significance ratings for disturbance at Malmstrom AFB and near aggregate sources are identical to those of the Proposed Action.

4.7.3.2 Historic and Architectural Resources

Alternative 1. The impacts for this alternative would be the same as those of the Proposed Action. As discussed in Section 4.7.3.1, some impacts (e.g., bridge upgrading and enlargement of launch facilities) would occur no matter which alternative is chosen, but it is possible to avoid all projected sensitive areas in the proposed program area.

Alternative 2. Impacts of this alternative would be slightly higher than those of Alternative 1, but are still considered low and significant.

Alternative 3. Impacts of this alternative would be the highest of the three, but because impacts on historic and architectural resources are generally expected to be low, they are still regarded as low and significant for the overall program.

4.7.3.3 Native American Resources

Alternative 1. Impacts are expected to be low and significant with this alternative, the same as those of the Proposed Action.

Alternative 2. Higher impacts on Native American resources would occur with this alternative but the impacts are still considered low and significant.

Alternative 3. Because all launch facilities would be used, no sensitive areas could be avoided. However, the areas projected to be most likely to contain sensitive resources were evaluated and no impacts were identified. Impacts are expected to be the same as the Proposed Action.

4.7.3.4 Paleontological Resources

Alternative 1. Impacts on paleontological resources for this alternative are nearly identical to those projected for the Proposed Action. For this alternative, of the 100 launch facilities proposed for deployment, expansion of 45 launch facilities would cause no impacts, 29 would cause low and not significant impacts, 3 would cause low and significant impacts, and 23 would cause moderate and significant impacts. Three launch facility expansions would cause impacts on the Two Medicine Formation (G-9, T-41, and T-48), three would affect the Hell Creek Formation (L-3, L-5, and L-6), and one would affect the Judith River Formation (E-11). The T/E route upgrades in these vicinities could also affect important fossil-bearing formations.

Alternative 2. Alternative 2 would also result in moderate and significant impacts. Of the 125 launch facilities proposed for this alternative, 56 launch facility expansions would cause negligible impacts, 40 low and not significant impacts, 3 low and significant impacts, and 26 moderate and significant impacts. The launch facilities affecting Zone 4 geologic units, or those which would receive moderate impacts, are E-6 and E-11 on the Judith River Formation, G-2 and G-9 on the Two Medicine Formation, and L-3 and L-5 on the Hell Creek Formation.

Alternative 3. This alternative represents the worst alternative for paleontological resources. All launch facilities would be affected, including F-10 located on the Willow Creek Anticline area of the Two Medicine Formation, where impacts would be high and significant. Most impacts would occur on launch facilities or T/E routes in Zone 4, including most of the important Cretaceous formations as well as Quaternary deposits (geologic units with important vertebrate fossils and dispersed distribution). Ten launch facility expansions affecting other parts of the Two Medicine Formation are F-8, F-9, F-11, G-2, G-5, G-9, T-41, T-44, T-48, and T-50. Three launch facility expansions affecting the Hell Creek Formation are L-3, L-5, and L-6. Therefore, impacts for this alternative would remain moderate and significant.

4.7.4 Cumulative Impacts

4.7.4.1 Prehistoric Resources

If the Small ICBM and Peacekeeper in Rail Garrison programs are implemented simultaneously, 360 acres would be acquired for onbase housing and additional facilities and rail lines would be constructed southeast of the existing flightline. Disturbance to prehistoric resources may occur during construction of facilities resulting in loss of site integrity or destruction of the resource.

Approximately 360 acres for housing would be acquired north of the base in sensitivity Zones 2 and 4. Because the area has been surveyed and no prehistoric sites were found, site-specific impacts would be negligible. Additional facilities for the Peacekeeper in Rail Garrison program would be located southeast of the existing flightline in sensitivity Zone 2 and prehistoric sites may yet be identified in this area. Therefore, overall impacts at Malmstrom AFB for both programs are projected to be low and significant.

4.7.4.2 Historic and Architectural Resources

No perceptible increase in cumulative impacts on these resources is expected if the Small ICBM and Peacekeeper in Rail Garrison programs are implemented concurrently since most of the additional activities would be confined to Malmstrom AFB.

4.7.4.3 Native American Resources

No perceptible increase in cumulative impacts on these resources is expected if the Small ICBM and Peacekeeper in Rail Garrison programs are implemented simultaneously.

4.7.4.4 Paleontological Resources

If the Small ICBM and Peacekeeper in Rail Garrison programs are implemented concurrently, impacts on paleontological resources would not change. Malmstrom AFB and surrounding areas occur on Quaternary glacial till, which usually does not contain fossils.

4.7.5 Impacts of the No Action Alternative

With the No Action Alternative, impacts on cultural and paleontological resources would occur only as a result of currently authorized missions and ongoing nonprogram-related processes. At Malmstrom AFB, future non-Small ICBM facility construction may affect relatively undisturbed areas in the southeastern part of the base. In the deployment area, some resource loss would result from natural erosion, but greater impacts would occur where human activities accelerate the natural processes. Deforestation and intensive cultivation of agricultural land are two such activities which would continue to contribute to resource loss. Vandalism and private artifact-collecting activities would also continue to affect the resource base.

4.7.6 Potential Mitigation Measures

Mitigation measures reduce adverse impacts on cultural resources. The assumed (and preferred) mitigation is avoidance for both subsurface resources (sites) and aboveground resources (structures). Avoidance is accomplished through redesign or rerouting of proposed facilities. The site must also be protected from impacts during construction. Activities such as storage and transport of construction equipment and fill dirt must be planned so as to avoid the resource. Avoidance helps preserve the important historic/cultural characteristics of a resource and/or its research potential. It also avoids costs and potential construction delays associated with data recovery.

The CRMP required by the PA (Appendix B.2) will propose other mitigation measures and specify the conditions under which they will be employed. These proposed mitigation measures provide increased protection for resources which have been avoided and provide for mitigation (through data recovery) of impacts on resources which cannot be avoided. Other measures provide for protection of cultural and paleontological resources encountered during construction. Examples of proposed mitigations are the following:

- Data-Recovery Measures (Archaeological Sites). If a site or structure cannot be avoided and/or preserved, scientific or historical data must be recovered before the resource is affected. For sites, this involves the use of archaeological methods such as surface collection, mapping, and excavation. The kind of data recovery and the sample size would depend on specifications for particular site types contained in the CRMP. If a resource is significant for its scientific research potential (as opposed to historical context), implementation of the appropriate data-recovery measures can result in a finding of no adverse impact. Data recovery is labor intensive (i.e., costly) but is necessary if eligible resources cannot be avoided. Data recovery may also delay construction. Fieldwork would be conducted by Air Force Regional Civil Engineer (AFRCE) contractors, subcontractors, or consultants, but compliance with regulations and the PA would remain an AFRCE responsibility. The results of data recovery must be presented in a professionally acceptable report which is disseminated to the professional community and the public. Reporting standards would be detailed in the CRMP.

- Construction Monitoring. Because it is impossible to predict the location of all subsurface cultural material based on a surface survey, significant cultural materials may be encountered during ground-disturbing construction activities. Identification and evaluation of cultural resources encountered during construction will be made by a qualified archaeologist who is monitoring ground-disturbing activities. Resources discovered during construction are evaluated in consultation with the SHPO and treated (usually through data recovery) according to provisions in the CRMP. Actual fieldwork would usually be conducted by an Air Force subcontractor. Monitoring complies with the provisions of the PA. It involves the cost of field personnel and may result in construction delays if data recovery is necessary.

- Preservation Measures. Avoidance of sites and structures can be enhanced through application of preservation measures. For sites, such measures include protection from erosion and vandalism through stabilization of soil, planting of vegetation, and patrolling of the area. For structures, preservation measures include structural stabilization (reinforcement of flooring, reroofing, etc.) and/or rehabilitation (rewiring, new plumbing, etc.). Preservation measures protect the resource from deterioration after it has been avoided by construction impacts. The decision to apply preservation measures is based on conditions specified in the CRMP and in consultation with the SHPO.

- Data-Recovery Measures (Historic Structures). For standing structures, data recovery or documentation is carried out if they cannot be avoided or moved. Documentation consists of historical research to document historical context and recording of architectural or engineering characteristics following standards prescribed by the Historic American Building Survey or the Historic American Engineering Record. Recording techniques include large format photography from fixed and surveyed positions, plan maps, and architectural drawings of elevations and interior features. The level of documentation would follow guidelines in the CRMP and must be approved by the SHPO. Acceptable documentation may be used to support the conclusion that impacts are adverse but acceptable.

- Removal of Structures for Reuse at Another Location. If a structure cannot be preserved in place, it may be possible to move it to another location. The new location should be as similar to the original location as possible because the move may affect eligibility by compromising integrity of setting. Any plan to move an eligible historic resource must be approved by the SHPO. Funds which would otherwise be used in demolishing or documenting a resource can often be applied to moving. However, stabilization and/or rehabilitation may also be necessary.

- Paleontological Specimen Evaluation and Recovery. Paleontologically sensitive formations have been identified. Any ground-disturbing activities in areas containing these formations should be monitored by a paleontologist under subcontract to AFRCE. Fossils would be evaluated for significance in consultation with the SHPO. Significance is usually based on rarity of the species and degree of preservation. If significant, fossils would be recovered using standard paleontological techniques. Fieldwork would be conducted by AFRCE subcontractors, potentially employing university or museum personnel. Excavation is labor intensive and costly and construction delays are possible.

4.7.7 Irreversible and Irretrievable Resource Commitments

The cultural and paleontological resource bases are fragile, finite, and nonrenewable. Physical disturbances of any kind would result, to some degree, in an irreversible and irretrievable commitment (e.g., loss) of resources. The importance of any given resource is closely related to its structural and/or depositional integrity. Once a site is disturbed, it may be stabilized and protected from further deterioration, but it cannot be restored to its original condition. Even the application of data-recovery techniques involves some loss because data recovery is necessarily selective.

4.7.8 Relationship Between the Local Short-Term Use of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

Effects of the proposed program are likely to increase the loss of cultural and paleontological resources beyond the conditions which could be expected without the program. However, program-related field studies and analyses would contribute to the present level of knowledge about resources in north-central Montana. The information resulting from the loss of some sites should be useful in future efforts to manage the remaining resources. It is anticipated that the number of cultural and paleontological resources lost without the benefit of some form of data recovery would be small; the resulting loss of productivity in the north-central Montana region as a whole should be slight.

4.8 Biological Resources and Threatened and Endangered Species

The proposed program would affect biological resources primarily through surface disturbance at Malmstrom Air Force Base (AFB) and in the deployment area. Indirect impacts from increased recreational activities could also occur. The impact analysis process for biological resources addresses vegetation, wildlife, aquatic habitats, unique and sensitive habitats, and threatened and endangered species.

4.8.1 Impact Analysis Methodology

The impact analysis methodology for biological resources and threatened and endangered species involved three separate procedures: evaluation of program impacts, determination of levels of impact (LOI), and determination of the significance of impacts. The methodology also included consideration of a number of assumptions and assumed mitigations. Identification of proposed sets of launch facilities for the Proposed Action and for Alternatives 1 and 2 considered the available environmental sensitivity data. Data describing existing environmental conditions for vegetation, wildlife, threatened and endangered species habitats, aquatic habitats, water quality, and soils were also grouped into categories of sensitivity. These categories (low, medium, and high) reflect the relative sensitivity of the respective resources in areas of potential direct surface disturbance. They are displayed graphically in Section 4.8.2. This categorization more clearly represents the potential for impacts in the deployment area and facilitates the application of multiple-attribute decision analyses.

Impacts were evaluated at the site level and collective assessment was made for each resource element. Site-level impacts were evaluated at Malmstrom AFB, launch facilities, and other areas that may be directly disturbed near roads and bridges. References to local-level impacts deal with disturbances in the immediate vicinity of a site. Indirect impacts associated with increased recreational use were also assessed. The overall assessments place site-level impacts in the perspective of the importance of these accumulated impacts within the entire program study area. This potential for overall impacts from disturbance at multiple sites was examined for local ecosystems (e.g., immediate watersheds, sections of forest, or parcels of native grassland) and larger systems (e.g., entire watersheds, prairie systems, or regional forests). No substantial impacts on biological resources from multiple disturbances in local or regional areas could be identified. These overall assessments were strongly influenced by individual sites that would receive biologically important impacts (e.g., loss of threatened and endangered species habitat or degradation of fisheries habitat). Impacts on threatened and endangered species also have importance at the state and national levels.

4.8.1.1 Evaluation of Program Impacts

Vegetation. Major vegetation types and land cover types were mapped within 1,000-foot corridors along transporter/erector (T/E) routes and access roads, and within 500 feet of launch facilities using aerial photographs and existing vegetation maps as discussed in Section 3.8.2.2. The data were incorporated into a computerized Geographic Information System to facilitate analysis. Relative abundance of these types was measured within smaller 100-foot corridors along T/E routes, 1,000-foot corridors along access roads, and within 500 feet of launch facilities. Areas of potential surface disturbance were assumed to occur within these sampled units. Because the roadside area that would potentially be disturbed is narrow (less than 20 ft wide) and exceeds the resolution and scale used for vegetation mapping, it was necessary to sample the wider roadside area previously discussed. Therefore, the amount of each vegetation type that would be disturbed was assumed to be proportional to the area occupied by that vegetation type in the sampled corridor. For example, if foothills prairie occupies 27 percent of the transect, it was assumed that 27 percent of the area to be disturbed would be foothills prairie. The amount of each vegetation type found within 500 feet of each launch facility was also calculated. Again, the area of each vegetation type that would be disturbed at a launch facility was assumed to be proportional to the area occupied by that type in the sampled unit.

The locations and amounts of potential offsite disturbance were also considered. The analysis considered effects of erosion, siltation, dust, and excess water or water loss. The intensity of the disturbance, the duration of the disturbance as a result of program-related activities, and the persistence of the disturbance because of inherent plant community characteristics (such as recovery potential) were also estimated. The expected effectiveness of and procedures for revegetation in each vegetation type were identified and factored into the impact assessment. Potential impacts that may result from indirect program-related activities, such as increased recreational use and program-induced development elsewhere in the Region of Influence (ROI), were also addressed.

Wildlife. Direct impacts on wildlife in the deployment area were determined by estimating the overlap between the ranges of wildlife species (particularly big game species) and construction areas at Malmstrom AFB, launch facilities, and T/E routes. Areas where aggregate resources may be developed were also evaluated. Potential disturbances to wildlife include interference with behavior (e.g., migration, feeding, and daily movement) or reproduction. The type of disturbance (e.g., loss of habitat, displacement, loss of food sources, or mortality) was evaluated for both game and nongame species and, where possible, the severity of the disturbance was noted. Wintering habitat is of particular importance to the survival of big game; therefore, emphasis was placed on evaluating impacts on these habitats.

The percentage of wintering habitat lost was compared with the total wintering habitat located in the deployment area. This analysis was applied to big game species, which are of special concern to federal and state wildlife agencies and the general public. Where available, density and distribution data were used in the analysis to determine what impacts can be expected for other game species and where impacts would be concentrated (e.g., at Malmstrom AFB, along T/E routes, or near launch facilities).

Disturbance to nongame species was addressed in a different manner. Distribution and density data were unavailable for nongame species and impacts were evaluated based on the diversity of nongame communities that may be affected. Diversity was used to characterize the nongame communities because it is an indicator of the numbers and types of species found in the ROI and suggests the complexity of ecological relationships that may be affected by the program. Potential indirect impacts on both game and nongame species were addressed by comparing species distributions with those areas that would receive increased recreational use. Species that are particularly susceptible to disturbance were noted.

Aquatic Habitats. Aquatic habitats can be directly affected by program-related construction and operations. Streams, lakes, and other wetlands were identified along T/E routes, access roads, launch facilities, and at Malmstrom AFB. These aquatic habitats were considered in the impact analysis if they were likely to be affected by road upgrades, bridge replacement, or proposed launch facility construction. Operations impacts are expected to be very low, but habitats that may be affected (e.g., those near the off-road Hard Mobile Launcher [HML] vehicle operations training area at Malmstrom AFB) were also considered. Potential impacts at each site were quantified to the degree possible based on the area lost to landfill operations, areas modified by activities such as channelization or bridge construction, areas that may receive program-generated sedimentation, areas where aquatic productivity may be reduced, and areas where important aquatic biota may be threatened (e.g., through creation of barriers to fish migration in streams). The degree of impact expected at each site was determined relative to the intrinsic value of the habitat as determined in the baseline analysis. This analysis incorporated data from the Montana Department of Fish, Wildlife and Parks (MDFWP) fisheries data base, agency and literature resources, and field observation. Final summarization placed these potential impacts in the perspective of local (i.e., in the immediate vicinity of the site of impact), regional (e.g., within large watersheds), and national concern.

Secondary activities related to the proposed program (e.g., increased recreational use of aquatic habitats and population-induced housing construction) may also disturb aquatic habitats. Analysis of these potential impacts relied heavily on projections of increased use and locations supplied by the socioeconomics and recreation resources. Comments and concerns of natural resource management agencies were incorporated to arrive at an overall significance rating.

Unique and Sensitive Habitats. Habitats that may be disturbed by the program were identified. These potential disturbances were qualified with respect to the amount of habitat lost, recovery time, effects on continued existence of the habitat in its present state, disruption of the present function of the habitat, and the local, regional, and national importance of any habitat loss. These impacts were quantified when possible, but also relied on qualitative evaluation because different types of habitats (e.g., wetlands, game preserves, and mountain grasslands) must be compared.

Information supplied by the socioeconomics and recreation resources was used to determine the likelihood that program-induced population growth would result in disturbance or enhancement of unique and sensitive habitats. Determination of impacts in these respective habitats relied on interviews with natural resource management agencies and personal observation of habitat conditions. These impacts were ranked qualitatively and combined with the results of the direct impact analysis to produce an overall significance rating.

Threatened and Endangered Species. Impacts on threatened and endangered species were determined for all federally listed, proposed, candidate, and Montana-recognized species likely to be affected by the proposed program. Emphasis was placed on species located within the areas of direct surface disturbance that have the greatest potential for being disturbed by program activities. A biological assessment of potential impacts on the federally listed bald eagle, peregrine falcon, grizzly bear, gray wolf, and black-footed ferret was prepared for the U.S. Fish and Wildlife Service (USFWS) in response to their request during Section 7 consultation. Results of the biological assessment and the USFWS response is discussed in Section 4.8.2.5. Locations of other threatened and endangered sensitive species and critical habitats were also compared to proposed locations of program construction and operations activities to evaluate which species may be directly affected. Specific program activities were analyzed to determine what impacts, if any, would occur, and whether the species disturbed are federally listed, proposed, candidate, or Montana-recognized. Types of impacts evaluated included direct mortality, displacement, loss of habitat or habitat component, noise pollution, disturbance of daily/seasonal movements or activities, and stress. Field surveys were conducted during the spring and summer of 1987 for 12 plant species (Section 3.8.3.5). Field surveys were also conducted at the 11 launch facilities that were thought to occur in or near threatened and endangered species habitats. These potentially threatened and endangered species habitats were surveyed within a 1,000-foot circle surrounding the launch facility to determine the likelihood of protected species occurring near the launch facility. Sensitive species occurring elsewhere in the ROI were also addressed. Impacts on these species would result from population growth and increased recreational use.

4.8.1.2 Determination of Levels of Impact

The expected overall impact on each biological resources element (vegetation, wildlife, aquatic habitats, unique and sensitive habitats, and threatened and endangered species) was determined to be negligible, low, moderate, or high. The LOI represents the biological magnitude of the expected disturbances; that is, the effect on the condition of populations, habitats, and ecological systems. The LOIs are defined as the following:

- Negligible Impact -- No impact is expected, or the impact is expected to be so small as to be essentially unnoticeable.
- Low Impact -- The impact is noticeable, but no consequences are expected that would alter the overall condition of populations and habitats and integrity of ecological systems.
- Moderate Impact -- The proposed program begins to adversely affect the condition of populations and habitats and integrity of ecological systems.
- High Impact -- The proposed program has a substantial adverse impact on the condition of populations and habitats and integrity of ecological systems.

The factors used in determining the LOI for each element are described in the following sections.

Vegetation. The LOI determination was based on the quantity and type of vegetation expected to be affected:

- Number of acres disturbed by program construction or operations activities, considering the types of vegetation affected and their abundance in the region;
- Severity of the disturbance (i.e., whether clearing, severe disturbance, or minor disturbance is involved); and
- Potential for program-indirect impacts on vegetation as a function of population increases in the ROI.

Wildlife. The LOI determination was based on the quantity of game and nongame habitat expected to be disturbed, and the expected degree of displacement and reduction of wildlife populations:

- Approximate area of year-long game habitat disturbed, considering the abundance of the habitat type in the deployment area;
- Approximate area of seasonally important game habitat disturbed, considering the abundance of the habitat type in the deployment area;
- The extent to which an important habitat component (feeding, nesting, breeding, cover, and water) is lost;

- Approximate areas and species diversity of nongame habitats disturbed, considering the abundance of the habitat type in the deployment area;
- Expected degree of displacement or reduction of wildlife populations; and
- Increased hunting/poaching of game species, as a function of expected human population increases in the deployment area and ROI.

Aquatic Habitats. The LOI determination was based on the quantity of both wetlands and fish habitat potentially affected, and the expected increase in use of aquatic habitats in the ROI:

- Area of wetland habitat expected to be directly affected, considering the abundance of wetlands in the ROI;
- Area and/or length of fish habitats that have the potential to be directly affected, considering abundance of such habitats in the ROI;
- Number of fish (sport, native, and forage) species potentially affected; and
- Expected increase in use of aquatic habitats as a function of population increases in the ROI.

Unique and Sensitive Habitats. The LOI determination was based on the number of habitats that have the potential to be directly affected and the expected increase in use of habitats in the ROI:

- Number and area of unique and sensitive habitats expected to be directly affected, considering the abundance of such habitats in the ROI; and
- Expected increase in use of unique and sensitive habitats as a function of population increases in the ROI.

Threatened and Endangered Species. The LOI determination was based on the number of federally listed, federal-proposed/candidate, and Montana-recognized species potentially affected, and the estimated potential for impact on designated critical habitats:

- The number of federally listed, federal-proposed/candidate, and Montana-recognized species expected to be directly or indirectly affected, and the expected severity of the effects;
- The extent to which the distribution of a potentially affected species is restricted to the area of direct surface disturbance or indirect impact area;
- The extent to which designated critical habitat is expected to be affected; and
- The extent to which an important habitat component (e.g., feeding, nesting, breeding, wintering, water, and cover) is lost.

In determining the LOI for threatened and endangered species, those occurring in the areas of direct surface disturbance were projected to receive greater impacts than those occurring in indirect impact areas. In addition, potential impacts on federally listed species and species proposed for federal listing were weighed more heavily than impacts on federal-candidate species, which were in turn weighed more heavily than impacts on Montana-recognized species. This hierarchy among various categories reflects the degree of endangerment of the protected species.

These factors were evaluated for each element using the data and analyses described in Sections 3.8.2 and 4.8.1.1. These evaluations were then synthesized to assess the overall potential for the proposed program to affect the biological status of each element. An LOI was then assigned for each element as previously described. The LOI was determined for both short- and long-duration impacts. A short-duration impact is defined as a transitory impact from which the resource would essentially recover within 5 years after the end of construction. Long-duration impacts would persist for more than 5 years after the end of construction, or result from long-duration operations. Operations are not expected to have any transitory (short-duration) impacts because disturbance from operations would occur repeatedly over a long period.

4.8.1.3 Determination of Significance

The significance of biological resources and threatened and endangered species impacts was evaluated in accordance with Council on Environmental Quality (CEQ) regulations. Significance was assessed through evaluation of the context and intensity of impacts. Context includes consideration of the settings (site, local, or regional) and the duration of the impacts. The CEQ regulations provide ten items that should be considered in evaluating intensity. Of these ten items, the following are applicable to the biological resources and threatened and endangered species:

- The degree to which the proposed action affects public health or safety;
- Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas;
- The degree to which the effects on the quality of the human environment are likely to be highly controversial;
- The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration;
- Whether the action is related to other actions with individually insignificant but cumulatively significant impacts;
- The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973; and
- Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment.

For biological resources impacts, the concepts of intensity and context are embodied in an evaluation of the wider ecological and social importance of an impact at the local, regional, or national level. The wider ecological importance of an impact refers to its potential to affect a wider array of biological resources that are ecologically related to the directly affected resources. The social importance of a biological impact refers to its potential to affect the scientific, recreational, economic, or aesthetic value of the resource. This potential is reflected to a large extent in the level of concern an impact elicits from natural resource management agencies and scientific authorities.

All impacts on biological resources elements were determined to be significant or not significant based on an assessment of their wider ecological and social importance.

The following primary factors were considered in determining the significance of all elements:

- Uniqueness; ecological, scientific, recreational, or economic value; current level of disturbance of affected resource; and resulting level of concern the impacts would elicit from natural resource management agencies or scientific authorities;
- The extent to which the proposed program would add to present or future disturbances of resources in the ROI; and
- Potential to recover through natural population or habitat recovery or through artificial means such as revegetation and stream restoration.

An additional factor considered in determining significance for aquatic habitats is the perceived sensitivity of the habitat as indicated by its degree of protection or management. A factor considered in determining significance for unique and sensitive habitats is the type or classification assigned to it (e.g., wilderness area, research natural area, and designated natural area) and the degree of sensitivity indicated by that classification.

For threatened and endangered species, the likelihood that the proposed program would pose a threat to the continued existence of threatened and endangered species was also used in determining significance.

These factors, derived from the ten indicators of intensity contained in the CEQ guidelines, were evaluated to determine whether the ecological and social effects are sufficient to warrant the impact being rated as significant. This determination included an estimate of whether the expected impacts are of sufficient concern to be considered significant by natural resource management agencies and scientific authorities.

4.8.1.4 Assumptions and Assumed Mitigations

Assumptions. The analysis of impacts on biological resources and threatened and endangered species included one general assumption that no additional impacts from road maintenance are expected during the operations phase because maintenance will not increase above its current level.

Assumed Mitigations. The analysis of impacts on biological resources and threatened and endangered species includes consideration of two types of mitigation measures: (1) assumed mitigations, representing standard construction practices and prudent planning, which the biological impact analysis assumes will be implemented to reduce impacts; and (2) potential mitigations (Section 4.8.6), which are additional measures that could entail significant program changes or expenditures of resources or efforts, which if implemented, will be practical and effective in further reducing impacts.

The following assumed mitigations were used in the assessment of biological resources impacts:

- Disturbance of native vegetation, aquatic habitats, and other identified sensitive habitats will be reduced to the extent possible through the use of sound construction practices and avoidance on a local basis (through the site-selection process, placement of onsite structures, and by operating construction equipment only on designated areas and roads). Area limitations for construction activities will be established and enforced to minimize habitat disturbance. This measure can be very effective in reducing or eliminating impacts because sensitive areas mav be avoided and overall disturbance will be minimized, especially in areas with long recovery times.

- In consultation with the appropriate state and county agencies, revegetation and noxious weed control plans will be developed for reclamation of disturbed sites. These plans will comply with state and county regulations regarding soil erosion, revegetation, and weed control. The plans will be implemented by the state and/or county for disturbed areas along T/E routes, and by Air Force contractors for disturbed areas near access roads and launch facilities. The revegetation plan will describe site preparation; erosion control measures; seeding mixtures, rates, and method and local time of application; fertilization; mulching; and monitoring; and be implemented immediately upon completion of construction. The noxious weed control program will address preventive measures (e.g., discouraging off-road vehicle use and washing of heavy construction equipment before entering new construction areas), and control measures including mechanical control (e.g., hand pulling, mowing, and hoeing), cultural control (rapid revegetation of *disturbed areas with desirable species),* and chemical control (use of herbicides or soil sterilants). Properly applied reclamation and monitoring programs can effectively speed up recovery times, reduce erosion, and reduce noxious weed invasion.

- Development, implementation, and monitoring of a noxious weed control program for the HML vehicle operations training area will be undertaken. This program will be developed in consultation with the appropriate state and county agencies. Application of this program during operations will be very effective in controlling the growth of noxious weeds in the HML vehicle operations training area and keep them from spreading to nearby lands.

- Measures will be taken to minimize dust, erosion, and sediment runoff into water bodies and noise in wildlife habitats (e.g., construction controls, limiting activity, use of mufflers, and application of reclamation plans). These measures, applied in concert, will greatly reduce potential impacts on terrestrial and aquatic systems.

- Existing aquatic habitats damaged by program activities will be restored to predisturbance conditions. Aquatic habitats destroyed by program activities (such as landfill in prairie potholes) will be replaced with similar habitats. Restoration, replacement, and monitoring programs will be developed in consultation with natural resource managers when the total level of disturbance is assessed to ensure adequate success of these mitigations. Aquatic reclamation and replacement programs are often effective means of compensating for habitats lost or destroyed.

- Disturbed habitats will be restored after construction, to the extent possible, through grading, revegetation, or other means. Short-term soil stabilization using accepted soil-protection techniques and quick-growing native species and long-term revegetation with native plants will be carried out wherever appropriate. This mitigation measure will help the area return to predisturbance conditions, therefore reducing or eliminating the loss of biological productivity within the shortest possible time.

- Removal of trees that are utilized by raptors for nesting and roosting activities will be avoided. If a tree used for roosting must be removed, mitigations will be performed in a manner consistent with raptor management guidelines.

- New bridge and culvert upgrades and other intrusions into aquatic habitats will be designed to minimize short-duration disturbances (e.g., sedimentation, landfill, removal of riparian vegetation, and discharge of construction materials or fuels) from construction activities and to avoid long-duration disturbances (e.g., bridge or culvert design that forms a barrier to fish movement, permanent removal of sensitive habitats due to filling, and permanent clearing of riparian habitat). These measures can greatly reduce and often eliminate major impacts on aquatic habitats.

- Timely on-the-ground surveys of construction sites will be conducted to ensure that these areas do not fall within 0.25 mile of bald eagle or peregrine falcon nests. If construction activities must take place within 0.25 mile of nest sites, these activities will be scheduled to avoid biologically critical periods. Nest inventories for bald eagles and peregrine falcons will be made within 1 mile of previously undisturbed rights-of-way. Additional guidelines from the Interagency Rocky Mountain Front Wildlife Monitoring Evaluation Program (U.S. Fish and Wildlife Service 1984) and the Montana Bald Eagle Management Plan (Montana Bald Eagle Working Group 1986) will be followed when appropriate. This will greatly reduce the probability of disturbing these two threatened and endangered species.

- Construction and aggregate mining activities occurring within 1 mile of grizzly bear spring habitats and denning sites or within 0.25 mile of gray wolf denning sites will be scheduled to avoid biologically critical periods. This would minimize the potential disturbance of these two threatened and endangered species.

- Black-footed ferret surveys will be conducted for areas immediately surrounding aggregate sites and potential construction areas if prairie dog colonies are encountered during program activities. If black-footed ferrets are located, the Air Force will immediately coordinate activities with the USFWS.

- The results of surveys of the potential habitats of one federal-candidate and ten Montana-recognized plant species will be incorporated in early planning and siting processes to avoid disturbance to these species.

- In addition to limiting the disturbance of wildlife habitat to the extent possible, efforts will be made to reduce noise levels during construction and operations through the use of noise modifiers (e.g., mufflers). Substantial reduction in noise levels can greatly reduce the amount of disruption of daily/seasonal activities in wildlife.

- In general, *mitigation and monitoring* plans will be developed in consultation with the appropriate federal, state, and county agencies to comply with all appropriate regulations. Plans developed for activities performed by state or county agencies will be implemented by the respective agency. This type of coordination often improves the success rate for mitigation plans and assists the identification of actual problem areas.

- A spill contingency plan will be developed to reduce potential impacts on aquatic and terrestrial systems. This plan will include measures to reduce the probability of spills (e.g., application of safety guidelines) to recover hazardous materials and to compensate for environmental damages resulting from a spill. Adherence to safe operations and transportation guidelines can virtually eliminate spills of hazardous materials. Rapid response to recover hazardous materials can reduce further disturbance resulting from the spread of the material. Compensation for environmental damages resulting from a spill can help restore the damaged site or assist other programs until restoration is completed.

4.8.2 Impacts of the Proposed Action

Short-duration construction impacts on biological resources and threatened and endangered species are expected to occur. In some instances, long-duration impacts may occur. Short- and long-duration impacts from operations would generally be restricted to the HML vehicle operations training area. Increased program-induced population growth would create a greater demand on biological resources (e.g., hunting, fishing, and other recreational activities) in the Great Falls area. Potential overall short- and long-duration impacts (i.e., those impacts resulting from construction, operations, and indirect sources) *on vegetation, wildlife, and threatened* and endangered species would be low and not significant. Overall short-duration impacts on aquatic habitats would be moderate, and overall long-duration impacts would be low. Short- and long-duration impacts on aquatic habitats would not be significant. In addition, overall short- and long-duration impacts on unique and sensitive habitats would be negligible (Figures 4.8.2-1 and 4.8.2-2). Selection of either housing option would have little effect on these conclusions; therefore, no further discussion of these options is provided.

4.8.2.1 Vegetation

For the Proposed Action, overall short- and long-duration impacts on vegetation would be low and not significant. Short- and long-duration disturbance to vegetation would occur as a result of earthmoving activity during construction of new facilities, roads, and bridges. Approximately 3 acres of vegetation would be removed during construction of new facilities at each of the proposed 100 launch facilities. Short-duration disturbances, including crushing and mortality of plants, soil compaction, and some soil erosion, would occur in areas where off-road construction and support vehicles would travel. Dust pollution from these activities may adversely affect the growth of sensitive plant species in surrounding areas. Long-duration impacts on vegetation include destruction of plants and plant cover, destruction of soil structure, soil compaction, decreased water infiltration rates, and accelerated soil erosion. Long-duration disturbance is expected in the HML vehicle operations training area due to repeated off-road passes of the HML under a wide range of weather conditions. This activity would result in crushing and breaking of plants, removal of roots from substrate, burying plants, and adverse soil impacts as previously discussed. The degree of disturbance would vary depending on the frequency, intensity, season of travel, soil and vegetation type, and recovery potential of the HML vehicle operations training area. Disturbance to vegetation in the deployment area

LEVEL OF IMPACT	SIGNIFICANCE	
Adverse Impacts	Not Significant	Significant
Negligible		
Low	◦	•
Moderate	○	●
High	◯	⬤
Beneficial Effects	▨	

Note: Some resource elements may have both beneficial effects and adverse impacts.

PROGRAM IMPACTS

ELEMENT/AFFECTED INTEREST	SHORT DURATION				LONG DURATION			
	PROPOSED ACTION	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	PROPOSED ACTION	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3
VEGETATION	◦	◦	◦	◦	◦	◦	◦	◦
WILDLIFE	◦	◦	◦	○	◦	◦	◦	◦
AQUATIC HABITATS	○	○	○	○	◦	◦	◦	◦
UNIQUE AND SENSITIVE HABITATS								
THREATENED AND ENDANGERED SPECIES	◦	◦	◦	○	◦	◦	◦	○

EM4/20

FIGURE 4.8.2-1 IMPACTS ON BIOLOGICAL RESOURCES AND THREATENED AND ENDANGERED SPECIES ASSOCIATED WITH THE PROPOSED SMALL ICBM PROGRAM IN MONTANA

PROGRAM IMPACTS	NUMBER OF LAUNCH FACILITIES													
	SHORT DURATION							LONG DURATION						
	NOT SIGNIFICANT				SIGNIFICANT			NOT SIGNIFICANT				SIGNIFICANT		
	NEGLIGIBLE	LOW	MODERATE	HIGH	LOW	MODERATE	HICH	NEGLIGIBLE	LOW	MODERATE	HIGH	LOW	MODERATE	HIGH
VEGETATION														
PROPOSED ACTION	48	44			8			48	48			4		
ALTERNATIVE 1	50	42			8			50	48			2		
ALTERNATIVE 2	62	52			11			62	58			5		
ALTERNATIVE 3	101	77			22			101	87			12		
WILDLIFE														
PROPOSED ACTION	67	15	18					68	32					
ALTERNATIVE 1	67	17	16					68	32					
ALTERNATIVE 2	83	20	22					84	41					
ALTERNATIVE 3	124	39	37					124	76					
AQUATIC HABITATS														
PROPOSED ACTION	78	16	2	1	2	1		95	5					
ALTERNATIVE 1	74	19	2	1	3	1		94	6					
ALTERNATIVE 2	93	25	2	1	3	1		118	7					
ALTERNATIVE 3	152	33	4	1	7	1	2	185	13	2				
UNIQUE AND SENSITIVE HABITATS														
PROPOSED ACTION	100							100						
ALTERNATIVE 1	100							100						
ALTERNATIVE 2	125							125						
ALTERNATIVE 3	200							200						
THREATENED AND ENDANGERED SPECIES														
PROPOSED ACTION	90	10						90	10					
ALTERNATIVE 1	90	10						90	10					
ALTERNATIVE 2	115	10						115	10					
ALTERNATIVE 3	181	18					1	181	18					1

EM4/8

FIGURE 4.8.2-2 SUMMARY OF SITE IMPACTS ON BIOLOGICAL RESOURCES AND THREATENED AND ENDANGERED SPECIES ASSOCIATED WITH PROPOSED SMALL ICBM CONSTRUCTION AND OPERATIONS AT LAUNCH FACILITIES IN MONTANA during the operations phase is expected to be minimal. No off-road travel by the HML or associated support vehicles would occur in the deployment area during operations; consequently, vegetation would not be affected.

Loss of onbase vegetation is expected to result from construction of new facilities and housing units, development of the HML vehicle operations training area and associated facilities, and development of utility and transportation corridors. A total of 321 acres of vegetation would be temporarily disturbed and a total of 839 acres would be permanently lost onbase. An additional 100 acres outside the northern base boundary would be converted to new program-related facilities and recreational development. Much of the vegetation likely to be disturbed onbase would be a grassland type comprised of a mixture of introduced and native grasses (Section 3.8.3.1). Construction of facilities in the HML vehicle operations training area, and construction of simulated T/E and access roads, would likely result in the long-duration loss of 350 acres of agricultural land. Off-road vehicle training for HML drivers would repeatedly disturb 50 percent of the area over the life of the program.

Disturbance to vegetation in the deployment area, including destruction of plant cover, crushing of plants, and soil compaction, is expected to result from road and bridge upgrading and development of program-related facilities at the launch facilities. Much of the area expected to be affected for road widening was disturbed during original road construction or during road maintenance. Many of the vegetation types in the deployment area (Table 4.8.2-1) have moderate to good potential for recovery from disturbance with application of appropriate revegetation techniques. Revegetation measures and noxious weed control programs are also expected to substantially reduce the potential for establishment and the spread of noxious weeds on disturbed sites. Approximately 880 acres of vegetation are expected to be temporarily disturbed and 228 acres of vegetation permanently disturbed along T/E route corridors, and a total of 140 acres temporarily disturbed and 160 acres permanently lost around launch facilities.

Figure 4.8.2-3 presents the sensitivity of vegetation near launch facilities, access roads, and T/E routes in three categories (high, moderate, and low). Areas supporting riparian or forest vegetation were ranked as areas of high sensitivity because of the high value of these types of habitat and because they are slower to recover from disturbance. Native grasslands and shrublands were included as areas of moderate sensitivity because they represent native vegetation with faster recovery rates than the previous category. Low sensitivity areas represent agricultural lands and other areas that do not support native vegetation, but still have biological value. Launch control facilities are shown for descriptive purposes only and are not rated because no direct disturbance would occur there. This figure may be compared to Figure 4.8.2-4 to evaluate proportionate levels of operations activities that could potentially occur in environmentally sensitive areas. Figure 4.8.2-4 shows the number of launch facilities served by each segment of the T/E routes. Basically, T/E routes serving a larger number of launch facilities would receive a proportionately larger rate of use by operations and support vehicles than would T/E routes serving a smaller number of launch facilities. The route segments serving the greatest number of launch facilities are already major highways (e.g., Interstate 15 and U.S. 87) that have high traffic levels. The remaining segments receive use from the current Minuteman program that would be similar to the proposed Small Intercontinental Ballistic Missile (ICBM) program.

The largest acreage of sensitive vegetation types (riparian and forest vegetation types) that occur in areas of direct surface disturbance in the deployment area are found in Cascade and Fergus counties; the largest acreage of native grassland in areas of direct disturbance is also most common in Cascade and Fergus counties; and Fergus and

Table 4.8.2-1

Existing Land Cover Categories (Including Major Vegetation Types) by Percentage Composition in Potential Disturbance Zones

	Potential Disturbance Zones		
Mapped Categories	All T/E Routes in Deployment Area (100-ft Corridor) (%)	Access Roads (1,000-ft Corridor) (%)	Launch Facilities (Within 500 ft of Fence) (%)
Native Grassland	28	33	34
Forested Land	2	1	1
Riparian Vegetation	3	2	1
Inland Saline Flats	<1	<1	<1
Agricultural Land	63	63	64
Maintained Grassland	<1	<1	0
Urban/Disturbed	3	<1	0
Mineral Extraction	<1	<1	0
Water	<1	<1	<1

Pondera counties contain the majority of agricultural lands in areas of direct surface disturbance. Four launch facilities (C-8, E-8, N-6, and O-9) are located near forest or riparian types that would require long-duration recovery periods if disturbed. Forty-three launch facilities have at least 25 percent of the vegetation within 500 feet dominated by native grassland. Because only small areas are expected to be disturbed and the distances between affected launch facilities are large, no substantial ecosystem-level impacts are expected.

Table 4.8.2-1 lists major vegetation types and general mapping categories expected to be disturbed during construction. These amounts are based on relative abundance along the T/E routes, access roads, and around the launch facilities. Impacts at launch facilities are presented in Figures 4.0-1 (Section 4.0) and 4.8.2-1. Descriptions of vegetation at launch facilities are in Appendix A. Forty-eight facilities would have short-duration, negligible impacts and 44 would have short-duration, low, and not significant impacts. If selected for deployment, vegetation at eight launch facility sites would receive short-duration, low, and significant impacts, but vegetation at only four launch facilities would receive long-duration, low, and significant impacts (Figure 4.8.2-2). These significant impacts at launch facilities would result from the disturbance of sensitive riparian and forest communities because these habitats are ecologically important, are of concern to natural resource managers and the general public, and their loss is part of a nationwide trend in the loss of important biological habitats. Long-duration, negligible impacts would occur at 48 launch facilities, and another 48 launch facilities would have long-duration, low, and not significant impacts. Although a range of site-level, long-duration, negligible to low, and significant impacts may occur as a result of the proposed set of launch facilities identified for the Proposed Action, the accumulated impacts from disturbances onbase, along T/E routes, and at launch facilities would result in approximately the same overall LOI.

The small area expected to be disturbed during the construction and operations phases, the anticipated minor loss of biological productivity and habitat, implementation of the appropriate assumed mitigations, and the fact that much of this area has been previously disturbed result in short- and long-duration, low impacts on vegetation. The relatively small amount of native vegetation that would be disturbed by the proposed program is not likely to generate substantial concern among natural resource management agencies or scientific authorities. A considerable amount of native vegetation has been disturbed in the region; therefore, the small amount of new area potentially disturbed by the program would result in a not significant impact. These factors, in addition to the relatively good recovery potential of many of the sites, application of appropriate mitigation measures to reduce vegetation impacts, and the minor concern expected, indicate that overall short- and long-duration impacts on vegetation would not be significant (Figure 4.8.2-1).

4.8.2.2 Wildlife

Short- and long-duration impacts on wildlife as a result of the Proposed Action would be low and not significant. Construction activities at Malmstrom AFB and in the deployment area would cause minor short-duration disturbances, including disruption of daily/seasonal activities, displacement, and increased stress during critical periods (e.g., times of reproduction) to various wildlife species and their associated habitats. This potential disturbance would result from increased human activity, traffic, and noise at construction sites. Major big game species of concern in the deployment area include mule deer, white-tailed deer, pronghorn, elk, and black bear. Impacts on small and nongame wildlife species in the deployment area would be minor because of the small amount of habitat lost, mortality, and disruption of daily/seasonal behavior. Onbase construction activities are not expected to affect any big game species; however, nongame species would receive some minimal impacts. Minor long-duration impacts would result from habitat loss, operations (which would cause some disruption of daily/seasonal activities, displacement, and increased stress), and increased hunting pressure as a result of program-induced population growth.

No big game species are known to occur on Malmstrom AFB; however, small game and nongame species onbase would be affected by habitat loss resulting from construction of new facilities, development of the HML vehicle operations training area, and development of utility and transportation corridors. Short-duration disturbance of wildlife habitat from physical disruption would include approximately 321 acres associated with construction of new buildings onbase, and long-duration disturbance onbase would result in the permanent loss of 839 acres. An additional 100 acres adjacent to the northern base boundary would be converted to recreational and technical support uses, and may generate additional wildlife impacts. Because this land is currently in agricultural use, the long-duration effect may be beneficial for wildlife. Construction of buildings and simulated T/E routes in the HML vehicle operations training area and off-road training exercises would result in the long-duration disturbance of at least one-half of the proposed 350-acre area. These long-duration impacts would be small because of the low wildlife diversity and use currently supported by the habitats.

An increase in construction traffic, the influx of construction workers, and the operation of construction machinery at launch facilities and along T/E routes would cause some short-duration impacts on game and nongame wildlife species. Construction would

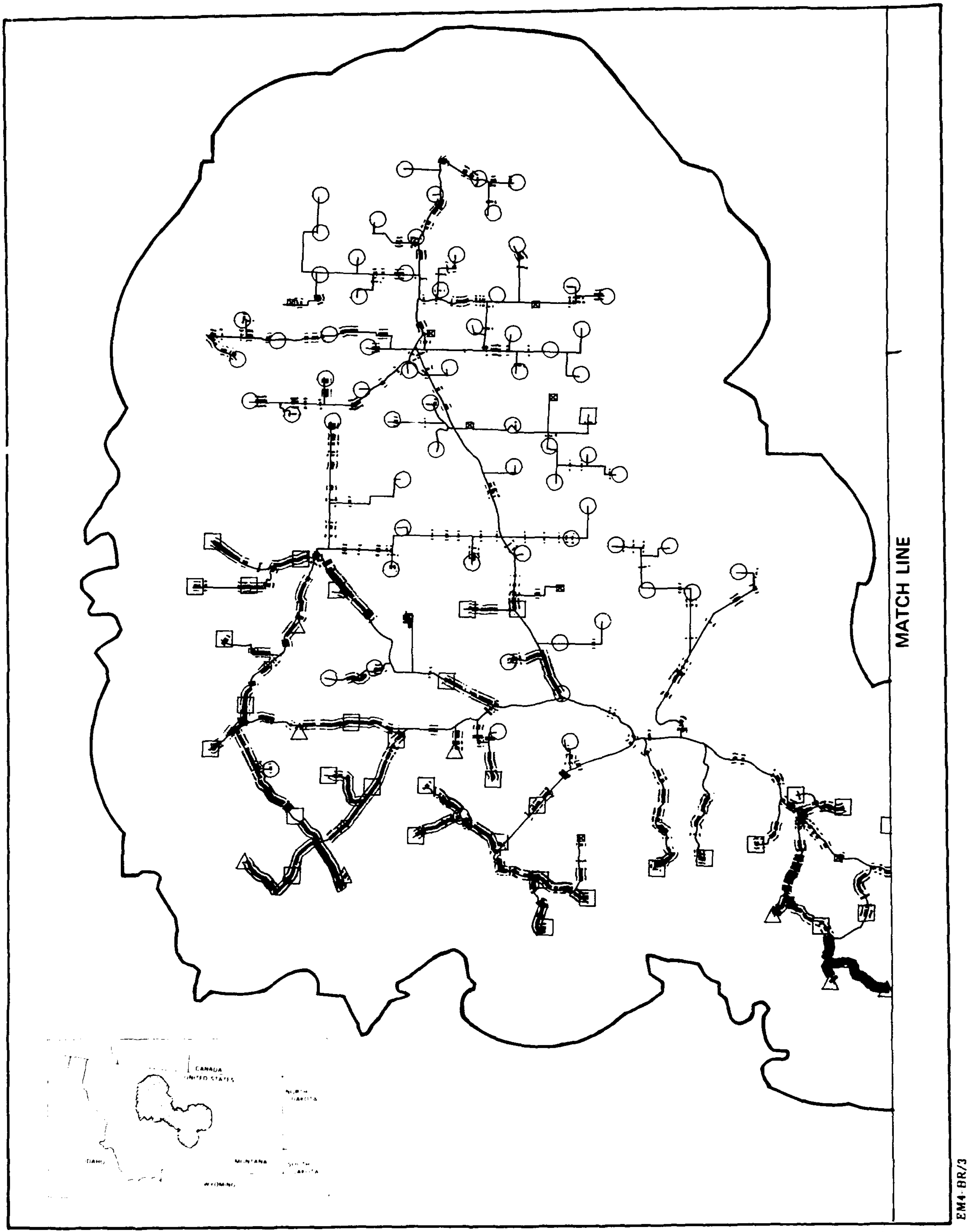


FIGURE 4.8.2-3 SENSITIVITY LEVELS OF VEGETATION NEAR LAUNCH FACILITIES AND TRANSPORTER/ERECTOR ROUTES

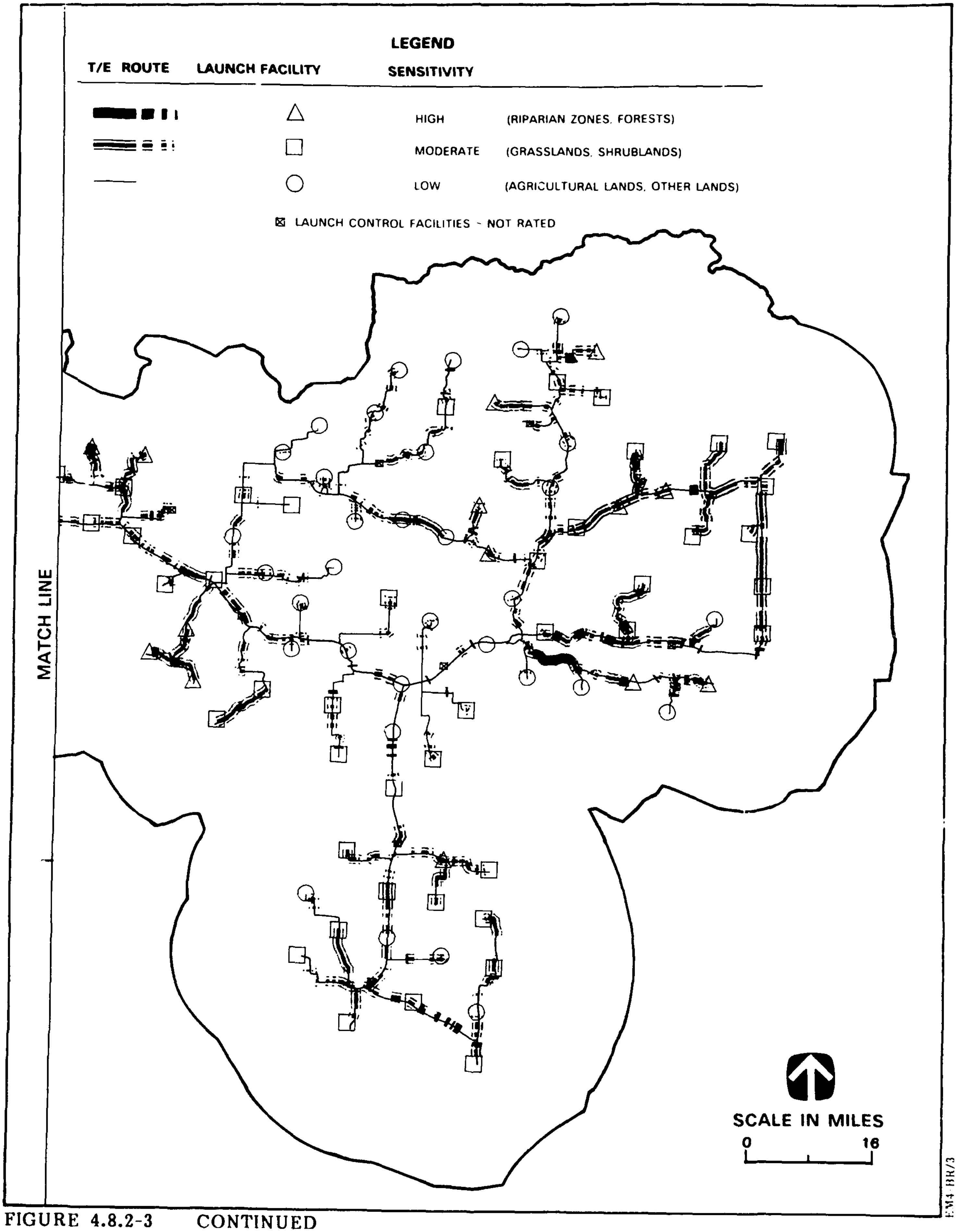


FIGURE 4.8.2-3 CONTINUED

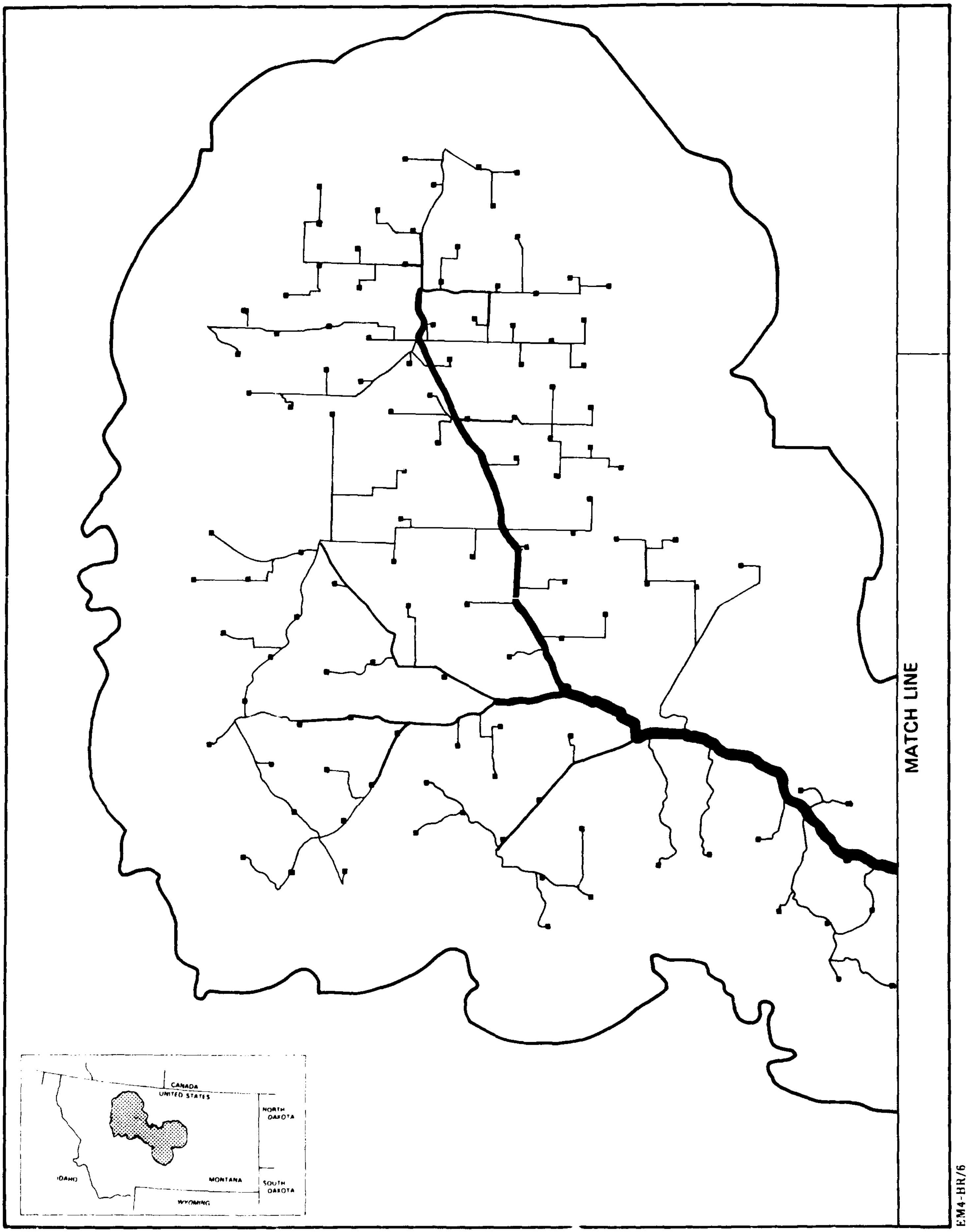


FIGURE 4.8.2-4 NUMBER OF LAUNCH FACILITIES SERVED BY TRANSPORTER/ERECTOR ROUTE SEGMENTS

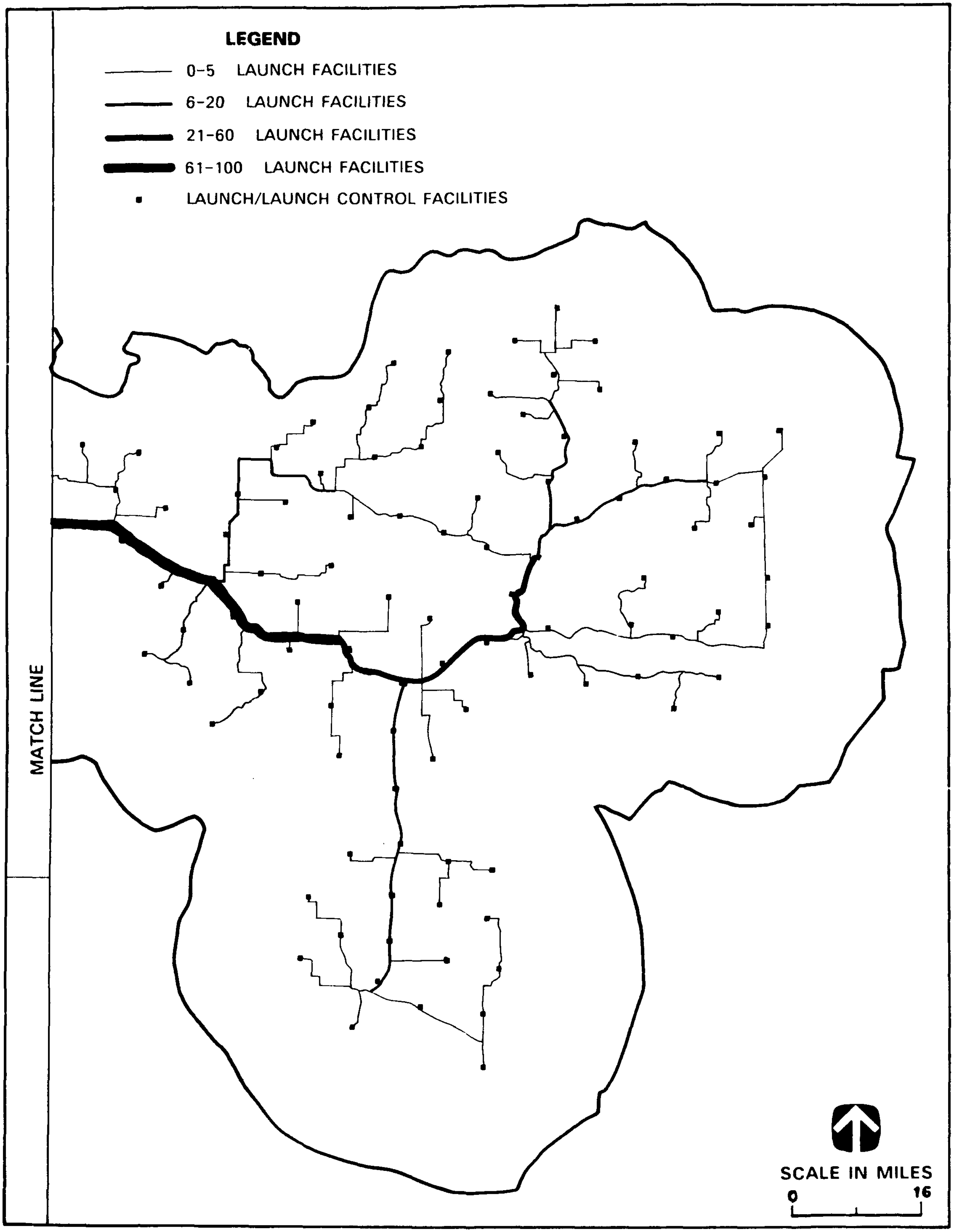


FIGURE 4.8.2-4 CONTINUED

disrupt daily/seasonal activities, increase stress during critical periods (e.g., big game wintering and calving/lambing periods and times of raptor nesting activities), increase wildlife mortality from animal-vehicle collisions, and cause some displacement. Upgrading bridges located in or near riparian habitats would also cause displacement of aquatic wildlife (e.g., waterfowl and shorebirds) and various raptor species. Bridge construction may cause minor habitat losses and temporary displacement of wildlife. Wildlife (big game, small game, and nongame) disturbance from construction activity would be temporary and recovery is expected within one or two seasons. Recovery of wildlife habitat may take longer and is dependent on the type of habitat disturbed. Long-duration impacts would result from the permanent loss of approximately 388 acres of wildlife habitat that would be removed during launch facility expansion and T/E route upgrading. These losses represent minimal impacts on wildlife because of the small amount and marginal quality of habitat involved. Impacts on wildlife would be dispersed over a large area and over a long time frame; consequently, no adverse impacts are expected for the regional ecosystem.

Figure 4.8.2-5 presents the sensitivity of wildlife (and threatened and endangered species) habitats near launch facilities, access roads, and T/E routes. Three sensitivity categories were developed to display the range of variation in habitat quality in the deployment area. Areas rated as having high sensitivity contain winter concentration areas. Areas rated as having moderate sensitivity contain severe winter habitat of big game. Areas of low sensitivity support general wildlife habitat (they may be within 1 mi of severe big game winter habitat, but do not contain severe big game winter habitat). Launch control facilities are shown for descriptive purposes only. Only a few launch facilities occur in sensitive wildlife habitat and these are widely dispersed over the area. This figure may be compared with Figure 4.8.2-4 to show proportionate levels of operations activities that could potentially occur in environmentally sensitive wildlife habitats.

Approximately ten launch facilities and 53 miles of T/E routes occur in severe wintering habitat for mule deer, white-tailed deer, and pronghorn. Road segment upgrade construction would disturb an additional 20 feet of the road and would permanently remove approximately 129 acres of big game severe wintering habitat. Expansion of the ten launch facilities located in big game severe wintering habitat (Table 4.8.2-2) would permanently remove an additional 34 acres. Impacts from the loss of severe wintering habitat are expected to be minimal because of the overall small amount of acreage involved (less than 1% of total severe wintering habitat in the deployment area) and the marginal quality of the habitat that occurs within the already disturbed highway right-of-way and around the launch facilities.

Program operations would cause some long-duration impacts on big game and nongame species including disruption of daily/seasonal activities and displacement due to increased activities along T/E routes and at the launch facilities. The extent of these impacts is dependent on the frequency of traffic, degree of human activity, and noise at the launch facilities. Wildlife species occurring in the areas of disturbance may become conditioned to the moderate increase in activities; therefore, any disturbance that occurs may be temporary and eliminated as soon as the animal inhabitants become conditioned to operations activities. Program-induced population growth would increase regional hunting pressure during the life of the program. Certain areas near Malmstrom AFB (e.g., the Highwood and Little Belt mountains) are currently high-hunting pressure areas and would probably receive additional program-related pressure. Program-induced population growth would probably also cause a proportional increase in poaching.

Table 4.8.2-2

Launch Facilities Within Big Game Severe Wintering Habitat

	Big Game Species		
Launch Facility	White-Tailed Deer	Mule Deer	Pronghorn
B-9		X	
B-11		X	X
C-6	X		
C-8	X	X	
C-10		X	
D-7		X	X
I-5			X
N-3			X
O-3			X
O-11	X	X	X

Increases in nonconsumptive recreational activities (e.g., hiking, snowmobiling, photography, and bird watching) in the ROI would have indirect impacts (e.g., temporary displacement or disruption of daily/season activities) on the diverse and abundant wildlife in the area. However, these recreational activities are likely to be dispersed over a wide area and would have only a minimal impact on wildlife in the region.

A relatively small amount of habitat is expected to be temporarily or permanently lost due to the proposed program, and the majority of impacts on wildlife are expected to be minor. These impacts can be further minimized through the implementation of appropriate mitigation measures. In addition, regional wildlife populations would not be adversely affected due to the small areas involved and the dispersed nature of the impacts. Therefore, no ecosystem-level impacts are expected. Impacts are summarized in Figures 4.0-1 (Section 4.0) and 4.8.2-2 for launch facilities and T/E routes. Big game species whose habitats encompass launch facilities are listed for each launch facility in Appendix A. No reduction in habitat carrying capacity (i.e., quantity of wildlife capable of being supported by a habitat) is expected nor would the reproductive potential of any wildlife species be adversely affected. Potential disturbance to wildlife is not likely to generate concern among natural resource management agencies or scientific authorities. Therefore, short- and long-duration, low, and not significant impacts would occur on wildlife (Figure 4.8.2-1).

4.8.2.3 Aquatic Habitats

Short-duration impacts on aquatic habitats as a result of the Proposed Action would be moderate; long-duration impacts would be low. These short- and long-duration impacts would not be significant. Short-duration impacts on aquatic habitats would occur during the construction phase of the program. Bridge, culvert, and road construction may result in the temporary disturbance of some habitats and is likely to cause sedimentation in streams and wetlands (causing plant and animal mortality and loss of habitat). Long-duration construction impacts on aquatic habitats would occur where landfill encroaches on streams and wetlands. This would result in the direct loss of aquatic habitat or would create biological barriers to movement within the habitat. Operations activities would generally not produce any major impacts on aquatic habitats; however, off-road training maneuvers at Malmstrom AFB would cause erosion over the life of the program. Minor

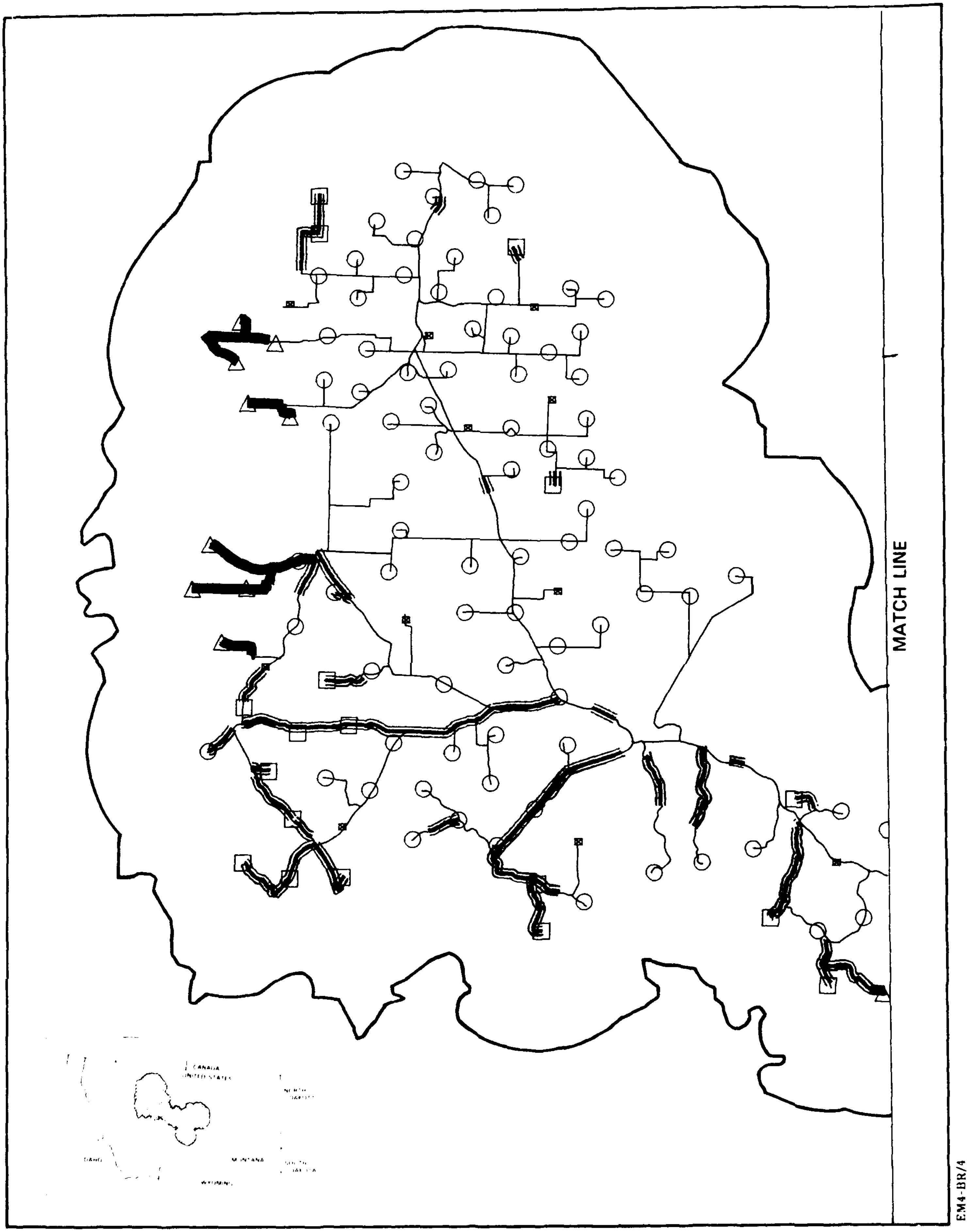


FIGURE 4.8.2-5 SENSITIVITY LEVELS OF WILDLIFE AND THREATENED AND ENDANGERED SPECIES HABITATS NEAR LAUNCH FACILITIES AND TRANSPORTER/ERECTOR ROUTES

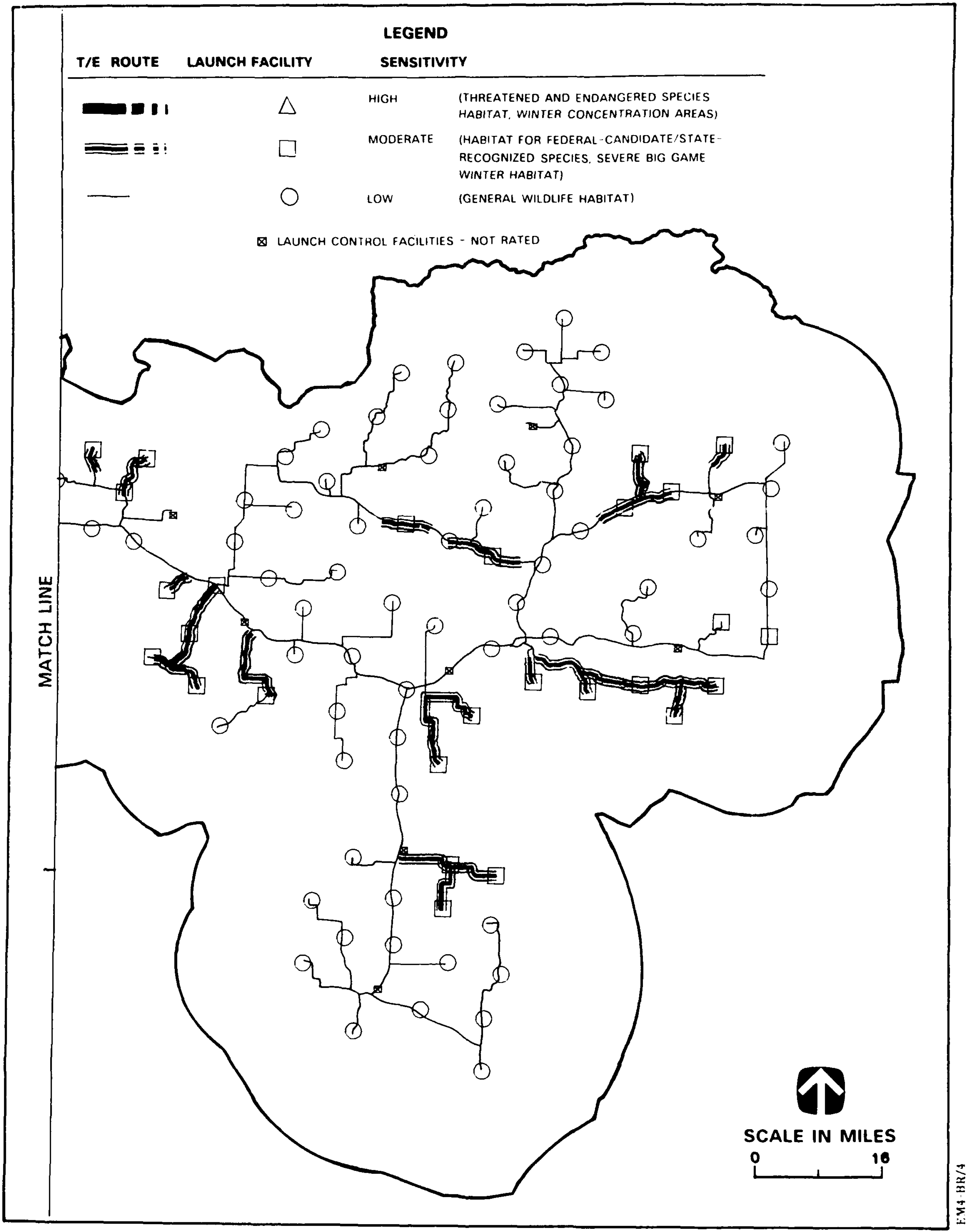


FIGURE 4.8.2-5 CONTINUED

drainages near Malmstrom AFB would carry eroded sediments from the HML vehicle operations training area to the Missouri River. This increased sedimentation near the point of entry in the Missouri River would cause some degradation of fish habitat and may result in some increased fish mortality.

Figure 4.8.2-6 shows the sensitivity levels of aquatic habitats in program corridors (near launch facilities, access roads, T/E routes, and at bridges scheduled for improvement) and surface water quality in perennial streams throughout the deployment area. Four sensitivity categories were developed to display the range of environmental sensitivity in aquatic habitats in the deployment area. Areas of high sensitivity include MDFWP fisheries Class 1, 2, or 3 streams that would be directly or indirectly affected or wetlands that would be directly affected if construction occurred at that site. Areas of moderate sensitivity include MDFWP fisheries Class 4 or 5 streams that would be directly or indirectly affected or wetlands that would be indirectly affected if construction occurred at that site. Areas of low sensitivity contain either MDFWP fisheries Class 6 streams that would be directly or indirectly affected or artificial ponds or washes with minor riparian growth that would be indirectly affected if construction occurred at those sites. Areas of no sensitivity do not contain aquatic habitats and no aquatic habitats would be affected if construction occurred in those areas. As shown in this figure, the locations of aquatic habitats are greatly separated and the limited disturbance expected at any one site is unlikely to affect other portions of a given watershed. Even in situations where construction at bridges may occur simultaneously on streams that join within 5 miles, the level of disturbance to aquatic habitats and biota would be so small that it is unlikely that any effect from construction would carry to the point of confluence. Figure 4.8.2-6 may be compared with Figure 4.8.2-4 to show proportionate levels of operations activities that could potentially occur in environmentally sensitive aquatic habitats.

Among the proposed set of launch facilities identified for the Proposed Action, seven (B-3, B-9, B-11, L-3, L-10, N-11, and O-9) are near streams and six (K-4, L-10, M-10, N-11, O-2, and R-30) are near ponds. Launch facility O-11 is within a USFWS wetland easement but is not within 1,000 feet of any wetlands. Construction at these launch facilities is likely to result in short- and long-duration disturbance to these nearby habitats (e.g., habitat disruption from machinery operating in the habitat), and sedimentation may occur in aquatic habitats bordering the launch facility construction areas (potentially killing aquatic biota and degrading the habitat value). Disturbance of aquatic habitats is of regional concern to natural resource managers; however, the total amount of disturbance expected throughout the deployment area would be small, and mitigations at each site, including the avoidance of equipment operation and landfill in wetlands, may further reduce these disturbances. Most of the perennial streams near launch facilities represent minor fisheries resources and are not adjacent to the launch facilities; therefore, only minor construction disturbance from potential erosion and sedimentation would occur. Possible exceptions to this are launch facilities in the Belt Creek (A-11) and Otter Creek (A-4) drainages, which are very close to these streams. Although these creeks are important fisheries resources, they are greater than 500 feet from the launch facilities and are unlikely to be directly affected. Mitigation measures in these areas should greatly reduce potential indirect disturbances from erosion and runoff. Any disturbance of washes near launch facilities is unlikely to cause a substantial impact on aquatic habitats because these washes generally do not support important wetland vegetation or wildlife. The LOI and significance ratings for each launch facility are presented in Figure 4.0-1 (Section 4.0). Aquatic habitats at launch facilities are further described in Appendix A. Three launch facilities would have site-level, short-duration, and significant impacts (2 low and 1 moderate) because of the expected temporary loss and disturbance of some critical aquatic habitat that is of concern to natural resource managers as well as the general public. No launch facilities would have site-level, long-duration, and significant impacts (Figure 4.8.2-2). Construction at most of the launch facilities would cause site-level, long-duration, and negligible impacts and at a few there would be long-duration, low, and not significant impacts.

Bridges to be upgraded have been identified at 124 locations, but many of these bridges do not cross aquatic habitats. The distribution of streams with important fisheries is shown in Figure 4.8.2-7. Figure 4.8.2-8 identifies 56 bridges to be upgraded that cross substantial aquatic habitats. Eighteen of these bridges cross streams considered to be important fisheries resources by the MDFWP (including the Missouri, Judith, Sun, and Teton rivers, and Elk, Warm Spring, and Wolf creeks). The majority of these streams are moderate to substantial resources in the department's stream data base. Construction at these bridge sites would result in local disturbance of streams from machinery, debris, and potential placement of structures in the streams and would produce sedimentation that is carried downstream. These impacts would be temporary and can be reduced by construction mitigations. These bridges are located throughout the deployment area (Figure 4.8.2-8), and short-duration construction impacts should not be large enough to generate any additional impacts within local or regional watersheds. The Montana Stream Protection Act governs the specifications of bridge construction in order to reduce or eliminate disturbance to habitats and to eliminate the creation of barriers to fish migration in streams. Bridges built in accordance with this Act should not result in any substantial long-duration impacts on aquatic habitats. Many existing culverts along the T/E route system would be replaced. Most of these culverts are on very small drainages and would not cause any noticeable impact on aquatic habitats. Culverts that do occur on important fisheries resources are also governed by the Montana Stream Protection Act and their replacement should not result in any long-duration impacts.

Road widening or other surface disturbances would result in potential direct impacts on streams and wetlands adjacent to the roadway (e.g., loss of habitat from landfill and mortality from equipment operation) and may cause some sedimentation in these habitats near the roadway. A USFWS wetland easement containing a prairie pothole occurs along Interstate 15, south of Dutton, Montana, in a potential road upgrade area. Construction may cause sedimentation and loss of habitat in this pothole. Potential road construction areas have been identified along the Belt and Wolf Creek drainages, which are moderate to substantial fisheries resources in the MDFWP stream data base. Road construction along these streams would produce short-duration impacts primarily from increased sedimentation. Long-duration impacts on stream systems from road construction are unlikely if roads are built in accordance with the Montana Streambed and Landform Preservation Act (the Act is designed to reduce or eliminate undesirable disturbance of streams due to modifications such as channelization). Some landfill may occur in wetlands adjacent to roads; however, no major wetlands occur in the potential road construction area. Many minor wetlands (generally less than 1 acre) that occur along existing T/E routes were created, in part, by blocked drainages during original road construction. It is unlikely that construction from the program would result in any overall change from the baseline conditions for these small wetlands.

Operations-phase impacts on aquatic habitats are expected to be very small because there would be almost no additional disturbance of aquatic habitats and little chance for offsite disturbance that would affect the aquatic habitat's biota. Approximately 50 percent of the 350-acre HML vehicle operations training area would be regularly disturbed throughout the life of the program by off-road training activities. Sediments eroding from this site would enter the drainages on the base. These areas are not important wetland or stream habitats, but they do drain into the Missouri River. A minor net localized increase in the sediment load of the Missouri River is likely to occur and

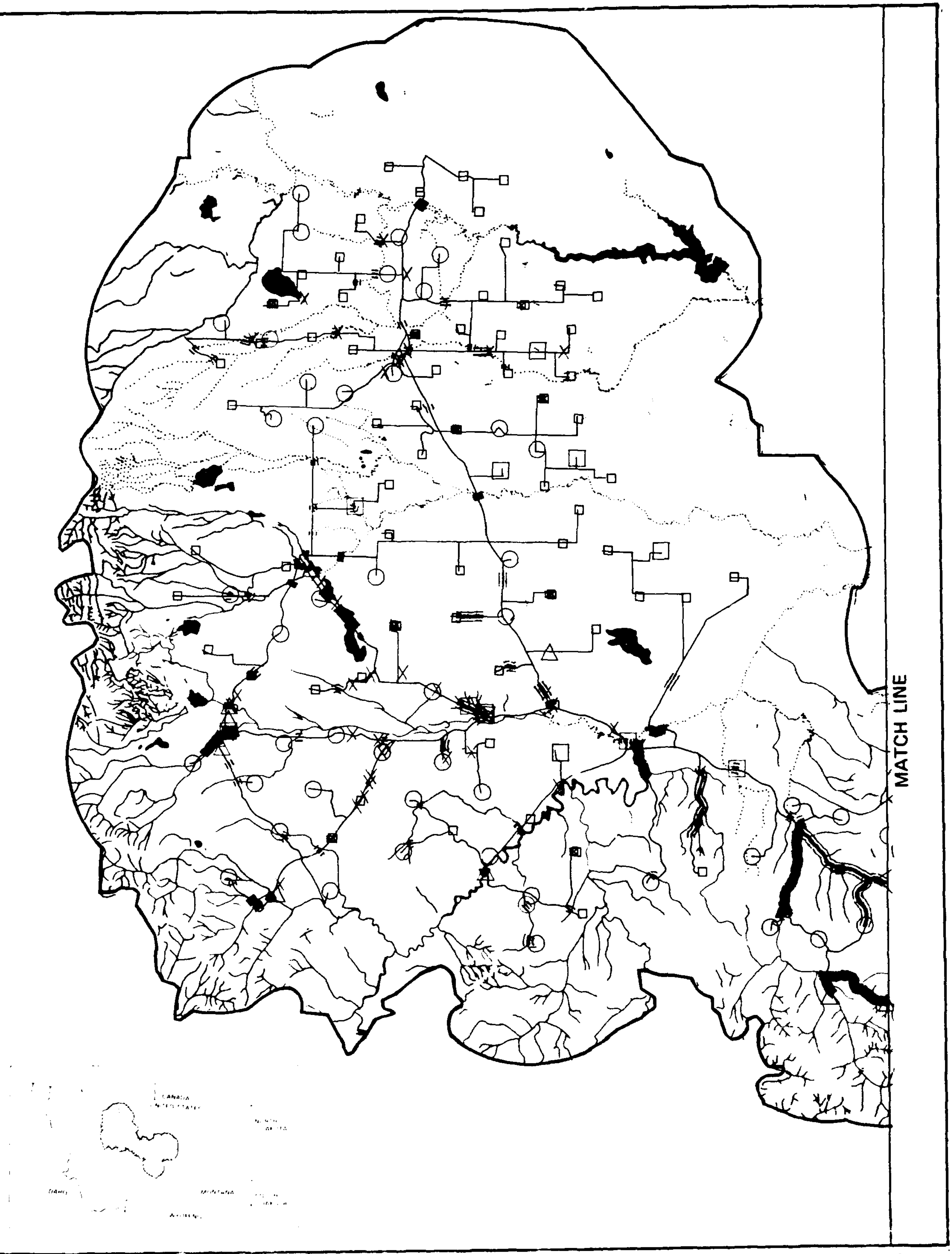


FIGURE 4.8.2-6 SENSITIVITY LEVELS OF AQUATIC HABITATS IN PROGRAM CORRIDORS AND SURFACE WATER QUALITY THROUGHOUT THE DEPLOYMENT AREA

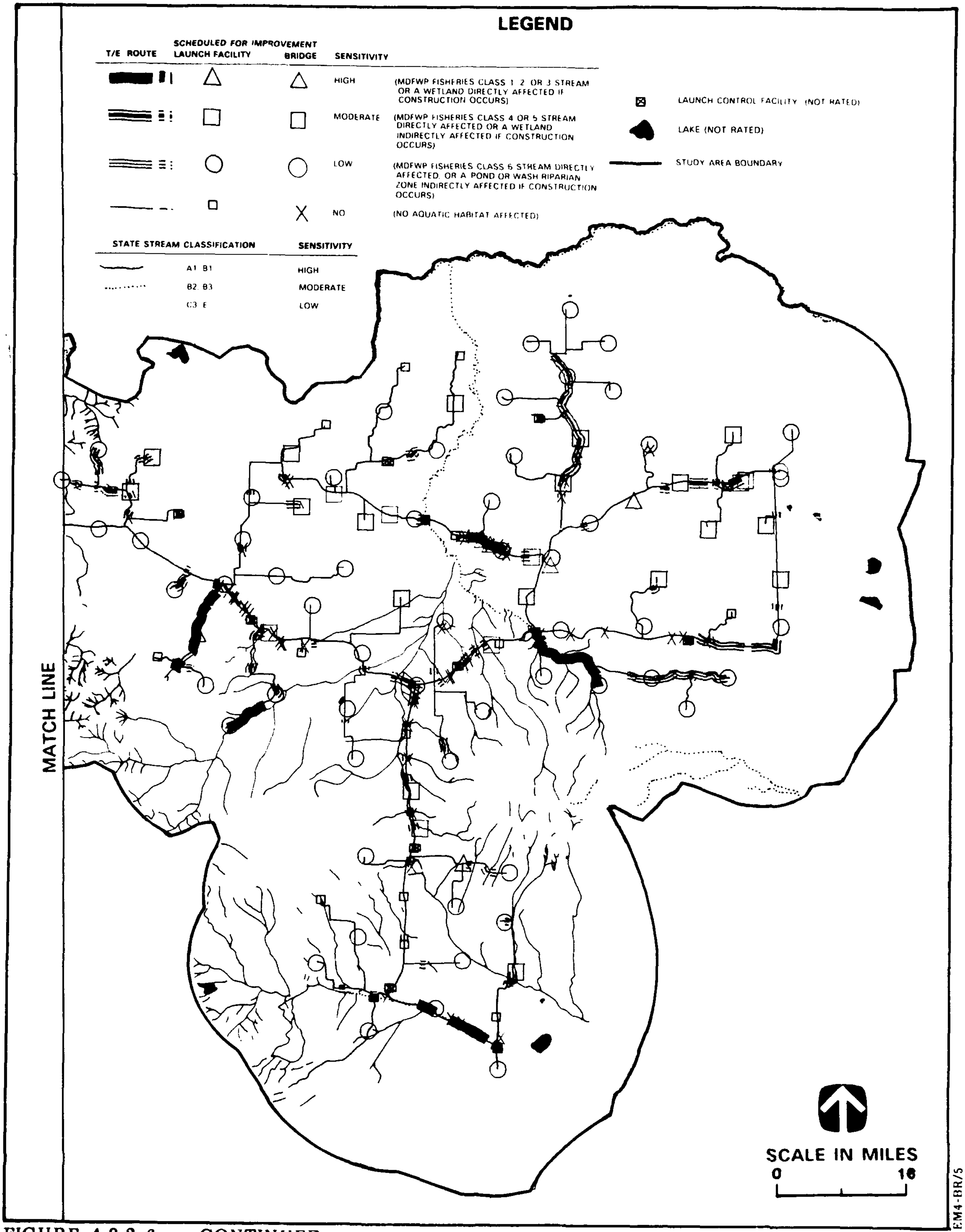
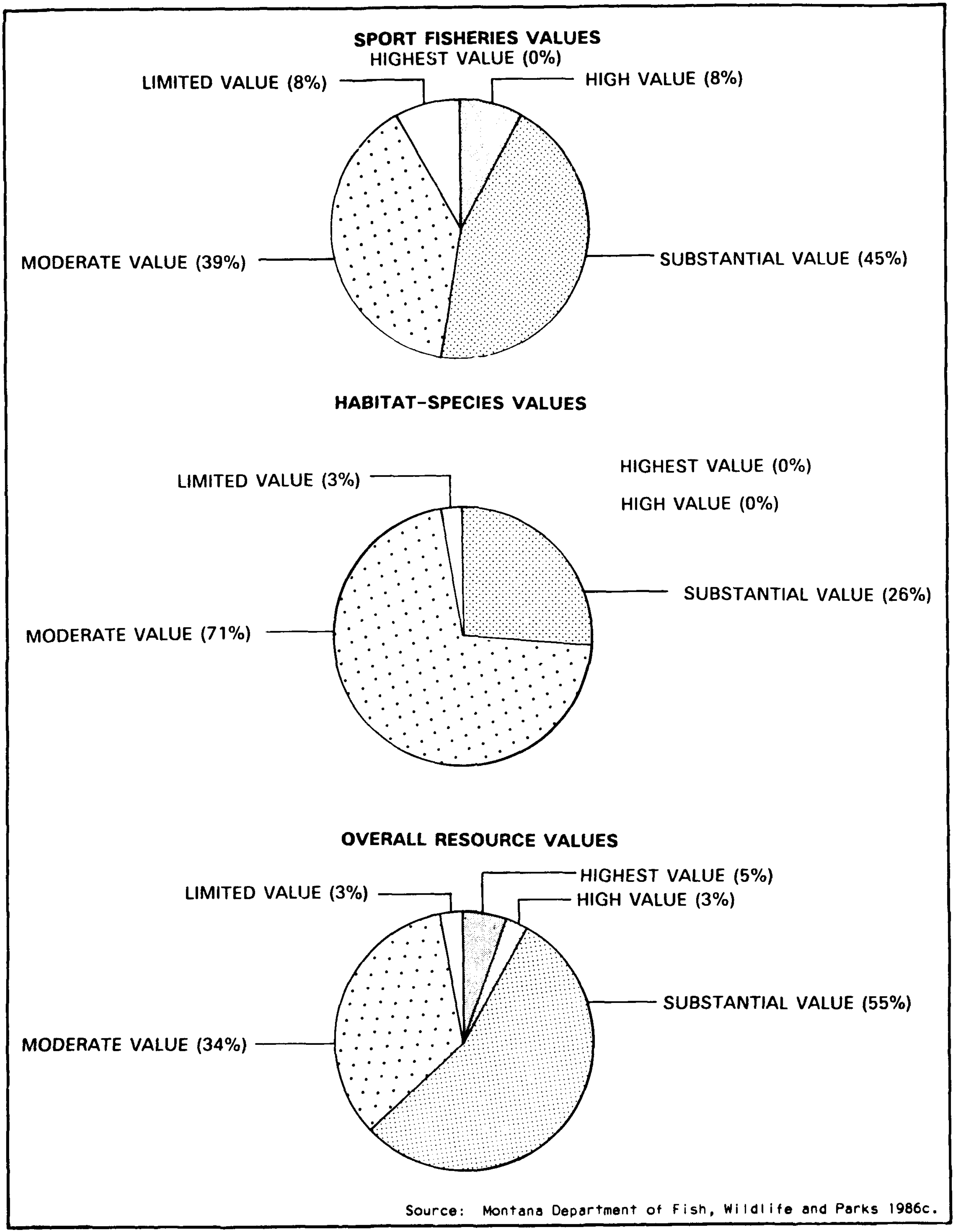


FIGURE 4.8.2-6 CONTINUED



Source: Montana Department of Fish, Wildlife and Parks 1986c.

EM4-BR/1

FIGURE 4.8.2-7 DISTRIBUTION OF STREAM VALUE CLASSES AT POTENTIAL BRIDGE IMPROVEMENT SITES

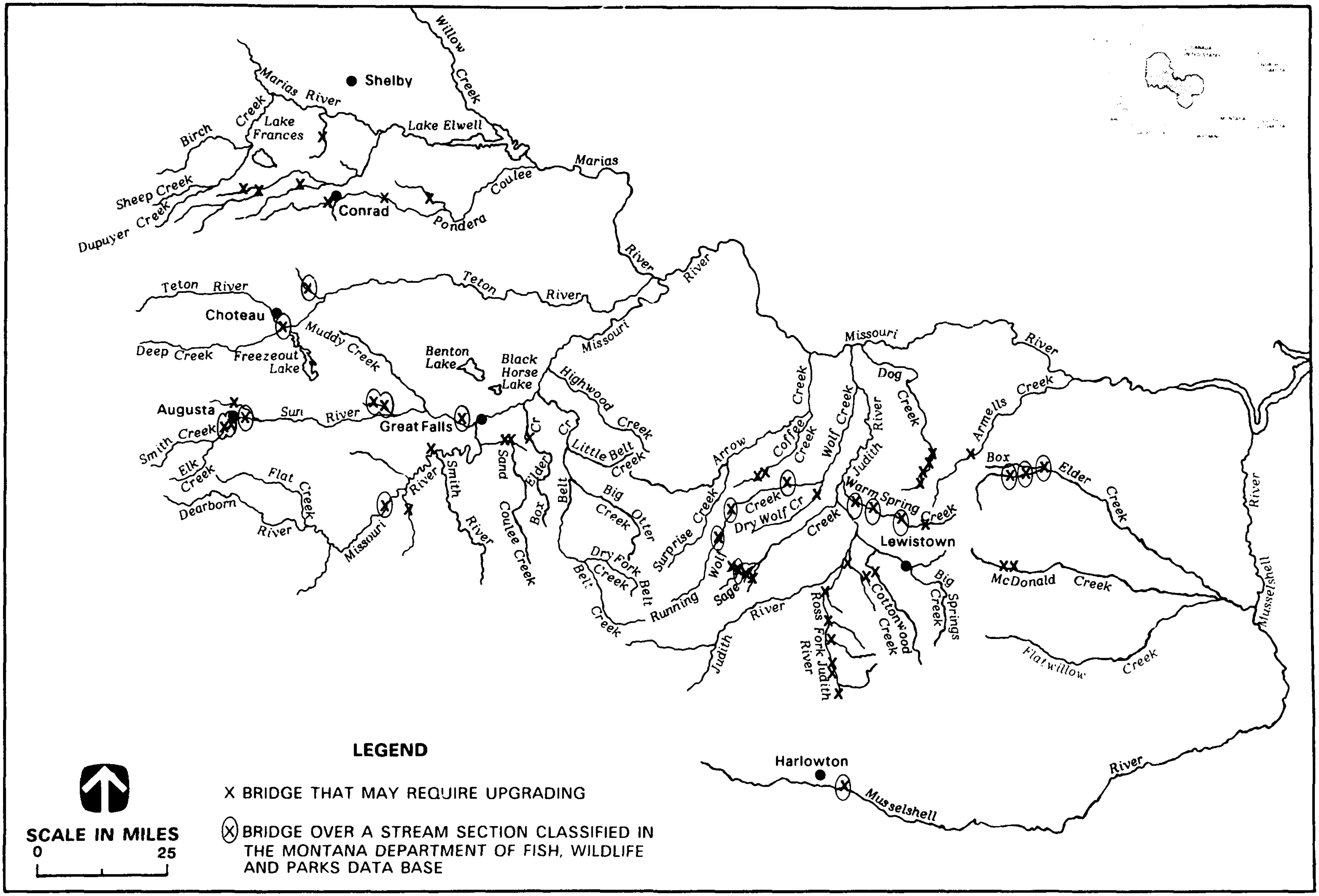


FIGURE 4.8.2-8 BRIDGE IMPROVEMENT SITES IN RELATION TO MAJOR STREAMS AND AQUATIC HABITATS

be of long duration because of these activities. The increased sedimentation should not produce serious disturbance to the biota or to the habitat quality of this section of the Missouri River, and control measures are available to limit the amount of sediments reaching the river. Normal operations would require periodic road maintenance and potential additional bridge renovation in the deployment area. These activities should produce only minor short-duration impacts on aquatic habitats because only small areas would be disturbed.

The anticipated program-induced population growth (4.0% in the 9-county deployment area and 8.5% in Cascade County during operations) would cause additional recreational use of aquatic habitats. The expected increase in fishing and other aquatic recreation is well within projections by the MDFWP for increases in sport fishery and aquatic habitat use in the regions to be affected by the program. Minor increased demand for aquatic recreational resources (especially fishing areas) would occur near Great Falls. The overall effect on fisheries would be minimal, but may require natural resource management agencies to modify local regulations (e.g., creel limits). Because there are ample fishing and recreation zones within commuting distance from Great Falls, few modifications are expected to be necessary to protect aquatic biota.

Overall short-duration impacts on aquatic habitats would be moderate because of the quality of streams, prairie potholes, and other aquatic habitats that would be disturbed in the deployment area by launch facility construction, bridge replacement, and road construction/improvements. These multiple impacts would be dispersed over such large areas and times that the function of local and regional watersheds and wetland systems would not be affected. Overall long-duration impacts on aquatic habitats would be low. This long-duration rating is primarily based on the expected disturbance of prairie potholes at a few launch facilities. This long-duration disturbance is not expected to diminish the value of regional wetlands. Although a large number of the aquatic habitats to be affected are of concern to aquatic resource managers, the expected level of disturbance and mitigations should reduce this concern. Therefore, short-duration, moderate and long-duration, low impacts would not be significant (Figure 4.8.2-1).

4.8.2.4 Unique and Sensitive Habitats

Overall short- and long-duration impacts on unique and sensitive habitats would be negligible because no local- or ecosystem-level impacts on these habitats are expected. No unique and sensitive habitats are expected to receive direct impacts from either construction or operations. Freezeout Lake is crossed by a causeway on the T/E route system, but this section of road was recently rebuilt and should not require further modification for the program. Launch facility F-10 is adjacent to the southeastern boundary of Pine Butte Swamp Preserve but would not be selected for the Proposed Action. All other identified unique and sensitive habitats are also distant from proposed construction and operations areas and should not be directly affected by the program. Figures 4.0-1 (Section 4.0) and 4.8.2-2 summarize impact ratings at launch facilities and along T/E routes, which are negligible for short- and long-duration impacts.

Management plans for unique habitats near Great Falls, the major population center, may need to be altered as a result of program-induced population growth in Cascade County (8.5% during operations). Unique areas along the Missouri, Sun, and Smith rivers near Great Falls are not within defined public or private preserves and some development may occur near them to accommodate the expected population growth. However, these areas are sufficiently distant from the expected locations of program-related development and are likely to be only slightly affected. Benton Lake National Wildlife Refuge and Giant Springs State Park are close to Great Falls and would receive increased use as a result of the program, but their habitats are protected and should not be substantially affected. A large number of wildlife refuges, preserves, wilderness areas, and state and national parks occur throughout the deployment area and remaining ROI. Program-related population use is expected to be distributed among these habitats so that the biological resources of any one habitat would not be affected.

Because of the general lack of effects to unique and sensitive habitats, short- and long-duration impacts would be negligible (Figure 4.8.2-1). General concern by natural resource managers for impacts on unique habitats is also expected to be low.

4.8.2.5 Threatened and Endangered Species

Overall short- and long-duration impacts on threatened and endangered plant and animal species as a result of the proposed program would be low and not significant. Minor impacts on threatened and endangered species may occur during road and bridge upgrading and launch facility construction. Plant species are more likely to be affected by construction impacts than animals due to their immobility. Operations activities are not likely to adversely affect any threatened or endangered species. Figure 4.8.2-5 presents the sensitivity of threatened and endangered species (and wildlife) habitats near launch facilities, access roads, and T/E routes. Three sensitivity categories were developed to display the range of variation in habitat quality in the deployment area. Areas rated as having high sensitivity contain threatened and endangered species habitat or winter concentration areas. Areas rated as having moderate sensitivity contain habitat for either federal-candidate species or state-recognized species. Figure 4.8.2-5 may be compared with Figure 4.8.2-4 to show proportionate levels of operations activities that could potentially occur in environmentally sensitive threatened and endangered species habitats. Launch control facilities are shown for descriptive purposes only.

Plants. Adverse impacts on threatened and endangered plant species may occur as a result of road and bridge upgrading and launch facility construction. Areas potentially disturbed during road upgrading are those that lie immediately adjacent to the existing roads. Much of this area was disturbed during initial road construction and is periodically disturbed by road and ditch maintenance activities and/or agricultural practices. Road upgrading may result in the loss of native prairie or forest and possibly in the disturbance of some special status species or their habitats. Potential impacts due to bridge upgrading include direct loss of aquatic or riparian species, increased sedimentation, and subtle changes in hydrologic characteristics of the area that may eventually change the aquatic nature of the site. Because many of the special status plant species under consideration inhabit aquatic or semi-moist sites, they may be adversely affected by bridge improvements. New development resulting from program-related population increases would be limited and is not expected to affect these species. No direct impacts are anticipated during the operations phase of the program, and program-associated recreational pressure is expected to be minor and dispersed because of the abundant recreational opportunities in the area.

No federally listed threatened or endangered plant species are known to occur in the deployment area or elsewhere in the ROI. One federal-candidate (Category 2) species, persistentsepal yellowcress, occurred historically in the Sun River-Benton Lake area. Potential habitat (along margins of alkaline ponds and marshes) occurs within the general deployment area.

Eleven other Montana-recognized plants are known to occur in the general deployment area (Table 4.8.2-3). Several sites near the T/E routes, access roads, and launch

Table 4.8.2-3

Potential Locations of Federal-Candidate and Montana-Recognized Plant Species in Areas of Direct Surface Disturbance

Common Name	Scientific Name	General Location
Chaffweed	Centunculus minimus	Great Falls area
Craw's sedge	Carex crawei	Choteau area
Dwarf wooly-heads	Psilocarphus brevissimus var. brevissimus	Great Falls area
Foxtail muhly	Muhlenbergia andina	Great Falls area
Graceful arrowgrass	Triglochin concinnum var. debile	Augusta area, Choteau area
Guadalupe water-nymph	Najas guadalupensis	Great Falls area
Klaus bladderpod	Lesquerella klausii	Bowman's Corner area
Long-styled thistle	Cirsium longistylum	Monarch area
Many-headed sedge	Carex sychnocephala	Great Falls area
Pale sedge	Carex livida	Choteau area
Persistentsepal yellowcress	Rorippa calycina	Sun River-Benton Lake area
Tapered rush	Juncus acuminatus	Choteau area

facilities are known to provide potential habitat for these species. These sites were surveyed during the spring and summer of 1987. Only one Montana-recognized species, long-styled thistle, was found in the area of potential direct surface disturbance. This species, considered by the Montana Natural Heritage Program to be imperiled in the state, occurs in several locations along the T/E routes near Monarch, Montana and near launch facility A-5. Launch facility A-5 was not identified as part of the proposed set of launch facilities for the Proposed Action. In addition, other populations of this species may occur elsewhere along these routes. Road widening and upgrading in these areas are likely to remove these populations. Because of its tendency to inhabit disturbed sites, the species may recolonize temporarily disturbed areas.

The 5 Category 2 species and 22 Montana-recognized species that occur or may occur elsewhere in the ROI are not likely to be adversely affected from increased recreational pressure. Many of these species occupy remote sites that are not readily accessible to the public.

Short- and long-duration impacts on threatened and endangered plant species are expected to be low because of the small number of habitats that would be affected, the small number of federally listed and Montana-recognized species that occur in the area of surface disturbance, and the reasonable likelihood of reducing or offsetting adverse impacts through application of appropriate mitigation measures. The proposed program is not expected to add substantially to the cumulative impacts on threatened and endangered species in the region and is not likely to generate major concerns on the part of natural resource management agencies or scientific authorities. Therefore, short- and long-duration impacts would not be significant.

Animals. There are five threatened and endangered animal species that occur or potentially occur in the deployment area. Eleven launch facilities thought to occur in or near threatened and endangered species habitats were surveyed to determine the likelihood of protected species occurring in the area. It was determined that only 6 of the 11 launch facilities occur in or near potential threatened and endangered species habitats. Recent data provided by the MDFWP indicate launch facility I-7 also occurs in proximity to a protected species (Table 4.8.2-4). Those species listed as endangered include the bald eagle, American peregrine falcon, gray wolf (Northern Rocky Mountain wolf), and the black-footed ferret. The threatened grizzly bear also occurs in the deployment area. A biological assessment of potential impacts on these five species was prepared for the USFWS in accordance with Section 7 of the Endangered Species Act of 1973. It was concluded that no threat to the continued existence of threatened and endangered species would occur as a result of the program (this conclusion applies to the Proposed Action and alternatives [Section 4.8.3.5]). The USFWS has agreed with this conclusion, but expressed concern should grizzly bears, bald eagles, or peregrine falcons be found in proximity to potential disturbance areas. The USFWS asked that guidelines from the Interagency Rocky Mountain Front Wildlife Monitoring Evaluation Program (U.S. Fish and Wildlife Service 1984) be followed to ensure protection of these species. The Air Force has cooperated with the USFWS in developing appropriate guidelines and these guidelines have been incorporated in assumed mitigations for this program (Section 4.8.1.4). The complete response of the USFWS appears in Appendix C.

Of the five federally listed animal species potentially occurring in the deployment area, the bald eagle has the greatest potential to be affected. There are approximately six launch facilities in or near bald eagle habitat (Table 4.8.2-4). Approximately 450 to 500 bald eagles overwinter in Montana with some of these eagles occurring along the Missouri River south of Great Falls within the deployment area. Approximately 20 eagles also overwinter in the western portion of the deployment area primarily along Birch Creek, the middle fork of the Teton River, the North Fork of the Sun River, and associated drainages. No bald eagle habitat is expected to be lost as a result of program activities; however, increased traffic associated with construction activities, operation of heavy construction equipment, and increased noise levels at the six launch facilities located in or near potential bald eagle habitat and along T/E routes may temporarily disturb some eagles to a minor extent. The potential for affecting bald eagles is greatest at launch facility I-7 due to the active nest located approximately 1.5 to 2 miles to the south. However, launch facility I-7 has not been identified as part of the Proposed Action. Bridge upgrades in the deployment area may also cause some local-level impacts on eagles due to the potential for affecting riparian habitat. A bridge scheduled for improvement on Interstate 15 is also located approximately 1.5 to 2 miles north of the active bald eagle nest. Construction activities at this bridge are unlikely to adversely affect nesting activities because of their distance from the nest. Minor disturbances that may occur include minor disruption of daily/seasonal movements (e.g., feeding and reproduction), increased stress during critical periods (e.g., overwintering and nesting periods), and possible displacement. These short-duration impacts, if they occur, can be minimized through the implementation of appropriate mitigation measures.

The American peregrine falcon, which is associated primarily with aquatic habitats, is believed to occur in the deployment area. Although the exact distribution of peregrines and the location of currently active aeries (nest sites) within the deployment area are not known, the program is unlikely to have any adverse impacts on this species. Some minor

Table 4.8.2-4

Threatened and Endangered Animal Species Potentially Occurring in Areas of Direct Surface Disturbance

Common Name	Scientific Name	Launch Facilities In or Near Potential Habitat
Bald eagle	Haliaeetus leucocephalus	F-5, F-9, F-10, F-11, H-8, I-7
Grizzly bear	Ursus arctos	F-9, F-10, F-11
Gray wolf	Canis lupus	F-9, F-10, F-11
American peregrine falcon	Falco peregrinus anatum	Unknown[1]
Black-footed ferret	Mustela nigripes	Unknown[2]

Notes: [1] Distribution of the American peregrine falcon within the deployment area is not well defined.

[2] Black-footed ferrets are not known to occur in the deployment area; however, isolated populations may exist.

impacts (disruption of daily/seasonal activities and displacement) may occur during the construction phase, particularly during bridge upgrading; however, these impacts would be temporary and could be mitigated.

Impacts on the grizzly bear and wolf, which are known to occur in the western portion of the deployment area, are unlikely to be adverse. No prime grizzly bear habitat would be disturbed, though some disruption of daily/seasonal activities and displacement may result from construction activities at launch facilities and along T/E routes that occur near grizzly habitat (Table 4.8.2-4). These impacts would be temporary and could be mitigated. The gray wolf also occurs in the same general area as the grizzly bear and may occasionally be found in the western portion of the deployment area (Table 4.8.2-4). The exact distribution and current statewide population levels are not known; however, the wolf population is considered to be low. Wolves are unlikely to occur in the area of direct surface disturbance except as occasional transients. Consequently, the program is unlikely to adversely affect this species.

No black-footed ferret populations are known to occur in Montana. Furthermore, no prairie dog towns, which are the sole habitat of ferrets, occur on Malmstrom AFB, within T/E route rights-of-way, or within the anticipated construction boundaries of launch facilities. Therefore, no impacts to black-footed ferrets are anticipated.

In addition to the five federally listed species, there are eight federal-candidate and five Montana-recognized animal species that occur within the deployment area (Section 3.8.3, Table 3.8.3-2); none are known to occur on Malmstrom AFB. Construction activities along T/E routes and at launch facilities (particularly those located in open grasslands or shrubby areas) may cause some short-duration impacts on the ferruginous hawk, northern swift fox, upland sandpiper, long-billed curlew, mountain plover, Preble's shrew, and sage sparrow. Loss of these species' habitats is expected to be low in the deployment area. Temporary disruption of daily/seasonal activities and reproductive behavior for these species may result from construction activities. In addition, bridge upgrades may temporarily affect certain aquatic and riparian species. These species include Canadian toad, Harlequin duck, and milk snake. The wolverine and lynx, which generally occur in mountainous areas, are unlikely to receive any direct impacts from program activities. The spotted bat, which inhabits rocky cliffs, is also unlikely to be affected.

Some operations impacts on threatened and endangered animal species would occur during the life of the program. Increases in daily security traffic, maintenance activities, human activities, and noise at the launch facilities and along T/E routes may cause some disruption of daily/seasonal activities and displacement; however, these disruptions are expected to be minor.

In addition to those species that occur in the deployment area, two federally listed, six federal-candidate, and six Montana-recognized animal species (Section 3.8.3, Table 3.8.3-2) occur in the ROI but outside the deployment area. Program-induced population growth would cause an increase in nonconsumptive recreational activities (e.g., hiking, snowmobiling, photography, and bird watching) which may cause some temporary displacement and disruption of daily/seasonal activities of the threatened and endangered species found in the ROI. These recreational activities would be dispersed over a wide area and would have very little impact on threatened and endangered animal species in the region.

Short- and long-duration impacts on threatened and endangered animal species are expected to be low because of the small amount of habitat that would be lost or disturbed and the minimal impacts expected for species occurring in the area of direct surface disturbance. Although a range of site-level impacts would result dependent on which launch facility locations are proposed for use (Figure 4.8.2-2), impacts accumulated along T/E routes and at launch facilities would remain approximately the same. In addition, program impacts are not expected to add substantially to the cumulative impacts on threatened and endangered species in the region, nor would these impacts generate concern among natural resource management agencies or scientific authorities. Any impacts that are likely to occur can be minimized through the implementation of appropriate mitigation measures. Therefore, short- and long-duration impacts on threatened and endangered animal species are not expected to be significant. Impacts on threatened and endangered plants and animals at launch facilities and along T/E routes are summarized in Figures 4.0-1 (Section 4.0) and 4.8.2-2. Because these impacts on plant and animal threatened and endangered species would be minor, overall short- and long-duration impacts on threatened and endangered species would be low and not significant (Figure 4.8.2-1).

4.8.3 Impacts of Alternatives

Impacts on biological resources and threatened and endangered species are only expected to vary to a minor degree between the Proposed Action and Alternatives 1 and 2. Alternative 1 would result in approximately the same disturbance at the launch facilities as the Proposed Action because the same number of launch facilities would be used. Alternative 2 would utilize 125 launch facilities, which reduces the opportunity to avoid impacts at some launch facilities through site selection. Impacts along T/E routes would remain approximately the same because both Alternatives 1 and 2 use most of the T/E route system. From an overall perspective, the differences in impacts between

Alternatives 1 and 2 are minor and the overall impact ratings for each element would not change regardless of the range of site-level impacts at launch facilities. A decision to use Alternative 3 would eliminate the opportunity to reduce impacts through site avoidance and would result in substantial impacts at some sites (Figure 4.8.2-2). Overall short-duration impacts on vegetation, wildlife, and threatened and endangered species for Alternatives 1, 2, and 3 would range from low to moderate and not significant. Long-duration impacts on these resources for Alternatives 1 and 2 would be low and not significant. Long-duration impacts on these resources for Alternative 3 would be low to moderate and not significant. For aquatic habitats, short-duration impacts for all three alternatives would be moderate and not significant. Long-duration aquatic habitat impacts would be low and not significant. Alternatives 1, 2, and 3 would result in short- and long-duration, negligible impacts on unique and sensitive habitats.

4.8.3.1 Vegetation

Impacts on vegetation for Alternatives 1 and 2 are very similar to impacts identified for the Proposed Action. Construction of new facilities, roads, and bridges would result in both short- and long-duration disturbance of vegetation as discussed in Section 4.8.2.1. Disturbance to vegetation in the deployment area during the operations phase is expected to be minimal for the Proposed Action and Alternatives 1 and 2. Significant impacts would occur at launch facilities where sensitive riparian and/or forest vegetation is present.

Alternative 1. Alternative 1 would result in disturbance to the same number of launch facilities as the Proposed Action. Short- and long-duration impacts at 50 of the launch facilities would be negligible (Figure 4.8.2-2). Short-duration impacts would be low and not significant at 42 launch facilities, and low and significant at 8 launch facilities. Long-duration impacts would be low and not significant at 48 launch facilities, and low and significant at 2 launch facilities (E-8 and N-6). These significant impacts would result from the disturbance of sensitive riparian and forest habitats of concern to natural resource managers. No local- or regional-level ecosystem impacts are expected because the disturbed areas would be small and spatially dispersed. Many of the disturbances would also be dispersed over the construction phase of the program. Overall short- and long-duration impacts on vegetation would remain low and not significant.

Alternative 2. Alternative 2 would result in additional disturbance of vegetation per launch facility, for a total of 375 acres (200 acres permanently and 175 acres temporarily disturbed) for 125 launch facilities. For this analysis, road and bridge upgrading was assumed to be the same as the Proposed Action. Short- and long-duration impacts at 62 launch facilities would be negligible. Short-duration impacts at 52 launch facilities would be low and not significant. Eleven launch facilities would experience short-duration, low, and significant impacts. These significant impacts would be of long duration at only five of these launch facilities. These significant impacts would result from the disturbance of sensitive riparian and forest habitats of concern to natural resource managers. Fifty-eight launch facilities would receive long-duration, low, and not significant impacts (Figure 4.8.2-2). These small, local-level impacts would be dispersed throughout the deployment area, would occur over the construction phase of the program, and would not likely affect local or regional ecosystems. Overall short- and long-duration impacts on vegetation would remain low and not significant.

Alternative 3. Alternative 3 would result in reduced disturbance of vegetation per launch facility (2 acres) but disturbance would occur at all 200 facilities which would result in approximately 400 acres (200 acres permanently and 200 acres temporarily) disturbed. For this analysis, road and bridge upgrading was assumed to be the same as the Proposed Action. Short- and long-duration impacts would be negligible at 101 launch facilities. Short-duration impacts would be low and not significant at 77 launch facilities, and low and significant at 22 launch facilities. Long-duration impacts would be low and not significant at 87 launch facilities, and low and significant at 12 launch facilities (Figure 4.8.2-2). These significant impacts would result from the disturbance of sensitive riparian and forest habitats of concern to natural resource managers. Although all sites would be affected, the dispersed nature of the potential impacts are not expected to affect local or regional ecosystems. Overall short- and long-duration impacts on vegetation would be low and not significant, but would be more adverse than the Proposed Action because the environmentally sensitive launch facility areas previously mentioned would not be avoided.

4.8.3.2 Wildlife

Impacts on wildlife species from the Proposed Action and Alternatives 1 and 2 differ only to a minor degree with respect to the number of acres of habitat disturbed. Construction activities (e.g., expansion of launch facilities, upgrading T/E routes and bridges, and building new facilities onbase) associated with Alternatives 1 and 2 would cause some short- and long-duration disturbance of wildlife and associated habitats. Operations impacts over the life of the program would be minimal for Alternatives 1 and 2. Impacts from Alternative 3 would be similar; however, the use of 200 launch facilities would eliminate the opportunity to entirely avoid sensitive habitats at some launch facilities.

Alternative 1. Alternative 1 would result in almost the same amount of disturbance to wildlife as the Proposed Action. Approximately 388 acres of habitat would be lost due to expansion of launch facilities and road upgrading and 808 acres would be permanently disturbed onbase. No local- or regional-level ecosystem impacts are expected because of the relatively small amount of habitat that would be disturbed. Furthermore, impacts would be substantially dispersed geographically and over time. Overall short- and long-duration impacts on wildlife from Alternative 1 would be low and not significant.

Alternative 2. Alternative 2 would cause the loss of approximately 200 acres of habitat at the launch facilities from permanent disturbance and 175 acres from temporary disturbance. The same T/E routes would be upgraded for Alternative 2 as the Proposed Action. Approximately 878 acres would be permanently disturbed and 348 acres would be temporarily disturbed onbase. Construction activities associated with Alternative 2 would cause minor impacts on wildlife in the region because relatively small amounts of habitat would be disturbed. These short- and long-duration impacts would be low and not significant. In addition, no adverse impacts on local or regional ecosystems are expected because the impacts would be substantially dispersed geographically and over time.

Alternative 3. Alternative 3 would cause the permanent loss of approximately 200 acres of habitat due to expansion of launch facilities. Disturbance along T/E routes, access roads, and onbase was assumed to be similar to the Proposed Action. Although loss of wildlife habitat for Alternative 3 would be similar to the Proposed Action, use of 200 launch facilities would increase the chance of adversely affecting wildlife and sensitive areas such as big game wintering habitats. Although all sites would be affected, no impacts on local or regional ecosystems are expected because impacts would be dispersed geographically and over time. Therefore, overall short-duration impacts would be moderate and long-duration impacts would be low. Neither short- or long-duration impacts would be significant.

4.8.3.3 Aquatic Habitats

Impacts on aquatic habitats and biota from Alternatives 1, 2, and 3 would be similar to the Proposed Action. The number of habitats affected would change slightly with Alternatives 1 and 2, especially at launch facilities, but the regional effect would remain approximately equal to the Proposed Action. Therefore, no change is expected in the overall impact rating. Because all launch facilities would be used in Alternative 3, some site-level, short-duration, and significant impacts are expected to occur.

Alternative 1. For Alternative 1, impacts along T/E routes and at launch facilities are expected to remain at the same level because the same number of launch facilities would be used. Launch facilities selected for this alternative would avoid some important habitats, but would still affect others (J-9 is adjacent to a prairie pothole; B-3, B-9, B-11, C-10, L-3, L-10, N-11, and O-10 are near streams; B-3, K-4, L-10, N-11, O-6, and R-30 are near ponds). Short-duration impacts on aquatic habitats would be moderate and long-duration impacts would be low. No local- or regional-level ecosystem impacts are expected because these disturbances would be spatially and temporally dispersed. These short- and long-duration impacts would not be significant.

Alternative 2. Because 125 launch facilities would be used, Alternative 2 would result in slightly greater impacts than the Proposed Action; however, this increase is minor on a regional basis. Among launch facilities selected for this alternative, J-9 and R-24 are near prairie potholes; B-3, B-9, B-11, L-3, L-10, N-11, O-7, O-9, and O-10 are near streams; and B-3, D-8, K-4, L-10, M-10, N-11, O-2, O-6, and R-30 are near ponds. Short-duration impacts for Alternative 2 would be moderate and long-duration impacts would be low. These impacts would be sufficiently dispersed geographically and over time so that no local- or regional-level ecosystem impacts are expected. Both short- and long-duration impacts would not be significant.

Alternative 3. Alternative 3 would result in the maximum disturbance of aquatic habitats at launch facilities. Seven launch facilities are near prairie potholes, 16 are near streams, and 12 are near ponds. These additional impacts at launch facilities would result in some local-level, significant impacts at ten launch facilities (A-5, A-6, B-3, C-10, G-6, G-7, J-9, L-3, M-2, and O-9). These short-duration disturbances would result primarily from erosion in sensitive stream habitats and other wetlands but do not represent a substantial change from the Proposed Action on a regional basis. Short-duration impacts would be moderate and long-duration impacts would be low for Alternative 3. Although all potential sites would be affected, the spatial and temporal separation of disturbances maintain sufficiently low impact levels such that no local- or regional-level ecosystem impacts are expected. These overall short- and long-duration impacts would not be significant.

4.8.3.4 Unique and Sensitive Habitats

Because of the low level and types of impacts likely to occur in unique and sensitive habitats, there is no difference between the Proposed Action and Alternatives 1, 2, and 3. Short- and long-duration impacts on unique and sensitive habitats would be negligible for Alternatives 1, 2, and 3.

4.8.3.5 Threatened and Endangered Species

Impacts on threatened and endangered species for Alternatives 1 and 2 are similar to impacts identified for the Proposed Action. Road and bridge upgrades and launch facility construction would result in some short- and long-duration disturbance of threatened and endangered species. However, these impacts are expected to be minor for Alternatives 1 and 2. Alternative 3 would eliminate the opportunity to avoid launch facilities in threatened and endangered species habitat and would increase the probability of disturbance.

Alternative 1. Alternative 1 would have the same potential for affecting threatened and endangered species as the Proposed Action; however, launch facility I-7, which is about 1.5 to 2 miles from an active bald eagle nest, would be used for Alternative 1. Expansion of the launch facility is unlikely to have an adverse impact on nesting activities because of distance from the launch facility. Upgrading a bridge on Interstate 15, which is located 1.5 to 2 miles from the nest, is also not expected to substantially affect the nesting eagles. Any potential impacts would be mitigated; consequently, short- and long-duration impacts on threatened and endangered species would be low and not significant.

Alternative 2. Alternative 2 would have a slightly greater potential for affecting protected species than the Proposed Action because more launch facilities would be expanded, increasing the probability that some threatened and endangered species or their habitats would be affected. Launch facility I-7, which is about 1.5 to 2 miles from an active bald eagle nest, would be used for this alternative; however, construction activities at the launch facility are unlikely to have an adverse impact. Furthermore, upgrading a bridge on Interstate 15, which is located 1.5 to 2 miles from the nest, would not substantially affect nesting activities. It is unlikely that any protected species would be substantially affected and onsite mitigation, particularly at launch facility I-7, would further reduce these impacts. Therefore, short- and long-duration impacts would remain low and not significant.

Alternative 3. Alternative 3 would have a greater potential for affecting protected species than the Proposed Action because more launch facilities would be expanded. Expansion of all 200 launch facilities would increase the probability of disturbing threatened and endangered species because sites with known populations or potential habitat of threatened and endangered plants would be disturbed; however, many of these disturbances are the result of construction and could be reduced through mitigation. Launch facilities located in or near threatened and endangered animal species habitat include F-5, F-9, F-10, F-11, H-8, and I-7. Launch facility I-7 is located 1.5 to 2 miles from an active bald eagle nest; however, construction activities are unlikely to adversely affect nesting activities. Furthermore, upgrading a bridge on Interstate 15, which is 1.5 to 2 miles from the nest, would not substantially affect the eagles. Therefore, short- and long-duration impacts would be moderate and not significant.

4.8.4 Cumulative Impacts

Deployment of the Small ICBM and Peacekeeper in Rail Garrison programs at Malmstrom AFB would produce a cumulative impact because there would be additional disturbance of land on the base (it would not add to areas disturbed in the deployment area for the Small ICBM). This cumulative disturbance on Malmstrom AFB consists of the temporary disturbance of 126 acres and the permanent loss of 166 acres of vegetation because of new construction. There is no valuable wildlife habitat onbase and cumulative impacts on wildlife would be minor. The requirements for onbase construction may eliminate some small wetland areas (consisting of cattails and ponded water) near the Weapons Storage Area (WSA) that were formed by a drainage that was blocked when the WSA was built. Although the loss of this habitat would be minor, it is likely that a similar habitat could be restored in a new pond on the north-side expansion of Malmstrom AFB. No additional disturbance to unique and sensitive habitats or threatened and endangered species is expected. Peacekeeper in Rail Garrison operations are not expected to produce any impacts on biological resources because the activity and disturbed habitat is confined to Malmstrom AFB areas that do not represent biologically valuable habitat. Therefore, cumulative impacts on biological resources from construction and operations activities represent very minor additions (low and not significant for vegetation and negligible for all other elements) to the impacts for the Proposed Action and would not be significant.

4.8.5 Impacts of the No Action Alternative

If the proposed program is not implemented, present activities, policies, and trends would continue to have impacts on biological resources. New and continuing programs, missions, and associated construction at Malmstrom AFB can be expected to disrupt biological habitat. Building associated with the KC-135R air refueling mission will disturb grassland and minor wetland habitats onbase. These present and future programs would disturb almost as much land onbase as the Proposed Action. No other programs are presently planned that would cause disturbance at the launch facilities and no other government or private activities should cause disturbance at the launch facilities. Roads and bridges throughout the state would continue to be improved on an as-needed basis because of normal wear and additional demand from growth.

Regional recreational activities, such as off-road vehicle use, boating, hunting, and fishing, may also adversely affect biological resources in the ROI. Most of the ROI is experiencing at least modest rates of growth and development. Construction would result in loss of biological habitat and disruption of ecological communities. Increasing population size would lead to increased recreation-related impacts. Increased development and recreation would degrade aquatic habitats and biologically unique habitats, and add to cumulative impacts on threatened and endangered species.

4.8.6 Potential Mitigation Measures

Potential mitigations are measures that could be undertaken to reduce or eliminate program impacts. All, some, or none of the measures identified for biological resources and threatened and endangered species may be implemented. For each measure, the agencies that may be involved in implementation are identified. The Air Force would encourage implementation of these measures through environmental awareness and other programs. Potential mitigation measures for biological resources and threatened and endangered species include the following:

- Coordinate the method and extent of construction activities near critical wildlife and fisheries habitat in accordance with interests, guidelines, and/or regulations of the USFWS and the MDFWP and adopt appropriate measures to minimize impacts wherever possible. Implement offsite habitat restoration or increase protection of sensitive species or their habitat if offsite mitigation is considered the only feasible means to compensate for site-level impacts on threatened and endangered species habitat or sensitive wetlands. It may be more appropriate to assist other natural resources restoration and development programs in order to provide more productive compensation for environmental damages (U.S. Air Force).

- Build sediment traps on drainages flowing away from the HML vehicle operations training area and other disturbed areas on Malmstrom AFB to control impacts from increased erosion in the area. This would reduce potential impacts on the biota in the Missouri River near Great Falls that could occur if these eroded sediments were allowed to enter the river (U.S. Air Force).

- Include measures in the environmental awareness program to educate program personnel on the importance of minimizing environmental damage to natural habitats and inform them about legal hunting practices and the importance of hunting safety (U.S. Air Force, USFWS, and MDFWP).
- Avoid simultaneous road construction or bridge replacement at multiple sites on streams within a local watershed. This measure would greatly reduce the level of direct disturbance to mobile aquatic biota and reduce the level of potentially additive effects such as sedimentation in local aquatic systems (Montana Department of Highways).
- Avoid building temporary culverts in streams and other aquatic habitats during bridge replacement. Use of detours or constructing the new bridge alongside the old bridge to maintain traffic flow would eliminate direct disturbances resulting from temporary culverts (Montana Department of Highways).

4.8.7 Irreversible and Irretrievable Resource Commitments

The expected operational life of the proposed program is 20 years. Disturbed biological communities, given sufficient time, can usually recover to a state approximating predisturbance conditions once the disturbance ends. Therefore, few of the biological impacts expected from the proposed program would be irreversible or irretrievable in the strict sense. However, some of the expected impacts are likely to be of such long duration that they would represent irreversible or irretrievable commitments of biological resources for all practical purposes. For example, some of the long-duration disturbance of vegetation and wildlife habitat expected from construction, such as the removal of vegetation and habitat for construction of buildings, roads, or other facilities, may remain disturbed longer than 20 years. These long-duration commitments of biological resources are expected to be negligible for this program for three reasons: (1) relatively little undisturbed biological habitat would be affected, (2) much of the habitat expected to be affected has already been severely disturbed by agriculture and ranching, and (3) the moderate, seasonably wet climate supports relatively fast growth rates and biological communities can generally recover from temporary disturbances or be replaced by successional communities within a relatively short time span.

In addition, some potential impacts of the proposed program could be literally irreversible or irretrievable. Removal of an aquatic habitat for construction of a program facility represents an irretrievable loss of that habitat. Restoration or replacement with another aquatic habitat could be infeasible, depending on the location, and the new habitat is not likely to have the same ecological value of the lost habitat. Therefore, the loss of the original habitat cannot be completely mitigated. If the proposed program resulted in loss or degradation of the biologically unique characteristics of a unique and sensitive habitat, it is not likely that the biological uniqueness of the habitat could redevelop or be restored, at least in the foreseeable future. Extinction of a threatened or endangered species is irretrievable, but the proposed program would be implemented so as to not cause the extinction of any species.

4.8.8 Relationship Between the Local Short-Term Use of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

The proposed program is not expected to have a long-duration adverse impact on regional biological productivity because this system would disturb only relatively small areas, much of which are already disturbed, so that little cumulative productive biological habitat would be lost. In addition, ecological recovery rates in the proposed locations for development are relatively fast.

4.9 Water Resources

The deployment of the Small Intercontinental Ballistic Missile (ICBM) at Malmstrom Air Force Base (AFB) would result in increased water requirements during both the construction and operations phases of the program. The proposed program would affect the quality of surface or groundwater features near the construction sites and the amount of current water use in the Region of Influence (ROI). To evaluate proposed program effects, impacts on water use and surface and groundwater hydrology and quality were analyzed.

4.9.1 Impact Analysis Methodology

The impact analysis methodology for water resources involved three separate procedures: evaluation of program impacts, determination of levels of impact (LOI), and determination of the significance of impacts. The methodology also included consideration of a number of assumptions and assumed mitigations. Impacts were evaluated at the site, local, and regional levels. Site-level impacts include those effects immediately around and downstream of program construction activities. Local- and regional-level impacts relate to program effects on surface and groundwater basins and the water supplies serving the affected communities in the ROI. Finally, an overall impact assessment was made for each resource element.

4.9.1.1 Evaluation of Program Impacts

Water Use. Total water use associated with the proposed program was evaluated for each year of the construction phase (1990 to 1995) and for the year 2000 (a typical year of full program operations). Estimates of construction-related water requirements for the proposed program were derived from other military program historical data. All onbase construction and operations water needs were assumed to be drawn from the base water supply system. Direct, onbase, operations-related water requirements were estimated based on a factor of 50 gallons per capita per day (gpcd) for Malmstrom AFB operations personnel.

Deployment area water requirements for program operations were estimated based on a factor of 70 gpcd for personnel at Hard Mobile Launcher (HML) enclosures. Domestic water use by program-related inmigrants was estimated by applying area-specific, per capita water use factors to program-induced inmigrant projections developed from the socioeconomic analysis (Section 4.1). A factor of 140 gpcd was applied to inmigrants residing in military housing on Malmstrom AFB. Program-related water use by civilian inmigrants and weekly commuters to the communities affected by the program were calculated using daily per capita water use factors for each community. These factors were averaged over the last 5 years and corrected for industrial or other nonprogram-related use. For Great Falls, Lewistown, and Conrad, the per capita water use factors of 170 gpcd, 200 gpcd, and 160 gpcd, respectively, were used.

Water use figures were calculated for Great Falls, Malmstrom AFB, Lewistown, and Conrad for each year of the projected period. Program-related requirements were compared to future baseline use to evaluate the relative annual increase in water use. Finally, the annual water entitlement of each affected town was compared to the town's peak annual, baseline-plus-proposed program water use to evaluate the adequacy of the municipal water supply and the likelihood of interference with existing users. Emphasis was placed on identifying potential water shortages and/or the need to accelerate future water-development plans. Potential program effects on agricultural and rural users in the deployment area were also assessed.

Surface Water Hydrology and Quality. For cities in the ROI using surface water as a supply source, the peak-year, program-induced water requirements were compared to the average annual flow of the stream supplying the town. The potential for reduction in surface water flows was then determined. Using available water quality data and the dilution capacity of the receiving stream, a qualitative assessment was made of the potential for degradation of baseline water quality as a result of program-induced increases in effluent discharge from the affected city.

Water quality impacts in the deployment area were assessed by first plotting an overlay of the location of ground-disturbing activities, such as bridge replacements, road upgrades, and launch facilities, on a map of perennial streams and lakes. Potential upland erosion resulting from these activities was determined by application of the Universal Soil Loss Equation. Once calculated, program-induced erosion was multiplied by a sediment delivery ratio to estimate the quantities of sediment delivered to the affected water body. The proximity of the construction site to the affected stream and the watershed size were major factors in the estimation of the delivery ratio. Other major considerations in this analysis included the amount of construction activity within a watershed and the sensitivity of the affected stream to water quality degradation, based on current state-designated stream classifications.

The potential for local changes in drainage patterns and stormwater hydrology resulting from construction activity at Malmstrom AFB and Great Falls was investigated. Data on local soils and land use were combined to determine the storm-runoff characteristics of selected drainage areas under both baseline and proposed program conditions. Runoff from both housing scenarios was calculated using the U.S. Soil Conservation Service urban-runoff model, TR-20. The design storm used in the analysis was the 10-year, 2-hour rain event (1.22 inches) used by the City of Great Falls Engineering Department.

Groundwater Hydrology and Quality. Major groundwater resources in the deployment area were analyzed. Groundwater maps and reports published by the Montana Bureau of Mines and Geology and the U.S. Geological Survey provided most of the information used to analyze potential program impacts. These data were also augmented by interviews with personnel from state and federal agencies gathering groundwater data. Potential program-induced pumpage was compared to baseline regional groundwater withdrawal. Areas where program pumpage might affect the groundwater system, reducing groundwater availability, were identified. An evaluation of the groundwater resources was also conducted for Lewistown, whose water supplies are derived from Big Springs. In this case, the peak-year, program-induced water diversion was compared with the average annual flow of the springs to evaluate the potential for spring-flow reduction.

Existing launch facilities with saline-seep areas located downgradient and within 0.5 mile were determined from aerial photographs taken in May 1986 and verified by field inspection. Additional launch facilities that lie within areas highly prone to saline seep were identified using maps developed by the Montana Cooperative Extension Service and from the files of the Montana Salinity Control Association. This information was used to identify those launch facilities where additional clearing and construction might intensify saline-seep problems.

4.9.1.2 Determination of Levels of Impact

The magnitude of program impacts on water resources was evaluated using the LOI criteria shown in the following for each element. Program impacts were assessed at the site, local, and regional levels. Differences between site and local or regional LOI criteria are explained, when applicable. A site-level impact is confined almost entirely within the immediate area around a disturbance caused by the program. A local-level impact may occur several miles from a program-induced disturbance or throughout a community. A regional-level impact is experienced throughout a river basin, within extensive portions of a major groundwater aquifer, or along many miles of a major stream.

Water Use. The LOI definitions for water use are the following:

- Negligible Impact -- Program-induced water needs would use little or none of the developed water sources. There is no application for or purchase of water rights.
- Low Impact -- Program-induced water requirements would use an appreciable fraction of the developed and/or legally available water sources. Temporary permits to appropriate water would be applied for and/or some existing water rights would be leased.
- Moderate Impact -- Program-induced water needs would use a substantial amount of the remaining physical capacity and/or legal allocation of the developed water sources. New, permanent water rights would be applied for and/or some existing rights would be purchased.
- High Impact -- Program-induced water requirements would use all or most of the remaining physical capacity and/or legal allocation of the developed water sources. Substantial, additional water resources development would have to take place to meet program needs.

Surface Water Hydrology and Quality. The LOI definitions for surface water are the following:

- Negligible Impact -- No appreciable effects would occur to the flow or quality of the surface water resources as a result of the program.
- Low Impact -- Appreciable changes in the flow and/or quality of the surface water resources would result from the proposed program. However, decreases in perennial streamflow would be small and water quality would decline only slightly. Small increases in stormwater runoff may occur. No additional facilities or changes in water management practices are needed to handle these changes. At the site level, a substantial, but very short-duration, increase in sedimentation would occur at isolated points along streams classified as B2 (domestic supply, marginal coldwater fishery; see Section 3.9.3, Figure 3.9.3-2) or lower.
- Moderate Impact -- Substantial decreases in perennial streamflow, declines in the quality of the surface water resources, and/or increases in stormwater runoff are likely to occur. Construction of minor facilities and/or minor modification of water-management practices may be required to handle the hydrologic changes. At the site level, a substantial, but short-duration, increase in sedimentation would occur at isolated points along streams classified as B1 (domestic supply, coldwater fishery), or at two or more points in proximity to each other along streams classified as B2 or lower. Alternately, elevated sedimentation to a stream classified as B2 or lower is expected to occur during a recovery period of considerably longer duration.

- High Impact -- Major decreases in perennial streamflow, declines in surface water quality, and/or increases in stormwater runoff are likely to occur. Construction of major facilities and/or substantial modification of water-management practices may be required to handle the hydrologic changes. At the site level, a substantial, but very short-duration, increase in sedimentation would occur at two or more points in proximity to each other along streams classified as B1. Alternately, elevated sedimentation to a B1 stream is expected to occur during a recovery period of considerably longer duration.

Groundwater Hydrology and Quality. The LOI definitions for groundwater are the following:

- Negligible Impact -- Little or no groundwater would be withdrawn to support the proposed program. No appreciable change would occur to the quantity or quality of the groundwater resources in the ROI.
- Low Impact -- The proposed program would use a minor portion of the groundwater resources. No appreciable changes in groundwater quality are likely to occur.
- Moderate Impact -- The proposed program would require substantial additional development of the groundwater resources with some decline in groundwater levels likely. Potential declines in groundwater quality would be minor.
- High Impact -- Program-induced groundwater requirements would cause major groundwater drawdown. Potential declines in groundwater quality may be substantial.

4.9.1.3 Determination of Significance

The significance of water resources impacts was evaluated in accordance with Council on Environmental Quality (CEQ) regulations. Significance was assessed through evaluation of the context and intensity of impacts. Context includes consideration of the settings (site, local, or regional) and the duration of the impacts. The CEQ regulations provide ten items that should be considered in evaluating intensity. Of these ten items, the following are applicable to water resources:

- The degree to which the proposed action affects public health or safety;
- Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas;
- The degree to which the effects on the quality of the human environment are likely to be highly controversial;
- The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks; and
- Whether the action threatens a violation of Federal, State, or local laws or requirements imposed for the protection of the environment.

In addition to these considerations, the following considerations are judged appropriate in evaluating significance for water resources:

Water Use.

- Whether the proposed program would result in the development of more costly sources of water and a potential rise in the cost of obtaining water by other major users;
- The degree to which the proposed program would either result in or intensify periods of water shortage or temporary curtailment of water to existing major users, reducing the reliability of the existing water supply and/or resulting in inconvenience or economic hardship; and
- Whether substantial shifts in the types of water use would occur (including the elimination of one or more major types of water use) changing the economic and social patterns of an area.

Surface Water Hydrology and Quality.

- The degree to which stream water quality degradation resulting from the program would impair state-designated uses, reducing the value of the stream for aquatic habitat maintenance or other downstream use.
- Whether the dewatering of one or more perennial streams is of a magnitude that a substantial depletion of the resource occurs. (As a result of stream flow reduction and/or cessation, important characteristics such as the aesthetic and recreational values of the affected streams would be severely reduced).
- The degree to which the proposed program results in changes in the drainage and/or flood characteristics of a stream which would result in substantial increases in downstream damage.

Groundwater Hydrology and Quality.

- The degree to which the proposed program is likely to result in a reduction or cessation of the flow of one or more major springs. (Such springs are unique geographic features and their loss represents a substantial depletion of groundwater resources.)
- Whether declines in groundwater levels are of a magnitude that substantial depletion of the resource occurs. (As a result of declining groundwater levels, there may be a reduction in the base flow of streams to which the groundwater discharges. Alternatively there may be a substantial reduction in the capacity of major production wells forcing their deepening or abandonment at substantial cost to existing users.)
- Whether the program threatens degradation of groundwater quality to the point that the aquifer can no longer be used for established or likely future uses.

4.9.1.4 Assumptions and Assumed Mitigations

Assumptions. Several assumptions were made in developing the water resources impact analysis and include the following:

- The Air Force will use the "best management practices" to comply with all applicable federal, state, and local standards regarding erosion control, protection of public water supplies, and maintenance of stream water quality;
- Water acquisition efforts will follow state law; and
- The per capita water use factors used to calculate program-induced water use will remain constant throughout the proposed program.

Assumed Mitigations. Certain practices are part of standard Air Force policy and construction procedures. The following assumed mitigations have been factored into the evaluation of the LOI and significance of the proposed program on the water resource system:

- Minimize site disturbance and implement proper revegetation and erosion control techniques to reduce soil-erosion potential (Sections 4.8.1.4 and 4.10.1.4).
- Coordinate the construction of bridges over irrigation canals with the appropriate irrigation district or company to minimize disruption of water supply.
- Provide state-approved wastewater collection and disposal systems to handle program-related wastewater during both the construction and operations phases.
- Develop a spill prevention and response plan to respond quickly and effectively to any program-related accidental spills of hazardous or toxic materials in the deployment area. The plan will, at a minimum, contain the information found in a spill prevention, control, and countermeasure plan. The Air Force will also negotiate with the responsible resource agen (s) for the payment of equitable compensation for cleanup costs and/or environmental damages that result from the spill.

4.9.2 Impacts of the Proposed Action

Depending on the housing option selected, total program-related water use would range from 4,700 to 5,210 acre-feet (acre-ft) over the construction phase (or an average annual use of 780 to 870 acre-ft per year [acre-ft/yr]). During the operations phase, total water use would range from 1,380 to 1,590 acre-ft/yr. During the construction and operations phases, over 80 percent of total water use would be required for domestic use by program-related inmigrants. Most of the program-induced water use would be supplied by surface water sources. Overall impacts would be the same for both housing options. Regional-level, short- and long-duration, low impacts on water use and surface water would occur. The short-duration impacts on groundwater resources would be low, and the long-duration impacts would be negligible. None of these impacts would be significant (Figures 4.9.2-1a and 4.9.2-1b).

LEVEL OF IMPACT	SIGNIFICANCE	
Adverse Impacts	Not Significant	Significant
Negligible	☐	
Low	○	●
Moderate	○	●
High	○	●
Beneficial Effects	▨	

Note: Some resource elements may have both beneficial effects and adverse impacts.

PROGRAM IMPACTS

ELEMENT/AFFECTED INTEREST	SHORT DURATION				LONG DURATION			
	PROPOSED ACTION	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	PROPOSED ACTION	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3
WATER USE	○	○	○	○	○	○	○	○
MUNICIPAL USERS	○	○	○	○	○	○	○	○
IRRIGATION AND RURAL USERS	○	○	○	○				
GROUNDWATER HYDROLOGY AND QUALITY	○	○	○	○				

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FIGURE 4.9.2-1a IMPACTS ON WATER RESOURCES ASSOCIATED WITH THE PROPOSED SMALL ICBM PROGRAM IN MONTANA

LEVEL OF IMPACT	SIGNIFICANCE	
Adverse Impacts	Not Significant	Significant
Negligible	☐	
Low	○	●
Moderate	○	●
High	○	●
Beneficial Effects	☐	

Note: Some resource elements may have both beneficial effects and adverse impacts.

PROGRAM IMPACTS

ELEMENT/AFFECTED INTEREST	SHORT DURATION								LONG DURATION							
	PROP. ACTION		ALT. 1		ALT. 2		ALT. 3		PROP. ACTION		ALT. 1		ALT. 2		ALT. 3	
	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING	ONBASE HOUSING	OFFBASE HOUSING
SURFACE WATER HYDROLOGY AND QUALITY	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○	○
GREAT FALLS									○	○	○	○	○	○	○	○
DEPLOYMENT AREA	○	○	○	○	○	○	○	○								

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FIGURE 4.9.2-1b IMPACTS ON WATER RESOURCES ASSOCIATED WITH THE PROPOSED SMALL ICBM PROGRAM IN MONTANA

4.9.2.1 Water Use

Most of the program-induced increases in water use would occur in the Great Falls area, with a minor portion occurring in the towns of Lewistown and Conrad and in isolated rural areas. The supplies of these towns can readily meet program water requirements. The effect on other towns within the ROI would be minimal. Therefore, the overall short- and long-duration impacts on water use for either housing option would be low and not significant.

Program-related water use can be divided into four components: use at Malmstrom AFB, use at the major support community of Great Falls, use in Lewistown and Conrad, and use in the rural parts of the deployment area to support construction and operations activities.

Water use at Malmstrom AFB is the largest component of program-related water requirements for the onbase housing option and consists of onbase construction- and operations-phase water needs and domestic water use by military inmigrants. During the 6-year construction phase (1990-1995), total water requirements to support onbase construction would amount to 50 acre-ft, operations water needs would amount to 350 acre-ft, and domestic water use by military inmigrants would amount to 2,750 acre-ft. Together, these onbase uses amount to 3,150 acre-ft, accounting for over 70 percent of the total program-related water use during the construction phase (Table 4.9.2-1). The program-related, onbase water requirements would increase steadily through the construction phase and reach a maximum of 1,240 acre-ft/yr in the operations phase (the year 2000); this includes 150 acre-ft/yr needed for office-related and industrial operations. This peak is almost double the onbase baseline water use. Baseline-plus-program onbase water use (Table 4.9.2-2) would amount to 2.540 acre-ft/yr during the operations phase. Since the maximum contract delivery of water from the City of Great Falls to Malmstrom AFB is 1,410 acre-ft/yr, the contract delivery amount would need to be renegotiated. Nevertheless, the utilities analysis (Section 4.2) concludes that the city pipelines serving the base have adequate hydraulic capacity to meet baseline-plus-program water needs at Malmstrom AFB.

Program-related water use at Great Falls, including the water supplied to Malmstrom AFB, would stabilize in the operations phase at 1,350 acre-ft/yr, a 9-percent increase over baseline water use in the year 2000. The baseline-plus-program water requirements at Great Falls would peak at 15,910 acre-ft in the year 2000. This amount can easily be obtained from the Missouri River and represents only 22 percent of the city's annual water rights to this river (Table 4.9.2-2).

For the offbase housing option, most program-induced military inmigrants would live in Great Falls. Water use at Malmstrom AFB would be much less than for the onbase housing option. Although construction- and operations-phase water requirements would remain the same, total onbase water use would decrease to 790 acre-ft over the construction phase and 320 acre-ft/yr during the operations phase (Table 4.9.2-1). Peak, annual, baseline-plus-program onbase use would amount to 1,620 acre-ft in the operations phase. The existing water delivery system has adequate hydraulic capacity to supply this amount (Table 4.9.2-2). Nevertheless, an increase in the contract amount of water to be delivered by the city would still have to be negotiated.

Great Falls has a higher per capita water use than Malmstrom AFB. Consequently, the effect of building the new housing facilities offbase would increase program-induced water requirements for the Great Falls metropolitan area by 510 acre-ft over the construction phase and 210 acre-ft/yr during the operations phase as compared to the

Table 4.9.2-1

Program-Related Water Use Within the Malmstrom AFB Region of Influence (acre-ft)

	1990	1991	1992	1993	1994	1995	Construction Phase Total	2000[1]
Malmstrom AFB								
Onbase Housing Option	10	120	480	700	820	1,020	3,150	1,240
Offbase Housing Option	10	40	130	180	190	240	790	320
Great Falls[2]								
Onbase Housing Option	150	140	210	190	150	150	990	110
Offbase Housing Option	150	230	640	830	910	1,100	3,860	1,240
Lewistown	0	0	30	20	20	0	70	0
Conrad	0	0	10	10	10	0	30	0
Deployment Area	80	90	80	90	80	40	460	30
TOTAL:								
Onbase Housing Option	240	350	810	1,010	1,080	1,210	4,700	1,380
Offbase Housing Option	240	360	890	1,130	1,210	1,380	5,210	1,590

Notes: [1] Represents a typical year of full program operations.
[2] Excludes Malmstrom AFB.

onbase housing option. These increases could be easily met by the city's entitlement to the Missouri River. Baseline-plus-program water use at Great Falls, including Malmstrom AFB, would peak at 16,120 acre-ft/yr in the year 2000, still only 22 percent of the city's water rights to the river (Table 4.9.2-2). Therefore, the city's water supply would not be seriously affected by the Proposed Action for either housing option.

An additional 70 acre-ft in Lewistown and 30 acre-ft in Conrad would be used by civilian inmigrants during the construction phase. Lewistown would experience a peak, annual increase of 30 acre-ft in 1992. This is only a 1-percent increase over baseline and can be easily supplied by the town's allocated supply at Big Springs (Table 4.9.2-2). Conrad would experience annual increases of 10 acre-ft in 1992 through 1994, a 2-percent increase over baseline. This amount can also be easily met by the city's average annual water entitlement from the Pondera County Canal and Reservoir Company (Table 4.9.2-2).

Program-induced water use in the deployment area would amount to 460 acre-ft over the construction phase, peaking at 90 acre-ft/yr in 1991 and 1993 (Table 4.9.2-1). Most of this water would be used for aggregate washing, soil compacting, concrete batching, dust control, and revegetation. The proposed program contractors would be responsible for obtaining the water needed during the construction phase and can be expected to seek the least expensive sources available. Any water acquisition actions would comply with State of Montana water laws. It is likely that most construction water would be taken

Table 4.9.2-2

Program-Related Water Use Impacts on the Water Supply of Affected Entities
(Values in acre-ft unless otherwise noted)

	1990	1991	1992	1993	1994	1995	Construction Phase Total	2000[1]
Malmstrom AFB								
Baseline Water Use	1,300	1,300	1,300	1,300	1,300	1,300	7,800	1,300
Baseline-Plus-Program Water Use								
Onbase Housing Option	1,310	1,420	1,780	2,000	2,120	2,320	10,950	2,540
(Percent of Available Supply)[2]	(35)	(37)	(47)	(53)	(56)	(61)	(48)	(67)
Offbase Housing Option	1,310	1,340	1,430	1,480	1,490	1,540	8,590	1,620
(Percent of Available Supply)[2]	(35)	(35)	(38)	(39)	(39)	(41)	(38)	(43)
Great Falls[3]								
Baseline Water Use	14,240	14,260	14,300	14,340	14,370	14,410	85,920	14,560
Baseline-Plus-Program Water Use								
Onbase Housing Option	14,400	14,520	14,990	15,230	15,340	15,580	90,060	15,910
(Percent of Available Supply)[4]	(20)	(20)	(21)	(21)	(21)	(21)	(21)	(22)
Offbase Housing Option	14,400	14,530	15,070	15,350	15,470	15,750	90,570	16,120
(Percent of Available Supply)[4]	(20)	(20)	(21)	(21)	(21)	(22)	(21)	(22)
Lewistown								
Baseline Water Use	2,070	2,070	2,070	2,070	2,100	2,100	12,480	2,130
Baseline-Plus-Program Water Use	2,070	2,070	2,100	2,090	2,120	2,100	12,550	2,130
(Percent of Available Supply)[5]	(49)	(49)	(50)	(50)	(51)	(50)	(50)	(51)
Conrad								
Baseline Water Use	610	610	630	630	630	630	3,740	660
Baseline-Plus-Program Water Use	610	610	640	640	640	630	3,770	660
(Percent of Available Supply)[6]	(19)	(19)	(20)	(20)	(20)	(19)	(19)	(20)

Notes: [1] Represents a typical year of full program operations.

[2] Based on a hydraulic capacity of the Great Falls water-delivery system of 3,800 acre-ft/yr.

[3] Includes Malmstrom AFB use.

[4] Based on a total of 73,120 acre-ft/yr of water rights to the Missouri River.

[5] Based on a total of 4,200 acre-ft/yr of water rights to Big Springs.

[6] Based on an average annual entitlement of 3,270 acre-ft/yr from shares in the Pondera County Canal and Reservoir Company.

from sources located some distance from the actual construction sites. Some construction water may be supplied by municipalities such as Conrad, which currently supplies domestic water to many outlying ranches. During the operations phase, a total of 30 acre-ft/yr would be used at 100 launch facilities. This water would be trucked from nearby towns and/or private sources. The amount of water needed in the deployment area is relatively small and its use would have a generally minor effect on most potential supply sources. Therefore, the overall effect of program-related water use on agricultural irrigators and rural water users would generally be minor. However, some of this water may be withdrawn from water-short areas (Section 3.9.3, Figure 3.9.3-4). Although no substantial impacts are likely to occur to existing water users due to the minor amounts of program-related water induced, this may require the purchase or lease of existing water rights of irrigators or other water-rights holders. Such water-rights holders would be fairly compensated for the use of their water.

During the construction phase, up to 18 bridges crossing irrigation canals could be upgraded. Twelve of these bridges are located in the Greenfields and Fort Shaw irrigation districts of the Sun River Project. There is a potential for temporary disruption of water supply to irrigated croplands while these upgrades are constructed. However, the construction contractors would be required to plan these upgrades in coordination with the appropriate irrigation districts or companies to minimize disruption of irrigation water supply. This would be accomplished by either limiting bridge construction to the nonirrigation period (generally mid-October to early April) or by limiting irrigation canal disruption to short periods of time acceptable to the irrigation district if construction must proceed during the irrigation season. In the latter case, advance notice to the affected irrigators would minimize water supply impacts. Therefore, the effects of program-related interference with existing agricultural and rural water users would be minor.

In summary, the Proposed Action domestic water requirements by both civilian and military inmigrants would constitute over 80 percent of the total program-related water use. It would total from 3,840 to 4,350 acre-ft for the 6-year construction phase, depending on the housing option. Construction-plus-operations water needs would amount to 860 acre-ft for the same period. For the onbase housing option, program-related total water requirements would amount to 4,700 acre-ft over the construction phase (or an average annual use of 780 acre-ft/yr) and 1,380 acre-ft/yr during the operations phase. For the offbase housing option, total water use would amount to 5,210 acre-ft over the construction phase (or an average annual use of 870 acre-ft/yr) and 1,590 acre-ft/yr during the operations phase. For either housing option, approximately 90 percent of the construction-phase water use and nearly all of the operations-phase water use would occur in the Great Falls area. The water supplies of towns in the ROI are adequate to meet future baseline-plus-program water demands of either housing option. No major water users are likely to be adversely affected by program-related water use. Municipal water users in Conrad and Lewistown would experience short-duration, low impacts. Municipal water users in Great Falls would experience long-duration, low impacts. The short-duration impacts on irrigation and rural water users would be low while the long-duration impacts would be negligible (Figure 4.9.2-1a). None of these impacts would be significant. No changes in water use trends are likely to result from the proposed program other than some temporary leasing of local water rights. No change or acceleration of future development plans by major users would be necessary, and the proposed program would not affect the cost of water to existing major users. Therefore, the overall short- and long-duration water use impacts for either housing option would be low and not significant.

4.9.2.2 Surface Water Hydrology and Quality

The increases in water diversions and wastewater discharges resulting from the program would not substantially affect existing streamflows or water quality. Increases in stormwater runoff would have a local-level, long-duration, moderate impact in the Great Falls area for both housing options. Construction in the deployment area would result in some site-level, short-duration, moderate to high impacts on water quality (Figure 4.9.2-2). However, the overall short- and long-duration impacts on surface water would be low. None of the impacts would be significant.

Surface water would be used to supply the program-related water needs in the cities of Great Falls and Conrad. Water diversions at Great Falls (including Malmstrom AFB), with or without the program (with either housing option), represent less than 0.3 percent of the average, annual flow of the Missouri River and would not appreciably affect its flow nor its baseline water quality. Conrad is supplied by Lake Frances, an irrigation reservoir. Under baseline conditions, the water use at Conrad represents less than 1 percent of the reservoir's available supply in a year of average precipitation. During the peak year (1993) of program-induced use, an additional 0.01 percent of the reservoir supply would be required. This would not appreciably change the hydrology of the reservoir and the irrigation canals it feeds.

Depending on the housing option, peak, program-induced, annual increases in wastewater discharges at Great Falls (including Malmstrom AFB) would range from 990 to 1,190 acre-ft/yr during the operations phase, an approximately 10-percent increase over baseline (Section 4.2.2). Peak, program-induced effluent discharge from Lewistown would be 10 acre-ft/yr, a 0.5-percent increase. A similar peak discharge would occur at Conrad and represents a 2-percent increase for that system. Wastewater discharges are typically evaluated against the 10-year, 7-day low flow of the receiving water. Under these conditions, effluent from Great Falls and Lewistown would be 0.5 and 5 percent, respectively, of the low flows of the Missouri River and Big Spring Creek, with or without the program (with either housing option). Flow records were insufficient to estimate the 10-year, 7-day low flow of the Dry Fork-Marias River. However, typical summer low flows approach just 1.0 cubic feet per second (cfs). Baseline effluent discharge from Conrad of 0.5 cfs would comprise about half of the flow under these conditions and the water quality of the stream is likely to be effluent-limited. The additional short-duration discharge of 0.015 cfs attributable to the program would intensify this situation slightly. During program operations, Conrad and Lewistown would have no program-related discharges. The utilities analysis (Section 4.2) has determined that there is adequate plant capacity at the three towns to treat the additional effluent to meet discharge standards. Therefore, the water quality in the receiving streams is not likely to be measurably altered because of program-related increases in effluent discharges.

Approximately 25 acre-ft/yr of wastewater would be generated by all the HML enclosures during program operations. This would be collected in holding tanks and trucked away periodically by private contractors. The wastewater would be delivered into municipal wastewater systems with which the contractor has agreements for treatment and discharge. Therefore, water quality would not be adversely affected by wastewater generated in the deployment area because of proposed program operations.

Surface water would likely be used to supply the majority of the construction and operations-phase program-related water in the deployment area. The annual water requirements would be distributed across a large portion of the deployment area. The peak water requirements would occur in 1991 and 1993. The 90 acre-ft of water needed in

PROGRAM IMPACTS	NUMBER OF LAUNCH FACILITIES													
	SHORT DURATION							LONG DURATION						
	NOT SIGNIFICANT				SIGNIFICANT			NOT SIGNIFICANT				SIGNIFICANT		
	NEGLIGIBLE	LOW	MODERATE	HIGH	LOW	MODERATE	HIGH	NEGLIGIBLE	LOW	MODERATE	HIGH	LOW	MODERATE	HIGH
SURFACE WATER														
PROPOSED ACTION	80	18	1	1				100						
ALTERNATIVE 1	80	16	2	2				100						
ALTERNATIVE 2	104	18	2	1				125						
ALTERNATIVE 3	160	30	6	4				200						

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FIGURE 4.9.2-2 SUMMARY OF SITE IMPACTS ON WATER RESOURCES ASSOCIATED WITH PROPOSED SMALL ICBM CONSTRUCTION AND OPERATIONS AT LAUNCH FACILITIES IN MONTANA this year represents less than 0.01 percent of the streamflow within the ROI and would generally have a negligible overall effect on streamflow and quality. However, construction water use in the summer could contribute to the local desiccation of some of the smaller streams. In many instances it is possible that a state water permit might not be granted and that water would have to be bought or leased from existing local water rights holders or trucked from more distant sources as discussed in Section 4.9.2.2.

The general water quality of perennial streams throughout the deployment area is shown in Section 4.8.2.3, Figure 4.8.2-6. Perennial streams with a state classification of A1 or B1 are of highest water quality and therefore most sensitive to water quality degradation. Streams classified as B2 or B3 are of moderate water quality. Streams classified as C3 or E tend to be of lower water quality and are generally less sensitive to construction disturbance. There are no C1 or C2 streams in the ROI. Program construction in the deployment area would typically be remote from surface waters and would have little or no water quality impact. Those instances where construction activities occurred in the vicinity of surface water bodies, resulting in an impact on water quality, would generally be isolated from one another. Deposition and dilution processes would attenuate the impact and there would generally be no additive effects on the overall water quality within a stream basin. One possible exception to this would be the simultaneous construction of several bridges within a few miles of each other within the same stream basin. In this case, the individual impacts on local water quality could combine to result in more extensive water quality degradation within the river basin and a higher level of impact as compared to the case where the same bridges were constructed one at a time. The site- and local-level impacts of program construction on surface water are discussed in the following.

Most of the proposed program impacts on surface water are expected to be short-duration declines in water quality (primarily increases in sedimentation and associated turbidity) associated with construction at the launch facilities, road upgrades, and bridge replacements along transporter/erector (T/E) routes. In those locations where ground disturbance occurs in the vicinity of streams or lakes, increased sedimentation is likely to result from grading and excavation activities and exposed-soils erosion. The extent of this impact would vary with the type and season of construction activity.

The most pronounced water quality degradation would occur from bridge and road-approach construction at perennial stream crossings. Grading, excavation, heavy-equipment operation, and other disturbance in the floodplain and along the streambank would directly introduce sediment into the stream, temporarily raising suspended-solids concentrations to extremely high levels. A review of the limited literature dealing with the effects of bridge and culvert installation reveals the general pattern of site-specific water quality impact. A sudden and very transient increase in turbidity would occur immediately following commencement of construction activity between the streambanks. Suspended-sediment levels may increase to tens of thousands of milligrams per liter. These very high sediment levels would occur through the duration of bank or streambed disturbance activities, but would rapidly diminish on completion of construction at the crossing. Given base flow conditions in the stream, suspended-sediment concentrations would return to near-background levels within a few days. In the initial period following bridge construction, elevated turbidity would be noticeable for a considerable distance downstream, depending on average stream velocity and intervening inflow of other streams.

During the recovery period following construction, increased erosion and sedimentation from disturbed areas in the vicinity of streams is expected to occur during periods of storm runoff. Standard stabilization and revegetation measures would reduce program-related sedimentation from stormwater unoff to levels experienced before construction within a period of about 1 year in most cases.

The upgrade of the T/E route system to handle HML travel could result in the reconstruction of up to 124 bridges. Twenty-nine of these bridges lie across perennial streams. These are of concern because water quality impacts may be unavoidable. Eighteen of these 29 bridges lie over streams that are classified as B1: a coldwater fishery suitable for municipal water supply. Their sensitivity to water quality degradation resulting from sedimentation is reflected by stringent state regulations that limit man-induced increases in turbidity to 5 Nephelometric Turbidity Units (NTUs) above their natural turbidity level. During proposed program construction, this would be greatly exceeded for a short period of time downstream of each bridge replacement, as previously discussed. Montana water quality regulations allow for temporary degradation associated with construction activity by issuing a short-term exemption from surface water quality standards resulting from construction activity (Administrative Rules of Montana 1984). With standard streambank stabilization measures and revegetation of disturbed areas, the short-duration surface water impacts of isolated bridge replacements would be low to moderate. However, there are several areas where construction of more than one bridge could occur within the same stretch of a B1 stream. If bridges are constructed simultaneously, there would be a potential for turbidity increases in considerably longer lengths of stream than would result from construction of a single bridge. These areas include:

- Seven bridges along a 31-mile stretch of upper Ross Creek and its tributaries, north of Judith Gap;
- Three bridges on the lower portion of Mill Coulee Creek, a tributary of the Sun River near the Town of Sun River; and
- Two bridges over Little Rock Creek (just west of Lewistown), and one over a tributary, King Coulee Creek, all within 5 miles of each other.

Should construction proceed simultaneously at more than one of these bridge locations, short-duration, high water quality impacts would occur to the affected streams. Multiple-bridge construction could also occur along several streams with lower water quality classifications. These include Warm Springs Creek, a C3 stream (warmwater fishery and marginal for agricultural and industrial supply) with three bridges in an 8-mile stretch; and the upper portion of the Dry Fork-Marias River, a B2 stream with two bridges 5 miles apart on two adjacent tributaries. Given their lower water quality classifications, short-duration impacts on these streams from simultaneous bridge construction are rated moderate. The severe water quality degradation associated with bridge construction would in each case be of very short duration and would have almost no lasting effects. Therefore, these impacts would not be significant.

For the 41 bridge upgrades over intermittent streams, the high, transient sedimentation occurring during actual bridge construction could be avoided. If construction occurs during periods of little or no flow in the stream, downstream water quality impacts would be limited to infrequent periods of stormwater runoff until stabilization and revegetation measures have taken effect.

Surface water impacts would also occur due to road construction in the deployment area. This would result from accelerated erosion and resulting sedimentation occurring in the disturbed road corridor. Up to 1,100 acres could be disturbed along roads that have been identified for possible improvement in the deployment area. Most of this temporary land disturbance would occur at distances of greater than 1 mile from perennial streams, resulting in little impact on water quality. However, there is potential for road construction along some T/E routes that run parallel to, and in proximity (within 0.5 mile) with, a stream. The potential for sedimentation and resulting water quality declines would be greatest in these instances. With assumed mitigations, areas disturbed by road upgrades would stabilize in about 1 year following construction completion and local sedimentation should return to baseline levels. For the Proposed Action, only one segment of a T/E route to be upgraded would have a substantial local-level impact on water quality. In the southeast portion of the deployment area, a 2-mile stretch of road parallels Careless Creek (a Class B1 stream) for a distance of 0.1 to 0.2 mile. The proximity of the creek to road construction activities, combined with a moderate slope, indicates the potential for a short-duration, moderate, and not significant water quality impact.

Water quality impacts from launch facility construction would be similar to the impacts resulting from road construction. Approximately 3 acres would be disturbed within and around each of the 100 proposed launch facilities. Depending on slope and local drainage characteristics, noticeable increases in turbidity would be limited primarily to those launch facilities lying in the vicinity of perennial streams. As with road upgrades, there would be an initial increase in local sedimentation due to land disturbance at a launch facility. This would decline to background levels within about a year following completion of construction as revegetation and other stabilization measures took effect. Approximately 80 percent of the launch facilities lie at a distance greater than 1 mile from the nearest sensitive perennial streams (or greater than 0.5 mile from Class C3 perennial streams). Disturbance at these sites would not affect water quality. Therefore, impacts on water quality from construction at these sites would be negligible.

Eighteen launch facilities are located at distances that vary from less than 0.25 mile to a Class C3 stream to between 0.5 to 1 mile to a Class B1 stream. Site-level, short-duration water quality impacts resulting from launch facility construction at these sites would be low (Figure 4.9.2-2). One launch facility, A-11, is located on a bluff 0.5 mile from lower Belt Creek, a Class B2 stream. The considerable slope and direct site drainage characteristics indicate the possibility for moderate, local-level impacts on water quality. Finally, one launch facility, H-7, lies on a slope 0.4 mile from a tributary to Simms Creek, a Class B1 stream. Construction at this launch facility has a high probability of substantial sedimentation from the construction site located near a highly sensitive stream. Therefore, the local-level, short-duration impacts on water quality would be high. The analysis indicates that given the limited amount of ground disturbance at any one site in the deployment area and the assumed mitigations of site stabilization and revegetation, the quantities of sediment delivered to streams after the construction phase are unlikely to raise the turbidity of any major stream by more than the permissible level of 5 NTUs. Therefore, none of these impacts would be significant (Figure 4.9.2-2).

The land use analysis (Section 4.4) concluded that no program-induced construction would occur in Conrad and Lewistown. Therefore, the drainage impacts within these two cities would be negligible. However, in Great Falls, several program-related activities would occur that could change local drainage conditions. Considerable construction would occur at Malmstrom AFB for new proposed program facilities and associated onbase housing (for the onbase housing option). A total of approximately 1,160 acres of land would be disturbed onbase. This includes 350 acres of land used for the HML vehicle operations training area, 100 acres used for recreation and technical support facilities, and 330 acres of land for new military housing. One hundred acres of the HML vehicle operations training area would remain permanently disturbed as a result of program operations. Such activities would increase the amount of stormwater runoff and associated sediment leaving the base. Some local increases on erosion and sedimentation are likely to occur. The base is located in generally flat terrain with a gradient generally less than 2 percent. Therefore, program-induced land disturbance would tend to result in only limited increases in erosion and resulting sedimentation. Sediment yield to the Missouri River from the temporarily disturbed areas would be about 40 tons for the onbase housing option, or 20 tons for the offbase housing option, over the construction phase. An additional 14 tons per year eroded from the HML vehicle operations training area would be carried to the river annually for the duration of program operations. Given the large dilution capacity of the river and the comparatively high sediment load it currently carries, the limited amount of onbase-generated sedimentation is expected to result in a local-level, long-duration, low impact on the Missouri River.

A stormwater runoff analysis was conducted for Malmstrom AFB and the adjacent area using the runoff model, TR-20. The results indicated that for the onbase housing option, the system of coulees which drain most of the base to the north, directly to the Missouri River (Figure 4.9.2-3), would experience an increase in peak stormwater flow (due to a 10-yr, 2-hr storm) of 3 percent over the baseline condition, which is currently computed to be nearly 860 cfs. Because of the temporal nature of stormwater runoff, the peak flows of the tributaries cannot be added to arrive at the downstream peak flow. Most of the increase in stormwater runoff is attributable to military housing that would be constructed at the northwest corner of the base. Runoff from this new housing would also boost peak stormwater flows in a smaller coulee flowing northwest of the base (Rainbow Coulee) by 40 percent (Figure 4.9.2-3) to a total of about 220 cfs. Peak runoff in the West Coulee would increase by 6 percent. There is very little development north of the base and these increases in stormwater runoff are not expected to cause any substantial damage. However, the higher flows would likely increase coulee erosion and resulting sedimentation to the Missouri River. Minor channel modifications and/or increased downstream culvert capacity may be necessary. The local stormwater impacts are likely to be of long duration, moderate, and not significant. Construction of program facilities in the southeastern portion of the base, including the HML vehicle operations training area, would cause only minor increases in the amount of runoff and sediment flowing south from the base to Sand Coulee Creek.

For the offbase housing option, no new housing would be constructed onbase. Only minor increases in stormwater runoff would occur in the coulees that drain northward from the base to the Missouri River. However, 290 acres would be developed for new housing in the Great Falls area. The stormwater impacts from this development would depend on the locations where the new housing would be built. It is likely that this amount of housing would require at least minor modifications to the existing stormwater collection system of the city. Therefore, the local-level, long-duration impact would be moderate and not significant.

With the Proposed Action, program-induced water withdrawals would not appreciably reduce streamflow in the ROI. Additional program-induced wastewater discharges should cause no measurable reduction in water quality. Construction-phase impacts in the deployment area on the water quality of streams would be low to negligible with a few exceptions. Should bridge construction proceed simultaneously on one or more of the Class B1 streams discussed, site-level, short-duration, moderate to high, and not significant impacts would occur. Local-level, long-duration, moderate, and not significant impacts would result in Great Falls because of increases in stormwater runoff as a result of either housing option (Figure 4.9.2-1b). The proposed program would have only minor effects on the quality (Section 4.9.3.2) and flow of the major streams in the ROI and would therefore result in short- and long-duration, low, and not significant surface water impacts at the regional level.

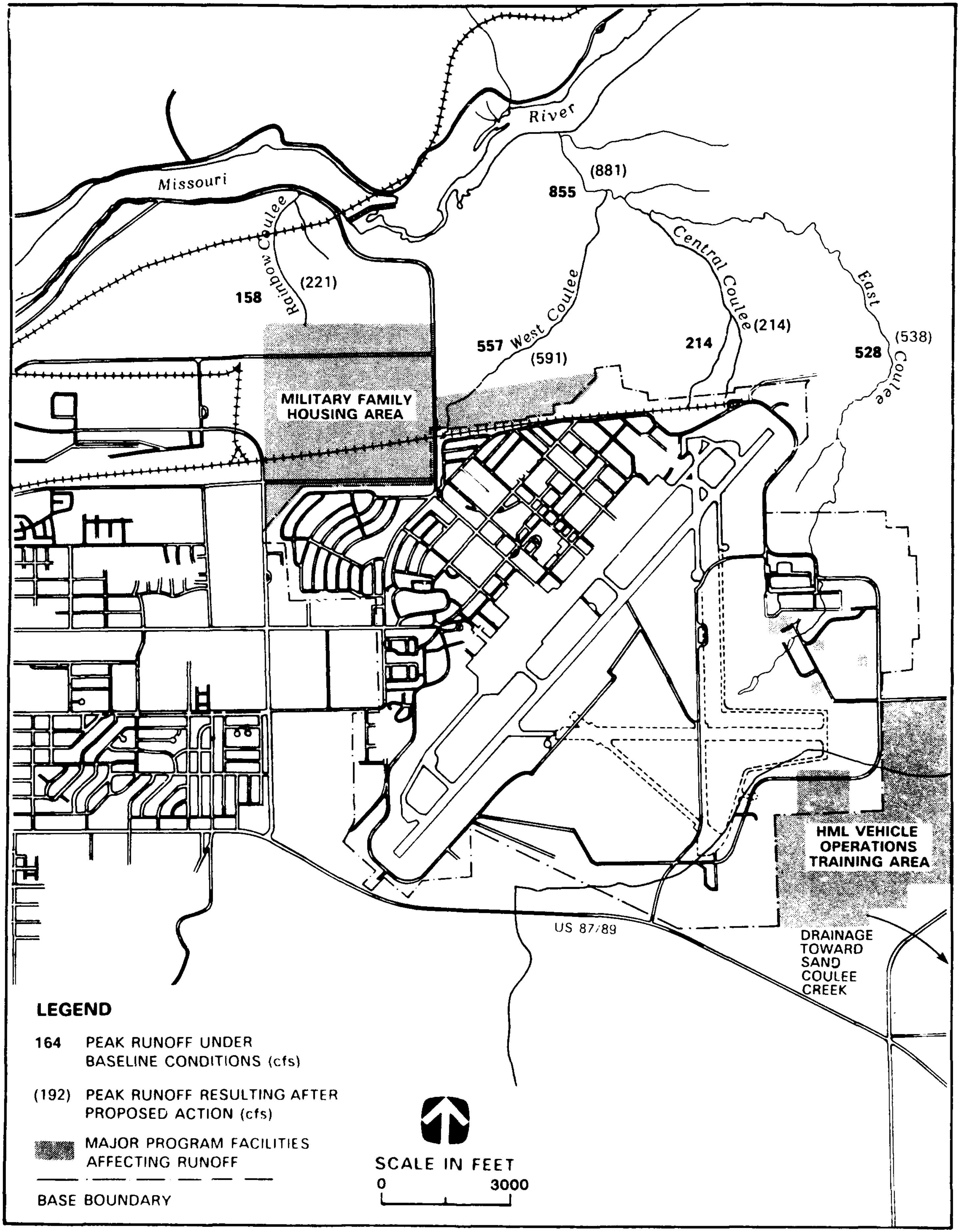

FIGURE 4.9.2-3 STORMWATER RUNOFF FROM MALMSTROM AFB

4.9.2.3 Groundwater Hydrology and Quality

Overall short-duration impacts on groundwater resources would be low and not significant, while long-duration impacts would be negligible. None of these impacts would be significant.

Because there is an adequate source of good quality surface water in the vicinity of Malmstrom AFB, groundwater resources would play a secondary role in supplying program-related water requirements. No program-induced groundwater use would take place in the Great Falls metropolitan area; therefore, the housing options would not affect groundwater resources. Groundwater sources would supply the domestic use of program-induced inmigrants in the City of Lewistown since the city obtains its water from Big Springs. Peak, program-induced withdrawals at Lewistown would be 30 acre-ft in 1992. This withdrawal represents only 0.04 percent of the average annual flow of the springs and would not affect groundwater quality. Therefore, program-induced water withdrawals at Lewistown would have a local-level, short-duration, low, and not significant impact on groundwater resources.

Groundwater pumpage to support construction and operations activities in the deployment area would be, at most, no greater than 460 acre-ft over the 6-year construction phase and 30 acre-ft/yr during the operations phase, assuming no surface or other sources of water were used. These withdrawals would be spread across large portions of the deployment area and represent an increase of only 0.3 percent over the baseline groundwater pumpage of the ROI.

There are 30 launch facilities located upgradient within 0.5 mile of existing saline seeps (Figure 4.9.2-4). Twenty of these have been identified for the Proposed Action. The additional 0.1 to 1.6 acres of permanently devegetated land at each HML site would contribute additional recharge to the shallow groundwater system around the site and may intensify a nearby saline-seep problem. In addition, near certain launch facilities, new saline seeps could develop. Site-specific data on the local groundwater systems around the launch facilities are not sufficient to accurately identify specific locations where new seeps might be induced. It is likely that new saline-seep problems would be most prevalent in high saline-seep hazard areas (Figure 4.9.2-4). Nineteen of the launch facilities identified for the Proposed Action occur within a high saline-seep hazard area, and another 12 lie within a moderate saline-seep hazard area. In most cases, the launch facility covers a small fraction of the recharge area for a particular seep. In many cases, the fallow farmland surrounding the launch facilities covers a much larger area. Therefore, the effect of launch facility enlargement on a local saline-seep problem would generally be minor. The overall regional-level impact would be negligible. Nearly all of the land disturbance associated with road construction would be temporary and have a narrow, linear shape that contributes little additional recharge to the local groundwater system. Therefore, road construction would also have a negligible impact on saline seep.

Program-induced groundwater pumpage is not expected to seriously affect either the levels or quality of groundwater in the ROI. The overall short-duration impacts on groundwater resources resulting from the relatively minor amounts of construction-related groundwater withdrawal would be low and not significant. The long-duration impacts would be negligible (Figure 4.9.2-1a).

4.9.3 Impacts of Alternatives

The overall impacts on water resources from Alternatives 1, 2, and 3 are the same as the Proposed Action. Short-duration impacts on all elements would be low and not

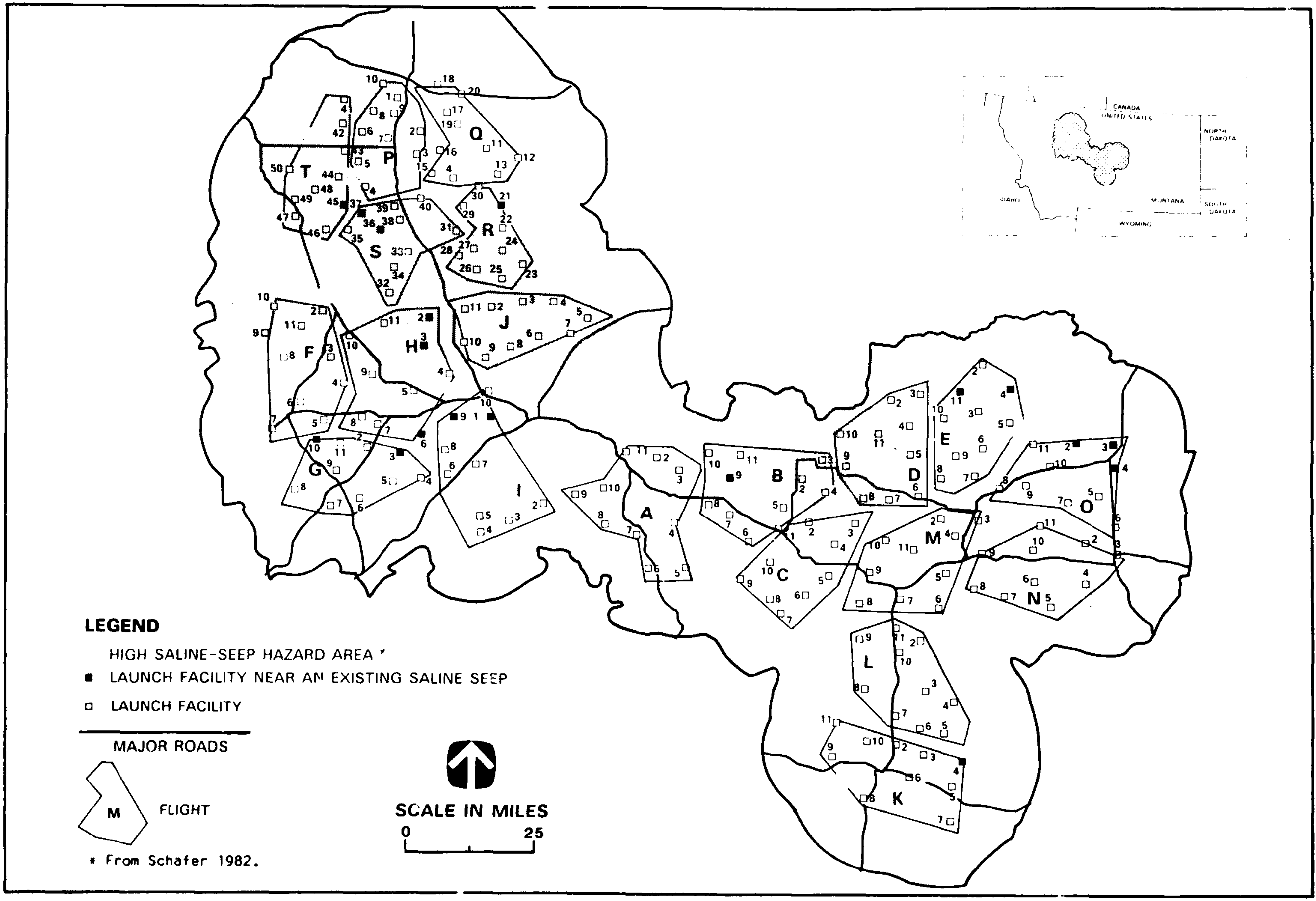

FIGURE 4.9.2-4 HIGH SALINE-SEEP HAZARD AREAS IN THE DEPLOYMENT AREA

significant. Long-duration impacts on water use and surface water hydrology and quality would also be low and not significant, while long-duration impacts on groundwater hydrology and quality would be negligible.

4.9.3.1 Water Use

Both construction- and operations-phase water use for Alternatives 1 and 2 vary somewhat from that of the Proposed Action (Tables 4.9.3-1 and 4.9.3-2). However, for all alternatives, approximately 90 percent of the construction-phase water use and nearly all of the operations-phase water use would occur in the Great Falls metropolitan area, which has an adequate water supply to meet the requirements of any alternative.

Alternative 1. This alternative would require less water than the Proposed Action because of the smaller number of personnel required for proposed program operations and the smaller amount of construction water requirements. For the onbase housing option, total water use would amount to 3,910 acre-ft over the construction phase (or an average annual use of 650 acre-ft/yr) and 990 acre-ft/yr during the operations phase. For the offbase housing option, total water use would amount to 4,300 acre-ft over the construction phase (or an average annual use of 720 acre-ft/yr) and 1,130 acre-ft/yr during the operations phase. These amounts represent 17- and 29-percent decreases, respectively, from the construction- and operations-phase water requirements of the Proposed Action, for either housing option.

Alternative 2. This alternative would require more construction water and operations personnel than the Proposed Action. For the onbase housing option, total water use would amount to 4,830 acre-ft over the construction phase (or an average annual use of 810 acre-ft/yr) and 1,700 acre-ft/yr during the operations phase. For the offbase housing option, total water use would amount to 5,370 acre-ft over the construction phase (or an average annual use of 900 acre-ft/yr) and 1,930 acre-ft/yr during the operations phase. These amounts represent 3- and 23-percent increases, respectively, over the construction- and operations-phase water needs of the Proposed Action, for either housing option.

Alternative 3. This alternative would require virtually the same number of program personnel and the same amount of water use as the Proposed Action.

The available water supply of the major affected entities would not be seriously affected by the program-related water requirements of Alternatives 1, 2, or 3 for either housing option. Most of the program-related water use would occur in the Great Falls metropolitan area, which can readily meet baseline-plus-program water requirements from its allocation to the Missouri River. The existing water supply system of Great Falls to Malmstrom AFB has adequate hydraulic capacity to meet program needs for any alternative. However, the existing contract delivery amount would have to be increased in all cases.

Construction- and operations-phase water use in the deployment area and domestic water use at Lewistown and Conrad for Alternatives 1, 2, and 3 would differ little from the Proposed Action. Therefore, the overall short- and long-duration impacts on water use for all alternatives would be the same as the Proposed Action: low and not significant.

Table 4.9.3-1

Total Construction-Phase (1990-1995) Water Use for the Proposed Action and Alternatives (acre-ft)

	Proposed Action	Alternative 1	Alternative 2	Alternative 3	Cumulative[1]
Malmstrom AFB					
Onbase Housing Option	3,150	2,500	3,200	3,150	3,640
Offbase Housing Option	790	650	810	790	940
Great Falls[2]					
Onbase Housing Option	990	960	1,000	990	1,010
Offbase Housing Option	3,860	3,200	3,930	3,860	4,270
Lewistown	70	70	110	70	70
Conrad	30	30	20	30	30
Deployment Area	460	350	500	380	460
TOTAL:					
Onbase Housing Option	4,700	3,910	4,830	4,620	5,210
Offbase Housing Option	5,210	4,300	5,370	5,130	5,770

Notes: [1] Impacts of Small ICBM and Peacekeeper in Rail Garrison programs.
[2] Excluding Malmstrom AFB.

Table 4.9.3-2

Annual Operations-Phase Water Use for the Proposed Action and Alternatives
(acre-ft)

	Proposed Action	Alternative 1	Alternative 2	Alternative 3	Cumulative[1]
Malmstrom AFB					
Onbase Housing Option	1,240	880	1,430	1,240	1,360
Offbase Housing Option	320	230	380	320	350
Great Falls[2]					
Onbase Housing Option	110	90	230	110	140
Offbase Housing Option	1,240	880	1,510	1,240	1,360
Lewistown	0	0	0	0	0
Conrad	0	0	0	0	0
Deployment Area	30	20	40	30	30
TOTAL:					
Onbase Housing Option	1,380	990	1,700	1,380	1,530
Offbase Housing Option	1,590	1,130	1,930	1,590	1,740

Notes: [1] Impacts of Small ICBM and Peacekeeper in Rail Garrison programs.
[2] Excluding Malmstrom AFB.

4.9.3.2 Surface Water Hydrology and Quality

The difference in site-level water quality impacts among Alternatives 1, 2, and 3 is related to the number and location of launch facilities where construction would occur. The impacts resulting from potential bridge upgrades and road widening associated with Alternatives 1, 2, and 3 would also vary somewhat depending on the T/E routes needed for access to the three different sets of launch facilities.

For the cities of Conrad and Lewistown, water diversions and wastewater discharges associated with the program would remain virtually the same as the Proposed Action, and the surface water impacts would be as discussed in Section 4.9.2.2. Program-related water diversions at Great Falls would vary substantially among the alternatives as shown in Table 4.9.3-1. However, given the large average annual flow of the Missouri River (about 6 million acre-ft/yr), the baseline-plus-program diversions represent about one-quarter of 1-percent flow reduction in the river for all alternatives and housing options. Program-related wastewater discharges to the Missouri River during the operations phase would vary 710 acre-ft/yr for Alternative 1 with the onbase housing option, to 1,440 acre-ft/yr for Alternative 2 with the offbase housing option. For all alternatives and housing options, the baseline-plus-program wastewater discharges from Great Falls represent about one-half of 1 percent of the 10-year, 7-day low flow of the river. Adequate wastewater treatment capacity exists to treat the range of possible discharges for all alternatives (Section 4.2.3.2). Therefore, the short- and long-duration, local-level impacts of the alternatives on the Missouri River would be the same as the Proposed Action: low and not significant.

Water diversions to support program construction and operations in the deployment area would remain minor and would not vary substantially among the alternatives. The impacts would be the same as the Proposed Action.

Alternative 1. The onbase housing option would involve the construction of 30 percent less housing on the northwestern portion of the base (230 acres) than the Proposed Action. Peak stormwater runoff is calculated to increase by about 35 percent over baseline in one of the two coulees draining this area. Although this is a slight decrease from the Proposed Action, local-level, long-duration impacts would remain moderate and not significant.

The offbase housing option would also involve less additional housing in the Great Falls area (about 200 acres) resulting in less program-induced runoff to the city stormwater system. However, development of this magnitude would probably require at least minor upgrades to the existing city stormwater system and would therefore result in a local-level, long-duration, moderate, and not significant impact.

This alternative would involve only two personnel at each HML enclosure as compared to four with the Proposed Action. Therefore, wastewater generation at the launch facilities would be half that of the Proposed Action: about 12 acre-ft/yr. Water quality would not be adversely affected by its disposal.

Compared with the Proposed Action, this alternative involves the potential upgrade of 1 additional bridge over a perennial stream for a total of 30 bridges. The potential road upgrades associated with this alternative would include only the single sensitive length of road already discussed for the Proposed Action. Therefore, the impacts resulting from road and bridge upgrades would be the same as the Proposed Action.

Construction at the 100 launch facilities selected for Alternative 1 would result in one additional site-level (at C-10), high impact because of its proximity to upper Wolf Creek near Stanford. One additional site-level, moderate impact would occur at launch facility B-6 because of its proximity to Surprise Creek, also near Stanford. There would be site-level, low impacts at 16 launch facilities and site-level, negligible impacts at the remaining 80 launch facilities. All of these short-duration impacts would not be significant.

Alternative 2. The onbase housing option would involve the construction of the largest amount of onbase housing (380 acres) on the northwestern portion of the base. However, peak stormwater runoff from Malmstrom AFB is not calculated to increase substantially over that likely to occur from the Proposed Action. Therefore, local-level, long-duration impacts would remain moderate and not significant.

The offbase housing option would involve the construction of the largest amount of housing in the Great falls area (about 330 acres), and therefore the most program-induced runoff to the city stormwater system. As with the Proposed Action, it is unlikely that this development would be concentrated in a single area of Great Falls. However, upgrades to the existing city stormwater system would probably be required, resulting in a local-level, long-duration, moderate, and not significant impact.

For this alternative, more personnel would be required at HML enclosures as compared to the Proposed Action. Therefore, wastewater generation at the launch facilities would be slightly more than the Proposed Action: about 28 acre-ft/yr. Water quality would not be adversely affected by its disposal.

Compared with the Proposed Action, this alternative involves the potential upgrade of two additional bridges over perennial streams or a total of 31 bridges. The potential road upgrades associated with this alternative would include the same single sensitive length of road (along Careless Creek) as the Proposed Action. In addition, a portion of Big Skunk Creek in the Dearborn Basin would also receive short-duration and moderate water quality impacts due to road construction (Table 4.9.3-3). Other impacts resulting from road and bridge upgrades would be the same as the Proposed Action.

Construction at the 125 launch facilities proposed for Alternative 2 would result in the same two moderate and high impacts as the Proposed Action. One additional moderate impact would occur at launch facility G-8 due to its proximity to Cuniff Creek in the Dearborn Basin. There would be low impacts at 18 launch facilities and negligible impacts at the remaining 104 launch facilities. All of these site-level, short-duration impacts would not be significant.

Alternative 3. This alternative would involve the construction of virtually the same amount of housing onbase for the onbase housing option, or in the Great Falls area for the offbase housing option, as the Proposed Action. Therefore, the local-level, long-duration stormwater impacts are the same as the Proposed Action: moderate and not significant for both housing options.

Wastewater generation at the launch facilities would also be the same as that of the Proposed Action: about 25 acre-ft/yr.

This alternative potentially involves the upgrade of all 36 bridges over perennial streams as shown in Figure 4.9.3-1. One additional high and not significant water quality impact could occur as a result of simultaneous upgrading of two bridges in the Sand Coulee Creek Basin, a Class B1 stream south of Great Falls. This alternative would also involve

Table 4.9.3-3

Stream Segments That Parallel Transporter/Erector Routes to be Upgraded

Stream	Classification	Length (mi)	Average Separation (mi)
Careless Creek	B1	2	0.2
S.F. McDonald	C3	0.5	0.1
Dry Fork-Belt Creek	B1	9	<0.1
Tributary to Upper Arrow Creek	C3	2	0.1
Big Skunk Creek	B1	1	0.1
Dry Creek (Sun River)	B1	1.1	0.1-0.3
Hay Coulee-Willow Creek	B1	5	0.1-0.3
TOTAL:		20.6	

potential road construction at all seven sensitive road locations shown in Figure 4.9.3-1, resulting in one high and six moderate water quality impacts. These local-level, short-duration impacts would not be significant.

For Alternative 3, construction would occur at all 200 launch facilities and would result in high water quality impacts at four launch facilities: A-5, B-10, C-10, and H-7. Moderate impacts would occur at six launch facilities: A-6, A-11, B-6, F-11, G-8, and N-4. There would be low impacts at 30 launch facilities and negligible impacts at the remaining 160 launch facilities. All of these site-level, short-duration impacts would not be significant.

A sedimentation analysis was performed to assess the impacts of all program-related land-disturbing activities at the river-basin level. This analysis assumed worst-condition scenarios (i.e., all potential launch facility modifications and T/E route upgrades within a given river basin were constructed simultaneously). The median percent increase in basinwide sedimentation over baseline was found to be less than 0.1 percent. The worst case was found to be the Dry Fork-Belt Creek Basin, which could experience a 0.7-percent increase over the baseline sedimentation level. Therefore, the incremental effects of program-induced sedimentation were found to be very minor at a basinwide level.

In summary, the program-related impacts of all the alternatives on surface water hydrology and quality, resulting from water diversions and wastewater discharges at the affected towns, would not be substantially different from those of the Proposed Action. Alternative 3 would involve more moderate to high water quality impacts in the deployment area than the other two alternatives or the Proposed Action. None of the alternatives would have a serious effect on regional surface water hydrology or quality. Therefore, the overall short- and long-duration impacts of all alternatives would remain low and not significant.

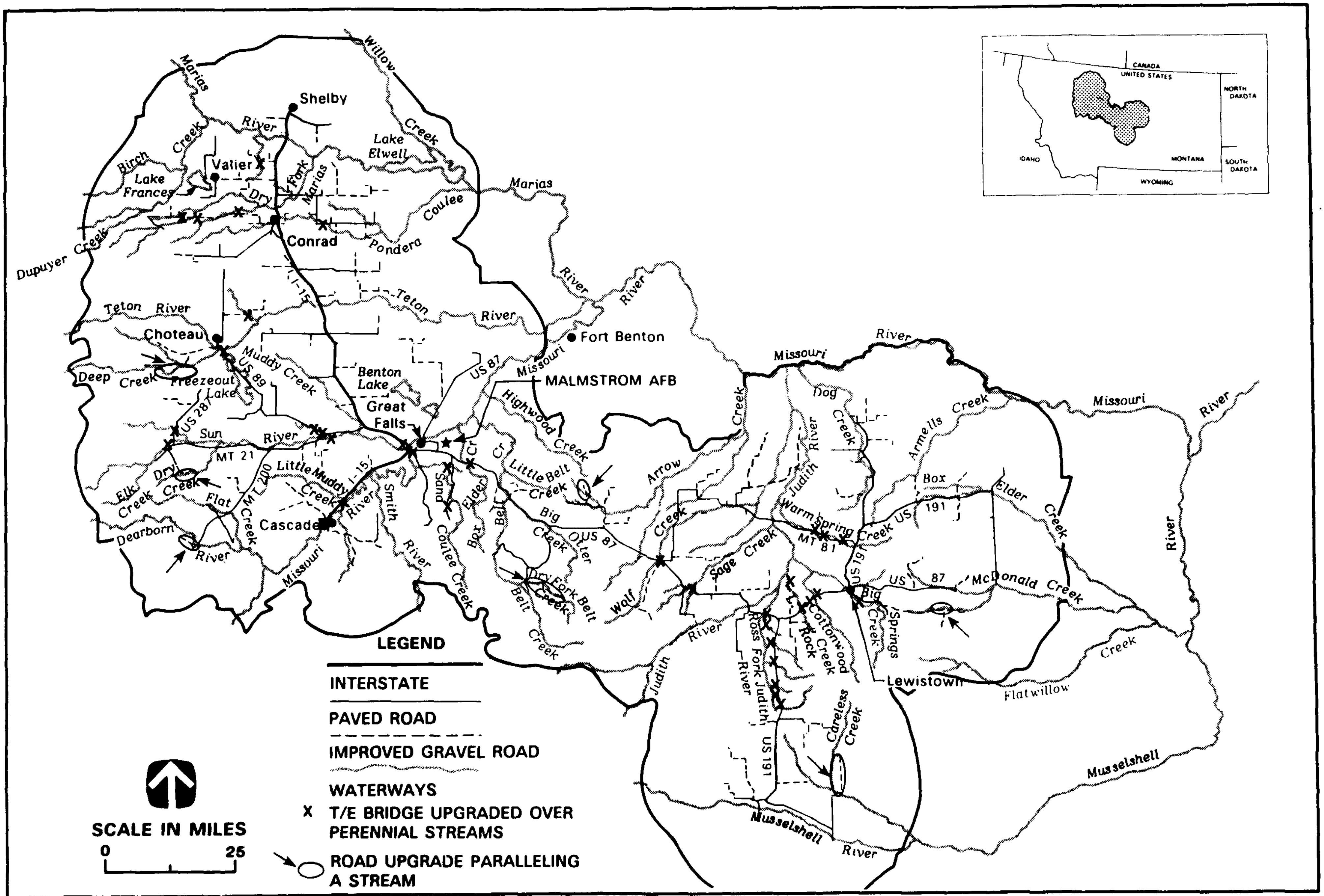

FIGURE 4.9.3-1 LOCATIONS OF POTENTIAL STREAM IMPACT DURING UPGRADES OF TRANSPORTER/ERECTOR ROUTES AND BRIDGES

EM4-WR/2

4.9.3.3 Groundwater Hydrology and Quality

Alternatives 1, 2, and 3 would require relatively small amounts of groundwater that would not differ substantially from the needs of the Proposed Action. The housing options would not affect the groundwater resources because no program-related groundwater pumping would occur in the Great Falls metropolitan area.

Alternative 1. Groundwater withdrawals from Big Springs to support domestic water needs of program-induced inmigrants in Lewistown would be the same as those for the Proposed Action. This alternative involves expansion of 16 launch facilities located upgradient of existing, nearby saline seeps.

Alternative 2. When compared to the Proposed Action, groundwater withdrawals from Big Springs would require only an additional 40 acre-ft over the 6-year construction phase. This would not have an appreciable effect on the flow of Big Springs. This alternative involves expansion of 23 launch facilities located upgradient of existing, nearby saline seeps.

Alternative 3. Groundwater withdrawals from Big Springs to support domestic water needs of program-induced inmigrants in Lewistown would be the same as those for the Proposed Action. This alternative involves expansion of all 30 launch facilities located upgradient of existing, nearby saline seeps (Section 4.9.2.3, Figure 4.9.2-4).

The assumed average of 1.6 acres of permanently devegetated land at each launch facility generally constitutes a small fraction of the recharge area to a given nearby saline seep. Therefore, launch facility enlargement would generally have a minor effect on saline seeps at the site level and a negligible effect at the regional level. The overall groundwater resources impact ratings for all three alternatives are the same as the Proposed Action: short-duration, low, and not significant impacts, and long-duration, negligible impacts.

4.9.4 Cumulative Impacts

4.9.4.1 Water Use

Concurrent deployment of the Small ICBM and Peacekeeper in Rail Garrison programs would require additional amounts of water. No additional water use outside the Great Falls area would be attributable to the Peacekeeper in Rail Garrison program. For the onbase housing option, cumulative total water use would amount to 5,210 acre-ft over the construction phase (at an average annual use of 870 acre-ft/yr) (Section 4.9.3.1, Table 4.9.3-1) and 1,530 acre-ft/yr during the operations phase (Section 4.9.3.1, Table 4.9.3-2). Over 80 percent of this water use would occur at Malmstrom AFB, where water needs would increase steadily throughout the construction phase and reach a peak of 1,360 acre-ft/yr in the operations phase. This peak is 10 percent higher than the corresponding peak experienced for the Proposed Action alone. Baseline-plus-cumulative water use at the base would be 2,660 acre-ft/yr, which can be readily supplied by the Great Falls water delivery system to the base. Baseline-plus-cumulative water requirements at Great Falls, including Malmstrom AFB, would peak at 16,060 acre-ft/yr in the year 2000. This peak is only 1 percent higher than the corresponding peak experienced for the Proposed Action alone, and it represents 22 percent of the city's entitlement to the Missouri River.

For the offbase housing option, cumulative total water use would amount to 5,770 acre-ft over the construction phase (at an average annual use of 960 acre-ft/yr) and 1,740 acre-ft/yr during the operations phase. All of the additional water use attributable to the

Peacekeeper in Rail Garrison program would occur in the Great Falls metropolitan area. Baseline-plus-program cumulative water use at Great Falls would peak at 16,270 acre-ft/yr in the year 2000, which is also 22 percent of the city's entitlement to the Missouri River. Therefore, the overall impacts on water use for the Small ICBM and Peacekeeper in Rail Garrison programs would be essentially the same as for the Proposed Action. For either housing option, cumulative short- and long-duration impacts would be low and not significant.

4.9.4.2 Surface Water and Hydrology and Quality

There would be no additional surface water impacts in the deployment area resulting from the Peacekeeper in Rail Garrison program. Water diversions from the Missouri River to Great Falls would increase only slightly over those resulting from the Proposed Action. Effluent discharges from Great Falls during the operations phase would increase by only about 100 acre-ft/yr over that of the proposed program for either housing option. For the onbase housing option, stormwater runoff from the base would increase only slightly above that resulting from the Proposed Action. For the offbase housing option, the acreage of new housing in the Great Falls area would fall between that for the Proposed Action and Alternative 2. For either housing option, local-level, long-duration stormwater impacts would remain moderate and not significant. Therefore, surface water hydrology quality would not change substantially from that experienced as a result of the Proposed Action.

The Peacekeeper in Rail Garrison program would not substantially change the regional-level surface water impacts resulting from the Proposed Action. Therefore, the short- and long-duration cumulative impacts on surface water resources would remain low and not significant.

4.9.4.3 Groundwater Hydrology and Quality

Deployment of the Peacekeeper in Rail Garrison program would not affect groundwater resources at Malmstrom AFB because no groundwater would be used for its construction or operations. In addition, there are no saline-seep problems in the Great Falls metropolitan area. The cumulative impacts on groundwater resources would be the same as the Proposed Action. For either housing option, cumulative short-duration impacts on the groundwater resources would be low, and cumulative long-duration impacts would be negligible. These short- and long- duration impacts would not be significant.

4.9.5 Impacts of the No Action Alternative

In the absence of the Small ICBM program, water resource development and use would likely follow existing trends. At the regional level, adequate water would generally be available to meet most nonagricultural needs. Agricultural water use would continue to fluctuate on an annual basis in response to market conditions and available water. However, overall use for irrigation would probably not change greatly over that of the last decade. The State of Montana is currently analyzing many streams in the Missouri Basin to determine minimum flows for the preservation of aquatic habitats. It is likely that minimum flows would be reserved in many such streams in the future. This measure should protect these streams from future depletion. Groundwater development within the ROI may accelerate as unappropriated surface water becomes increasingly scarce. Groundwater use would increase, particularly as a supplemental source of irrigation water in water-short basins. Saline seep would continue to increase at an accelerated rate throughout the region unless major changes in farming practices occur. Municipal water use at Great Falls would moderately increase and would be easily met by the available supply.

4.9.6 Potential Mitigation Measures

Potential mitigations are measures that could be undertaken to reduce or eliminate program impacts. All, some, or none of the measures identified for water resources may be implemented. For each measure, the agency that may be responsible for implementation is identified. The Air Force would encourage implementation of these measures through environmental awareness and other programs. Potential mitigation measures for water resources include the following:

- For reconstructed bridges, build a single span, where feasible. This would allow construction activities to be confined behind the streambanks and would minimize equipment operation directly in the stream. Both measures are very effective in minimizing very short-duration, but very substantial, decreases in downstream water quality. Bridge abutments should be designed to allow the unrestricted passage of high flows in order to avoid potential channel scour and/or bank erosion (Montana Department of Highways).

- Minimize the area of construction disturbance and, where practical, avoid the construction of steep embankments (which may require extensive cuts and fills) in proximity (0.5 mi or less) to streams; for construction occurring along roads closely paralleling streams, confine the disturbed area to the side of the road lying away from the stream (where feasible). These measures would be moderately effective in minimizing local sedimentation and water quality degradation in the deployment area (U.S. Army Corps of Engineers and the Montana Department of Highways).

- Avoid steep slopes to the extent possible and apply sediment retention measures until post-construction stabilization measures have taken effect for the ten launch facilities identified as having short-duration, moderate to high impacts. This would be highly effective in minimizing site- or local-level water quality impacts. Other temporary erosion control measures that would help to protect water quality are discussed in Section 4.10.6 (U.S. Army Corps of Engineers).

- Construct a stormwater detention facility(s) that is capable of controlling the 10-year, 2-hour peak runoff from the new military housing area to preconstruction levels. This would be effective in avoiding potentially damaging increases in downstream storm flows and increased streambank erosion in several of the coulees that drain the base to the Missouri River (U.S. Army Corps of Engineers).

- Schedule bridge upgrades that cross intermittent streams for periods when the streams are not flowing continuously (normally the summer and fall seasons). This measure would be highly effective in minimizing downstream water quality impacts and could substantially reduce bridge construction costs (Montana Department of Highways).

- Avoid, where possible, simultaneous improvements to nearby (less than 10 stream mi) bridges crossing the same perennial stream system to minimize multiple streambed disturbance. This would be moderately effective in minimizing local-level sedimentation impacts (Montana Department of Highways).

- Grade identified launch facilities which are located near existing saline seeps to promote immediate offsite conveyance of runoff to the nearest local drainage channel. This would be moderately effective in minimizing infiltration and recharge of the local groundwater system and would help to avoid intensifying the saline-seep problem (U.S. Army Corps of Engineers).

4.9.7 Irreversible and Irretrievable Resource Commitments

The proposed program would require from 990 to 1,930 acre-ft/yr of water during program operations, depending on which alternative deployment scenario and housing option is selected (Section 4.9.3.1, Table 4.9.3-2). Nearly all of this water would be diverted from the Missouri River at Great Falls. The diversion, partial depletion, and return of the remainder (as treated effluent) would have a very small effect on the hydrology and quality of the river and its downstream users. Water is a renewable resource. Should program operations cease, this water would be available for other uses. The short-duration water quality impacts of program construction would not permanently change the availability or quality of the resource from baseline conditions. Therefore, the program would not result in any irreversible or irretrievable commitment of water resources.

4.9.8 Relationship Between the Local Short-Term Use of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

The proposed program would not appreciably affect the availability of water resources for other purposes and would therefore not adversely affect the long-term productivity of the region. Launch facility construction may intensify existing saline seeps or contribute to the emergence of new ones. To the extent that this occurs, groundwater quality and agricultural production would be locally reduced.

4.10 Geology and Soils

The construction, deployment, and operations of the Small Intercontinental Ballistic Missile (ICBM) system at Malmstrom Air Force Base (AFB) and in the deployment area would affect the geology and soils environment. The analysis of impacts considers geologic hazards (e.g., seismicity, seismic effects, and mass movements), geologic resources (e.g., aggregate and energy resources), and soil erosion.

4.10.1 Impact Analysis Methodology

The impact analysis methodology for geology and soils involved three separate procedures: evaluation of program impacts, determination of levels of impact (LOI), and determination of the significance of impacts. The methodology also included consideration of a number of assumptions and assumed mitigations. Impacts were evaluated at the site and regional levels, and a collective assessment was made for each resource element. Site-level impacts address areas where specific construction or land acquisition occurs. Areas potentially affected include sections of the transporter/erector (T/E) route system where road widening may occur. Construction at a number of bridge sites and launch facilities as well as construction at Malmstrom AFB, including housing areas and activities at the Hard Mobile Launcher (HML) vehicle operations training area, were also considered as potential site-level impacts. Regional-level impacts are those that affect county or multicounty areas such as those areas considered for aggregate resources.

4.10.1.1 Evaluation of Program Impacts

Program impacts were evaluated by relating program requirements to existing baseline conditions for each of the resource elements considered.

Geologic Hazards. Program effects on seismicity were evaluated by determining what geologic structures are associated with the earthquakes generated in the region. Program activities were evaluated with respect to their potential for accelerating the baseline rate of seismic activity in the region or the potential for the program to be affected by seismic activity in the region.

Program effects on mass movements were evaluated by assessing the geologic conditions at each area to be disturbed by program construction and comparing the conditions to those of active mass movements elsewhere in the Region of Influence (ROI). Known or potential mass movements near program construction activities were evaluated to determine whether the program would reactivate movement of the features based on the type of construction activity and its proximity to the known or potential mass movement. Each of the criteria listed in the following were used to evaluate the potential for program-induced mass movements at each launch facility and T/E route segment. The first three criteria are considered to be most important in evaluating landslide susceptibility in the ROI.

- Bedrock of the Mississippian/Pennsylvanian Heath and Amsden formations or Cretaceous shales (predominantly the Colorado Group);
- Slopes greater than 10 percent;
- Terrain showing evidence of past mass movement activity;
- Quaternary terrace deposits overlying Cretaceous shale bedrock;

- Presence of glacial lake deposits;
- Presence of springs of other perennial water sources within 0.5 mile; and
- Presence of construction-related bedrock cuts or artificial fill.

Geologic Resources. Program-induced impacts on aggregate resources were evaluated by estimating the amount of aggregate required by the program and comparing that demand to the current production rate, maximum production capacity, and regional supply. The current production rate is the amount of aggregate produced on an annual basis. This rate is influenced by consumer demand for aggregate, as well as the availability of adequate production facilities (e.g., trucks, loaders, and washing equipment). In contrast, the maximum production capacity is the rate at which aggregate could be produced if all production facilities were used to the maximum extent. Maximum production capacity is independent of consumer demand. The regional aggregate supply consists of known (demonstrated) geologic deposits suitable for use as road base, for construction activities, or in concrete, as well as those deposits that can reasonably be assumed (inferred) to be suitable for road base, construction activities, or concrete.

Program impacts on oil and gas resources were evaluated by comparing potential construction sites to areas with known resources. Oil and gas resource areas were identified by the presence of an oil- or gas-producing well or active lease near program construction areas.

Program impacts on coal resources were evaluated by comparing the location of potential construction sites to areas with known resources as well as program demand for coal related to resource supply and production capacity. Coal resource areas were indicated by the presence of active operations, active leases, or known resource areas.

Soil Erosion. Program impacts were evaluated by determining the erosion susceptibility of soils in the areas potentially disturbed by the program. Soil erosion expected to be initiated by program activities was calculated by application of the Wind Erosion Equation for wind erosion and the Universal Soil Loss Equation for sheet erosion. These equations were developed by the U.S. Soil Conservation Service (SCS).

4.10.1.2 Determination of Levels of Impact

The LOI is the determination of the magnitude of an impact. The LOI is determined by comparing LOI criteria to the amount of change in baseline conditions attributable to program requirements. Values for several geology and soils elements are not numerically definable and were assessed through the use of professional judgment.

Geologic Hazards. The LOI definitions for geologic hazards are the following:

- Negligible Impact -- The proposed program would not measurably affect the projected baseline rate of natural geologic processes.
- Low Impact -- The proposed program would increase the baseline rate of natural geologic processes that are already occurring or initiate geologic processes, but these geologic processes are not expected to influence human activities. For example, an increased frequency of mass movements caused by program construction activities may occur outside construction zones in the deployment area (e.g., drainage diverted offsite causing slope failure in adjacent areas).

- Moderate Impact -- The proposed program would increase the baseline rate of natural geologic processes and may initiate new occurrences that could cause detrimental effects to existing structures. For example, program construction that disturbs soil and surficial deposits may result in the initiation of mass movements that could cause minor damage to a road or bridge.

- High Impact -- The proposed program would accelerate the baseline rate of geologic processes and initiate geologic conditions that may cause extensive damage to structures or have long-lasting adverse impacts. For example, program-induced mass movements may render roads and bridges impassable or require continued maintenance long after construction has ceased.

Geologic Resources. The LOI definitions for geologic resources (i.e., aggregate and coal) used by the proposed program are the following:

- Negligible Impact -- Program demand would not require existing resource producers to increase current production rates by more than 1 percent. Existing aggregate producers are able to accommodate the program requirements without identifying and exploiting new sources. Program demand would not interfere with the needs of other consumers in the region.

- Low Impact -- Existing producers are able to accommodate program requirements with an increase in the production rate. Baseline-plus-program demand is less than the existing production capacity. Existing producers may be required to identify and exploit new sources to meet program-plus-baseline demand in accordance with program construction schedules. Program demands may cause a measurable reduction in the supply of the resource for the baseline demand in the local area; however, it would not adversely affect other consumers in the region.

- Moderate Impact -- Existing producers are able to accommodate program requirements with an increase in the production rate. Baseline-plus-program demand approximately equals existing production capacities Existing producers are not able to accommodate the program-plus-baseline demand in accordance with program construction schedules without identifying and exploiting new sources. Program requirements would reduce the supply of the resource for the baseline demand in the local area resulting in temporary shortages for other consumers.

- High Impact -- Existing producers are not able to accommodate the program demand without identifying and exploiting new sources and may be forced to use sources or processing techniques normally considered unconventional. Existing producers do not have sufficient production capacity to meet baseline-plus-program demand.

The LOI definitions for energy resources (i.e., oil and gas) not used directly by the proposed program that mav be affected through restricted access are the following:

- Negligible Impact -- No measurable changes in access, exploration, development, or production of energy resources resulting from program-related activities. No mineral, oil, or gas leases are located adjacent to a launch facility.

- Low Impact -- Program-related activities periodically interrupt the access, exploration, development, or production of speculative or hypothetical oil and gas or coal resources as defined by the presence of active leases within the proposed expansion area at the launch facility.

- Moderate Impact -- Program-related activities periodically interrupt the access, exploration, development, and production of energy resources in areas designated as having potentially economic energy resources (e.g., active lease areas), or interfere with the normal procedures of an active operation.

- High Impact -- Program-related activities cause major interruption or elimination of access, resource exploration, development, or production of known active energy resource areas, such as condemnation of oil- or gas-producing fields or elimination of access to active oil- or gas-production areas or mining operations.

Soil Erosion. The LOI definitions for soil erosion are keyed to the maximum tolerable soil loss values developed by the SCS. Application of these values to the proposed program results in the following:

- Negligible Impact -- Program-induced soil erosion would be much less than the maximum tolerable soil loss for all of the proposed construction and operations areas. Program-induced erosion rates are generally much smaller than baseline erosion rates.

- Low Impact -- Program-induced soil erosion would cause adverse effects on the soil; however, the soil loss is still below the maximum tolerable loss. Soil losses that exceed the maximum tolerable loss are restricted to small portions of the construction and operations areas.

- Moderate Impact -- Program-induced soil erosion would cause adverse effects on the soil. Soil loss is expected to approximately equal the maximum tolerable loss for most areas affected by construction and operations disturbances.

- High Impact -- Program-induced soil erosion would cause adverse effects on the soil. Program-induced soil erosion is expected to exceed the maximum tolerable soil loss in large portions of the area disturbed by the proposed program.

4.10.1.3 Determination of Significance

The significance of geology and soils impacts was evaluated in accordance with Council on Environmental Quality (CEQ) regulations. Significance was assessed through evaluation of the context and intensity of impacts. Context includes consideration of the settings (site, local, or regional) and the duration of the impacts. The CEQ regulations provide ten items that should be considered in evaluating intensity. Of these ten items, the following are applicable to the geology and soils resource:

- The degree to which the proposed action affects public health or safety; and

- The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.

In addition to the considerations specifically identified in the CEQ regulations, the following considerations are judged appropriate for the geology and soils resource:

Geologic Hazards.

- Whether program-related construction would result in detrimental effects that continue beyond the life of the program and would require extensive or continuous remedial action.

Geologic Resources.

- Whether the program requirements deplete the existing demonstrated and inferred local and/or regional commercial aggregate supplies;
- Whether the action would cause the removal of critical oil, gas, or coal reserves from production; and
- Whether the program aggregate demand would conflict with aggregate resource needs of concurrent programs.

Soil Erosion.

- Whether the long-duration program-induced erosion would remove topsoil at a rate greater than the soils natural regenerative capabilities and would result in an appreciable net loss of topsoil.

4.10.1.4 Assumptions and Assumed Mitigations

Assumptions. A number of program-related assumptions were made in order to evaluate the site- and regional-level impacts. However, no assumptions were applicable for geologic hazards because specific construction criteria have not been determined. Likewise, no assumptions were used for the analyses of oil, gas, and coal resources.

Aggregate Resources. Assumptions made for aggregate resources are the following:

- Aggregate consumed by the proposed program will be derived from existing commercial producers unless their production capacities or reserves do not meet baseline and program demand. New aggregate pits will only be opened only after existing producer reserves are depleted.
- Aggregate supplied to a construction site will be derived from the closest existing commercial producer.
- A 30-mile, one-way haul distance from the aggregate producer to the construction site was used as the maximum economical haul distance. Construction areas more than 30 miles from an existing commercial producer will be serviced by the closest producer. Additional mileage for hauling the aggregate will be the preferred alternative to opening new aggregate pits.
- Maximum regional production capacities were assumed to be 125 percent of the regional commercial production rate.

Soil Erosion. Assumptions used in the analysis of soil erosion include the following:

- A typical cross section was used for T/E routes and bridges throughout the deployment area. It was assumed this cross section will be maintained during program activities.
- Approximately 50 percent of the HML vehicle operations training area will be continuously disturbed and will remain essentially unprotected throughout the life of the program.
- Disturbed ground as a result of T/E route or launch facility access road modifications will occur within 20 feet of the edge of the road in the existing rights-of-way.
- Launch facility construction activities will disturb about 3 acres at each launch facility for the Proposed Action and Alternatives 1 and 2. Disturbance areas were assumed to be 2 acres per launch facility for Alternative 3.

Assumed Mitigations. A number of program-related assumed mitigations were applied in order to evaluate the site- and regional-level impacts. However, no assumed mitigations were applicable for geologic hazards because specific construction criteria have not been determined. Similarly, no assumed mitigations were used for the aggregate resource analyses.

Energy Resources. Assumed mitigations used for analyses of oil, gas, and coal include the following:

- All active oil- or gas-production facilities or active coal-mining operations within the expanded explosive safety zones will be compatible with the terms of the easement;
- Oil, gas, or coal exploration will not be restricted in the explosive safety zones; and
- Just compensation will be made for mineral and energy resource interests that must be extinguished to allow launch facility expansion.

Soil Erosion. Assumptions used in analyses of soil erosion analysis include the following:

- Soil erosion rates for construction activities onbase, at launch facilities, and on T/E routes were computed based on unprotected ground with maximum slope lengths of the disturbed ground estimated to be 200 feet.
- Ground disturbed as a result of construction activity will be mulched immediately after construction is completed. Construction was assumed to last about 3 months. The mulch will consist of straw applied at a rate of 1 ton per acre or other materials providing equivalent protection. The mulch will be maintained until new vegetative cover is well established.

4.10.2 Impacts of the Proposed Action

Overall short-duration impacts on geologic hazards (mass movements) are expected to be low and not significant because the adverse impacts are not expected to require extensive mitigation measures at the site level (Figure 4.10.2-1). Short-duration impacts

LEVEL OF IMPACT	SIGNIFICANCE	
Adverse Impacts	Not Significant	Significant
Negligible	☐	
Low	∘	•
Moderate	○	●
High	◯	⬤
Beneficial Effects	▨	

Note: Some resource elements may have both beneficial effects and adverse impacts.

ELEMENT/AFFECTED INTEREST	PROGRAM IMPACTS							
	SHORT DURATION				LONG DURATION			
	PROPOSED ACTION	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	PROPOSED ACTION	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3
GEOLOGIC HAZARDS	∘	∘	∘	∘	∘	∘	∘	∘
MASS MOVEMENTS	∘	∘	∘	∘	∘	∘	∘	∘
MALMSTROM AFB								
LAUNCH FACILITIES	∘	∘	∘	∘	∘	∘	∘	∘
T/E ROUTES	∘	∘	∘	∘	∘	∘	∘	∘
BRIDGES	∘	∘	∘	∘	∘	∘	∘	∘
GEOLOGIC RESOURCES	⬤	⬤	⬤	⬤	○	○	○	○
AGGREGATE *	⬤	⬤	⬤	⬤	○	○	○	○
GREAT FALLS AREA	●	●	●	●	○	○	○	○
LEWISTOWN AREA	⬤	⬤	⬤	⬤	○	○	○	○
SHELBY/CONRAD AREA	●	●	●	●	○	○	○	○
ENERGY RESOURCES					∘	∘	∘	∘
MALMSTROM AFB								
LAUNCH FACILITIES					∘	∘	∘	∘
SOIL EROSION	◌	◌	◌	◌	∘	∘	∘	∘
WIND EROSION	∘	∘	∘	∘	∘	∘	∘	∘
MALMSTROM AFB	∘	∘	∘	∘	⬤	⬤	⬤	⬤
LAUNCH FACILITIES	∘	∘	∘	∘				
T/E ROUTES	∘	∘	∘	∘				
BRIDGES	∘	∘	∘	∘				
SHEET EROSION	◌	◌	◌	◌	∘	∘	∘	∘
MALMSTROM AFB	∘	∘	∘	∘	⬤	⬤	⬤	⬤
LAUNCH FACILITIES	◌	◌	◌	◌				
T/E ROUTES	◌	◌	◌	◌				
BRIDGES	◌	◌	◌	◌				

Note: * Impacts on aggregate resources are at the regional level.

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FIGURE 4.10.2-1 IMPACTS ON GEOLOGY AND SOILS ASSOCIATED WITH THE PROPOSED SMALL ICBM PROGRAM IN MONTANA on geologic resources would be moderate in the Great Falls and Shelby/Conrad supply areas and high in the Lewistown supply area because program demand for aggregate would exceed the ability to produce sand and gravel. Impacts would be significant at the regional level for aggregate as a result of the depletion of demonstrated and inferred aggregate supplies. Short-duration, negligible impacts are expected to oil, gas, and coal resources. Short-duration impacts on soil resources are expected to be high, because many soils at launch facilities and along T/E routes and bridges would have high erosion rates. Site-level impacts would not be significant due to the promulgation of soil erosion controls after construction is completed.

Overall long-duration impacts on geologic hazards are expected to be low as a result of the potential for mass movements at several launch facilities, road segments, and bridge sites and not significant at the site level (Figure 4.10.2-2) since none of the adverse effects are expected to continue beyond the life of the program or require extensive mitigation measures. The collective effect of regional impacts on aggregate resources would lead to long-duration, moderate impacts (Figure 4.10.2-1) as a result of the need to identify additional reserves for future baseline demand. These long-duration impacts would not be significant. Site-level, long-duration impacts on oil, gas, and coal resources are expected to be negligible at 71 launch facilities and low at 29 launch facilities where a number of oil and gas leases would be extinguished for the length of the operations phase. Long-duration impacts on soil resources would be high and significant for the site level only at the proposed HML vehicle operations training area (Section 4.0, Figure 4.0-1) because of the removal of soil at a rate greater than the soil's natural regenerative capability resulting in an appreciable loss of topsoil. Long-duration impacts on soil resources would be negligible elsewhere on the base and in the deployment area as a result of post-construction erosion control and the recovery of vegetation in the construction areas. None of the long-duration impacts would be significant except for onbase soil erosion in the HML vehicle operations training area.

4.10.2.1 Geologic Hazards

The proposed program would not affect regional seismicity. In addition, the potential for seismic events to affect the program is remote. Short-duration, not significant mass movement impacts may occur at some launch facilities, T/E routes, and bridges because of the potential for an increase in the baseline rate of mass movements.

Seismicity and Seismic Effects. There are no impacts on seismicity or seismic effects within the proposed program area because no program activities are planned that would affect these geologic conditions (e.g., accelerating the rate of seismic activity).

Seismic activity is not likely to cause adverse impacts on the program because of low seismicity in the ROI and absence of active faults within the proposed program area.

Mass Movements. Program-related construction along access roads and at launch facilities may cause moderate impacts at sites where slopes are already unstable. Impacts at three launch facilities are expected to be moderate and not significant and impacts at two launch facilities are expected to be low and not significant. The remaining 95 launch facilities would have negligible impacts. Launch facilities with potentially moderate impacts resulting from the potential for landslides are found near the Judith Mountains in the eastern portion of the deployment area (N-11), and along the southern limit of the Highwood Mountains (A-2 and B-9). Moderate impacts may occur from the widening of T/E routes and construction of bridge crossings in areas throughout the deployment area, including a total of 7.5 miles of T/E routes on glacial lakebed sediments north of the Sun River, in the breaks south of the Missouri River in Fergus County, and in the Highwood, Little Belt, and Big Snowy mountains, where slopes at

PROGRAM IMPACTS	NUMBER OF LAUNCH FACILITIES													
	SHORT DURATION							LONG DURATION						
	NOT SIGNIFICANT				SIGNIFICANT			NOT SIGNIFICANT				SIGNIFICANT		
	NEGLIGIBLE	LOW	MODERATE	HIGH	LOW	MODERATE	HIGH	NEGLIGIBLE	LOW	MODERATE	HIGH	LOW	MODERATE	HIGH
GEOLOGIC HAZARDS (MASS MOVEMENTS)														
PROPOSED ACTION	95	2	3					95	2	3				
ALTERNATIVE 1	94	3	3					94	3	3				
ALTERNATIVE 2	120	2	3					120	2	3				
ALTERNATIVE 3	191	5	4					191	5	4				
GEOLOGIC RESOURCES (ENERGY)														
PROPOSED ACTION	100							71	29					
ALTERNATIVE 1	100							70	30					
ALTERNATIVE 2	125							90	35					
ALTERNATIVE 3	200							142	58					
SOIL EROSION														
PROPOSED ACTION		83	2	15				100						
ALTERNATIVE 1		86	2	12				100						
ALTERNATIVE 2		106	2	17				125						
ALTERNATIVE 3		166	3	31				200						
SOIL EROSION (WIND)														
PROPOSED ACTION		98	2					100						
ALTERNATIVE 1		98	2					100						
ALTERNATIVE 2		124	1					125						
ALTERNATIVE 3		198	2					200						
SOIL EROSION (SHEET)														
PROPOSED ACTION		84	1	15				100						
ALTERNATIVE 1		87	1	12				100						
ALTERNATIVE 2		107	1	17				125						
ALTERNATIVE 3		167	2	31				200						

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FIGURE 4.10.2-2 SUMMARY OF SITE IMPACTS ON GEOLOGY AND SOILS ASSOCIATED WITH PROPOSED SMALL ICBM CONSTRUCTION AND OPERATIONS AT LAUNCH FACILITIES IN MONTANA steep roadcuts are prone to rockfalls. Program-related construction may initiate or accelerate the occurrence of cutbank slumping and cause moderate mass movement impacts at bridges located at the railroad crossing at Vaughn and on Warm Springs Creek north of Lewistown. Low impacts are expected at an additional four bridges north of Vaughn, near the Sun River, and along Warm Spring Creek. Although mass-movement impacts would be most prevalent during the construction phase, continued movement may occur on unstable slopes beyond the life of the program; therefore, short- and long-duration impacts would occur. Overall short- and long-duration impacts are expected to be low due to the potential for the program to accelerate or initiate mass movements. These impacts would not be significant.

Short- and long-duration impacts at Malmstrom AFB would be negligible because generally level slopes would be affected by program construction. These slopes have a low susceptibility to mass movements.

4.10.2.2 Geologic Resources

Because of program demands for aggregate, overall regional-level, short-duration impacts on geologic resources would be high because program demand for aggregate exceeds the production capacity. These impacts would be significant as a result of depletion of demonstrated and inferred reserves during the construction phase. Long-duration impacts would be moderate and not significant because future (hypothetical) regional reserves and production capacity are sufficient to satisfy any foreseeable future regional demand. In particular, regional-level, short-duration, high, and significant impacts may occur for aggregate consumers in the Lewistown area with moderate and significant impacts in the Great Falls and Shelby-Conrad areas. Only site-level, short-duration, negligible to low impacts are expected for energy resources that include oil, gas, and coal.

Aggregate Resources. Overall short-duration impacts on aggregate resources in the ROI would be high and significant at the regional level. These impacts would result from construction-related production-rate increases that exceed production capacity in the ROI (Figure 4.10.2-3), and the depletion of demonstrated and inferred commercial reserves in certain areas. Long-duration impacts in the ROI would be moderate and not significant at the regional level because adequate supply and production capacity could be developed to fulfill any foreseeable future demand.

Regional-level, short-duration impacts would be high and significant in the eastern portion of the deployment area and moderate and significant in the central and northern portions of the deployment area. Regional-level, long-duration impacts in all portions of the deployment area would be moderate and not significant. Additional impacts on the central portion of the deployment area would result from program requirements at Malmstrom AFB. Aggregate requirements of the housing options were assumed to represent a very small portion of the base construction demand, and neither option would measurably affect the total base program aggregate requirements. Commercial and noncommercial aggregate resources in the various regions are shown in Section 3.10.3, Table 3.10.3-1. Program demand for the Proposed Action is illustrated in Table 4.10.2-1.

In the northern third of the deployment area, it was assumed that aggregate resources would be supplied by Shelby-Conrad area producers. These producers have a combined annual production rate of 0.59 million tons, and have about 3.78 million tons of demonstrated and inferred reserves (Section 3.10.3, Table 3.10.3-2). Program aggregate

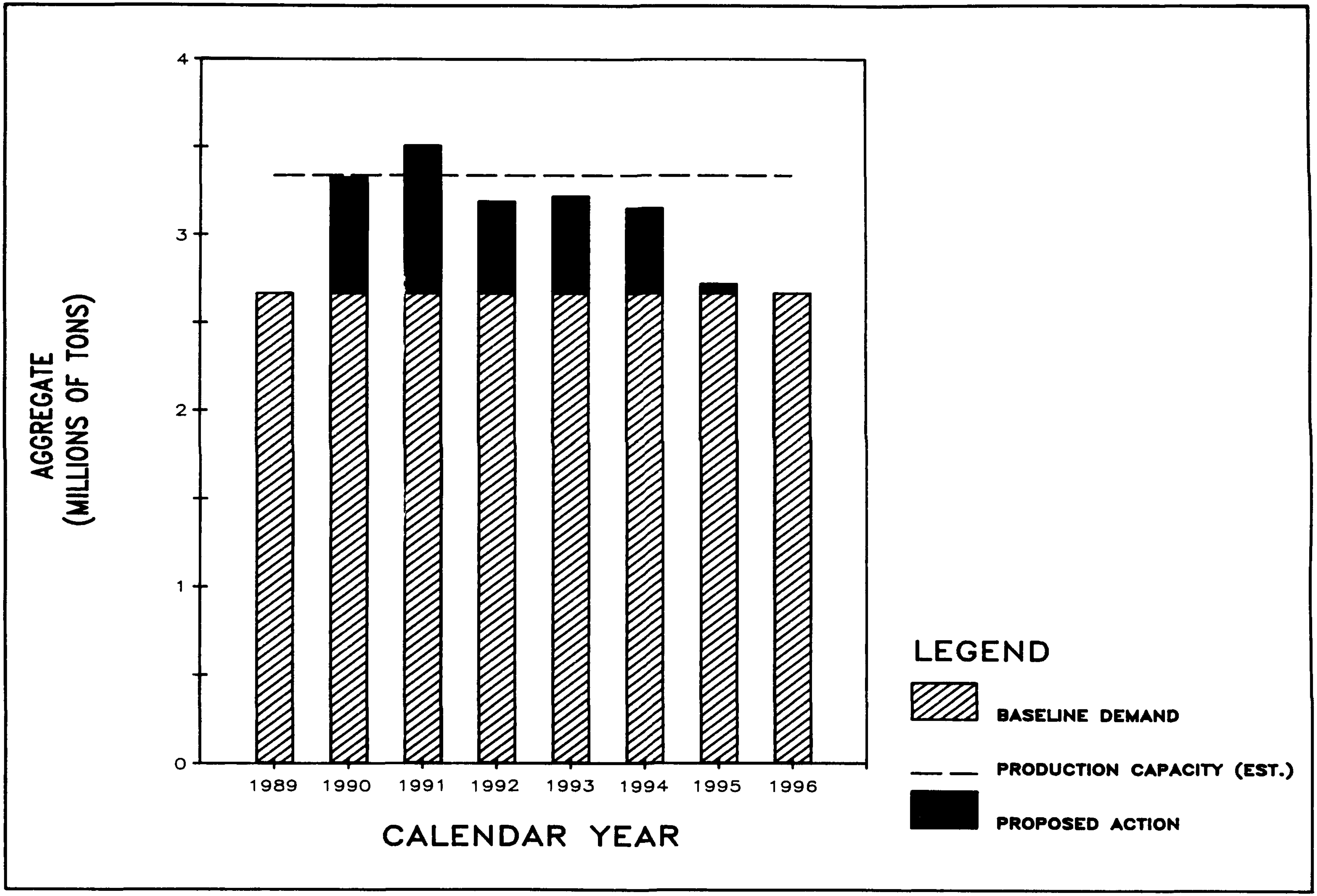

FIGURE 4.10.2-3 AGGREGATE RESOURCE PRODUCTION IN THE MALMSTROM AFB REGION OF INFLUENCE

Table 4.10.2-1

Program Aggregate Requirements by Calendar Year (In Thousands of Tons)

	1990	1991	1992	1993	1994	1995	1996	Total
Proposed Action								
Malmstrom AFB	80	190	70	60	80	0	0	480
Deployment Area	590	650	460	470	310	50	0	2,530
TOTAL:	670	840	530	530	390	50	0	3,010
Alternative 1								
Malmstrom AFB	80	170	60	70	60	0	0	440
Deployment Area	590	650	450	470	310	50	0	2,520
TOTAL:	670	820	510	540	370	50	0	2,960
Alternative 2								
Malmstrom AFB	80	200	70	80	80	0	0	510
Deployment Area	590	650	460	470	310	60	0	2,540
TOTAL:	670	850	530	550	390	60	0	3,050
Alternative 3								
Malmstrom AFB	70	180	60	70	70	0	0	450
Deployment Area	470	570	550	480	340	110	0	2,520
TOTAL:	540	750	610	550	410	110	0	2,970

requirements from 1990 to 1995 would range from 2 to 19 percent of the current production capacity of the producers. Program aggregate requirements represent approximately 11 percent of the demonstrated and inferred commercial reserves of the region. These program effects on aggregate resources in the northern third of the deployment area would result in short-duration, moderate impacts because existing producers could satisfy baseline and program demand with an increase in the production rate. These regional-level, short-duration impacts are considered significant because of the depletion of demonstrated and inferred reserves. Long-duration impacts would be moderate and not significant at the regional level because sufficient supply and production capacity could be developed to fulfill any foreseeable long-duration demand.

In the eastern third of the deployment area, it was assumed that aggregate resources would be supplied by Lewistown area producers. Production rate data were available for only one producer in the area and the production rate of 0.16 million tons of aggregate per year is extremely conservative. The suppliers here have about 0.78 million tons of demonstrated and inferred reserves. Program aggregate requirements from 1990 to 1994 would require between 75 and 157 percent of the current production capacity of the suppliers. Alternative sources would be required to satisfy program and baseline demand. Total program aggregate requirements would exceed the currently identified commercial reserves and these reserves would be totally depleted by 1991. These program effects on aggregate resources in the eastern third of the deployment area would result in short-duration, high impacts because existing producers do not have sufficient production capacity to supply baseline-plus-program demand. The short-duration impacts would be regionally significant because of depletion of demonstrated and inferred reserves. Long-duration impacts would result from the depletion of all presently identified commercial reserves and these impacts would be moderate and not significant because sufficient supply and production capacity could be developed to satisfy any foreseeable long-duration demand.

In the central third of the deployment area, it was assumed that aggregate resources would be supplied by Great Falls area producers. These producers have a combined production rate of 1.92 million tons of aggregate per year and have more than 8 million tons of demonstrated and inferred reserves. Program aggregate requirements would require production rate increases of up to 25 percent of the current capacity of the producers during the construction phase. Program aggregate requirements represent about 18 percent of the demonstrated and inferred commercial reserves and presently identified commercial reserves would be depleted by the end of 1992. These program effects to aggregate resources in the central third of the deployment area would result in short-duration, moderate impacts because existing producers could satisfy baseline and program demand with an increase in the production rate. These regional-level, short-duration impacts would be significant because of the depletion of demonstrated and inferred reserves. Long-duration impacts would be moderate and not significant at the regional level because sufficient future reserves and production capacity could be developed to satisfy any foreseeable long-duration demand. Additional impacts on aggregate resources in the central third of the deployment area would result from program demand at the base.

Program aggregate requirements at Malmstrom AFB represent a small fraction of the demonstrated and inferred commercial reserves of the central portion of the deployment area. However, since aggregate demand at Malmstrom AFB would be met by Great Falls producers, impacts would be the same as those for the central portion of the deployment area with short-duration, moderate, and significant impacts, and long-duration, moderate, and not significant impacts.

Oil and Gas. Expansion at launch facilities would require termination of current oil and gas leases but would result only in negligible or low impacts because exploration or production would not be restricted adjacent to the launch facility and just compensation would be paid for any leases that must be relinquished because of launch facility expansion. Expansion would potentially result in low impacts at 29 sites where active leases occur within the proposed expansion area; these impacts would not be significant because the affected oil and gas resources are neither critical nor represent a major portion of the state or local reserves. In addition, access to the oil and gas resources would not be restricted (Section 4.10.1.4). Impacts would be negligible at all other launch facilities and along T/E route segments. These impacts would be of long duration because the restriction of access to expanded areas would continue for the life of the program. Launch facilities where low impacts are expected are commonly found along the Sweetgrass Arch in the northern portion of the deployment area and along the Sun River, and to a lesser extent near the Judith Gap area and on the north side of the Judith Mountains. Overall long-duration impacts on oil and gas resources near launch facilities would be low and not significant. Short-duration impacts would be negligible. Oil and gas resources have not been discovered near the base; therefore, short and long-duration impacts from the Proposed Action and all housing options at Malmstrom AFB would be negligible.

Coal. Short- and long-duration impacts on coal resources in the ROI are expected to be negligible because the proposed program would not interfere with any existing operation or lease and only small amounts of mineable coal have been identified in the ROI. Present demand at Malmstrom AFB is 36,000 tons per year (T/yr). Additional demand for coal as a result of the program is approximately 24,000 T/yr from 1990 to 2010. The program coal demand is a very small percentage of the regional reserves, which include large coal deposits from the Powder River Basin field, southeastern Montana, and eastern Wyoming. Coal for the central heat plant at Malmstrom AFB has been purchased in the past from producers in the eastern Montana and Wyoming areas. Coal resources have not been documented near the base; therefore, impacts from the Proposed Action and all housing options would be negligible. Three coal leases are found directly adjacent to launch facility I-2 south of Great Falls. Long-duration impacts on coal resources at this site would be low because of the potential removal of this land from coal-leasing activities or restrictions on mining activities adjacent to the launch facility. The impact at this site, as well as all other launch facilities, would not be significant because the coal resources that would be affected are not an appreciable portion of the state or local reserves. In addition, access to the coal resources would not be restricted (Section 4.10.1.4).

4.10.2.3 Soil Erosion

Some site-level, short-duration impacts on soil resources as a result of program-induced soil erosion are expected to be high because soil erosion rates would exceed the maximum tolerable soil loss at some launch facilities and along most T/E routes and all bridges likely to require upgrading. These impacts would not be significant. Long-duration impacts on soil resources would be restricted to the base. At the base, site-level, long-duration impacts in the training area would be high because program-induced soil erosion would exceed the maximum tolerable soil loss. These impacts would be significant because they would extend beyond the functional life of the program and would cause irreparable loss of the topsoil. Overall site-level, short-duration impacts on soil erosion would be high and not significant; long-duration, site-level impacts would be low and not significant. Regional-level impacts on topsoil from soil erosion would be negligible.

Wind Erosion. Ground disturbance from road widening, road upgrades, or bridge modifications and replacements is expected to result in adverse impacts along portions of the T/E route system, especially those road segments parallel to the prevailing wind direction. Some launch facility expansion areas and T/E route segments are underlain by soil highly susceptible to wind erosion; however, the amount of time a soil is left unprotected is expected to be only 3 months during construction and the soil would be protected from excessive erosion by the application of a straw mulch or equivalent. By applying the straw mulch, the program-induced wind erosion rates would be substantially reduced. Overall short- and long-duration impacts from wind erosion would be low because soil loss is below the maximum tolerable rate and would not be significant.

No high wind erosion impacts are anticipated at any of the launch facilities, though moderate impacts are expected at D-7 and K-11 with low impacts at all remaining launch facilities. Overall short-duration program-induced wind erosion would be low and not significant because soil loss is below the maximum tolerable rate. Long-duration impacts would be negligible.

High wind erosion impacts are expected to occur along portions of one T/E route segment in Cascade County with moderate impacts along one segment in Fergus and Cascade counties. Program activities along the T/E routes are expected to result in site-specific, low impacts because of accelerated wind erosion. These short-duration impacts would not be significant because they would not result in appreciable reductions in topsoil thickness. Long-duration impacts would be negligible.

No high or moderate impacts are expected due to program-induced wind erosion at bridge localities; all impacts are expected to be low. Program-induced wind erosion at the bridge locations would result in low, not significant impacts at the site level. Soil loss is expected to remain below the maximum tolerable rate. These short-duration impacts would not be significant because they would not result in an appreciable loss of topsoil. Long-duration impacts would be negligible.

Ground disturbance associated with construction activities is expected to occur in the area immediately east of Malmstrom AFB for the proposed HML vehicle operations training area and northwest of the base for the proposed housing area. Soil would remain barren for a maximum of 1 year during housing construction activities but would be covered with a straw mulch or equivalent to enhance revegetation where appropriate. Consequently, short-duration wind erosion impacts from these actions would be low and not significant, and restricted to the site level. Soil loss is expected to occur at rates less than the maximum tolerable loss rate. Soils in about 50 percent of the HML vehicle operations training area would remain barren throughout the life of the program. Soils in the eastern portion of the base and immediately adjacent areas are all expected to erode at rates exceeding the maximum tolerable soil loss. Program-induced wind erosion at the HML vehicle operations training area is expected to result in site-level, long-duration, and high impacts because program-induced soil erosion rates would exceed the maximum tolerable soil loss. These impacts would be significant because they would extend beyond the functional life of the program and would cause irreparable loss of the topsoil.

Sheet Erosion. Ground disturbance from launch facility expansion, road widening, road upgrades, or bridge modifications and replacements is expected to result in short-duration, high, site-level impacts along the T/E route system and at launch facilities. Several launch facility expansion areas are underlain by soil highly susceptible to sheet erosion; however, the soil would be unprotected for a maximum of 3 months during construction and would then be covered by straw mulch or equivalent. High sheet erosion impacts would be concentrated in flights N (5 launch facilities) and A (3 launch facilities), with one launch facility in each of flights C, D, G, H, K, O, and T. Erosion rates are estimated to be four to seven times the maximum tolerable loss at launch facilities C-8, D-7, K-6, and N-2 and about one to three times the maximum tolerable loss at launch facilities A-2, A-7, A-11, G-9, H-7, N-9, N-11, O-11, and T-48. Program-induced sheet erosion would be slightly above the maximum tolerable loss at launch facilities N-6 and N-10. Moderate impacts are expected at launch facility E-2 with low impacts occurring at the other launch facilities. All launch facilities in flights J, Q, R, and S are expected to have low sheet erosion impacts. Overall short-duration sheet erosion impacts at launch facilities would be high because program-induced erosion rates are greater than the maximum tolerable soil loss at several launch facilities. These short-duration impacts would be restricted to specific sites and are not considered significant. Long-duration impacts would be negligible.

Potential road-widening activities are expected to accelerate sheet erosion, particularly along road segments constructed in soils with high sensitivity to erosion. Program-induced sheet erosion would be highest in Judith Basin, Fergus, and Lewis and Clark counties, where soils along approximately 50 percent of the T/E route segments would erode at rates greater than the maximum tolerable loss. In addition, two segments in Cascade County are expected to have high impacts. Moderate impacts are expected at one segment in each of Cascade and Fergus counties. The amount of time soils would be left unprotected was assumed to be only 3 months, and the soil would be partially protected from erosion by a straw mulch. Site-level, short duration impacts from road widening would be high because erosion would exceed the maximum tolerable loss. This impact would not be significant and would be restricted to specific sites. Long-duration impacts would be negligible.

All construction activity associated with bridge upgrading would increase soil erosion rates to levels that exceed the maximum tolerable soil loss. However, these rates are expected to last for only 2 to 3 months during the actual construction activity at the bridge and would diminish as the mulching and revegetation efforts are applied. Very high erosion rates (greater than 100 tons per acre per year) are expected at six bridges in Judith Basin County, four in Cascade County, and two in Lewis and Clark County. Short-duration impacts on soil resources from program-induced sheet erosion at bridges would be high because soil erosion is expected to exceed the maximum tolerable loss, but would be restricted to the site level. Impacts would not be significant because accelerated erosion rates would occur for only a short period of time and would not appreciably reduce topsoil thickness. Long-duration impacts would be negligible.

Ground disturbance for new housing is expected to occur adjacent to the northwestern corner of Malmstrom AFB. Soil in any one portion of this potential housing area would remain barren for a maximum of 1 year during an overall construction phase of up to 4 years, but would be protected from excessive erosion by the application of a straw mulch or equivalent materials. Consequently, short-duration sheet erosion impacts are expected to be low because soil erosion would remain below the maximum tolerable loss. These impacts would not be significant and would be restricted to the site level. Soils in about one-half of the HML vehicle operations training area would remain barren throughout the life of the program and are expected to erode at rates exceeding the maximum tolerable soil loss. Program-induced sheet erosion in the HML vehicle operations training area is expected to result in site-level, long-duration, and high impacts. These impacts would be significant because erosion would result in an applicable net loss of topsoil.

4.10.3 Impacts of Alternatives

The three alternatives under consideration use different combinations of the number of HMLs, launch facilities, HMLs per launch facility, and type of HML enclosures constructed. The impacts on geology and soils would be essentially the same for Alternative 1 as for the Proposed Action. Alternatives 2 and 3 would have greater site-level impacts than the Proposed Action, but the overall LOI and significance would not be substantially different.

Overall impacts on geology and soils resources are expected to be highest for Alternative 3 because a maximum amount of surface disturbance and land acquisition is anticipated from the use of all 200 launch facilities as opposed to 100 for the Proposed Action and Alternative 1 or 125 for Alternative 2. Short-duration impacts on aggregate resources would be high and significant for all alternatives because of program demands for aggregate. Long-duration impacts on soil resources as a result of soil erosion would be high and significant for the HML vehicle operations training area on Malmstrom AFB because of long-duration degradation of soils within the area as a result of HML vehicle operations training activities.

4.10.3.1 Geologic Hazards

For geologic hazards, the LOIs for all three alternatives would be the same as the Proposed Action. Site-level, short- and long-duration impacts would be low and not significant. Site-level impacts would vary depending on the launch facilities identified for deployment and are not considered significant. Impacts at Malmstrom AFB would be the same as the Proposed Action for all alternatives.

Alternative 1. Short- and long-duration impacts on geologic hazards would be the same as the Proposed Action. Overall short- and long-duration, negligible impacts are expected at 94 launch facilities with low, not significant impacts at three launch facilities (D-7, F-3, and M-6). Short- and long-duration, moderate, and not significant impacts may occur at three launch facilities (A-2, B-9, and N-11).

High impacts are not expected along any T/E route, though moderate impacts are expected for four segments in Fergus County with low impacts along portions of three segments in Fergus County and one segment in Wheatland County. Overall short- and long-duration impacts would not differ appreciably from the Proposed Action.

Moderate mass movement impacts would occur at only one bridge in Cascade County. Low impacts would occur at three bridges in Cascade County and one bridge in both Fergus and Teton counties. Overall short- and long-duration impacts would not differ appreciably from the Proposed Action.

Alternative 2. Short- and long-duration impacts on geologic hazards would be the same as the Proposed Action. Short- and long-duration, negligible impacts are expected at 120 launch facilities with moderate and not significant impacts at three launch facilities (A-2, B-9, and N-11) and low, not significant impacts at two launch facilities (F-3 and M-6).

Moderate impacts are expected along two T/E route segments in Cascade County and four segments in Fergus County. Low impacts would occur along four segments in Fergus County and one in Wheatland County. Overall short- and long-duration impacts would not differ appreciably from the Proposed Action.

Moderate mass movement impacts would occur at two bridges; one each in Cascade and Fergus counties. Low impacts would occur at three bridges in Cascade County and one bridge in both Fergus and Teton counties. Overall short- and long-duration impacts would not differ appreciably from the Proposed Action.

Alternative 3. Short- and long-duration impacts on geologic hazards would be slightly greater than the Proposed Action. Short- and long-duration, site-level impacts on geologic hazards would be moderate and not significant at four launch facilities (A-2, B-9, C-7, and N-11), low and not significant at five launch facilities (D-7, F-3, L-2, M-6, and N-5), and negligible for the remaining launch facilities. Impacts at these sites would not be mitigable by avoidance because all 200 launch facilities would be used for peacetime deployment.

Moderate impacts are expected along six T/E route segments in Fergus County, two in Cascade County, and one segment in both Judith Basin and Teton counties. Low impacts are concentrated in Fergus County (5 segments), but also occur in Cascade, Wheatland, and Lewis and Clark counties. Overall short- and long-duration impacts would not appreciably differ from the Proposed Action.

Moderate impacts are expected at two bridges in Cascade County, one bridge in Pondera County, and one bridge in Fergus County. Low impacts would occur at three bridges in Cascade County and one bridge in both Fergus and Teton counties. Overall short- and long-duration impacts would not appreciably differ from the Proposed Action.

4.10.3.2 Geologic Resources

For all three alternatives, impacts on aggregate resources are the same as the Proposed Action. Short-duration impacts would be high and significant at the regional level, and long-duration impacts would be moderate and not significant. The program aggregate demand is not measurably different from the alternatives. Impacts on energy resources are the same as the Proposed Action. Short-duration impacts would be negligible with long-duration, negligible to low impacts at the site level. Site-level impacts on energy resources would vary depending on the launch facilities identified for deployment and would not be significant.

Alternative 1. This alternative requires about 40,000 fewer tons of aggregate than the Proposed Action. This is less than a 2-percent reduction in program demand and would not materially change aggregate supply and production relationships identified for the Proposed Action. Short- and long-duration impacts on aggregate resources are expected to be the same as the Proposed Action.

Short- and long-duration impacts on oil and gas resources, as well as coal resources, are expected to be the same as the Proposed Action. Although not all of the launch facilities proposed for this alternative are the same as the Proposed Action, only one additional launch facility would have a low impact. Long-duration, negligible impacts are expected for 70 launch facilities, and long-duration, low, and not significant impacts are anticipated for 30 sites.

Alternative 2. Short- and long-duration impacts on aggregate resources would be nearly the same as the Proposed Action. Program demand for this alternative is about 63,000 tons (2%) greater than the Proposed Action. Program demand would not materially change aggregate supply and production relationships identified for the Proposed Action.

Long-duration impacts on oil and gas resources are expected to be low and not significant at 35 launch facilities as opposed to 29 for the Proposed Action. Construction at the remaining 90 launch facilities would result in long-duration, negligible impacts.

Alternative 3. This alternative requires about 23,000 fewer tons of aggregate than the Proposed Action. This is about a 1-percent reduction in program demand and would not materially change aggregate supply and production relationships identified for the Proposed Action. Short- and long-duration impacts on aggregate resources are expected to be the same as the Proposed Action.

Site-level, long-duration impacts on energy resources (oil and gas) would be low and not significant for 58 launch facilities. Impacts at the other launch facilities would be negligible. Impacts on coal resources would be the same as the Proposed Action. All short- and long-duration impacts would be negligible.

4.10.3.3 Soil Erosion

For all alternatives, soil erosion impacts are primarily the same as the Proposed Action. Short-duration impacts would be high and not significant, and long-duration impacts would be low. Site-level impacts vary depending on launch facilities identified for deployment and would not be significant except for one onbase location, where long-duration, high, and significant impacts on soil erosion would occur at the HML vehicle operations training area.

Alternative 1. Impacts of program-induced erosion on soil resources would be slightly less than the Proposed Action. Short-duration, high, and not significant sheet erosion impacts would occur at 12 launch facilities, but none would have high wind erosion impacts. Short-duration, moderate, and not significant wind erosion or sheet erosion impacts would occur at launch facilities K-11 and E-2.

Short- and long-duration impacts on soils along T/E routes are expected to be similar to the Proposed Action. The total amount of soil lost resulting from program-induced wind and sheet erosion is not appreciably different from the Proposed Action.

Short- and long-duration impacts on soils at bridges would be similar to the Proposed Action. The average soil erosion rates per bridge are not expected to differ appreciably from the Proposed Action, though the overall amount of soil lost resulting from bridge modifications is slightly greater than the Proposed Action.

Alternative 2. Impacts of program-induced erosion on soil resources would be slightly greater than the Proposed Action. Short-duration, high, and not significant sheet erosion impacts would occur at 17 launch facilities, but none would have high wind erosion impacts. Short-duration, moderate, and not significant wind erosion or sheet erosion impacts would occur at launch facilities K-11 and E-2.

Short- and long-duration impacts on soils along T/E routes are expected to be similar to the Proposed Action. The total amount of soil lost resulting from program-induced wind and sheet erosion is not appreciably different from the Proposed Action.

Short- and long-duration impacts on soils at bridges would be similar to the Proposed Action. The average soil erosion rates per bridge are not expected to differ appreciably from the Proposed Action, though the overall amount of soil lost because of bridge modifications is about 6 percent greater than the Proposed Action.

Alternative 3. Impacts of program-induced erosion on soil resources would be slightly greater than the Proposed Action. Short-duration, high, and not significant sheet erosion impacts would occur at 31 launch facilities, but none would have high wind erosion impacts. Short-duration, moderate, and not significant wind erosion or sheet erosion impacts would occur at launch facilities G-7, K-11, and E-2.

Short- and long-duration impacts on soils along T/E routes are expected to be similar to the Proposed Action. The total amount of soil lost resulting from program-induced wind and sheet erosion is not appreciably different from the Proposed Action.

Short- and long-duration impacts on soils at bridges would be similar to the Proposed Action. The average soil erosion rates per bridge are not expected to differ appreciably from the Proposed Action, though the overall amount of soil lost resulting from bridge modifications is about 14 percent greater than the Proposed Action.

4.10.4 Cumulative Impacts

4.10.4.1 Geologic Hazards

Short- and long-duration cumulative impacts would be negligible for geologic hazards within the affected area on or adjacent to Malmstrom AFB.

4.10.4.2 Geologic Resources

Cumulative impacts on geologic resources are not expected to change the LOI and significance ratings for aggregate resources. However, the construction of an estimated 12 miles of railroad spur, 9 miles of road, and other onbase facilities for the Peacekeeper in Rail Garrison program is expected to require about 251,000 tons of aggregate and/or railroad ballast. Most of the construction activity would occur in the immediate vicinity of Malmstrom AFB and aggregate would probably come from producers in the Great Falls supply area. Program aggregate demand would occur from 1990 through 1994 with a peak-year demand of about 94,000 tons in 1993. Railroad ballast would account for a portion of the 251,000 tons of aggregate required by the program. Current annual production of railroad ballast in Montana is about 43,000 T/yr with the total program requirements estimated to be about 49,000 tons (assuming about 4,100 tons per mile of rail line). The amount of unused railroad ballast production capacity in the ROI or adjacent areas is unknown; however, the capacity is expected to be sufficiently large to accommodate the Peacekeeper in Rail Garrison program.

In 1991, the cumulative aggregate demand resulting from the Small ICBM and Peacekeeper in Rail Garrison programs would slightly exceed the production capacity of producers in the Great Falls supply region. This condition would occur only in 1991 and would not change the LOI or significance ratings.

Onbase coal consumption would likely increase if the Peacekeeper in Rail Garrison program is deployed at Malmstrom AFB, but this additional demand plus baseline demand is expected to be much less than 1 percent of the regional coal production.

4.10.4.3 Soil Erosion

Cumulative impacts from the potential deployment of the Small ICBM and Peacekeeper in Rail Garrison programs are not expected to change the LOI for soil resources. Construction associated with the new facilities and the rail spur to the main line would result in some short-duration increases in soil erosion at individual sites. Long-duration impacts offbase are not expected to be different from those of the Proposed Action.

4.10.5 Impacts of the No Action Alternative

For geologic hazards, mass movement conditions would continue at a rate similar to that determined for the recent geologic past, which is low for the region. Land development and road maintenance and construction would proceed at a pace similar to historical trends. Overall, these developments would result in a minor initiation or acceleration of mass movements in the ROI. For aggregate resources, normal regional expansion would create a steady, low demand in the region, with peak requirements needed to respond to future large construction programs that may occur in the area. Energy resource uses are expected to be low but would fluctuate with state or national trends since local supply and demand is only a small fraction compared to these regions. Soil erosion would occur within the region at a rate similar to the existing baseline rate in response to land development, agricultural practices, and road construction.

4.10.6 Potential Mitigation Measures

Potential mitigations are measures that could be undertaken to reduce or eliminate program impacts. All, some, or none of the measures identified for the geology and soils resource may be implemented. For each measure, the agencies that may be involved in implementation are identified. The Air Force would encourage implementation of these measures through environmental awareness and other programs. Potential mitigation measures for the geology and soils resource include the following:

- Apply straw mulch (or materials providing equivalent protection) as a temporary soil erosion protection measure at rates greater than the 2,000 pounds per acre (lb/ac) assumed in the impact analysis. The application of straw mulch at a rate of 4,000 lb/ac of disturbed ground would reduce the amount of topsoil lost by 60 to 70 percent over that expected from implementation of the assumed mitigations. This relatively inexpensive mitigation measure would reduce many of the high impacts expected at disturbed areas to moderate. The mulch may have to be stabilized (e.g., tied down with netting) to prevent blowing (U.S. Air Force, U.S. Army Corps of Engineers, and Montana Department of Highways).

- Develop stormwater runoff measures to control the rate of runoff by the mechanical shortening of ground slopes or slope reduction. Mechanical shortening is possible through the use of runoff retardation features such as bales of straw anchored across the direction of surface water transport or routing the runoff across adjacent, gently sloping grassed areas, or the construction of terraces, berms, or small check dams to deflect and slow the runoff. These measures are less effective and more expensive than the application of straw mulch but could reduce impacts with extensive implementation. Reductions in the amount of ground slope often require an increase in the amount of disturbed area. Consequently, the benefits of slope reduction are often partially offset by the increased lengths of disturbed ground over which precipitation runoff would flow (U.S. Air Force, U.S. Army Corps of Engineers, and Montana Department of Highways).

- Apply sediment retention measures until post-construction revegetation measures have taken effect. The effectiveness of sediment traps in reducing impacts from increased erosion varies with the intensity and frequency of precipitation, topography, soil type, and extent of disturbance. Sediment traps are effective in reducing the long-duration sediment load (U.S. Air Force, U.S. Army Corps of Engineers, and Montana Department of Highways).

4.10.7 Irreversible and Irretrievable Resource Commitments

Aggregate is a nonrenewable resource in the region and, therefore, its use for this program would result in an irreversible and irretrievable commitment of about 3 million tons of the resource.

4.10.8 Relationship Between the Local Short-Term Use of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

Short- and long-duration impacts may occur on the geology and soils resource. Short-duration aggregate demands would be related to construction of facilities and upgrading of roads and bridges. This short-duration demand may affect the local availability of aggregate but not materially affect regional supplies during the operations phase. Minimal short- and long-duration impacts are expected on geologic hazards and other geologic resources. Short-duration impacts on soils as a result of erosion are predicted except for the HML vehicle operations training area adjacent to Malmstrom AFB, where impacts should be considered of long duration.

4.11 Air Quality

Construction and deployment of the Small Intercontinental Ballistic Missile (ICBM) system at Malmstrom Air Force Base (AFB) would effect local air quality. The impact analysis considers carbon monoxide (CO) and fugitive dust, the primary pollutants. These parameters are used as indicators of program impacts on air quality. Calculations were also performed for emissions of nitrogen oxides (NO_x), sulfur oxides (SO_x), and fugitive dust for the regional visibility analysis. Volatile organic compound emissions (precursors for the formation of ozone) during the construction and operations phases are expected to be minor and were not considered in this analysis.

4.11.1 Impact Analysis Methodology

The impact analysis methodology involved three separate procedures: evaluation of program impacts, determination of levels of impact (LOI), and determination of the significance of impacts. The methodology also included consideration of a number of assumptions and assumed mitigations. Impacts were evaluated at the local level in Great Falls and at the regional level for the deployment area. A collective assessment of impacts was also made.

4.11.1.1 Evaluation of Program Impacts

Air quality impacts can be segregated into traffic-related impacts during the operations phase, and temporary construction-related impacts at Malmstrom AFB and in the deployment area. The primary pollutant associated with transportation sources is CO, and is a problem unique to urban areas. The primary pollutant resulting from construction activities is fugitive dust. Appropriate computer models, incorporating ambient data and program assumptions, were used to estimate future conditions resulting from the program. Appropriate screening methodologies were used to estimate the effects on visibility in all areas.

In addition, onbase and offbase housing options were considered. Onbase housing construction activity, along with construction activity at Malmstrom AFB, was analyzed. For the offbase housing option, construction would occur at widely scattered locations in and around the greater metropolitan area. As a result, overall Great Falls air quality would not be affected by this small-scale, dispersed activity.

The Hard Mobile Launcher (HML) vehicle operations training area would be located on the southeastern side of Malmstrom AFB. It would consist of training roads, HML maneuver areas, classrooms, and enclosures for the training vehicles. A training activity scenario was developed to calculate fugitive dust emissions and for model input.

To determine vehicular CO concentrations on selected roadway segments in Great Falls, the U.S. Environmental Protection Agency (EPA) mobile source emissions program model, MOBILE 3, was used in conjunction with the CALINE 3 dispersion model (Federal Highway Administration 1979). MOBILE 3 was used to determine specific vehicular mixes (i.e., percentages of light-duty gas/diesel cars and trucks, medium-duty gas/diesel trucks, and heavy-duty gas/diesel trucks), percentage of hot or cold start operations, inspection/maintenance criteria, and ambient temperature. MOBILE 3 is an accepted EPA procedure for determining composite vehicular emission source strengths for CO.

The computerized CALINE 3 model was used for the estimation of CO concentrations from line (e.g., roadway) sources. The model incorporates vehicular emissions factors from MOBILE 3, vehicular volumes, meteorological parameters (e.g., wind speed and direction and atmospheric stability class), and roadway configuration (based on a

Cartesian coordinate system) to estimate 1-hour and 8-hour CO concentrations for selected roadway segments. Taking the most conservative approach, worst-case meteorological parameters were used in the analysis. These include the wind direction yielding the highest CO concentration at a receptor; 1 meter per second (m/sec) and 2 m/sec wind speeds for the 1-hour and 8-hour analyses, respectively; and atmospheric stability Class 5 (slightly stable) and Class 4 (neutral) for the 1-hour and 8-hour analyses, respectively.

Short-duration air pollution emissions would consist primarily of fugitive dust from areas cleared for construction and from construction-related motor vehicles, which include heavy-duty construction equipment. Construction activity (e.g., land clearing, blasting, ground excavation, and cut-and-fill operations) and vehicle movements are the most significant sources of fugitive dust, defined as particulate matter that becomes airborne because of natural causes and/or human activities.

Fugitive dust emissions change as the source activity varies. One important factor contributing to uncertain fugitive dust emissions estimates is the uncertainty in the parameters that scale the emissions rates to a specific site; namely, the silt and moisture content of the material and the extent of the source. In spite of these uncertainties, estimates were made for fugitive emissions resulting from construction activity. Fugitive dust emissions resulting from construction activity are proportional to the area of land being worked and the level of construction activity. Based on the EPA methodology, emissions factors were developed for construction activities. The construction area includes approximately 60 acres at Malmstrom AFB (for the peak-construction year, 1991), approximately 3 acres at each launch facility, possible rebuilding of as many as 124 bridges disturbing a total of 217 acres, and 20-foot potential disturbance corridors along transporter/erector (T/E) routes that may require upgrading in the deployment area. Because the disturbance from launch facility modifications and road and bridge improvements would occur over a 6-year period and for a nine-county region, all countywide fugitive emissions were calculated.

Fugitive dust concentrations were analyzed in detail for construction activities at Malmstrom AFB. The ambient air quality impacts for fugitive dust were estimated with the EPA Industrial Source Complex (ISC) model (U.S. Environmental Protection Agency 1979b) using the emissions data calculated for various activities. Fugitive dust generated by the improvement of roads and bridges in the deployment area and construction at launch facilities and other combustion-related criteria pollutants were not modeled. Instead, the total fugitive dust and other criteria pollutants generated in each county from various construction activities were compared with the known total county emissions.

Heavy diesel-powered construction equipment, trucks, and other motor vehicles used for construction activities at Malmstrom AFB emit pollutants such as sulfur dioxide (SO_2), particulates, NO_x, CO, hydrocarbons (HC), and other by-products through combustion of fuel. Total emissions of these pollutants from construction equipment and other motor vehicles depend not only on the level of construction activity, but also on the environmental control and management plan of the sites involved. Emissions resulting from heavy diesel equipment were estimated using EPA Document AP-42 and the numbers and types of construction equipment assumed to be onsite. The heavy truck emissions were estimated using the emission factors provided by the EPA (1985a). The SO_2, CO, and nitrogen dioxide (NO_2) emissions have been modeled for the combustion products from the construction activity at Malmstrom AFB.

Congress added the 1977 Amendments to the Clean Air Act to address the problem of deteriorating visibility in the mandatory Prevention of Significant Deterioration (PSD) Class I areas (where visibility is an important value). Mandatory Class I areas include national parks, wilderness areas, and international parks. Impairment to visibility is defined as that which interferes with the management, protection, preservation, or enjoyment of the visitor's visual experience of the mandatory Class I area, which may be traceable to a specific source. It is EPA policy to consider impacts on Class I areas that result from sources approximately 60 miles from the area. The nearest Class I area to Malmstrom AFB is Gates of the Mountains Wilderness, about 48 miles away. Visibility is a function of fugitive dust levels as well as other parameters (NO_2 and SO_2). The EPA visibility workbook (1980b) was used to determine potential visibility impairment on the Gates of the Mountains Wilderness from proposed program activities during the construction phase. Visibility analysis for deployment area construction activities was not addressed for the nearby PSD Class I areas because of the scattered nature of construction activity.

4.11.1.2 Determination of Levels of Impact

The magnitude of program effects on air quality was classified as having negligible, low, moderate, or high LOIs depending on the general health effects of pollutants generated by program facilities and activities. These were determined by known or projected ground-level concentrations and their relationship to applicable ambient air quality standards. In addition, EPA minimum threshold increments from new or modified major sources in nonattainment areas were used to better define the LOI definitions. The analysis includes a breakdown of LOIs by both areal extent and duration, as appropriate. Separate LOI criteria have been developed for CO, fugitive dust, and visibility.

The LOI definitions for CO are the following:

- Negligible Impact -- Predicted incremental CO concentrations would not equal or exceed EPA minimum threshold levels (500 micrograms per cubic meter [$\mu g/m^3$] or 0.45 parts per million [ppm] over an 8-hr period or 2,000 $\mu g/m^3$ or 1.8 ppm over a 1-hr period). These increments plus background concentrations would be minimal when compared to the national or state air quality standards. No general health effects would occur.

- Low Impact -- Predicted incremental CO concentrations would equal or exceed EPA minimum threshold levels, but the concentrations plus background would not exceed 5000 $\mu g/m^3$ or 4.5 ppm over an 8-hour period or 20,000 $\mu g/m^3$ or 17.5 ppm over a 1-hour period, which is 50 percent of the National Ambient Air Quality Standards (NAAQS). No general health effects would occur, but pollutant concentrations would show some increase.

- Moderate Impact -- Predicted incremental CO concentrations plus background would equal or exceed the 50-percent level of the NAAQS, but the total concentrations would not exceed the NAAQS (10,000 $\mu g/m^3$ or 9 ppm over an 8-hr period or 40,000 $\mu g/m^3$ or 35 ppm over a 1-hr period). No general health effects would occur, but pollutant concentrations would rise measurably.

- High Impact -- Predicted incremental CO concentrations would exceed the NAAQS (10,000 $\mu g/m^3$ or 9 ppm over an 8-hr period or 40,000 $\mu g/m^3$ or 35 ppm over a 1-hr period) when combined with background concentrations. General health effects would include decreased exercise capacity in angina patients.

The LOI definitions for fugitive dust are the following:

- Negligible Impact -- Predicted incremental concentrations of fugitive dust would not equal or exceed 1 $\mu g/m^3$ averaged annually or 5 $\mu g/m^3$ over a 24-hour period. These concentrations plus background would be minimal compared to the standards. No general health effects would occur.
- Low Impact -- Predicted incremental concentrations of fugitive dust would exceed 1 $\mu g/m^3$ averaged annually or 5 $\mu g/m^3$ over a 24-hour period, but the increment plus background concentrations of fugitive dust would not exceed 35 $\mu g/m^3$ averaged annually or 100 $\mu g/m^3$ over a 24-hour period. No general health effects would occur, but pollutant concentrations would show some increase.
- Moderate Impact -- Predicted incremental concentrations of fugitive dust would exceed 35 $\mu g/m^3$ averaged annually or 100 $\mu g/m^3$ over a 24-hour period. The increment plus background concentrations of fugitive dust would not exceed the ambient air quality standards of 50 $\mu g/m^3$ of particulate matter (PM_{10}) (only those particulate sizes with an aerometric diameter of 10 microns or less) averaged annually or 150 $\mu g/m^3$ (PM_{10}) over a 24-hour period. No general health effects would occur, but pollutant concentrations would rise measurably.
- High Impact -- Predicted incremental concentrations of fugitive dust would exceed the PM_{10} primary NAAQS (50 $\mu g/m^3$ averaged annually or 150 $\mu g/m^3$ over a 24-hr period) when combined with background concentrations of PM_{10}. General health effects would occur. Susceptible people would experience mild aggravation to the upper respiratory system.

The air quality effects on visibility were determined for Class I (regional-scale) areas. The level of visibility impairment as applicable to the program area was classified as described in the following. These classifications were based on existing visual ranges near Class I areas. The EPA has not promulgated standard visual ranges as criteria for accepted clear-zone distances within Class I areas; however, visual range is generally reported with respect to a distinct set of visibility markers (e.g. mountains, buildings, or towers) as used and recorded at various airport weather stations. This historical information was used to develop the LOI for visibility at the Gates of the Mountain Wilderness.

The LOI definitions for visibility are the following:

- Negligible Impact -- Predicted levels of visual range would not be less than the existing program area median yearly visual range of 64 miles.
- Low Impact -- Predicted levels of median yearly visual range would be reduced to between 50 to 63 miles.
- Moderate Impact -- Predicted levels of median yearly visual range would be reduced to between 30 to 49 miles.
- High Impact -- Predicted levels of median yearly visual range would be reduced to less than 30 miles.

4.11.1.3 Determination of Significance

The significance of air quality resource impacts was evaluated in accordance with Council on Environmental Quality (CEQ) regulations. Significance was assessed through evaluation of the context and intensity of impacts. Context includes consideration of the settings (site, local, or regional) and duration of the impacts. The CEQ regulations provide ten items that should be considered in evaluating intensity. Of these ten items, the following are applicable to the air quality resource:

- Impacts that may be both beneficial and adverse. A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial.
- The degree to which the proposed action affects public health or safety.
- Unique characteristics of the geographic area, such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.
- The degree to which the effects on the quality of the human environment are likely to be highly controversial.
- The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.

In addition to these considerations, which are specifically identified in the CEQ regulations, the following additional consideration is judged appropriate for the air quality analysis:

- Whether the program causes an increase in predicted concentrations of an individual pollutant when combined with background concentration levels, such that the applicable ambient air quality standard is equaled or exceeded; and
- Whether the program is expected to cause reductions in the median yearly visibility range to below 30 miles.

4.11.1.4 Assumptions and Assumed Mitigations

Assumptions. The following assumptions were considered in developing the pollutant emissions for Malmstrom AFB, in the deployment area, and at the HML vehicle operations training area as an input to the various models used:

- Construction will temporarily disturb about 3 acres of land at each launch facility for the Proposed Action and Alternatives 1 and 2, and disturb about 2 acres each for Alternative 3;
- Road and bridge construction will consist of potential widening of deployment area roads and possible rebuilding of as many as 124 bridges;
- Construction will temporarily disturb about 60 acres of land onbase for the peak construction year (1991);
- HML travel on dirt roads will be 100 miles each day;

- HML travel on gravel roads will be 100 miles each day;
- Approximately 100 acres of the HML vehicle operations training area will be permanently disturbed and will be subject to wind erosion; and
- HML vehicle operations training activity will occur approximately 240 days per year.

Assumed Mitigations. The following assumed mitigation was used in the assessment for fugitive dust impacts:

- Fugitive dust will be controlled by regular watering of construction areas, achieving a 50-percent reduction in emissions. This measure will be included in the construction contract specifications to minimize construction-phase emissions.

4.11.2 Impacts of the Proposed Action

Short-duration air quality impacts from the Proposed Action would be low and not significant regardless of the housing option selected (Figure 4.11.2-1); long-duration impacts would be negligible. Construction at Malmstrom AFB and at the launch facilities would produce two types of air contaminants: fugitive dust generated by soil movement, and exhaust emissions resulting from vehicles and construction equipment. The short-duration equipment emissions and dust produced during construction activities, including excavation and grading, could be troublesome to some workers and could affect adjacent areas, but would not produce any significant impacts. In addition, the potential long-duration air quality impacts associated with increases in traffic in Great Falls and the deployment area during the operations phase would be negligible. No degradation of regional visibility resulting from fugitive dust emissions was predicted.

Fugitive Dust Emission Impacts at Malmstrom Air Force Base. The EPA fugitive dust standards established in 1971 are measured as "total suspended particulate matter" or "TSP" and include particle sizes with an aerometric diameter smaller than 45 microns. The particulate matter air quality standards, which went into effect on July 31, 1987, include only those particle sizes with an aerometric diameter of 10 microns or less (PM_{10}). The PM_{10} standard is representative of the fugitive dust particle sizes most important in the assessment of air quality as it relates to human health. The PM_{10} standards have been incorporated into the assessment of fugitive dust emission impacts at Malmstrom AFB.

The EPA guidelines (AP-42 Emissions) (1985a) for the calculation of fugitive dust emissions represent the entire range of particulate diameters emitted and do not determine the fraction of emissions in the 10-micron range or smaller that would result from construction activity. Therefore, all of the fugitive dust emissions at Malmstrom AFB were conservatively assumed to be within the 10-micron particle size and referenced against the PM_{10} standard for impact analysis. It is expected that actual PM_{10} emissions would be smaller than the emissions calculated under the EPA guidelines for "total suspended particulate matter."

Fugitive dust generated at Malmstrom AFB for the peak construction year (1991) would have low and not significant impacts on Great Falls air quality (i.e., EPA minimum threshold levels for fugitive dust in nonattainment areas would be exceeded, but no violation of NAAQS would occur.) Table 4.11.2-1 shows the estimated maximum emissions at selected receptors as determined by the ISC model. The results indicate that maximum impacts would be confined to within 2 kilometers (km) of the construction

LEVEL OF IMPACT	SIGNIFICANCE	
Adverse Impacts	Not Significant	Significant
Negligible	☐	
Low	○	●
Moderate	○	●
High	○	●
Beneficial Effects	▨	

Note: Some resource elements may have both beneficial effects and adverse impacts.

PROGRAM IMPACTS

ELEMENT/AFFECTED INTEREST	SHORT TERM				LONG TERM			
	PROPOSED ACTION	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	PROPOSED ACTION	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3
AIR QUALITY	○	○	○	○				
FUGITIVE DUST	○	○	○	○				
MALMSTROM AFB	○	○	○	○				
DEPLOYMENT AREA								
GREAT FALLS AREA	○	○	○	○				
CARBON MONOXIDE								
MALMSTROM AFB								
DEPLOYMENT AREA								
GREAT FALLS AREA								
VISIBILITY								
GATES OF THE MOUNTAINS WILDERNESS AREA								

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FIGURE 4.11.2-1 IMPACTS ON AIR QUALITY ASSOCIATED WITH THE PROPOSED SMALL ICBM PROGRAM IN MONTANA

Table 4.11.2-1

Construction-Related Fugitive Dust Impacts at Selected Receptors in Great Falls, Montana

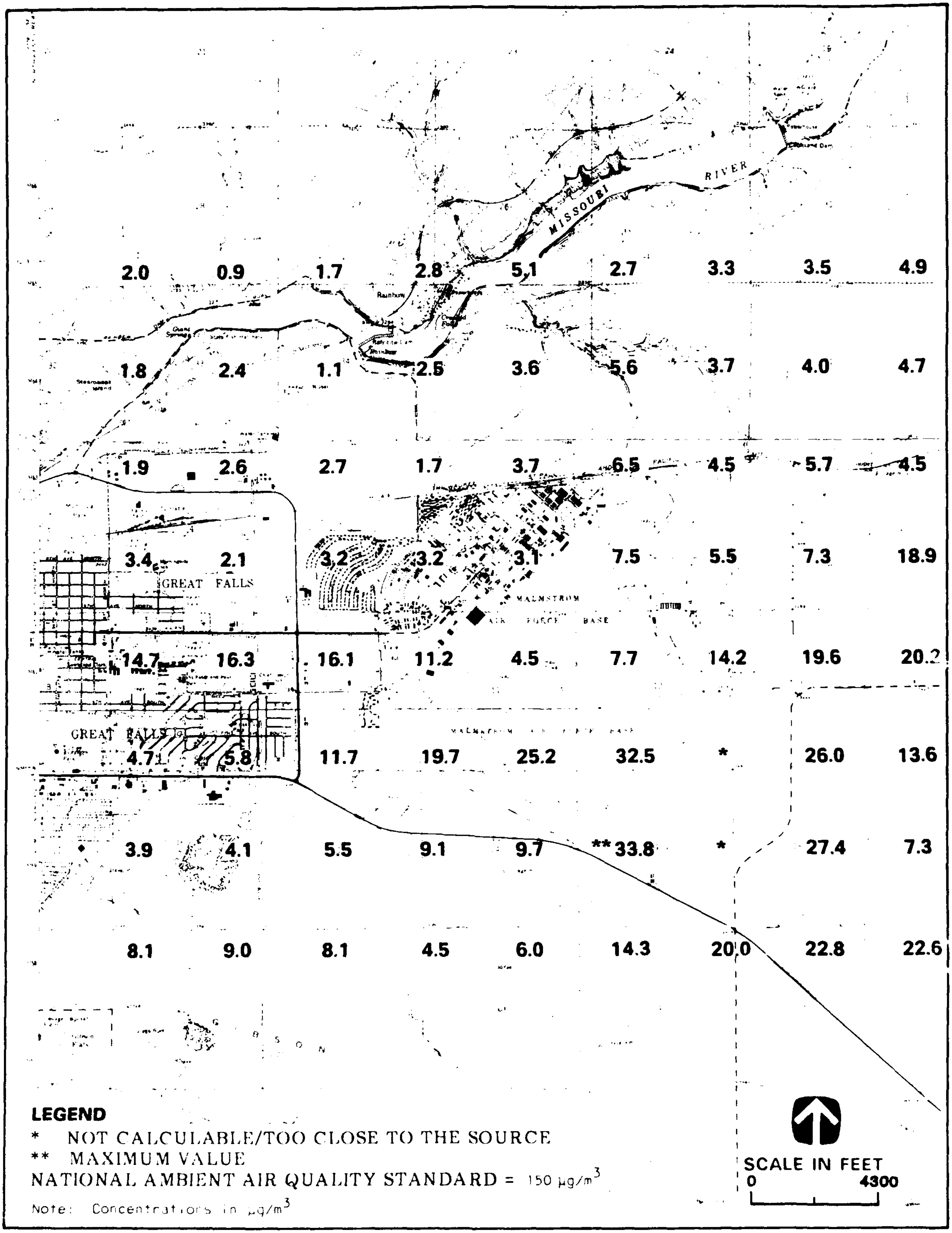
Location	Distance From Base (meters)	Averaging Period	Estimated Impacts ($\mu g/m^3$)	Background[1] Concentration ($\mu g/m^3$)	Estimated Impacts Including Background ($\mu g/m^3$)
Great Falls					
Downtown	4,900	24-hour	3.91	73	76.91
		Annual	0.04	31	31.04
Loy Elementary School	70	24-hour	6.63	73	79.63
		Annual	0.31	31	31.31
Chief Joseph Elementary School	800	24-hour	8.68	73	81.68
		Annual	0.20	31	31.20
Residential Area A	1,070	24-hour	7.72	73	80.72
		Annual	0.15	31	31.15

Note: [1] Background concentrations were obtained in consultation with the Montana Air Quality Bureau.

areas. A program-related increase of 8.68 μg would occur in the area of Chief Joseph Elementary School located 0.8 km west of Malmstrom AFB, increasing the background concentration to 81.68 $\mu g/m^3$. The predicted fugitive dust emissions and background concentration would not equal or exceed the 24-hour NAAQS of 150 $\mu g/m^3$ (PM_{10}). In addition, at this site, the annual background concentration would increase to 31.20 $\mu g/m^3$, which would not equal or exceed the PM_{10} standard of 50 $\mu g/m^3$. Construction and operations activities of the Small ICBM would result in some degradation of air quality, especially during the construction phase. These short-duration impacts would not of themselves violate any air quality standards.

The HML vehicle operations training area fugitive dust emissions for the 24-hour average would be 33.8 $\mu g/m^3$ and would occur approximately 7,000 feet southeast of the proposed KC-135R operations area. Fugitive dust emission concentrations in the vicinity of the proposed KC-135R operations area would be less than 12 $\mu g/m^3$. Program-related dust emissions would range from 4 $\mu g/m^3$ to 20 $\mu g/m^3$ along the Malmstrom AFB runway. Fugitive dust emissions generated by the HML vehicle operations training area are shown in Figure 4.11.2-2. The predicted dust emissions and the background would not equal or exceed the 24-hour PM_{10} NAAQS of 150 $\mu g/m^3$.

No degradation of regional visibility resulting from fugitive dust emissions was predicted at the nearest PSD Class I area (Gates of the Mountains Wilderness), which is located 48 miles from Malmstrom AFB. The short- and long-duration impacts would be negligible.



LEGEND

* NOT CALCULABLE/TOO CLOSE TO THE SOURCE

** MAXIMUM VALUE

NATIONAL AMBIENT AIR QUALITY STANDARD = 150 μg/m^3

Note: Concentrations in μg/m^3

EM4 AQ/1

FIGURE 4.11.2-2 MAXIMUM 24-HOUR PARTICULATE MATTER (PM_{10}) CONCENTRATION FROM HARD MOBILE LAUNCHER TRAINING ACTIVITIES

The SO_2, CO, and NO_2 emissions have been modeled for combustion products from construction activity at Malmstrom AFB. Because of the very low values, they were not presented.

Construction-Related Emissions in the Deployment Area. Construction activities in the nine-county deployment area include building 100 HML enclosures, potential upgrading of T/E routes and launch facility access roads, and possible rebuilding of as many as 124 bridge structures. Table 4.11.2-2 presents fugitive dust emissions from these activities.

Table 4.11.2-2 also shows the peak-year (1991) comparison of construction-related combustion emissions with regional air quality emissions inventory extracted from the EPA National Emissions Data Systems for CO, HC, NO_x, SO_x, and fugitive dust emissions for each county within the deployment area. These estimates were based on a mix of construction equipment relating to road and bridge construction and launch facility construction. As shown in Table 4.11.2-2, the greatest increase predicted for any parameter for any county is less than 4 percent, with approximately 82 percent of the parameters showing increases of less than 1 percent.

Fugitive dust generated by road and bridge improvements in the deployment area and launch facility construction would occur over a 6-year period and would be scattered in a nine-county region. Once construction is completed at a particular launch facility, bridge, or road segment, the fugitive dust emissions would cease. The fugitive dust particulates resulting from construction activities would increase less than 1 percent in all counties. The analysis indicated that short-duration impacts from construction within the deployment area would be negligible.

Fugitive dust emissions from vehicular activity during the operations phase in the deployment area were assessed for the 200 launch facilities. Dust emissions were calculated for vehicle travel on concrete, asphalt, gravel, and dirt roads in support of the operations phase. The total fugitive dust emissions increase was considered not significant when compared to the regional fugitive dust emissions. In addition, during the operations phase, variation in traffic loads and the resultant dust from vehicles on T/E routes that serve multiple launch facilities was assessed for two road segments: (1) a 1.2-mile section of paved road between the southern gate at Malmstrom AFB and U.S. 87/89, and (2) an 8.2-mile section of unpaved road along Montana State Highway 534, which serves four launch facilities. Table 4.11.2-3 provides the increase in fugitive dust emissions generated along these two sections of T/E routes serving multiple launch facilities from the program. Fugitive dust emissions were calculated for the year 2000 with and without the program using annual traffic on these T/E route segments during the operations phase. An increase of 4 to 6 percent in fugitive dust emissions resulting from the program would not be significant.

Vehicular Emissions in Great Falls. The results of the CO assessment for 1985 (base year), 1990 (construction phase), and the year 2000 (operations phase) with the offbase housing option are shown in Table 4.11.2-4. During the construction phase (1990), the predicted CO concentrations would result in negligible impacts on Great Falls traffic corridors. The largest increase in CO was predicted to be 0.2 ppm and 0.1 ppm for the 1-hour and 8-hour periods, respectively, as compared to future baseline.

The Proposed Action, with the offbase housing option, was modeled for CO during the operations phase (year 2000). This option was selected because it has the greatest predicted increase in traffic along Great Falls traffic corridors. For this alternative, the largest increase in CO was predicted to be 0.6 ppm and 0.1 ppm for 1-hour and 8-hour periods, respectively, occurring in the year 2000. These levels would result in

Table 4.11.2-2

Air Pollutant Emissions Impacts From Deployment Area Peak-Year Construction Activities Proposed Action - 100 Launch Facilities (1991)

County		Pollutant in Tons/Year					
		CO	HC	NO_x	SO_x	TSP	TSP (fugitive)
Cascade:	Regional	43,981	8,017	5,353	1,838	3,086	28,901
	Program[1]	5.17	1.28	12.93	1.11	0.86	37.34[2]
	% Increase	0.01	0.02	0.24	0.06	0.03	0.13
Chouteau:	Regional	7,700	1,289	673	74.0	202	29,272
	Program	2.04	0.44	5.10	0.44	0.34	4.67[2]
	% Increase	0.03	0.03	0.76	0.59	0.17	0.02
Fergus:	Regional	16,101	2,240	1,298	131	509	20,565
	Program	12.19	3.02	30.49	2.63	2.02	76.63[2]
	% Increase	0.08	0.13	2.35	2.01	0.40	0.37
Judith Basin:	Regional	4,429	653	393	39.0	91.0	10,297
	Program	1.85	0.46	4.63	0.40	0.16	26.15[2]
	% Increase	0.04	0.07	1.18	1.03	0.18	0.25
Lewis & Clark:	Regional	124,750	12,340	4,552	26,638	2,286	23,526
	Program	2.57	0.64	6.42	0.55	0.43	7.29[2]
	% Increase	-0-	0.01	0.14	-0-	0.02	0.03
Pondera:	Regional	4,653	1,177	579	61.0	385	9,957
	Program	2.19	0.54	5.48	0.47	0.36	19.64[2]
	% Increase	0.05	0.05	0.95	0.77	0.09	0.20
Teton:	Regional	4,969	775	660	63.0	183	13,103
	Program	9.78	2.42	24.45	2.11	1.62	27.18[2]
	% Increase	0.20	0.31	3.70	3.35	0.89	0.21
Toole:	Regional	3,359	685	510	43.8	217	12,215
	Program	0.45	0.11	1.13	0.10	0.08	4.32[2]
	% Increase	0.01	0.02	0.22	0.23	0.04	0.04
Wheatland:	Regional	3,459	515	209	17.0	57.0	5,399
	Program	1.55	0.38	3.87	0.33	0.26	18.28[2]
	% Increase	0.04	0.07	1.85	1.94	0.46	0.34

Notes: [1] Does not include construction activities at Malmstrom AFB.

[2] TSP (fugitive dust) emissions from the program represented for the total construction activity phase (6 years).

Table 4.11.2-3

Fugitive Dust Emissions Generated on Transporter/Erector Routes Serving Multiple Launch Facilities

		Annual Vehicle Miles Traveled Year 2000		Annual Emission (tons/year)		Percentage Increase
Road Segment	Surface	Without Program	With Program	Without Program	With Program	Due to Program
Malmstrom AFB South Gate to U.S. 87/89	Paved	2,148,390	2,227,668	37.6	38.98	4
Montana State Highway 534	Unpaved	463,915	493,845	25.9	27.6	6

long-duration, negligible impacts. Since the traffic projected for the Proposed Action, with the onbase housing option, is lower than the offbase housing option, long-duration impacts would be negligible.

4.11.3 Impacts of Alternatives

Impacts were assessed for CO resulting from vehicular traffic and construction-related fugitive dust emissions onbase and in the deployment area. Short-duration fugitive dust impacts would be low and not significant for all alternatives as a result of onbase construction activity. Short-duration impacts resulting from construction of the launch facilities would be negligible for all alternatives. Long-duration air quality impacts would be negligible for all alternatives.

There would be very little difference in air quality among the alternatives during onbase construction of the various facilities. The only differences would result from the amount of land disturbed onbase by new housing. Compared to the Proposed Action, Alternative 1 would disturb 7 acres less during the peak-construction year, and Alternative 2 would disturb 3 acres more. Alternative 3 impacts for new housing would be the same as the Proposed Action because the same number of acres would be disturbed. The short-duration impacts of fugitive dust generated by these disturbances would be low and not significant.

During construction activities at the launch facilities, Alternatives 1, 2, and 3 would generate fugitive dust emissions because of the disturbance of a total of 300, 375, and 400 acres, respectively, in nine counties. The fugitive dust emissions generated are not substantially different from those of the Proposed Action. Fugitive dust impacts during construction would be negligible and would not substantially contribute to the future baseline county emissions.

Table 4.11.2-4

Predicted Carbon Monoxide Concentrations at Selected Receptors for 1985, 1990, and 2000 (ppm)

		1985	Projections for 1990			Projections for 2000		
Roadway Segment	Averaging Time	Baseline	Future Baseline	Proposed Action	Difference	Future Baseline	Proposed Action With Offbase Housing Option	Difference
Great Falls, Montana								
10th Avenue South								
Between 57th Street and	1-hour	2.4	2.2	2.3	0.1	2.1	2.5	0.4
South Gate of Malmstrom AFB	8-hour	0.7	0.7	0.7	0.0	0.6	0.7	0.1
10th Avenue North								
Between 57th Street and	1-hour	2.8	2.7	2.9	0.2	2.5	2.8	0.3
Commercial Gate	8-hour	0.8	0.8	0.8	0.0	0.7	0.8	0.1
2nd Avenue North								
Between 38th and 57th Streets	1-hour	4.7	4.4	4.6	0.2	3.9	4.4	0.5
	8-hour	1.3	1.2	1.2	0.0	1.1	1.1	0.0
Between 57th Street and	1-hour	6.9	6.3	6.5	0.2	5.4	6.0	0.6
Malmstrom AFB Main Gate	8-hour	1.7	1.6	1.6	0.0	1.4	1.5	0.1

Alternatives 1, 2, and 3 include provisions for onbase military family housing. However, during the operations phase, there would be some small amount of program-induced, peak-hour commuting traffic. The long-duration CO impacts generated by this traffic would be negligible.

4.11.4 Cumulative Impacts

The overall short-duration impacts from the combined Small ICBM and Peacekeeper in Rail Garrison programs would be low and not significant; long-duration impacts would be negligible.

Concurrent deployment of the Small ICBM and Peacekeeper in Rail Garrison programs at Malmstrom AFB would result in additional onbase construction activities, creating additional air pollutant emissions. Peacekeeper in Rail Garrison construction would involve about 5 acres of technical and garrison facilities within a 125-acre technical support area and about 11 acres for personnel support facilities, including housing. This construction would generate about 70 tons of fugitive dust over a 3-year construction phase.

The combined fugitive dust emissions for the Small ICBM and Peacekeeper in Rail Garrison programs at Malmstrom AFB would be low and not significant and would not cause the violation of ambient air quality standards. Other combustion-related emissions generated by the two programs would be minimal and not significant.

No cumulative impacts at launch facilities would occur.

4.11.5 Impacts of the No Action Alternative

With the No Action Alternative, the Air Force would continue to maintain existing Minuteman ICBMs. The scope of such activities would not affect the rural deployment area or the urban center around Great Falls; therefore, no adverse impacts would occur on either of these areas.

The long-duration vehicular traffic CO concentrations, including existing programs, the KC-135R air refueling mission, and normal population growth in the City of Great Falls for the years 1990 and 2000, are shown in Section 4.11.2, Table 4.11.2-3. The results indicate CO concentrations for worst-case climatic conditions for 1-hour and 8-hour averaging are lower than the baseline (1985) conditions.

Continued construction at the base would generate fugitive dust and combustion-related pollutants that would be minimal and would not cause any violations of air quality standards.

No other programs are presently planned that would cause any air quality violations at the launch facilities. Roads and bridges throughout the State of Montana would be repaired through regular maintenance as needed, and should not be a problem for the excellent air quality in the region.

4.11.6 Potential Mitigation Measures

Potential mitigations are measures that could be undertaken to reduce or eliminate program impacts. All, some, or none of the measures identified for air quality may be implemented. For each measure, the agencies that may be involved in implementation are identified. The Air Force would encourage implementation of these measures through environmental awareness and other programs. Potential mitigation measures for air quality include the following:

- Transport workers to and from construction sites to a central parking facility. Pooling the transportation of workers to remote sites from central parking localities would lower dust and CO levels because fewer vehicles would be involved. This measure would be effective if it provides sufficient incentive to workers so that they participate in carpooling (i.e., they experience monetary savings, less wear on personal vehicles, and little personal inconvenience). This measure would not be effective if workers refuse to carpool (U.S. Air Force and its contractors).

- Encourage car and van pooling for Air Force employees during the operations phase. Pooling the transportation of employees at the maximum level to maintain system effectiveness will help reduce vehicle emissions and related impacts. This measure would have low to moderate success in lowering air pollutants (U.S. Air Force).

- Provide flextime for Air Force employees during the operations phase. This measure would reduce air pollution by lowering peak emissions from vehicles. Its effectiveness would be low to moderate (U.S. Air Force).

- Maintain construction vehicle engines requiring air pollution equipment. Properly tuned equipment would emit fewer harmful pollutants. This measure can be very effective in minimizing local air degradation (U.S. Air Force and its contractors).

- Place speed restrictions for vehicles on unpaved roads. Dust levels generated by moving vehicles on unpaved roads drop off substantially at low speeds. Imposing appropriate speed limits on these roads can effectively reduce fugitive dust (U.S. Air Force).

4.11.7 Irreversible and Irretrievable Resource Commitments

Implementation of the proposed program would result in no irreversible or irretrievable resource commitments with respect to air quality.

4.11.8 Relationship Between the Local Short-Term Use of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

The proposed program and alternatives would not deteriorate existing air quality in the operations phase, but would cause short-duration, temporary, local-level impacts during the construction phase.

4.12 Noise

Construction and deployment of the Small Intercontinental Ballistic Missile (ICBM) system at Malmstrom Air Force Base (AFB) would generate additional noise in the local environment. The analysis of impacts considers noise levels generated by construction vehicles and equipment and operations-related vehicles.

Noise in the general environment can be characterized by average noise level measures such as L_{eq}, the energy equivalent continuous noise level. The L_{eq} can be averaged over a 24-hour period or, for specific applications such as schools, can be averaged over a portion of the day. The daytime noise level, L_d, refers to noise occurring between 7 A.M. and 7 P.M. The day/night equivalent noise level, L_{dn}, incorporates a 10-decibel (dB) penalty for nighttime noise between 10 P.M. and 7 A.M. to reflect the added likelihood of annoyance during this nighttime period. For reference purposes, the guideline provided by the U.S. Environmental Protection Agency (EPA), identified as 55 decibels weighted on the A-scale (dBA) L_{dn}, was used.

4.12.1 Impact Analysis Methodology

Background noise monitoring was conducted at ten sites in and around Malmstrom AFB to obtain a representative measure of the existing sound levels. The impact analysis methodology for noise involved three separate procedures: evaluation of program impacts, determination of levels of impact (LOI), and determination of the significance of impacts. The methodology also included consideration of a number of assumptions and assumed mitigations. Noise impacts were evaluated by comparing program noise with background noise levels for construction-related activities at Malmstrom AFB and at launch facilities, and for operations-related traffic noise levels in the Great Falls area.

4.12.1.1 Evaluation of Program Impacts

The noise impacts of the Proposed Action would be caused by construction activities and additional traffic generated during the operations phase. Transportation studies have provided estimates of the existing and program-related traffic volumes on several traffic corridors within the City of Great Falls. At most locations, estimates of program-related traffic were well below 10 percent of the existing average daily traffic (ADT) volume in Great Falls traffic corridors. Traffic corridors where the ADT volume would increase by 10 percent or close to 10 percent as a result of the program were analyzed for noise impacts. For the construction-noise evaluation, a general approach was used from the EPA published noise guidelines for construction equipment and for typical construction sites.

The Federal Highway Administration (FHWA) STAMINA 2.0 computerized noise model was used to predict noise levels resulting from motor vehicle operation (Federal Highway Administration 1982) for the years 1985, 1990, and 2000. This model predicts noise levels from light-duty vehicles (automobiles and light trucks), medium-duty vehicles (2-axle, 6-tire trucks), and heavy-duty vehicles (trucks with more than 2 axles). STAMINA 2.0 incorporates data on vehicle volumes, vehicle speeds, and the physical characteristics of the roadway and surrounding environment into the calculation of noise-level values. The predicted peak-hour volumes used were taken from results of the transportation analysis. Additionally, calculations for roadway grade, reflective and absorptive barriers, ground cover, and adjustments for noise levels as they vary over distances are also components of this model.

The FHWA has established a noise-abatement level for highway projects of 65 dBA for the activity category that includes parks, residences, and schools. The 65-L_{eq} (1-hr energy equivalent sound level expressed in dBA) noise value was used to determine the location of existing high noise levels relative to traffic and compared with program-induced traffic noise levels.

Principal construction activities would occur at Malmstrom AFB and at the associated launch facilities. The specific noise-level changes would depend on the type and number of equipment used, the construction methods, and the scheduling of work. Based on typical noise levels from construction equipment (Table 4.12.1-1) and typical ranges of expected noise levels at construction sites, noise levels resulting from Small ICBM construction activity were estimated. Noise impacts associated with the construction activities of the proposed program were evaluated and compared with the guidelines provided by the EPA (55 L_{dn} day/night equivalent noise level expressed in dBA) for residential areas.

Table 4.12.1-1

Typical Noise Range Levels of Principal Construction Equipment

Noise Levels in dBA at 100 Feet (L_{eq} 1-hr)[1]			
Structure Construction		**Excavation and Earthmoving**	
Crane	69-81	Backhoe	66-87
Welding generator	65-76	Front Loader	66-78
Concrete mixer	68-72	Dump truck	72-88
Concrete pump	75-78	Jackhammer	76-92
Concrete vibrator	76[2]	Scraper	74-87
Air compressor	68-81		
Pneumatic tools	75-92	**Clearing**	
Bulldozer	80[2]	Front Loader	66-78
Cement and dump trucks	77-88	Dump truck	77-88
Front loader	66-78	Jackhammer	76-92
Dump truck	77-88	Crane with headache ball	69-81
Paver	80-82		
		Landscaping and Cleanup	
Grading and Compacting		Backhoe	66-87
Grader	74-87	Dump truck	77-88
Roller	67-69	Front loader	66-78
		Paver	80-82
Paving			
Paver	80-82		
Truck	77-88		
Tamper	68-71		

Notes: [1] Typical noise levels of principal construction equipment were adjusted from 50 to 100 feet.
[2] Represented by one value only in the EPA document.

Source: Derived from U.S. Environmental Protection Agency 1971a.

4.12.1.2 Determination of Levels of Impact

Noise effects resulting from program-related increases in vehicular or construction activity (individually or in combination) were classified as having a negligible, low, moderate, or high impact depending on the magnitude and/or duration of that effect on the existing ambient noise environment, relative to the local population and/or land use. Noise impacts were confined to the local vicinity of the noise sources. Noise sources and noise sensitive receptors are very site specific; any residential and public areas that may be affected by noise from program construction or operations were included in the study area. The LOIs determined for this analysis were based on sensitive noise receptors such as residential areas, schools, churches, and hospitals.

The LOIs for noise are the following:

- Negligible Impact -- Predicted noise impacts would not exceed ambient noise levels by more than 2.9 dBA. The increase is perceived as not noticeable.
- Low Impact -- Predicted noise impacts would exceed ambient noise levels by 3 to 4.9 dBA. The increase is perceived as barely noticeable.
- Moderate Impact -- Predicted noise impacts would exceed ambient noise levels by 5 to 9.9 dBA. The increase is perceived as clearly noticeable.
- High Impact -- Predicted noise impacts would exceed ambient noise levels by 10 dBA or more. The increase is perceived as doubling the noise level.

4.12.1.3 Determination of Significance

The significance of noise impacts was evaluated in accordance with Council on Environmental Quality (CEQ) regulations. Significance was assessed through evaluation of the context and intensity of impacts. Context includes consideration of the settings (site, local, or regional) and the duration of the impacts. The CEQ regulations provide ten items that should be considered in evaluating intensity. Of these ten items, the following are applicable to the noise resource:

- The degree to which the proposed action affects public health or safety;
- Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas;
- The degree to which the effects on the quality of the human environment are likely to be highly controversial; and
- The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.

In addition to the considerations specifically identified in the CEQ regulations, an increase in noise would be considered significant if the following conditions occur for an extended length of time:

- An increase in noise levels related to construction activities of greater than 10 dBA at a sensitive receptor, if the existing background noise levels are below the guideline provided by the EPA 55 dBA (L_{dn}), which is generally comparable to 57 dBA (L_{eq} 1-hr energy equivalent). This 10-dBA increase would create potential interference and annoyance.

- If the traffic-related noise levels exceed the FHWA standard of 65 dBA (L_{eq}) at any time.

4.12.1.4 Assumptions and Assumed Mitigations

Assumptions. The vehicular noise assessment assumed that roadways operated at a minimum of 30 miles per hour during the peak-hour period. This speed limit is the lowest threshold for which STAMINA 2.0 can predict associated noise levels. It represents a conservative estimate for worst-case noise analysis since lower assumed speeds will result in correspondingly lower noise-level predictions.

Assumed Mitigations. The following assumed mitigation measures were considered:

- Construction equipment was assumed to operate with noise-suppression baffles and mufflers;
- Standard construction procedures will be used, including adherence to local noise ordinances that may restrict truck size, routes, and the time of operation near residential areas; and
- During Hard Mobile Launcher (HML) maintenance, Occupational Safety and Health Administration noise standards will be met.

4.12.2 Impacts of the Proposed Action

Overall short- and long-duration noise impacts would be negligible as a result of vehicular noise generated at the launch facilities, at Malmstrom AFB, and Great Falls traffic corridors. Overall short-duration noise impacts would be negligible as a result of construction noise generated at either Great Falls or at launch facilities (Figure 4.12.2-1).

Vehicular Noise. The results of the STAMINA 2.0 noise analysis for 1985 (base year), 1990 (peak-construction workforce year), and the year 2000 (typical year of full operations) for the offbase housing option are shown in Table 4.12.2-1. During the construction phase (1990), the changes in vehicular noise levels would result in a negligible impact on local receptors. The maximum predicted increase in noise levels for 1990 was along 10th Avenue North (between 57th Street and the commercial gate), with a noise-level increase of 1.1 dBA (as compared to future baseline) during the 1-hour peak of vehicular traffic along this route. This noise-level increase was measured at 5 feet from the road right-of-way. The residential area is approximately 400 feet from the roadway; therefore, the predicted increase of 1.1 dBA would not be discernible.

The Proposed Action, with the offbase housing option, was modeled with STAMINA 2.0 for the operations phase (year 2000). This option was selected because it has the greatest predicted increase in traffic volumes along Great Falls traffic corridors. The maximum predicted increase in noise levels for the year 2000 was along U.S. 87/89 (between 57th Street and the south gate at Malmstrom AFB), with a noise-level increase of 1.9 dBA, which is barely noticeable as compared to future baseline. Furthermore, there are no sensitive receptors at this location. Therefore, the short- and long-duration program-induced vehicular noise impacts in Great Falls would be negligible for the

LEVEL OF IMPACT	SIGNIFICANCE	
Adverse Impacts	Not Significant	Significant
Negligible	☐	
Low	○	●
Moderate	○	●
High	◯	⬤
Beneficial Effects	▨	

Note: Some resource elements may have both beneficial effects and adverse impacts.

PROGRAM IMPACTS

ELEMENT/AFFECTED INTEREST	SHORT DURATION				LONG DURATION			
	PROPOSED ACTION	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3	PROPOSED ACTION	ALTERNATIVE 1	ALTERNATIVE 2	ALTERNATIVE 3
NOISE								
MALMSTROM AFB								
DEPLOYMENT AREA								
GREAT FALLS								

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FIGURE 4.12.2-1 NOISE IMPACTS ASSOCIATED WITH THE PROPOSED SMALL ICBM PROGRAM IN MONTANA

PROGRAM IMPACTS	NUMBER OF LAUNCH FACILITIES													
	SHORT DURATION							LONG DURATION						
	NOT SIGNIFICANT				SIGNIFICANT			NOT SIGNIFICANT				SIGNIFICANT		
	NEGLIGIBLE	LOW	MODERATE	HIGH	LOW	MODERATE	HIGH	NEGLIGIBLE	LOW	MODERATE	HIGH	LOW	MODERATE	HIGH
NOISE														
PROPOSED ACTION	93		7					100						
ALTERNATIVE 1	100							100						
ALTERNATIVE 2	116		9					125						
ALTERNATIVE 3	176		24					200						

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FIGURE 4.12.2-2 SUMMARY OF SITE-LEVEL NOISE IMPACTS ASSOCIATED WITH PROPOSED SMALL ICBM CONSTRUCTION AND OPERATIONS AT LAUNCH FACILITIES IN MONTANA

Table 4.12.2-1

Predicted Noise Levels at Selected Receptors 1985, 1990, and 2000

					Distance From Right-of-Way Line	
Roadway Segments	**Year**	**Program Option**	**Right-of-Way (L_{eq})**	**Difference**	**100 ft (L_{eq})**	**200 ft (L_{eq})**
Great Falls, Montana						
10th Avenue South						
Between 57th Street and South Gate of Malmstrom AFB	1985	Baseline	64.7		57.6	54.8
	1990	Future Baseline	65.0		57.9	55.1
	1990	Proposed Action (construction)	65.6	0.6	58.5	55.6
	2000	Future Baseline	65.3	1.9	58.2	55.4
	2000	Proposed Action (operations)	67.2		60.1	57.3
57th Street						
Between 2nd Avenue North and 10th Avenue North	1985	Baseline	64.9		58.4	56.0
	1990	Future Baseline	65.2		58.7	56.4
	1990	Proposed Action (construction)	65.4	0.2	59.0	56.6
	2000	Future Baseline	65.3		58.9	56.5
	2000	Proposed Action (operations)	65.8	0.5	59.4	57.0
10th Avenue North						
Between 57th Street and Commercial Gate	1985	Baseline	62.8		56.2	53.6
	1990	Future Baseline	62.8		56.2	53.6
	1990	Proposed Action (construction)	63.9	1.1	57.3	54.6
	2000	Future Baseline	63.2		56.6	54.0
	2000	Proposed Action (operations)	64.1	0.9	57.5	54.9
2nd Avenue North						
Between 38th and 57th Streets	1985	Baseline	63.8		58.8	56.5
	1990	Future Baseline	64.3		59.3	56.9
	1990	Proposed Action (construction)	64.7	0.4	59.6	57.3
	2000	Future Baseline	64.5		59.4	57.2
	2000	Proposed Action (operations)	65.2	0.7	60.2	57.8

offbase housing option. Since the traffic projected for the Proposed Action with the onbase housing option is minimal, short- and long-duration impacts would be negligible.

Short- and long-duration noise impacts resulting from the HML vehicle operations training area would be negligible. Tests conducted during the operation of the HML at Yuma Proving Ground, Arizona showed noise levels of 80 dBA from 100 feet decreasing to 52 dBA at a distance of 2,640 feet. The HML vehicle operations training area would be located near the southeast side of Malmstrom AFB, and there are no sensitive receptors in the vicinity that would be affected by the training activity. The ambient noise level of this area is estimated to be 55 dBA. Therefore, the short- and long-duration impacts of HML vehicle operations training would be negligible. Short- and long-duration noise impacts on the HML movement along transporter/erector routes would be negligible.

Vehicular Noise in the Deployment Area. The potential for noise impacts associated with increased vehicular traffic during the operations phase was assessed for the 200 launch facilities. Each launch facility in the deployment area would require 455 vehicle trips per year for support and maintenance activities. The total number of increased vehicle trips for each county in the deployment area was determined by the number of launch facilities in the respective counties. The total annual vehicle trips per county was converted to the total hourly increase in vehicle trips in order to conform with standard noise analysis methods. The projected countywide increases ranged from 0.31 to 2.7 vehicle trips per hour. Short- and long-duration noise impacts from traffic increases of such small magnitude would be negligible. In addition, 181 average daily trips would be generated at the south gate of Malmstrom AFB which serves multiple launch facilities. An increase in ADT of 4 percent would have a short- and long-duration, negligible impact on noise.

Construction Noise. Temporary impacts resulting from construction-related noise would occur within the immediate vicinity of construction sites. However, the precise noise levels would depend on the specific types of equipment used, the construction methods, and the scheduling of work. Several general conclusions can be made based on the types of construction work anticipated, and the similarities of equipment and their associated range of noise levels. Based on noise data contained in Table 4.12.1-1, construction-related noise associated with assumed activities can be estimated.

The various activities that would take place include the following:

- Construction of industrial structures, housing, roadways (grading, compacting, and paving), landscaping, and cleanup at Malmstrom AFB;
- Grading and compaction, excavation, earthmoving, and minimal structural construction at launch facilities; and
- Widening and improving (grading and compaction) of deployment area roadways, and bridge and culvert reconstruction.

Construction-related noise at Malmstrom AFB is not anticipated to affect offbase residential land uses since such noise levels from point sources attenuate quickly with distance. Potential construction-related noise levels of 85 to 90 dBA at 50 feet from the source would be reduced to 60 dBA at 1,600 feet from the source. The nearest offbase residential dwellings are greater than 6,000 feet from where the estimated construction noise would be 48 dBA from various construction sites at Malmstrom AFB. This noise which would be masked by ambient noise levels of about 58 dBA, resulting in short- and long-duration, negligible impacts.

Construction Noise in the Deployment Area. Temporary impacts resulting from construction-related noise at launch facilities would occur within the immediate vicinity of the construction sites. Grading and other construction activity at the launch facility sites, assuming bulldozer and dump truck activity only, would result in noise levels of approximately 85 dBA at 50 feet. These noise levels would decrease 6 dBA at double the distance from the source and would be reduced to approximately 55 dBA at 1,600 feet. Construction-related noise may be noticeable during periods when the normal sound levels are low. There are no applicable state or local community noise regulations for construction activity in the deployment area.

The existing noise levels in the rural areas where launch facilities are located are expected to be 45 dBA. However, the ambient noise levels are estimated to be 50 dBA near a number of launch facilities which are located close to noise sources such as major highways, secondary roads, and farm roads. Other noise sources that may raise background noise levels include infrequent agricultural operations throughout the year (tractor noise levels range from 92-106 dBA).

The sound levels from construction activities at the launch facilities are estimated to be 57 dBA and 55 dBA at 1,200 and 1,600 feet, respectively. For the Proposed Action, there are seven launch facilities (C-8, C-11, H-4, N-2, N-3, Q-15, and S-33) within 1,600 feet of inhabited structures (Section 4.0, Figure 4.0-1, and Figure 4.12.2-2). Temporary short-duration impacts from construction at these launch facilities would be moderate and not significant at the inhabited structures within 1,600 feet. Construction activity at the remaining 93 launch facilities would cause negligible impacts. The overall short- and long-duration impacts for the Proposed Action would be negligible as a result of the construction activity at the launch facilities.

4.12.3 Impacts of Alternatives

Noise impacts at Malmstrom AFB are only expected to vary a small amount between the Proposed Action and the alternatives. The noise impacts resulting from construction and operations activities at Malmstrom AFB would be essentially the same for the Proposed Action and Alternatives 1 and 3; whereas Alternative 2 would extend the period of increased noise levels because of increased housing construction. In any case, both short- and long-duration noise impacts at Malmstrom AFB would be negligible.

The sound levels resulting from construction activities at the residences nearest the launch facilities are estimated to be 57 dBA and 55 dBA at 1,200 and 1,600 feet, respectively. An increase in noise levels of 5 to 7 dBA resulting from construction activity over the background noise level of 50 dBA would result in short-duration, moderate, and not significant impacts at the residences located near these launch facility sites. For Alternative 1, there are no inhabited structures within 1,600 feet of the launch facilities; therefore, all short-duration impacts would be negligible.

For Alternative 2, there are nine launch facilities (C-2, C-8, C-11, D-8, H-4, N-2, N-3, Q-15, and S-33) (Section 4.0, Figure 4.0-1, and Figure 4.12.2-2) within 1,600 feet of inhabited structures. Temporary short-duration impacts from construction at these launch facilities would be moderate and not significant at the inhabited structures within 1,600 feet. Construction activity at the remaining 116 launch facilities would cause negligible impacts. The overall short-duration impacts for this alternative would be negligible from the construction activity at the launch facilities.

For Alternative 3, there are 24 launch facilities (A-6, A-8, C-2, C-8, C-11, D-8, D-11, E-3, H-4, H-5, H-6, I-10, J-6, J-10, M-2, M-5, M-7, N-2, N-3, N-8, P-6, Q-15, S-33, and

S-34) (Section 4.0, Figure 4.0-1, and Figure 4.12.2-2) within 1,600 feet of inhabited structures. Temporary short-duration impacts from construction at these launch facilities would be moderate and not significant at the nearby inhabited structures within 1,600 feet. Construction activity at the remaining 176 launch facilities would cause negligible impacts. The overall short-duration impacts would be negligible from the construction activity at the launch facilities. For all alternatives, long-duration impacts in the deployment area would be negligible.

4.12.4 Cumulative Impacts

Concurrent deployment of the Small ICBM and Peacekeeper in Rail Garrison programs at Malmstrom AFB would create a cumulative impact because additional construction activity onbase would create an increase in noise levels. However, there would be no change in the noise impacts at launch facilities. Cumulative noise impacts would consist of additional short-duration noise generated during construction of the Peacekeeper in Rail Garrison facilities, a spur track connecting to the main line, and additional housing. These noise effects would occur primarily on the east side of the base, away from sensitive receptors. Therefore, short- and long-duration impacts would be negligible.

4.12.5 Impacts of the No Action Alternative

If the proposed program is not implemented, a continuation of baseline trends would occur in the area (Table 4.12.2-1). No adverse impacts would occur at either Malmstrom AFB or in the deployment area.

4.12.6 Potential Mitigation Measures

No mitigation measures are recommended for noise.

4.12.7 Irreversible and Irretrievable Resource Commitments

Implementation of the proposed program would result in no irreversible or irretrievable resource commitments for noise. New air traffic noise contours are currently being prepared for the KC-135R air refueling mission.

4.12.8 Relationship Between the Local Short-Term Use of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

Implementation of the proposed program would result in short-duration program-related noise impacts primarily associated with the construction phase at launch facilities. No long-duration noise effects are anticipated; therefore, no effects on the maintenance and enhancement of long-term productivity would occur.

5.0 SAFETY CONSIDERATIONS

The Small Intercontinental Ballistic Missile (ICBM) system safety program developed by the Air Force extends from concept development to system design, through deployment and operations. Other federal agencies responsible for nuclear weapon safety include the Department of Energy (DOE) and the Nuclear Regulatory Commission (NRC). They are responsible for manufacturing, transport, and decommissioning nuclear materials. These activities are covered by documents such as: Final Environmental Impact Statement, Pantex Plant Site, Amarillo, Texas (U.S. Department of Energy 1983b), which covers nuclear weapons assembly, stockpile monitoring, maintenance, modifications, and retirement (disassembly) of the weapons; Final Environmental Impact Statement, Rocky Flats Plant Site, Golden, Colorado (U.S. Department of Energy 1980b), which assesses adverse impacts from postulated accidents associated with nuclear weapons production and stockpiling, radioactive effluent release to the environment, and actions regarding plutonium-contaminated soil cleanup (including a discussion on radioactive waste recycling, disposal, and/or shipping); and Final Environmental Impact Statement on the Transportation of Radioactive Material by Air and Other Modes (Nuclear Regulatory Commission 1977) and the Draft Environmental Assessment on the Transportation of Radionuclides in Urban Environs (Nuclear Regulatory Commission 1980), which add information on the subject of the transportation of radioactive materials and associated concerns.

This chapter begins with a description of the system safety program used in the development, deployment, and operation of the Small ICBM system. Following this, highly unlikely, but theoretically possible, mishaps are examined. For purposes of this analysis, conservative assumptions were made. The most severe and environmentally threatening mishap scenarios conceivably posed by the deployment of the Small ICBM at Malmstrom Air Force Base (AFB) were considered (Section 5.3). The probabilities of these events occurring were also calculated. Such mishaps could result in a solid-propellant, liquid-propellant, or a combined solid/liquid-propellant release, and in extreme circumstances, the release of nuclear materials. This could affect one or more of the following environmental factors: air quality, biology, water/soils, and human health and safety.

5.1 System Safety Program

In the 25-year operating history of the Minuteman ICBM systems, the Air Force has never experienced a mishap leading to a fire or explosion. The system safety programs are an integral part of this safe-operating history and will serve as the framework for the Small ICBM safety program. Furthermore, the technical advances to the components and operating procedures for the Small ICBM system ensure that the proposed system will operate safely.

All phases of Small ICBM weapon system acquisition and operation are conducted consistent with stringent safety programs. These safety programs include directives and regulations that establish policy, procedures, and criteria based on a comprehensive set of proven methods derived from both military and civilian experience. Department of Defense (DOD) Instruction 5000.36, "System Safety Engineering and Management" and Air Force Regulation 800-16, "Air Force System Safety Program," establish the requirement for the identification and elimination or control of hazards in the weapon system. The DOD Military Standard-882B (MIL-STD-882B), "System Safety Program Requirements," and MIL-STD-1574A, "System Safety Program for Space and Missile Systems," provide specific controls that are implemented in the Small ICBM Integrated System Safety Program which is tailored to the specific characteristics of the Small ICBM. These system safety engineering and management controls are applied throughout the functional life of the weapon system from concept development through decommissioning.

The Small ICBM Integrated System Safety Program is a risk-management program designed to identify potential mishap risks and define methods to eliminate or minimize them. This comprehensive system safety engineering program complies with DOD and Air Force directives. The program encompasses all aspects of the system, in both normal and emergency situations, during peacetime.

Proven technology and procedures from the Minuteman I, II, and III and Peacekeeper programs have been incorporated into the design of the Small ICBM weapon system. Where possible, design decisions have been made to enhance the overall safety of the system. Some examples are the following:

- Insensitive High Explosives (IHE) have been incorporated into the reentry vehicle. These explosives are stable and insensitive to shock and thermal stimuli.

- A unique software control device prevents unintended missile launch by blocking access to the missile-firing circuits. The missile can be launched only if a unique coded signal is generated and verified.

5.1.1 System Hardware

Prior to test, deployment, and operations, the Small ICBM must receive both explosives safety siting approval for facilities and nuclear safety certification for the weapon system and support equipment.

5.1.1.1 Explosive Safety Siting Requirements

Air Force explosives safety requirements are established to prevent or minimize mishaps and associated damage. Implementation of these requirements demands compliance with all directives that control the handling and use of explosives. Before accepting an explosive component into the Air Force or federal inventory, it is necessary to establish its hazard classification. Contractors who manufacture Small ICBM explosive components provide the Air Force with explosives hazard classification data which are the basis for the explosives class determinations. These data are used to establish procedures to assure safe handling, packaging, storage, and use of the item.

All three Small ICBM stages will contain a high-performance, solid-propellant rocket motor. Propellant weights are expected to be approximately 24,000 pounds for Stage I, 6,400 pounds for Stage II, and 3,000 pounds for Stage III. The solid propellant in the Small ICBM is expected to have properties similar to that used in Stage III for the Peacekeeper (Section 5.4.2.1).

The Post Boost Vehicle is powered by approximately 35 to 40 pounds (5 gal) of liquid propellant (composed primarily of hydrazine) in a stainless steel container. The container is filled and sealed at the factory; it is never opened, repaired, or maintained in the field. The Post Boost Vehicle contains the missile guidance control system, shroud and shroud separation motor, and miscellaneous ordnance items all similar in function to those used for the Minuteman system.

The Small ICBM reentry vehicle is the same as that used on the Peacekeeper. This reentry vehicle contains an IHE that is very stable. It has been rigorously tested to verify its insensitivity to shock and high temperatures. This type of explosive is even safer to handle than the previous Minuteman design, and its use ensures that ignition would occur only on direct command.

Although the probability of inadvertent combustion or explosion of missile propellants is low, DOD Standard 6055.9 and Air Force Regulation 127-100 prescribe a safe distance to be maintained from operational and storage locations containing explosives, including missile propellants. Locations containing explosives are required to be at specified minimum distances away from most types of facilities. These explosive safety zones vary depending on the combination, quantity, and hazard classification of propellants or explosives involved. Based on these factors, safe distances to other facilities were determined for the assembled Small ICBM. For example, the explosive safety zone criterion for a fully assembled Small ICBM in earth-covered igloos is 1,250 feet from an inhabited building.

5.1.1.2 Nuclear Safety

Nuclear safety certification for the Small ICBM ensures that nuclear safety objectives are met through control of critical functions. This includes strict control of information that permits missile functions to occur. Critical functions are also interlocked with one another so that each function must be accomplished only in a specific order, and only after the preceding function is accomplished in a prescribed manner. This ensures that inadvertent launch or explosion of the reentry vehicle is impossible.

Air Force Regulation 122-3 outlines policies, responsibilities, and the evaluation process for safety certification of equipment and procedures used with nuclear weapons. The weapon system, support and transportation equipment, test equipment, and procedures must all be certified. These processes are discussed in the following sections.

Design Certification. Design certification requires the evaluation of the entire weapon system design for compliance with the DOD Nuclear Weapon System Safety Standards, using the process defined in Air Force Regulations 122-3 and 122-9. The Nuclear Weapons System Safety Group (NWSSG) is a group chaired by the Air Force with representatives from several Air Force major commands, the DOE, and the Defense Nuclear Agency.

The NWSSG evaluates a nuclear weapon system for compliance with DOD nuclear weapon safety standards. In addition, the Air Force Weapons Laboratory must evaluate, and the Air Force Directorate of Nuclear Surety must certify, noncombat vehicles, support equipment, and associated software to ensure compliance with the criteria specified in Air Force Regulation 122-10. Software certification is accomplished (as part of the design certification) in accordance with the evaluation criteria in Air Force Regulations 122-9 and 122-10. Air Force Regulation 122-9 requires a Nuclear Safety Cross Check Analysis for any software that controls or is required in the functioning of the nuclear weapon system. This analysis is an independent cross-check that ensures that the software does not initiate any unauthorized functions.

Operational Certification. A comprehensive functional and physical checkout of the individual critical components and the weapon system using procedures approved by the Directorate of Nuclear Surety is required before the nuclear weapon is connected to the rest of the system and before initial operational deployment.

Nuclear Surety Inspection. After a nuclear weapon system has received design certification and has been operationally certified, the operators of the system must successfully pass an initial nuclear surety inspection. Air Force inspectors will review all procedures required prior to placement of the operational system on alert. Facilities and physical security procedures and activities are also reviewed during this inspection.

Decertification and Recertification. Prior to some maintenance work, a nuclear weapon system's or component's operational certification is revoked. Decertified components may not be returned to use in an operational weapon system until they are recertified. The processes for recertification of a system or component are functionally the same as that for the deployment/operational certification process and follows Directorate of Nuclear Surety approved procedures.

5.1.2 Personnel Training and Certification

Safety will be a critical aspect of all Small ICBM maintenance activities. All work on the missile system will be accomplished by highly trained and qualified maintenance technicians.

5.1.2.1 Comprehensive Training Program

A special Training Control Division will schedule, monitor, and control all aspects of training. This comprehensive training program will ensure that only highly trained and qualified personnel are permitted to perform work on the weapon system. Teams that handle nuclear weapons will receive special task certifications. All work will be performed in compliance with certified Technical Orders. In addition, a comprehensive quality control program will provide for periodic reviews of maintenance operations. The inspection and evaluation teams will perform periodic and unannounced maintenance and technical inspections. A staff of safety professionals and specialists, complemented by senior staff members and field supervisors, will ensure that safety is foremost in all maintenance operations. All applicable Occupational Safety and Health Administration standards and specially developed Air Force Occupational Safety and Health standards will be strictly enforced.

5.1.2.2 Personnel Reliability Programs

All personnel assigned to nuclear weapons activities and operations are evaluated under the criteria specified in Air Force Regulation 35-99, "Personnel Reliability Program" and Air Force Regulation 40-925, "Civilian Personnel Reliability Program." These programs are designed to ensure that military and civilian personnel who perform critical nuclear weapon duties have no medical or psychological traits that might result in behavior that could ultimately threaten the national security of the United States. These programs also assist in protecting against acts that could lead to attempting unauthorized launch, tampering with the system, or theft of the nuclear weapon. Both personnel reliability programs are designed to ensure very high standards of individual reliability for those whose duties are associated with nuclear weapons and nuclear components. Candidates must meet all requirements of the personnel reliability programs before they may perform duties associated with nuclear weapons. These requirements include position designation, security clearance, and screening. Personnel are continuously evaluated throughout the entire period of their assignment to nuclear weapons-related work and undergo recurring evaluations to ensure reliability. The programs are designed to promptly identify and eliminate unreliable personnel from such positions. The Air Force Two-Man Concept provides an additional safeguard for ensuring the safe operation of the missile system. Air Force Regulation 122-4, "The Two-Man Concept," establishes procedures to ensure that a lone individual does not have the opportunity to tamper with or damage, in a way that could go undetected, a nuclear weapon or the weapon system.

5.1.3 System Safety Group

Safe operation of an ICBM weapon system requires continuing review and evaluation of system modifications, technical manuals, and training programs for technicians that maintain and operate the systems. A System Safety Group (SSG) was formed at the inception of the design phase of the new Small ICBM system to monitor all design and engineering activities. This group ensures that all serious hazards are eliminated or minimized and the system is safe to operate. The SSG will continue to review and monitor the system throughout its functional life. In addition, the NWSSG will conduct a study of the nuclear safety of the weapon system and develop weapon system safety rules for approval by the Secretary of Defense before the system is allowed to become operational. Two years after initial operations begin and then at 5-year intervals, the NWSSG will review all aspects of the system to ensure continued compliance with the DOD nuclear weapons system safety standards. Major modifications affecting nuclear safety are studied by the NWSSG prior to incorporation.

5.2 Emergency Operations

Section 5.1 covered Air Force programs to ensure the safe operation of the Small ICBM during normal activities. This section describes Air Force preparations for handling emergency operations and a discussion of some examples of potential mishaps.

5.2.1 Air Force Contingency Plans

Although mishaps involving the Small ICBM weapon system that could affect the public are highly unlikely, the Air Force has the following comprehensive contingency response plans.

5.2.1.1 Potential Hazard System

Strategic Air Command (SAC) Regulation 355-3, "ICBM Potential Hazard System" (PHS) contains procedures for responding to potential hazards involving an ICBM. This regulation is implemented when situations exist that are not covered by Air Force Technical Orders. The ICBM PHS provides for the use of a communications network during emergency actions. The PHS is designed to resolve hazardous situations occurring at the local unit level by rapidly establishing centralized control at SAC Headquarters. A recovery plan to cover mishap response, decontamination, and cleanup will be developed by appropriate technical experts prior to deploying the system. Experts from Air Force Logistics Command, Air Force Systems Command, other governmental agencies, and aerospace contractors will participate as required. The PHS will be implemented whenever the local unit requests assistance. These procedures exist for Minuteman and Peacekeeper and will be applicable to the proposed Small ICBM when it becomes operational.

5.2.1.2 Disaster Preparedness Program

Air Force Regulation 355-1, "U.S. Air Force Disaster Preparedness Program," requires each installation commander to ensure that operations orders, plans, directives, and similar documents contain proper disaster preparedness instructions and guidance. Operations Plan 355-1 will be implemented at each ICBM base in the event of a mishap involving the missile system. This operations plan includes detailed procedures and checklists that ensure the safety of life and property in the event of a mishap. If a mishap occurs offbase, designated individuals would be dispatched to the scene of the mishap to coordinate with the local civil authorities or to take control of the mishap in accordance with an existing Memorandum of Understanding with the State of Montana. If it occurs onbase, the Air Force would take charge of the mishap scene. Planning efforts for coordination with civil authorities include training sessions, joint exercises, and establishment of mutual-aid agreements. The Air Force will publish a plan to cover highway mishaps involving the Small ICBM which will be similar to those currently in effect for Minuteman and Peacekeeper missiles.

5.2.1.3 Unauthorized Access

The Air Force will take positive steps to deny access to the Small ICBM by terrorists or other unauthorized persons. These measures include, but are not limited to, passive and active onboard protective devices, remote sensor systems, protective barriers, and security response forces. Such measures are designed to deny or slow the efforts of any unauthorized persons attempting to gain access to the Small ICBM warhead for a period long enough to allow adequate security forces to arrive and take control of the scene. Because of the sensitive nature of these steps, details will not be further discussed in this document because they are classified for national security reasons. However, should an attack on a Hard Mobile Launcher (HML) prove successful, the possible environmental impacts would be no worse than those described in Section 5.4, which details the effects of a worst-case mishap.

5.3 Abnormal Conditions

The Small ICBM weapons system is designed to operate safely and securely under both normal and abnormal (severe) operating conditions. Strict compliance with established operational and maintenance procedures will be maintained. As part of this Environmental Impact Statement (EIS) process, the weapons system design and operations planning communities of the Air Force studied those conditions which, while highly unlikely, were nonetheless analyzed and would present the greatest risk of damage to the environment and human health.

5.3.1 Potential Mishaps

Given the design of the Small ICBM, the design and structure characteristics of the HML, and system deployment at existing Minuteman facilities, the following cases were developed and analyzed:

> Case (1): A HML, while being transported to its basing location at a Minuteman launch facility in Montana, is hit by a fuel tanker truck. The impact speed is in excess of 70 miles per hour (mph), the HML is struck at its most vulnerable point (that offering the least missile protection), and total tanker weight is in excess of 80,000 pounds and is fully loaded with 8,000 gallons of gasoline.
>
> Case (2): An airplane collides with a HML while the HML is on alert at a Minuteman launch facility.
>
> Case (3): A plane carrying the warhead is involved in a crash.
>
> Case (4): A truck transporting the reentry vehicle is involved in a collision.

5.3.2 Mishap Probabilities

Case (1) postulates an 80,000-pound gasoline tanker truck colliding with the side of the HML at 70 to 100 mph. In the initial phase of the mishap, both the truck and the HML tend to crush-up, and after the crush-up both bodies move together sliding for some distance, and come to a complete stop. The gasoline in the tanker truck then ignites and burns close to the HML for a sufficient period of time to ignite the solid fuel stages of the Small ICBM. Rather than an explosion of the missile stages, they continue to burn, more or less in their initial position and configuration, and sufficient heat transfer to the reentry vehicle occurs to break its protective structure and expose the plutonium of the warhead. Some release of nuclear material occurs much like that from an aerosol (see aerosolization discussion, Section 5.4).

A statistical analysis of the probability (chance) of the subevents necessary to reach this ultimate event has been performed by the Air Force. Probabilities are expressed in numerical form; for example, 0.5 means one chance in two; 4.4×10^{-8} means 4.4 chances in 100 million. The analysis was specific to the Malmstrom AFB deployment area and assumed a 20-year functional lifetime for the Small ICBM system. For subevents (3) through (8) of the probability chain below, there is high confidence that the probability is much less than 0.5 for each subevent. However, because of a lack of empirical (observational) data to support this assumption, a probability of 1.0 (event will always occur) is assumed in this conservative analysis. The critical steps of mishap scenario Case (1) and their attendant probabilities are the following:

1. Probability that a motor vehicle collision resulting in a fire would occur: 4.4×10^{-8} (4.4 chances in 100 million).
2. Probability that a HML collision resulting in a fire involves a fuel tanker truck (or other vehicle with a large amount of fuel): 0.3 (3 chances in 10).
3. Probability that the HML is not driven or pushed clear of the fire: <1.0.
4. Probability that the solid propellant of the missile stages ignite: <1.0.
5. Probability that the solid propellant does not explode: <1.0.
6. Probability that the exhaust plume envelops the reentry vehicle: <1.0.
7. Probability that the exhaust plume temperature is high enough to melt the protective holder of the nuclear material: <1.0.
8. Probability that propellant burn time is sufficient to melt the vessel containing nuclear material: <1.0.
9. Probability that the conditions are correct to aerosolize 1 percent or more plutonium into a respirable form: 1×10^{-3} (1 chance in 1,000).

The overall probability of the mishap occurring and resulting in aerosolization of plutonium: $<1.32 \times 10^{-11}$ (less than 1.32 chances in 100 billion).

Case (2) postulates an airplane colliding with a HML on alert at a Minuteman launch facility. Although the HML would be housed in a protective structure, for purposes of this conservative analysis, no credit (decreased probability) was taken for this protection. Furthermore, an aircraft would have to be of sufficient weight (approximately 80,000 lb) and carry a sufficient amount of fuel to initiate a fire and sustain its burn for a sufficient period of time to ignite the solid propellants of the Small ICBM. Based on the expected number of aircraft mishaps in Montana, the likelihood that such a mishap would involve a HML location, and based a 20-year functional life of the Small ICBM force, the critical steps of mishap scenario Case (2) and their attendant probabilities are the following:

1. Probability that an aircraft collides with a HML: 2.97 x 10^{-10} (2.97 chances in 10 billion).
2. Probability that the collision is with an aircraft of sufficient size: 1.6 x 10^{-2} (1.6 chances in 100).

3-9. Events and probabilities are identical to Case (1).

Overall probability of a mishap resulting in aerosolization of plutonium: $<4.75 \times 10^{-12}$ (less than 4.75 chances in 1 trillion).

Case (3) postulates a mishap involving a transport airplane (80,000 lb gross weight) with a warhead aboard. Should this mishap occur and, as a result, should the casing surrounding the warhead be breached, there is a remote chance that a measurable amount of plutonium would be aerosolized and dispersed. Very little plutonium could be aerosolized in this scenario (considerably less than the 1% assumed in Cases (1) and (2)) since the solid rocket propellant stages would not be present to provide a fire source of sufficient temperature or duration to cause aerosolization. The concentration of aerosolized plutonium is estimated to be considerably less than the U.S. Environmental Protection Agency standard for allowable lung burden for plutonium workers. Therefore, the environmental consequences of this event would not be significant except in the immediate vicinity of the mishap, where plutonium dispersal in solid form would exist and cleanup would be required.

Case (4) postulates a collision involving a truck carrying a warhead. This incident would not produce temperatures high enough to cause aerosolization of plutonium since sufficient force to reach the plutonium casing and fuel for an extended burn are not present. A remote chance of plutonium dispersal in solid form exists and cleanup of the mishap vicinity might be required.

5.4 Case Study

The following section addresses a representative setting within the proposed Montana deployment area and discusses the consequences to the environment of mishap scenarios such as those outlined in Case (1) or Case (2) (Section 5.3.2).

5.4.1 Wind Dispersion Models

Two wind dispersion models, described in the following sections, were used to simulate the worst-case movement of burned or aerosolized materials downwind from the mishap. The first was used for the burn-off of propellants. The second was used for the aerosolization of nuclear materials contained within the reentry vehicle.

5.4.1.1 Propellant Dispersion Model

These mishap scenarios could result in either the evaporation or combustion of the propellants at the scene. Computer modeling techniques were chosen to simulate the downwind movement of the combustion products. Although no model can reproduce the identical topography and cultural features of an existing site, simulation models similar to that used in this analysis are routinely used to predict fuel-spill impacts and to organize emergency responses.

An evaporation/air dispersion model for chemical spills on land, SPILLS, originally developed by Shell Oil Company, was used to simulate the mishap scenario. SPILLS is a model which simulates the evaporation of a chemical spill and the atmospheric dispersion of the vapors. The model estimates concentrations of the vapors based on the time and distance downwind from pools of liquids and the downwind distribution of particulates following combustion.

The downwind movement of toxic particles and vapors is dependent to a large degree on the following parameters: ambient temperature, temperature of the plume, amount of material to be burned, burn rate and burn time, meteorological conditions at the site, and local topography. The values of the conditions were chosen to represent the worst case. For example, as wind speed increases beyond 4.5 mph, the total area affected by toxic particles increases but the concentration of particles is reduced due to wider dispersal, thereby reducing the total environmental effects. A list of assumptions and conditions used for this model is given in Table 5.4.1-1. Values for other parameters necessary for model runs, such as plume rise, were computed, taken from standard texts, or estimated from preliminary model runs.

5.4.1.2 Nuclear Dispersion Model

Computer modeling techniques (including the assumptions listed in Table 5.4.1-1) similar to those used for the propellants were also used for the nuclear dispersion model. The assessment was done by the Atmospheric and Geophysical Sciences Division of Lawrence Livermore National Laboratory. MATHEW, a three-dimensional wind model, and ADPIC, a particle dispersion model, were used to simulate the worst-case release scenarios.

In tests done by Lawrence Livermore National Laboratory in 1986, the warhead was exposed to a 1000°C fire for 2 hours and the casing surrounding the plutonium was not breached (i.e., no plutonium in any form was released).

The mishap scenarios in this study assume breaching of the casing surrounding the plutonium and the aerosolization of up to 1 percent of the available plutonium. Tests of plutonium aerosolization in various types of fires (including petroleum and solid rocket propellant), resulted in a range of $<10^{-5}$ (less than one-thousandth of 1%) to 1 percent with a mean (most likely) occurrence of 6×10^{-4} (6 hundredths of 1%). To assure a most conservative analysis, 1 percent was used.

5.4.2 Environmental and Human Health Effects

This section describes the environmental and human health effects of the Case (1) mishap scenario: a collision of the HML and a large fuel tanker truck. This discussion describes (1) solid-propellant releases, (2) liquid-propellant releases, (3) a combined liquid- and solid-propellant releases, and (4) a release of nuclear materials combined with a propellant burn.

5.4.2.1 Incidents Involving Solid Propellants

Propellant Properties. The Small ICBM will carry approximately 33,000 pounds of solid propellant. The solid propellant used in this missile is a Class 1.1 explosive proprietary mixture containing the following compounds (and their approximate proportions): HMX (cyclotetramethylenetetranitramine) (48%); aluminum (elemental) (18%); proprietary plasticisers (12%); ammonium perchlorate (9%); and butanetroil trinitrate (6%). After curing, the solid propellant has a physical consistency resembling that of a hard pencil eraser. Although the propellant will not spontaneously ignite, it will ignite when exposed to temperatures exceeding 500°F for more than 60 seconds.

Table 5.4.1-1

Model Parameter Assumptions

Ground-level winds	2.0 meters per second (4.5 mph)
500-meter winds	3.0 meters per second (6.75 mph)
Mixing layer depth	500 meters (1,640 ft)
Atmospheric stability	F (slightly stable)
Wind direction (ground level)	From 220 degrees (south-southwest)[1]
Wind direction at 500 meters	From 230 degrees (west-southwest)[1]
Ambient temperature	20°C (68°F)[1]
Spill area:	
-Hydrazine	10 m^2 (107.6 sq ft)
-Solid	100 m^2 (1,076 sq ft)
Solid propellant burn time	20 minutes
Plume rise	150 meters (500 ft)

Note: [1]From National Weather Service data for central Montana.

Release Scenarios. The following sections examine the environmental impacts on air quality, water, and biological resources that could result from the release of solid propellant and its combustion products into the environment. Cases (1) and (2) could result in a fire involving only the solid propellant. Some or all of the propellant would burn rapidly (within 20 minutes). If an explosion results from the fire, burning propellant dispersal is likely.

Consequence of Explosion. There is a remote possibility that a fire could ignite the solid missile stages causing a propellant explosion. This explosion would be primarily contained by the HML. However, debris and burned and unburned propellant could be scattered in a circular radius of 1,000 to 1,200 feet. In addition, small secondary fires are possible, depending on locational factors. Within this radius, damage to both plants and animals is likely. Injury or loss of life to personnel may occur. The effects of overpressure would extend to approximately 1,425 feet from the mishap. Structures within the 1,200- to 1,425-foot range would be subject to window breakage but would not receive other structural damage. The primary dangers in the 1,200- to 1,425-foot range would be flying glass from broken windows and possible ear damage resulting from overpressure.

The intact reentry vehicle would likely be among the debris ejected by the explosion. Tests done by the DOE indicate that the possibility of the explosion rupturing the reentry vehicle is extremely remote.

Air Quality Impacts. The release of particles and vapors from a propellant fire results in a plume (cloud) that rises to between 100 and 200 meters (328 to 656 ft) from the ground and spreads downwind. This plume is buoyant (lighter than air) and acts like smoke from a smokestack (i.e., it rises and carries the entrained particles aloft). At altitude, the buoyancy of the plume is offset by atmospheric factors (temperature, pressure, and density) that cause the plume to spread laterally. The spread plume then resembles the form described in the Gaussian Dispersion Model. The major components of the cloud are hydrogen chloride (HCl) and carbon monoxide (CO), which are potentially toxic. Other components include water ($H_2 0$), nitrogen (N_2), carbon dioxide (CO_2), aluminum oxide ($Al_2 0_3$), and hydrogen (H_2), which are essentially harmless. Hydrogen chloride gas from burning propellant may collide with and coat the aluminum oxide particles. These toxic particles are transported downwind and gradually settle causing vegetative spotting and minor acidification of surface water supplies. Rain could scavenge residual hydrogen chloride from the cloud, producing acidic precipitation.

The concentration of hydrogen chloride-aluminum oxide particles in the centerline of the downwind plume was simulated by the SPILLS model. Concentrations at the ground level, 100, 200, and 300 meters (328, 656, and 984 ft) were calculated 15, 30, and 60 minutes after the initiation of the propellant burn. The total available propellant was presumed to be burned in 20 minutes.

The plume moves downwind as a "puff," exhibiting both lateral and vertical dispersion. Ground levels exceed federal air quality standards for particulates 1 kilometer (km) (approximately 0.6 mi) from the mishap 30 minutes after the initiation of the burn. Sixty minutes after the burn, the particulate concentration at the same location is well within standards. This demonstrates the "puff" character of the plume at this distance from the mishap. Particulate ground-level concentrations exceed federal standards in an area 7 km (4.4 mi) to 25 km (15.5 mi) from the mishap at various times after the burn initiation.

Particulate concentrations at ground level exceeding federal standards are likely to occur at distances exceeding 25 km (15.5 mi); however, simulation by the model of ground-level concentrations beyond 25 km (15.5 mi) is less accurate because of terrain-induced turbulence and dispersion. Ground-level receptors would be exposed to particulate concentrations exceeding federal standards for periods of time greater than 1 hour.

Particulate concentrations at 150 meters (492 ft) from ground level indicate that a substantial quantity of the total particulate mass is entrained in the plume. Therefore, the downwind deposition of the particulates resulting from gravitational and dispersive processes would occur over a broad area. Air quality standard exceedances cannot be predicted accurately at longer distances.

The major nonparticulate constituents of the cloud, such as carbon monoxide, water, nitrogen, carbon dioxide, and hydrogen would be dispersed by the plume and would create no significant impacts. As was demonstrated in the Morton Thiokol study (1978), it is likely that hydrogen chloride generated during the burn would be released as a vapor, some of which would coat the particles and be transported downwind. Gaseous hydrogen chloride not absorbed to the particles would be transported downwind. It would react with other combustion products and naturally occurring compounds. If the mishap occurs during fog, rain, or temperatures near the dew point, gaseous hydrogen chloride may become chemically associated with water vapor, forming acidic rain.

Water Quality Impacts. Minor surface water quality impacts may occur from the settling of aluminum oxide particles coated with hydrogen chloride and the fallout of hydrogen chloride vapors from the cloud. Surface water quality impacts from the exposed solid propellant are not expected since it is essentially insoluble in water. Potential minor local impacts could result from the runoff of motor fuels, lubricants, and fire-extinguishing materials from the mishap into surface waters.

Potential impacts on groundwater resulting from the mishap scenario are highly dependent on local surface, subsurface, and deep groundwater system characteristics. Minor impacts could result from the movement of motor fuel, lubricants, and fire-extinguishing chemicals from the surface into shallow aquifers.

Biological Impacts. Minor adverse impacts on natural vegetation and animals could occur. Localized impacts on biota resulting from fire, fire-extinguishing chemicals, and mechanical cleanup are anticipated. Local biota may be affected from deposition of aluminum oxide-born hydrochloric acid by spotting of vegetative growth; plant mortality; or burning of eyes, throat, and skin for some animals.

Aquatic biological systems near the mishap could be affected by the deposition of hydrochloric acid. Such impacts would be insignificant because of the very low concentrations of hydrochloric acid.

Human Health Effects. The downwind particulate plume would result in air quality exceedances, at various time intervals, at locations from 1 km to 25 km (0.6 mi to 15 mi) from the mishap. Should the mishap coincide with outdoor human activities, persons exposed to the particulate could expect health effects, the severity of which would depend on the particulate concentration, the length of exposure time, and other factors. The most severe human health effects of acid-coated particles include respiratory impairment; burning of eyes, throat, or nose; and skin irritation. No life-threatening or long-term effects are anticipated.

5.4.2.2 Incidents Involving Liquid Propellant

Propellant Properties. From 35 to 40 pounds (approximately 5 gal) of hydrazine are carried in the Post Boost Vehicle. Hydrazine is a colorless, oily liquid that fumes on exposure to air at normal atmospheric pressure and is water soluble. Hydrazine vapors are slightly heavier than air and, depending on meteorological conditions, they may flow along the ground and fill depressions. Liquid hydrazine is not a detonatable compound. Hydrazine vapor mixed with air could be ignited, causing deflagration (instantaneous combustion), but would not cause extensive damage to the missile system.

Release Scenario. With either Case (1) or Case (2) mishap scenarios, the hydrazine tank could crack allowing the release of liquid hydrazine and hydrazine vapors. The process of a hydrazine spill resembles that which occurs when a fresh egg is cracked. Like the liquid contents of an egg, the hydrazine would flow out in about 5 minutes and form a pool. Evaporation of the spilled hydrazine would begin immediately and continue until the pool was gone, provided no remedial action to recover and properly store the hydrazine takes place. If an ignition source such as a diesel fuel fire is present, the hydrazine could burn.

Air Quality Impacts. Adverse environmental impacts on local air quality in the immediate area are likely to occur after a mishap. Depending on the conditions of the system after the mishap, hydrazine spilled from the tank may form a vapor or be ignited.

According to a computer model simulation done for this study, if all of the hydrazine is spilled into a liquid pool, the pool should totally evaporate in 18 minutes. The resulting vapor plume would travel downwind. The shape of the plume at 15, 30, and 60 minutes after the instantaneous release is shown in Figure 5.4.2-1. The value of the outermost contour of each plume is 0.03 parts per million (ppm) of hydrazine per cubic meter of air at 2 meters (approximately 6 ft) above the ground level. The concentration of hydrazine at ground level in the interior portion of the plume lessens with time because of the lateral and vertical diffusion of hydrazine.

A hydrazine fire would produce nitrogen oxides, carbon dioxide, water, and unburned hydrazine. Since it is likely that a fire would involve more than just hydrazine, the rising hot exhaust cloud would be expected to contain other chemicals, particulates, and dust

DISTANCE FROM MISHAP	ENVIRONMENTAL EFFECTS
LESS THAN 10 FEET	Destruction of local vegetation and contamination of soil requiring clean up. Short-term contamination of surface water if runoff occurs. Possible injury or death if deflagration occurs. Chance of severe burns, convulsion, and danger to life for first 18 minutes when liquid hydrazine may be contacted.
10 FEET TO 1,500 FEET	20-ppm limit exceeded for up to 30 minutes causing irritation of eyes, nose, throat, and lungs; dizziness, nausea, and tremors
GREATER THAN 1,500 FEET	0.03 NIOSH limit exceeded creating "areas of concern" requiring evacuation of personnel. Chance of susceptible personnel located along centerline of plume exhibiting irritation of eyes, nose, throat, and lungs. Chance of fuel, lubricants, or fire-fighting chemical runoff into surface water and migrating into groundwater

LEGEND

- - - - 0.03 PPM

——— 20 PPM

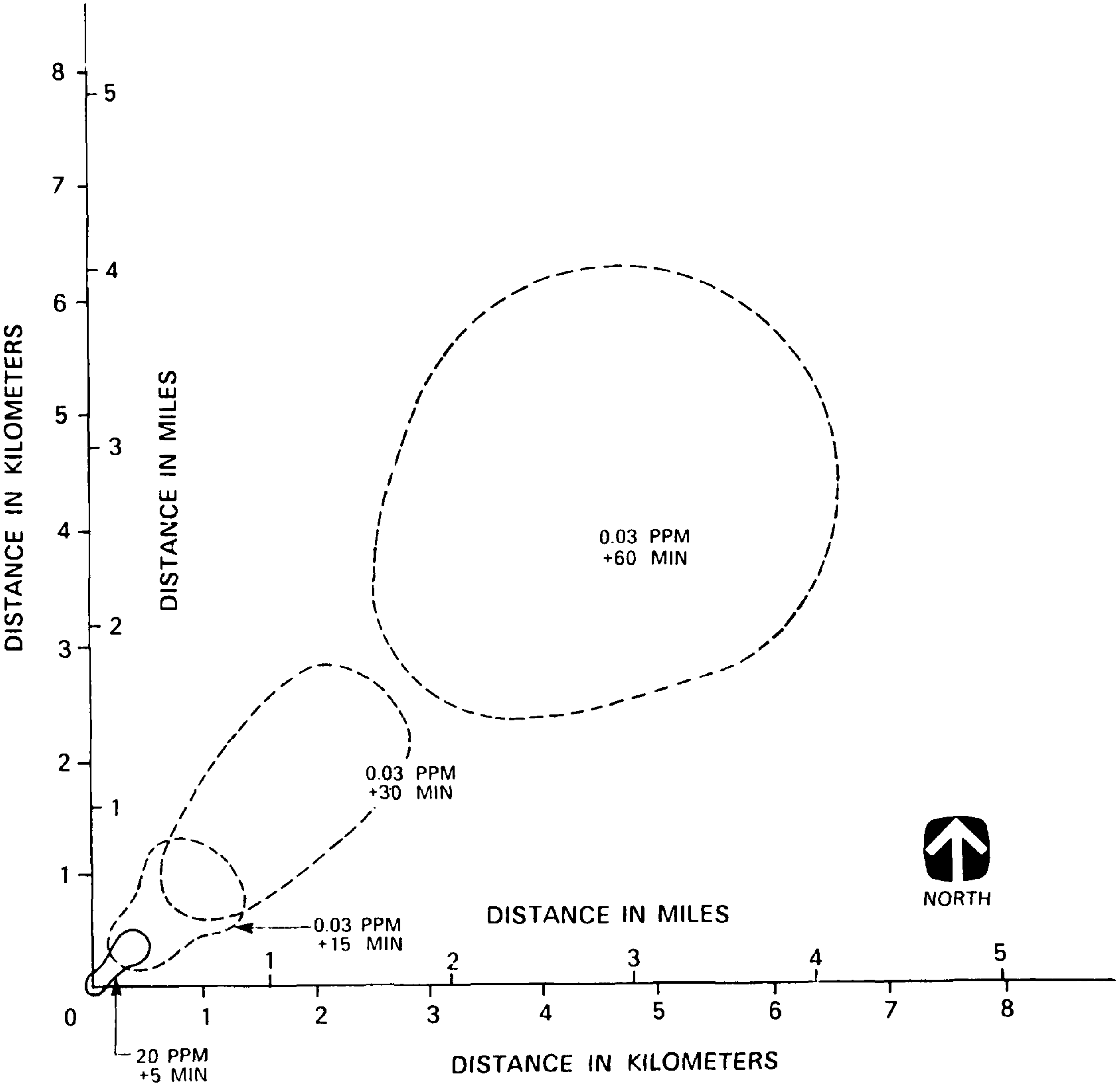


FIGURE 5.4.2-1 CONCENTRATION CONTOURS FOR EVAPORATED HYDRAZINE FOR 15-MINUTE, 30-MINUTE, AND GREATER THAN 60-MINUTE TIME PERIODS

from the mishap site. The resultant downwind plume is likely to resemble the plume described for the solid propellant burn. Any unburned hydrazine in the plume is likely to react with other compounds and be effectively reduced to zero concentration.

Water Quality Impacts. Although hydrazine could be released into surface water resources near the mishap site, the results of the modeling indicate that a liquid pool of the propellant would rapidly evaporate. Liquid hydrazine flowing away from the mishap would rapidly evaporate from the liquid pool which, because of the small volumes of hydrazine involved, is not expected to exceed a 10-square-meter (108 sq ft) area. Hydrazine could reach surface water resources if diluted with water during an emergency response to the mishap. If mixed with water, the rate of evaporation would decrease due to the dilution of the hydrazine and chemical reactions within the aqueous solution. Although aqueous solutions of hydrazine have been shown to be toxic to biological resources, the small amount involved in this scenario is not likely to result in concentrations high enough to have any long-term toxic effects.

Percolation of hydrazine fuel into the soil following a spill would be limited due to the small quantity (5 gal) of hydrazine present in the system. This small quantity, combined with the rapid evaporation rate predicted in the spill modeling, is likely to result in a small amount of hydrazine movement into the soil. Organic material in the soil is likely to react with hydrazine, breaking it down and effectively reducing the concentration of hydrazine in the soil. In addition, hydrazine is likely to evaporate from the surface of the soil once the pool of liquid existing above the soil has been evaporated. Because the hydrazine that has not evaporated would strongly adhere to soil components, cleanup following a spill would be relatively simple.

Biological Impacts. The downwind movement of the vaporized hydrazine plume could have impacts on local biotic systems. The concentration and areal extent of the hydrazine vapor are dependent on the size of the leak and physical condition of the hydrazine at the mishap site, the wind speed and direction, relative humidity, difference between the hydrazine pool temperature and ambient temperature, and vertical mixing height.

A spill of hydrazine can be expected to kill or seriously damage vegetation in the limited area of the spill proper. Any resulting fire would kill grasses, herbs, shrubs, and small trees, and burn the trunks and lower branches of large trees. Impacts on vegetation outside the immediate spill or fire area are unlikely due to the small quantity of hydrazine involved and the soil adhering characteristics of this chemical.

Any animals exposed to sufficiently high concentrations of hydrazine vapor could experience burning of eyes, skin, and respiratory tract, and possibly systemic effects, as described for humans in the following section. These concentrations would be limited to a small area because of the small quantity of hydrazine involved.

Human Health Effects. Hydrazine is a strong irritant and may cause eye damage and respiratory tract inflammation. It can be absorbed through the skin, ingested, or inhaled. Although the toxicological results of hydrazine exposure are documented, the value of the "safe" dose of hydrazine is expressed in many different ways. The Air Force uses a value of 20 ppm hydrazine as its 30-minute short-term public exposure guidance level (SPEGL) as established by the National Academy of Sciences Committee of Toxicology. The SPEGL is a standard index of human exposure tolerance. Under certain wind and atmospheric stability conditions, combined with a rapid hydrazine evaporation rate (1 lb per minute), the 20-ppm level might be experienced as far downwind as 1,500 feet.

People exposed to 20 ppm of hydrazine vapor might experience irritation of eyes, nose, throat, or lungs, as well as dizziness and nausea. Systemic effects at 20 ppm involve the central nervous system and cause tremors. If liquid hydrazine contacts the skin or eyes, it can cause severe local burns and dermatitis. In addition, it can penetrate skin causing systemic effects similar to those produced when hydrazine is inhaled. If inhaled, the vapor causes local irritation of the respiratory tract, followed by systemic effects. No life-threatening or long-term effects are anticipated.

Model simulations demonstrate that for this mishap scenario, a person located along the centerline of the plume could be exposed to concentrations of hydrazine exceeding both the 0.03 ppm-15 minute National Institute of Occupational Safety and Health (NIOSH) recommendation as well as the 20 ppm-30 minute SPEGL guideline. Persons exposed at these levels could exhibit the previously described symptoms. The NIOSH recommendation is used to create the boundaries of a toxic corridor in which emergency evacuation areas downwind of inadvertent spills can be calculated.

For this study, the 0.03-ppm contour (Figure 5.4.2-1) of the hydrazine plume was chosen to define the outer limit of the plume for the exposure level of concern. For the purposes of this study, if a person is exposed to concentrations of hydrazine greater than 0.03 ppm for a time exceeding 15 minutes, it was assumed that they have been exposed to a dose of hydrazine exceeding NIOSH recommendations. Those persons closer to the origin of the spill would be exposed to greater concentrations than those farther from the origin, as the concentration of hydrazine would be reduced by turbulence, dispersion, and reactivity. After 60 minutes, the puff dissipates quickly and 0.03-ppm concentrations do not occur beyond 5 miles.

5.4.2.3 Combined Releases

There is a possibility that both the liquid and solid propellants could be released or burned simultaneously in a mishap. In the worst case, it was assumed that fire and/or explosion would accompany the mishap and result in complete involvement of the missile. Debris and fire could then be spread over the area immediately surrounding the site.

The environmental impacts likely to result from a combined burn would be equivalent to the impacts previously described for the solid propellant, except that the contribution of the hydrazine would moderately increase the toxicity of the burning propellant cloud. There is little potential for additional environmental impacts resulting from the combined propellants, their reaction products, or combustion products.

The environmental effects of the nuclear release scenario are to be interpreted as additive to the effects of the solid propellant or combined release scenarios as the radioactive particles are carried downwind from the fire by the plume.

5.4.2.4 Incidents Involving Nuclear Materials

In the context of this discussion, "release" refers to the escape of nuclear material that has been converted to aerosol form by the very high temperatures possible in a propellant fire, or material that has been scattered by an explosion of the solid propellant. There is no possibility of a nuclear detonation under any mishap scenario.

Nuclear Material Properties. The impact of the release of radioactive material (such as weapons-grade plutonium) is dependent on the physical and radiological characteristics of the material released. How and in what form the material is released, along with the local meteorological conditions and terrain at a mishap site, would determine the distribution of the released nuclear material. The radiological characteristics of the material would determine its effect on the human body and the flora and fauna of the affected region. Uranium is present in the warhead and would be dispersed with the plutonium in the event of a propellant explosion or fire. However, since plutonium has higher toxicity and body retention, it is the nuclear material discussed.

The types of radiation emitted by the plutonium isotopes are alpha particles, beta particles, x-rays, and gamma photons. Alpha particles are the primary decay product of plutonium and are, biologically, 20 times more damaging than beta particles and gamma rays. The alpha particle is very effective in causing biological damage. It deposits its energy over a very short distance (approximately 25 micrometers or 0.00006 inch). This means that a small amount of plutonium embedded in human tissue via inhalation would result in a high, localized radiation dose. This would lead to continuous tissue damage as long as the plutonium is lodged in the same position. A beta particle or gamma ray deposits its energy over a much longer distance. Therefore, the dose intensity and resultant biological damage is much less than that for an alpha particle.

Plutonium isotope 239 (Pu-239) is the primary isotope of plutonium released. The plutonium isotope 241 (Pu-241) content of weapons-grade plutonium provides a larger fraction of the total radioactivity. However, the radiation released by this isotope is beta radiation, which produces only one-twentieth the biological damage of the alpha particles emitted by Pu-239. To remain conservative, all of the aerosolized plutonium was assumed to be Pu-239. The Pu-241 isotope is not considered further.

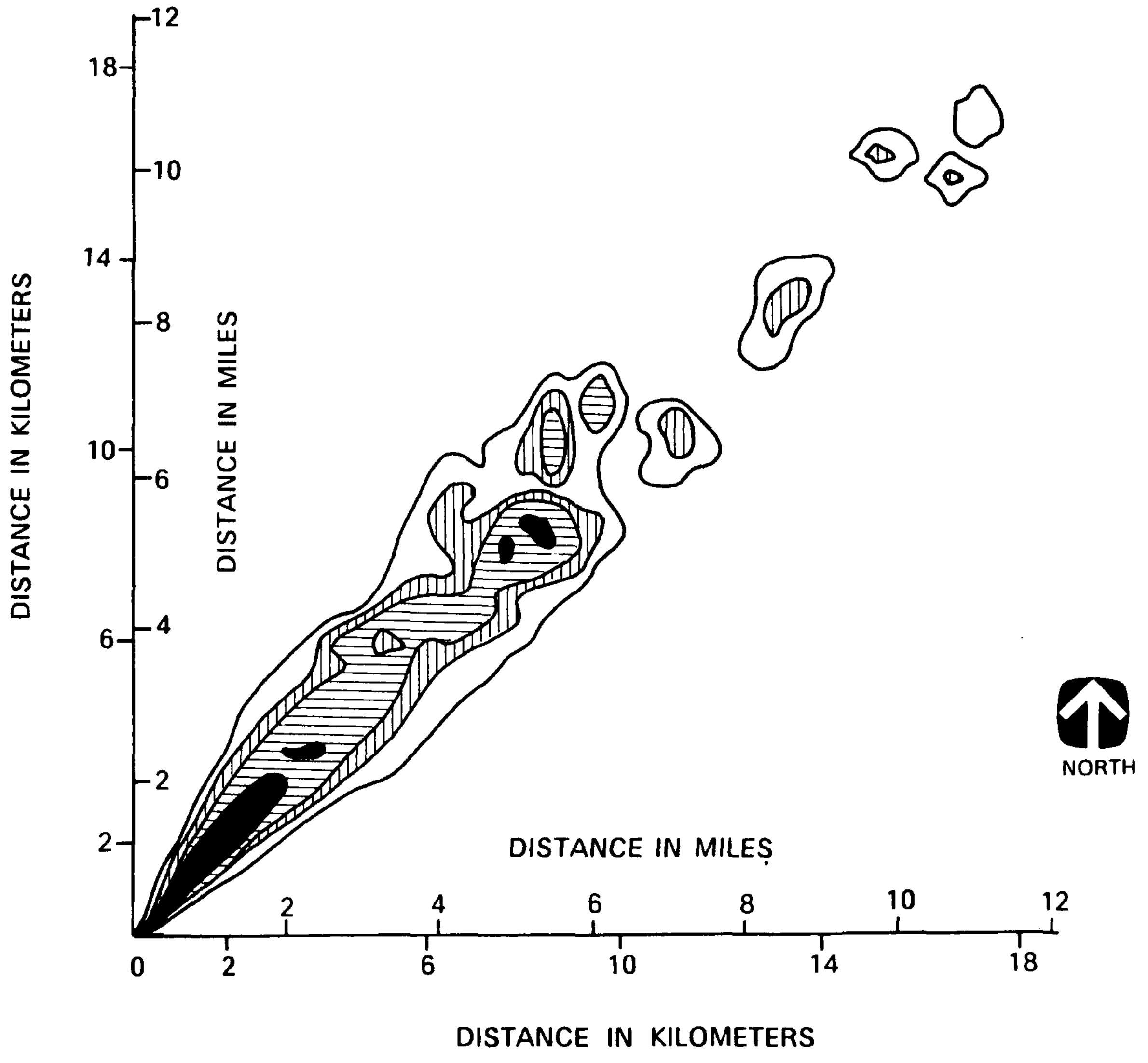
Release Scenarios. Either Case (1) or Case (2) mishap scenarios could result in the burning of missile propellant in proximity to the reentry vehicle. While these cases are unlikely events, they could result in loss of containment of plutonium and aerosolization in a high-temperature propellant fire. For purposes of this study, the worst case would be a fire in which 1 percent of the nuclear material is dispersed as particulate plutonium dioxide in aerosol form.

Figure 5.4.2-2 depicts contours generated by a computer model of radiation concentrations for a representative plutonium release in the deployment area.

Soil/Water Quality Impacts. One source of soil and water contamination from the plutonium released into the atmosphere is from resuspension of particles that have previously settled from the air onto the soil surface. Studies have shown that the amount of material resuspended is an insignificant fraction of the amount initially deposited on the ground. In the event of a mishap, most of the plutonium on the ground would be removed; however, some small quantities may remain following cleanup. The remaining plutonium is relatively insoluble and binds readily with soils to effectively limit its spread to groundwater. Surface water runoff from this soil after a mishap and the settlement of airborne plutonium particles on surface waters may pose a limited health risk to biota, depending on the amount and concentration of plutonium reaching the surface waters.

Biological Impacts. The intake of plutonium by animals and man has been studied extensively. These studies have determined how much plutonium is retained in the body and how the retained portion of this long-lived radioisotope is distributed within the body. The body tissues that are the most critical (in terms of mortality risk) are bone and bone marrow, lungs, and liver. These have been designated as "critical" because they collect the plutonium taken in by inhalation or ingestion, and it remains in these tissues for a sufficiently long time to cause damage or death during the period of retention; the

RADIATION LEVEL	HUMAN HEALTH EFFECTS
0.5 REM	32 additional latent cancer deaths in a 30-year period per million exposed
0.25 REM	14.2 additional latent cancer deaths in a 30-year period per million exposed
0.1 REM	6.4 additional latent cancer deaths in a 30-year *period per million exposed*
0.05 REM	3.2 additional latent cancer deaths in a 30-year period per million exposed
0.01 REM	0.64 additional latent cancer deaths in a 30-year period per million exposed



LEGEND

RADIATION LEVELS (AREA)

■ 0.5 REM (4 sq km)

▤ 0.1 REM (15 sq km)

▥ 0.05 REM (7 sq km)

☐ 0.01 REM (15 sq km)

TOTAL PLUME COVERAGE = 41 sq km

EM5/2

FIGURE 5.4.2-2 CONCENTRATION CONTOURS FOR AEROSOLIZED PLUTONIUM APPROXIMATELY 3-HOURS AFTER RELEASE

- Dwelling in a large eastern United States city for 20 years - 3,600 persons per million.
- Traveling 300,000 miles by auto - 1,000 persons per million.
- Additional cancer deaths resulting from exposure to plutonium in a worst-case HML mishap - 14.2 persons per million.

5.4.3 Cleanup Activities

Solid Propellant. The amount of solid propellant cleanup activities at a mishap site is dependent on the nature of the mishap. The use of fire-retardant chemicals, removal of contaminated soil and debris, and the extent of debris dispersal would determine the impact from the cleanup procedures. In a severe case, significant quantities of soil could be contaminated with solid propellant and its residue, requiring removal after a mishap. The severity of this impact would be dependent on the environmental conditions at the mishap site. Secondary impacts from cleanup activities are also possible.

Hydrazine. The mechanisms used to detect, cleanup, and dispose of spilled liquid hydrazine would depend on the volume of hydrazine spilled, the surface on which it is spilled, and the extent and nature of debris from the mishap that may prevent safe access to the hydrazine spill. Pooled hydrazine could contaminate up to 10 square meters of soil. Methods for decreasing the hazards resulting from a pool of hydrazine range from careful collection of the liquid to dilution and chemical neutralization. Hypochlorite compounds (e.g., household bleach) are commonly utilized to neutralize hydrazine. Special care in the application of neutralizing agents would be necessary if cleanup was being carried out in the vicinity of a stream. Proven methods are already used in other Air Force systems and will be included in contingency plans for the Small ICBM.

Nuclear Material. In the event of the dispersal of nuclear materials, cleanup would consist of sealing off the area and physically removing the nuclear material and any contaminated soil. Any contaminated vegetation would require removal and disposal. The specifics of an individual action would depend on the circumstances of the release and the character of the local area. Surface contamination could require the removal of up to 5,000 cubic meters of soil in the vicinity of the mishap.

5.5 Conclusions

Two extremely unlikely assumptions, that a mishap occurs and that it results in the release of the maximum amount of available propellant and nuclear materials, have been the basis for this analysis. Given these assumptions, the predicted environmental impacts would only be significant within the immediate mishap area with the exception of air quality. No significant impacts on water quality can be expected. Biological impacts would be similarly restricted to the nearby mishap area. Finally, human health impacts could be severe but only within the immediate mishap vicinity.

Environmental impacts of the abnormal Small ICBM safety events are detailed in Section 5.4. Environmental effects are summarized in Tables 5.5-1 through 5.5-5.

Table 5.5-1

Summary of Environmental Effects of Small ICBM Mishaps

Environmental Factor	Scenario			
	Solid-Propellant Burn (Combined Solid/Liquid-Propellant Burn)	**Solid-Propellant Explosion**	**Liquid-Propellant Release**	**Nuclear Material Release**
Air Quality	Possible acidic precipitation downwind Federal particulate standard exceeded	—	Local toxic concentration of hydrazine present exceeding NIOSH standards	—
Biology	Downwind vegetative spottings and irritation of dermal and respiratory tissue in animals Local damage as a result of fire	Possible local injury/mortality caused by flying debris or secondary fires	Tissue irritation to animals resulting from contact or inhalation of vapor Fire damage to vegetation	Limited risk to biota due to assimilation of contaminated surface water
Human Health and Safety	Mild aggravation of respiratory system of susceptible individuals	Possible local injury/mortality caused by flying debris or secondary fires	Tissue irritation resulting from contact or inhalation of vapor	Very small added risk of fatality from exposure-related health factors to people near the mishap
Water and Soils	Chance of motor fuel, lubricant, and firefighting chemicals running off into local surface water and migrating into groundwater	Chance of motor fuel, lubricant, and firefighting chemicals running off into local surface water and migrating into groundwater	Chance of motor fuel, lubricant, and firefighting chemicals running off into local surface water and migrating into groundwater Possible surface contamination requiring aerating up to 10 square meters of soil in vicinity of mishap	Possible surface contamination requiring removal of up to 5,000 cubic meters of soil in the vicinity of mishap Possible local contamination of surface water as a result of runoff

Table 5.5-2

Environmental Effects of an Uncontrolled Small ICBM Propellant Burn

Distance From Mishap	Environmental Effects
Less than 1 km	Local damage and injury or loss of life due to fire. Chance of fuels, lubricants, and firefighting chemicals running off into local surface water. Federal air quality standards exceeded for 30 minutes, causing irritation of eyes, throat, and skin. Chance of groundwater contamination by fuel, lubricant, or firefighting chemicals.
1 to 25 km	Federal air quality standards exceeded for 30 minutes to 1 hour. Spotting of vegetation due to HCl droplets. Irritation of the eyes, throat, and skin of exposed people and animals.
Greater than 25 km	Possible acid rain. Federal particulate standard exceeded for periods over 1 hour. No measurable human health effects.

Table 5.5-3

Environmental Effects of an Explosion of the Small ICBM Propellant

Distance From Explosion	Environmental Effects
Less than 1,200 feet	Injury or loss of life due to overpressure, flying debris, and secondary fires.
1,200 to 1,425 feet	Chance of damage to building due to overpressure, chance of injury to people due to flying glass, and ear damage due to overpressure.
Greater than 1,425 feet	Possibility of fuels, lubricants, or firefighting chemicals running into local surface water, and migrating into groundwater.

Table 5.5-4

Environmental Effects of a Liquid Propellant Release

Distance From Mishap	Environmental Effects
Less than 10 feet	Destruction of local vegetation and contamination of soil requiring clean up. Short-term contamination of surface water if runoff occurs. Possible injury or death if deflagration occurs. Chance of severe burns, convulsion, and danger to life for first 18 minutes when liquid hydrazine may be contacted.
10 feet to 1,500 feet	20-ppm hydrazine limit exceeded for up to 30 minutes causing irritation of eyes, nose, throat, and lungs; dizziness; nausea; and tremors.
Greater than 1,500 feet	0.03 NIOSH hydrazine limit exceeded creating "areas of concern" requiring evacuation of personnel. Chance of susceptible personnel located along centerline of plume exhibiting irritation of eyes, nose, throat, and lungs. Chance of fuel, lubricants, or firefighting chemical runoff into surface water and migrating into groundwater.

Table 5.5-5

Human Health Effects of Radiation Exposure

Radiation Level	Human Health Effects
0.5 REM	32 additional latent cancer deaths in a 30-year period per million people exposed
0.25 REM (weighted average for case study)	14.2 additional latent cancer deaths in a 30-year period per million people exposed
0.1 REM	6.4 additional latent cancer deaths in a 30-year period per million people exposed
0.05 REM	3.2 additional latent cancer deaths in a 30-year period per million people exposed
0.01 REM	0.64 additional latent cancer deaths in a 30-year period per million people exposed

Note: REM = Roentgen Equivalent Man; a unit of biological dose used to indicate the level of radioactivity in a contaminated area.

6.0 PUBLIC COMMENTS

The Council on Environmental Quality (CEQ) regulations require that "after preparing a draft environmental impact statement and before preparing a final environmental impact statement the agency shall:

- Obtain the comments of any federal agency which has jurisdiction by law or special expertise with respect to any environmental impact involved or which is authorized to develop and enforce environmental standards.
- Request the comments of:
    - Appropriate State and local agencies which are authorized to develop and enforce environmental standards;
    - Indian tribes, when the effects may be on a reservation; and
    - Any agency which has requested that it receive statements on actions of the kind proposed.
- Request comments from the applicant, if any.
- Request comments from the public, affirmatively soliciting comments from those persons or organizations who may be interested or affected."

The regulations further require that "an agency preparing a final environmental impact statement shall assess and consider comments both individually and collectively," and shall respond to those comments in the final document."

In compliance with these regulations, the Air Force released the Small Intercontinental Ballistic Missile (ICBM) Draft Environmental Impact Statement (DEIS) for a 58-day public review and comment period on June 25, 1987. Copies of the document were sent to agencies, organizations, and individuals as required and as documented in Chapter 9.0, and were made available to the public on request.

This chapter contains an overview of the public comment management process, a listing of all respondents, and a catalog of all comments received on the DEIS and the responses to those comments.

6.1 Public Review of the Draft Environmental Impact Statement

The public review and comment period for the DEIS began June 25, 1987 with publication of the Notice of Availability in the Federal Register, and ended on August 21, 1987. During this review period, public comments on the DEIS were solicited. Written comments were submitted to the Air Force Regional Civil Engineer, Ballistic Missile Support Office at Norton Air Force Base, California. Verbal and written comments were received at six public hearings held in the study area between July 20 and July 25, 1987. As set forth in the CEQ regulations, these hearings were held at least 15 days following availability of the DEIS. The hearings were held in Lewistown, Harlowton, Great Falls, Conrad, Augusta, and Helena, Montana.

6.2 Receipt of Comments

During the public comment and review period, public comments on the DEIS were received from federal, state, and local agencies; private organizations; and individual citizens. The comments included memoranda, letters, and written statements submitted at the public hearings. Each of these are referred to as documents and all were given the same consideration in the review and analysis process.

A total of 124 documents were received. Only one document (No. 124) was received after the comment period. In addition, transcripts of the six public hearings have been assigned document numbers 125 through 130.

6.3 Review and Response to Comments

Table 6.3-1 contains a listing of all respondents who submitted comments during the public review and comment period. It identifies the author's affiliation, name, title, and city. Respondents are grouped by type of affiliation: federal, state, and local agencies; private organizations, and individual citizens. This table also identifies the document number assigned to each respondent. All documents and the comments within them are presented sequentially from 1 through 124 in Section 6.4. An individual looking for a response to his/her comment can look at Table 6.3-1, identify his/her name, identify the document number assigned to him/her, and go to the document number in Section 6.4 to read the comment and response.

For all documents received during the public review period, 394 comments were identified. Table 6.3-2 provides a summary of the number of documents and comments by type of affiliation. Table 6.3-3 categorizes the comments by issue categories. Ninety comments, mostly from private organizations and individuals participating in the public hearings, relate to Air Force policy. Many questioned the need for the system or its deployment in Montana. Among the resource categories, the largest number of comments related to socioeconomics (issue categories 3 through 7 elicited 90 comments). Biological resources and transportation were other major resource categories eliciting 34 and 22 comments, respectively, followed by utilities (20 comments) and water resources (18 comments). Other resources received less than 15 comments each. All of these comments are listed in Section 6.4 along with the responses to individual comments. Some comments have been responded to in detail in this section; others make reference to responses made for similar comments by other respondents; and still others have been responded to in the main body of the Final EIS (FEIS) text. To ease the search process, references to this last category of responses are made in the form of FEIS section numbers.

In some cases, respondents are referred to the Environmental Planning Technical Reports (EPTRs). These are background studies which, in the interest of brevity and readability of the document, contain detail not provided in the FEIS. Limited copies of these studies will be distributed to the State of Montana Office of the Governor and public libraries in the study area.

A complete list of respondents and all documents received during the public comment period are reproduced in Appendix E of the FEIS, which is a separate volume. This appendix also includes all public hearing transcripts as recorded by the court reporters. Limited copies of this volume have been distributed to the Office of the Governor and public libraries.

Information on how to obtain Appendix E and individual copies of the EPTRs can be obtained by writing to:

Director of Environmental Planning
AFRCE-BMS/DEV
Norton Air Force Base, CA 92409-6448

Table 6.3-1

List of Respondents

Serial Number	Respondents	Document Number
	Federal Agencies	
1.	U.S. Bureau of Indian Affairs	5
2.	U.S. Bureau of Land Management (Sandra E. Sacher)	95
3.	U.S. Bureau of Land Management (Wayne Zinne)	106
4.	U.S. Bureau of Reclamation	123
5.	U.S. Environmental Protection Agency	99
6.	U.S. Fish and Wildlife Service	107
	State Agencies	
1.	Montana State Board of Health	46
2.	Office of the Governor (Governor Ted Schwinden)	98
3.	Office of the Governor (Ralph Driear, Administrative Assistant)	101
4.	Office of the Lieutenant Governor	1
	Local Agencies	
1.	City of Great Falls	70
2.	City of Lewistown	109
3.	Fergus County Disaster & Emergency Services	44
4.	Great Falls City-County Planning Board	111
5.	Lewistown City-County Planning Office	45
	Private Organizations	
1.	American Association of Retired Persons (Lloyd M. Erickson)	29
2.	Birdtail Ranch (Doug and Nancy Dear)	87
3.	Casino Creek Concrete (Marvin Mathison)	41
4.	Chester United Methodist Church (Margaret Novak)	58
5.	Concerned Citizens' Coalition (Marie Schreiber)	8
6.	Concerned Citizens' Coalition (Wilbur L. Johnson)	36
7.	Conrad Ambulance EMS (Paul P. Rathsack)	61
8.	Farming Corporation (Arnold Lindberg)	63
9.	Great Falls Ad Federation (Jay Egan)	32
10.	Great Falls Area Chamber of Commerce (Mike Labriola)	30
11.	Great Falls Clinic (Gordon K. Phillips)	89
12.	Institute for Peace and International Security (Paul F. Walker)	105
13.	Kaufmans (Ira M. Kaufman, Jr.)	6
14.	Kelleher Law Office (Robert C. Kelleher, Sr.)	91
15.	Konitz Contracting, Inc. (Tom Konitz)	49
16.	Konitz Contracting, Inc. (Bob Killham)	50
17.	Last Chance Peacemakers Coalition (Rick Duncan)	114

able 6.3-1 Continued, Page 2 of 4

Serial Number	Respondents	Document Number
	Private Organizations	
18.	Logging Creek Ranch Company (David Doran)	35
19.	Donald R. Marble Attorney at Law (Donald R. Marble)	100
20.	Marra, Wenz, Johnson & Hopkins, P.C. (Warren Wenz)	94
21.	Montana Catholic Conference (A.M. Moylan)	72
22.	Montana Chamber of Commerce (Forrest H. Boles)	90
23.	Montana Power Company (D.M. Sprague)	121
24.	Moore Public Schools (Richard Hughes)	2
25	Physicians for Social Responsibility (Belle C. Richards)	68
26.	Physicians for Social Responsibility (Belle C. Richards)	108
27.	Physicians for Social Responsibility (Catherine E. Wilkerson)	113
28.	Professional Systems, Inc. (Mark L. Macek)	21
29.	Sisters of Charity of Providence of Montana (Kathryn Rutan)	3
30.	Sun Valley Sun (Charles D. Klein)	55
31.	Waddell and Reed (Richard Moffitt)	17
	Individual Citizens	
1.	Archie C. Bishop (Conrad)	115
2.	Ruth Bishop (Conrad)	116
3.	Michael Black (Billings)	40
4.	Bill Bourret (Great Falls)	19
5.	B.J. Bowlen (Great Falls)	120
6.	Alan J. Brown (Great Falls)	14
7.	Gerd J. Callant (Harlowton)	51
8.	Carol I. Collins (Great Falls)	104
9.	Harry Cosgriffe (Two Dot)	54
10.	Jerry N. Costeu (Great Falls)	23
11.	Deb Corcoran (Great Falls)	124
12.	M. Eileen Croghau (Great Falls)	4
13.	Robert J. Dahle (Great Falls)	25
14.	Sue Dickenson (Great Falls)	12
15.	Kent Dodge (East Helena)	69
16.	Rebecca Dodge (East Helena)	73
17.	Rosanne Donahoe (Helena)	92
18.	Jim Eagen (Great Falls)	13
19.	Opal Fladstol (Conrad)	60
20.	J. Michael Fleming (Belt)	110
21.	Dorothy Floerchinger (Conrad)	62
22.	Gretchen Grayum (Montana)	112
23.	Bill Hallinan (Helena)	103
24.	Mary B. Hamilton (Helmsville)	67
25.	Charles M. Heber (Great Falls)	102
26.	Bette J. Hiner-Inseth (Helena)	85
27.	Victoria M. Homer (Helena)	117

Table 6.3-1 Continued, Page 3 of 4

Serial Number	Respondents	Document Number
	Individual Citizens	
28.	Zarina Jackson (Great Falls)	7
29.	Richard A. Johnsten (Great Falls)	26
30.	Robert F. Jorgensen, Jr. (Great Falls)	22
31.	Ruby J. Kammerer (Helena)	83
32.	Ed Keil (Conrad)	64
33.	Bob Kelleher (Billings)	42
34.	Ed Kendley (Palson)	118
35.	Jack Kendley (Helena)	97
36.	Ken Knudson (Great Falls)	11
37.	Duane Kolman (Harlowton)	53
38.	Phyllis J. Lake (Great Falls)	10
39.	Marilynn Laughery (Lewistown)	43
40.	Teresa Lawson (Great Falls)	18
41.	Patricia M. Lindsey (Helena)	88
42.	John E. Lubinus (Lewistown)	48
43.	Marilyn Maddox (Helena)	84
44.	Beverly Magley (Helena)	82
45.	Stephen Maly (Helena)	76
46.	Morris O. Mancoronal, Jr. (Conrad)	56
47.	Don Marble (Chester)	65
48.	Dave McLaughlin (Helena)	93
49.	Lois K. McMeekin (Helena)	81
50.	Kay and Bernadette Miller (East Helena)	38
51.	Frank B. Morrison, Sr. (Helena)	77
52.	Melisa J. Myers (Helena)	96
53.	Stewart Nash (Lewistown)	39
54.	Buck O'Brien (Conrad)	57
55.	Stephen O'Brien (Helena)	52
56.	Jerry O'Connell (Great Falls)	20
57.	Ray Ozman (Great Falls)	28
58.	Ray Ozman (Great Falls)	79
59.	Robert Parker (Ulm)	86
60.	Bill Rockwell (Great Falls)	31
61.	Jim Senkler (Helena)	75
62.	Joan Sieffert (Helena)	71
63.	Howard Snyder (Great Falls)	16
64.	Louise Snyder (Great Falls)	15
65.	Marcia Staigmiller (Great Falls)	9
66.	Alice Stanley (Helena)	78
67.	D.A. Sternberg (Helena)	122
68.	Norman E. Stordahl (Conrad)	66
69.	Milo Stubbs (Great Falls)	33
70.	Diana S. Talcott (Great Falls)	37

Table 6.3-1 Continued, Page 4 of 4

Serial Number	Respondents	Document Number
	Individual Citizens	
71.	Irene Terwolbeck (Gaplin)	119
72.	T.H. Thomas (Great Falls)	27
73.	Ken Vander Ven (Lewistown)	47
74.	Janice S. Van Riper (Helena)	74
75.	Shirley C. Walker (Great Falls)	24
76.	Carla M. Williams (East Helena)	80
77.	Zane Zell (Shelby)	59
78.	Kenneth A. Ziegler (Great Falls)	34

Table 6.3-2

Documents and Comments by Type of Affiliation

Affiliation	Number of Documents	Number of Comments
Federal Agency	6	67
State Agency	4	115
Local Agency	5	7
Private Organization	31	65
Individual Citizen	78	140
TOTAL:	124	394

Table 6.3-3

Number of Comments by Issue Categories and Type of Affiliation

Issue Category	Federal Agency	State Agency	Local Agency	Private Agency	Individual Citizen	Total
1. Air Force Policy		2		18	70	90
2. System Requirements	2	1	1	7	3	14
3. Employment		34		4	9	47
4. Housing		1		3	3	7
5. Education					6	6
6. Public Services		20	2	1	1	24
7. Public Finance		4			2	6
8. Utilities	6	8	1	4	1	20
9. Transportation	7	2	3	2	8	22
10. Land Use		4			1	5
11. Recreation (including Tourism)		9			5	14
12. Visual Resources		1			1	2
13. Cultural Resources	1	8				9
14. Biological Resources	13	12		6	3	34
15. Air Quality	9				1	10
16. Noise	3			1	1	5
17. Water Resources	14	3			1	18
18. Geology and Soils	9	1			1	11
19. Safety		1		7	4	12
20. Other Comments	3	4		12	19	38
TOTAL:	67	115	7	65	140	394

6.4 Comments and Responses

Doc Number	Comment Number	
1	1	**COMMENT:** DEIS received by Montana Clearinghouse. DEIS to be listed in the next Intergovernmental Review Bulletin issued by the Clearinghouse. Comments will be directed to AFRCE-BMS. **RESPONSE:** Noted.
2	1	**COMMENT:** Comment in support of the deployment and operation of the Small ICBM in central Montana for reasons of possible economic boost to Montana and logical succession of the ongoing missile upgrade process. **RESPONSE:** Noted.
3	1	**COMMENT:** Comment in opposition to the installation of the Small ICBM and other weapon systems in eastern Montana for reasons of arms race escalation, cost of military buildup, increased cost to taxpayers, and deterrent to rebuilding Montana's agricultural base and new industries. **RESPONSE:** The Small ICBM is a program directed by the President and the Congress. They determine the relative priority of defense versus other actions.
4	1	**COMMENT:** Comment in opposition to the Small ICBM system in Montana for reasons of disagreement with national defense policy and depending on a "war machine" for economic security. **RESPONSE:** See response to document 3, comment 1.
5	1	**COMMENT:** Concerned about relationship of predictive model to compliance with National Historic Preservation Act and to the identification of Native American sites. Feels need for cultural resources surveys. **RESPONSE:** The Advisory Council on Historic Preservation has identified predictive modeling as an acceptable part of the compliance process, especially when large planning areas are involved. The model is not intended to relate directly to Native American resources; they were identified from existing records and consultation with Native Americans. Cultural resources surveys have been conducted in consultation with the State Historic Preservation Office.
5	2	**COMMENT:** The LOI definition for a low and moderate impact on aggregate resources contains potentially contradictory sentences regarding the adequacy of existing aggregate resources. **RESPONSE:** The LOI definitions for aggregate resources have been altered to clarify their meaning and are presented in FEIS Section 4.10.1.2.

6 1 **COMMENT:** Statement in support of deployment of the Small ICBM in Montana because the construction and operations phases will bolster a terribly weak economic area and also bring in more tourists.

RESPONSE: Noted.

7 1 **COMMENT:** The Air Force should have allowed more than 20 days for review prior to public hearings.

RESPONSE: The Council on Environmental Quality regulations, which implement the National Environmental Policy Act, require the hearings to be held at least 15 days following availability of the DEIS. The Air Force held the hearings 24 days after the release of the DEIS. Further, the Air Force has allowed 58 days for public comment. It was made clear during the hearings that written public comments could be submitted to the Air Force through 21 August 1987.

7 2 **COMMENT:** Small ICBM is illegal because it violates SALT I and SALT II treaties, which undermines and goes against our history of arms control.

RESPONSE: The President and the Congress directed the program and can decide on any future changes in it based on their assessment of international arms control developments and other national security and foreign policy concerns.

7 3 **COMMENT:** Small ICBM, because of such technology as penetration aids and its extreme accuracy appears to be a first strike weapon not the "billed" second strike weapon. Because of this, question its deterrence capability.

RESPONSE: In keeping with the national security policy goals, the President directed the deployment of the Small ICBM system.

7 4 **COMMENT:** We already have five other weapon systems with first strike capability. The Soviets might see this as threatening and aggressive leading to destabilization of the arms race.

RESPONSE: Noted.

7 5 **COMMENT:** Opposed to Small ICBM for reasons it creates local inconveniences, is not vital to our national security, questions its deterrent capability, and further destabilizes the arms race and costly.

RESPONSE: See response to document 3, comment 1.

8 1 **COMMENT:** Would military personnel be eligible for HUD-subsidized programs? If yes, would military personnel have top priority? What impact would the Small ICBM have on the clients of the Mercy Home of Great Falls, which serves battered women and has 80 to 90 percent of their cases moved into HUD projects?

RESPONSE: Eligibility for HUD-subsidized housing is based on family size and income. Should military personnel meet the eligibility requirements, they would be required to follow the same procedures as all other eligible Great Falls residents to obtain HUD housing. The Air Force would provide housing either onbase or offbase through a leasing/rental guarantee program for most of the Small ICBM military personnel. Therefore, it is not expected that military personnel would require HUD-subsidized housing and would not displace Mercy Home referrals.

9 1 **COMMENT:** Comment in support of Small ICBM for reasons of the positive impacts on county road systems, overall transportation in the area, economy, and with appropriate planning and mitigation, the impacts on schools and services can be protected.

RESPONSE: Noted.

10 1 **COMMENT:** Commentor offered the following commentary: didn't want more "jetters" tearing up the street at 50-60 mph; value of home will drop.

RESPONSE: Recent Air Force history and statistics (obtained from a Peacekeeper Monitoring Program) suggest that such a situation is unlikely to occur. The Air Force found that in Cheyenne, Wyoming, a community in which ICBM deployment is currently underway, the personnel hired by Air Force contractors were in their mid-30s, were married, and averaged about 1 year of college. Most of them were residents of the community prior to taking employment with the Air Force. There is no "jetter" problem in Cheyenne, and we do not expect one in Great Falls. All Air Force personnel are expected to follow a code of conduct that reflects the importance of their mission. This discipline is enforced at all times both onbase and offbase. Because of the increase in housing demand associated with the program, we expect the value of existing housing units in Great Falls to rise rather than drop (FEIS Section 4.1.2.3).

10 2 **COMMENT:** Comment made that if the only way we can think to increase employment is this program, we should take a long, hard look at ourselves. Great Falls would be a bigger and better target in the event of war. The U.S. should agree with the Soviet Union to remove 100 medium-range missiles in Europe.

RESPONSE: Noted.

11 1 **COMMENT:** Comment in support of Small ICBM deployment for reasons of positive benefits, such as economy, to the Great Falls community, surrounding area, as well as Montana; through cooperation and mitigation, lessen the impacts, to the maximum extent possible, on the community and its school system.

RESPONSE: Noted.

12 1 **COMMENT:** What is the effect of Small ICBM on peace making role of U.S. and disarmament.

RESPONSE: See response to document 7, comment 2.

13 1 **COMMENT:** Concerned about effect of mid-term cancellation.

RESPONSE: If the Small ICBM program is canceled at any time after construction begins, an evaluation would be made to determine potential impacts.

14 1 **COMMENT:** Will the local interstate highway system be expanded or improved?

RESPONSE: The Federal Highway Administration (FHWA), state and local transportation agencies, Military Traffic Management Command (MTMC), and the Air Force will determine specific defense access road improvements in support of the Small ICBM system.

15 1 **COMMENT:** Can see no reason why military children cannot be bused to schools now closed when other classes are filled.

RESPONSE: Potential mitigation measures have been recommended in FEIS Section 4.1.6 and do include busing students from Malmstrom AFB to area schools. The final selection of mitigations to minimize impacts on the Great Falls Public Schools system will be made by the school board with participation of the Department of Defense.

15 2 **COMMENT:** Comment in support of missile program because we need all the protection we can get since Russia is so far ahead of us in the arms race.

RESPONSE: Noted.

16 1 **COMMENT:** Several schools in the Great Falls Public Schools system are closed. They could be used for the children associated with the program.

RESPONSE: See response to document 15, comment 1.

16 2 **COMMENT:** Comment in support of missile program because of the need to update our defense system and can live with the impacts.

RESPONSE: Noted.

17 1 **COMMENT:** Comment in support of Small ICBM program because of possible increased business with Malmstrom AFB.

RESPONSE: Noted.

18 1 **COMMENT:** Comment in opposition to Small ICBM program for reasons of cost, the threat to peace, and quality of life.

RESPONSE: See response to document 3, comment 1.

19 1 **COMMENT:** Comment in support of Small ICBM program assuming Congress determines this weapon system is necessary to maintain a strong defense posture in this country.

RESPONSE: Noted.

20 1 **COMMENT:** Are additional gates planned at Malmstrom AFB?

RESPONSE: As a result of the proposed program, no new gates are planned; however, there is some potential for relocating the north gate to accommodate traffic-pattern changes.

21 1 **COMMENT:** Comment in support of the Small ICBM program for its potential to establish a diverse and growing economic base.

RESPONSE: Noted.

22 1 **COMMENT:** Comment in support of Small ICBM program. Commentor observation: a group of environmentalists continue to "stack the deck" at various hearing meetings with negative viewpoints and taking all the time. These groups are not representative of the majority of the people and should be allowed to speak at only one meeting allowing the news media a more objective sample of people attending meetings. Maybe a show of hands for or against is in order.

RESPONSE: Noted.

23 1 **COMMENT:** Statement in support of Small ICBM deployment, specifically Alternative 2, for its employment growth potential.

RESPONSE: Noted.

24 1 **COMMENT:** If U.S. safety is at such risk, the U.S. should press forward with talks with the Soviets and resolve this explosive situation.

RESPONSE: Noted.

25 1 **COMMENT:** Comment in support of deployment of the Small ICBM at Malmstrom AFB.

RESPONSE: Noted.

26 1 **COMMENT:** Comment in support of Small ICBM program assuming Congress determines this weapon system is necessary to maintain a strong defense posture in this country.

RESPONSE: Noted.

27 1 **COMMENT:** Comment in support of Small ICBM program because opinion is there will not be any significant adverse impacts.

RESPONSE: Noted.

28 1 **COMMENT:** Why is the Small ICBM necessary?

RESPONSE: See response to document 7, comment 2.

29 1 **COMMENT:** Will the rates charged for public utilities be increased, particularly for fixed income groups, such as senior citizens?

RESPONSE: The costs of utility service in the Great Falls area should not increase as a result of the program. No additional capital investments will be required for potable water, wastewater, solid waste, and energy systems since excess plant capacity is available. These facilities will be able to operate at a more efficient rate, thereby reducing the cost per unit processed.

30 1 **COMMENT:** Comment in support of deployment of the Small ICBM at Malmstrom AFB.

RESPONSE: Noted.

31 1 **COMMENT:** Comment in support of deployment of the Small ICBM at Malmstrom AFB.

RESPONSE: Noted.

32 1 **COMMENT:** Comment in support of Small ICBM deployment because it will benefit both the country and Great Falls.

RESPONSE: Noted.

33 1 **COMMENT:** Comment in support of deployment of the Small ICBM at Malmstrom AFB.

RESPONSE: Noted.

34 1 **COMMENT:** What happens to the new missiles and transporters if a new arms control treaty is signed?

RESPONSE: Any arms control treaty generally stipulates a period of time, usually lasting several years, before the agreed limits must be met. The parties to an agreement can use this time to make any adjustments necessary to meet those limits.

34 2 **COMMENT:** Could Small ICBM program be a bargaining chip at peace talk summits?

RESPONSE: These are determinations to be made by the President.

34 3 **COMMENT:** Will the program result in crowding at golf courses in Great Falls?

RESPONSE: Golf facilities have been identified by the Great Falls Park and Recreation Department as being occasionally used at or near capacity. Without expansion of the existing golf facilities, it is anticipated that crowding at the two city golf courses could occur more frequently as a result of baseline population growth. The Small ICBM program population will result in additional use of the city's golf facilities and will likely contribute to the crowding of these facilities (FEIS Section 4.5.2.2).

35 1 **COMMENT:** Are there additional launch sites proposed in the areas around Monarch and Niehart? If so, where?

RESPONSE: The Small ICBM program will only utilize the existing Minuteman launch facilities. No additional launch facilities are planned. Five of the proposed launch facilities (A-4, A-5, A-6, A-7, and A-8) are located within 10 miles of the towns of Monarch and Niehart. Three of these (A-5, A-6, and A-8) will be utilized only under Alternative 3, where all 200 launch facilities are used.

36 1 **COMMENT:** Will temporary workers choose to live in hotel/motel/campgrounds or in rental housing? How can they afford to live in motels for an extended period of time?

RESPONSE: About 30 percent of the construction workers are expected to inmigrate to the Great Falls area. Based on past experience at F.E. Warren AFB, about 55 percent of the inmigrating workers will live in rental housing, 15 percent in mobile homes, and 30 percent in hotels/motels. Most workers who will live in hotels/motels for an extended period of time will be collecting per diem payments to cover this cost. However, it is not expected that temporary workers, who will be in the area for an extended period of time, would live in hotels/motels. Rather, they will live in mobile homes and rental units.

37 1 **COMMENT:** Concerned that the Air Force is not sincere in wanting to help the economics of the area.

RESPONSE: The Small ICBM program is proposed for deployment at Malmstrom AFB to maintain the deterrence capabilities of U.S. strategic forces. The anticipated impact on the economy as well as other environmental issues were considered in the final selection process. Operational needs of the system, however, were weighted more heavily in that process (FEIS Section 1.1).

37 2 **COMMENT:** Could the Air Force utilize available local contractors for the Small ICBM program?

RESPONSE: The process for selecting the construction contractors and other vendors is an open, competitive process. The Air Force cannot require contracts to go only to local firms. The Air Force will support certain activities such as giving information seminars so that local firms become more knowledgeable in how to compete successfully for federal jobs. To the extent feasible, the Air Force will divide construction activities into smaller segments which will better meet the bonding capabilities of the small contractors. This will permit smaller local firms to compete more actively in the Small ICBM program bidding process (FEIS Section 4.1.2.1).

37 3 **COMMENT:** Concerned that influx of young military personnel will increase crime.

RESPONSE: Crime rates are based on many variables, not just the age of certain segments of the population. It is not expected that the additional military personnel will result in disproportional increases in crime in the area. Recent experience with the Peacekeeper in Minuteman silos program at F.E. Warren AFB indicated that no increase in crime rates was attributed to military personnel.

37 4 **COMMENT:** Young Air Force personnel are less likely to take care of rental housing.

RESPONSE: About 70 percent of young enlisted Air Force personnel are unmarried and will be living in dormitories on Malmstrom AFB. Married personnel who live offbase receive a housing allowance that enables them to obtain and maintain suitable housing within the community.

37 5 **COMMENT:** Will unsuccessful job seekers be transients or vagrants, thereby destabilizing Great Falls?

RESPONSE: Based on experience with the Peacekeeper missile deployment at F.E. Warren AFB, job seekers will be mature, educated, family types who will not destabilize Great Falls.

37 6 **COMMENT:** Adding more weapons to the world arsenal will not make for a stable and secure environment.

RESPONSE: Noted.

37 7 **COMMENT:** Question the sincerity of the military processing the EIS.

RESPONSE: It is not disqualifying under the law that the proponent agency favors the adoption of the proposal or particular alternatives or mitigation measures. What is required is that the EIS provides an adequate analysis of the environmental impacts that can be anticipated.

37 8 **COMMENT:** It is dishonest to have a division of a defense contractor writing the EIS. It is a conflict of interest and loses its credibility. If another EIS is prepared, it should be done by objective people taking key roles in its development.

RESPONSE: The U.S. Air Force was aware of the possibility of conflict of interest from the inception of the environmental support contract. After full investigation, it was determined that Tetra Tech's relationship with Honeywell, a defense contractor, did not pose a conflict of interest. A detailed answer to this question was provided by the Air Force in response to a comment by Mr. Kruger in the Lewistown public hearings on the DEIS. It appears verbatim in the transcripts of those hearings on pages 13 through 15. (FEIS Appendix E.)

38 1 **COMMENT:** Comment in opposition to deploying 200 Small ICBMs in north central Montana. Also would like to get rid of the Minuteman silos.

RESPONSE: Noted.

39 1 **COMMENT:** Concerned that HMLs will be on public roads every day and that accidents are inevitable.

RESPONSE: A HML may be on the road almost every day, especially along U.S. 87/89 between Great Falls and Belt; however, farther from the base, the frequency would be lower. In addition, with the driving-safety program provided for HML drivers and the presence of a U.S. Federal Marshall controlling traffic and leading the HML transporter convoy, traffic accidents related to HML transport would be minimized.

39 2 **COMMENT:** Concerned about severe impacts on the Great Falls Public Schools system due to the Small ICBM.

RESPONSE: The impacts on the Great Falls Public Schools system have been evaluated as high and significant for the Proposed Action with both housing options, and all alternatives (FEIS Sections 4.1.2.4 and 4.1.3.4). However, potential mitigation measures have been identified in FEIS Section 4.1.6 and Appendix D as possible ways of eliminating or alleviating these impacts.

39 3 **COMMENT:** Concerned that housing will be built for the program and abandoned at a later date when program is completed.

RESPONSE: The program is not expected to follow a "boom-bust" pattern. Housing demand will increase gradually over the construction phase and stabilize at these higher levels once the operations phase is reached.

39 4 **COMMENT:** Comment strongly urges the Small ICBM program not be recommended in Montana or anywhere in the U.S. Recommends putting our protection in the air.

RESPONSE: Noted.

40 1 **COMMENT:** Statement in opposition to Small ICBM deployment in Great Falls area for reasons of possibility of more crime, false and temporary economic growth, and HML movements.

RESPONSE: These issues are addressed in FEIS Sections 4.1.2.1, 4.1.2.5, and 4.3.2.1.

41 1 **COMMENT:** Comment in support of Small ICBM deployment in central Montana for reasons of little impacts, economic boost, and more jobs.

RESPONSE: Noted.

41 2 **COMMENT:** Concerned that traffic will increase due to HMLs on the roads.

RESPONSE: Traffic impacts are recognized (FEIS Section 4.3.2.1) and possible mitigation measures are identified in the FEIS Section 4.3.6.

42 1 **COMMENT:** Requested Lewistown public hearing transcript.

RESPONSE: Copy provided.

43 1 **COMMENT:** Comment in opposition to Small ICBM for reasons of cost of program, the state is in a recession, cattle ranchers are barely surviving, and dollars could be better used elsewhere.

RESPONSE: See response to document 3, comment 1.

44 1 **COMMENT:** Concerned about what effect the Small ICBM program personnel will have on the Fergus County Disaster and Emergency Services. If there is an effect, who will assist either monetarily or otherwise?

RESPONSE: For Fergus County, short-duration county public services impacts are considered low due to projected increases in the number of emergency calls of up to 5 percent. These impacts are not considered significant since no additional personnel or facilities would be needed. No long-duration impacts would occur (FEIS Section 4.1.2.5).

45 1 **COMMENT:** EIS does not reference satellite maintenance sites - economic and safety basis for consideration.

RESPONSE: As a result of suggestions made during scoping meetings and public hearings, the Air Force has initiated a study of expanding the maintenance capabilities at the HML enclosures. This could reduce traffic delays and accident potential associated with missile movements to Malmstrom AFB. Additionally, the resulting increase in construction workers in the deployment area has the potential to provide beneficial economic impacts to outlying communities. The concept of satellite or field maintenance centers at Lewistown and Conrad, however, was found unfeasible for the following reasons: (1) maintenance and repair of the HML at these centers would require duplication of secure facilities such as assembly, surveillance, and inspection building; mechanical maintenance shops; and weapons storage area; (2) facility construction would require additional land acquisition and road upgrades, thereby increasing program costs; and (3) Field Missile Maintenance Squadron and Security Police Squadron personnel would have to be located at the satellite centers increasing the overall military personnel requirements.

46 1 **COMMENT:** Montanans voted against further deployment of nuclear weapons 5 or 6 years ago. Commentor wants to see this vote honored and if not honored, at least addressed in the EIS.

RESPONSE: The defense of this country is a national issue. The basing and deployment decisions are ultimately made by the Congress and the President.

47 1 **COMMENT:** Concerned that traffic will increase due to HMLs on the roads.

RESPONSE: See response to document 41, comment 2.

47 2 **COMMENT:** Will highways used by the HMLs be improved?

RESPONSE: The Air Force is presently coordinating with the Military Traffic Management Command, Federal Highway Administration, Montana State Department of Highways, and county road departments regarding road and bridge improvements needed to accommodate increases in program-related traffic, including HML movements.

48 1 **COMMENT:** Concerned that home is near launch facility N-8.

RESPONSE: Launch facility N-8 would be utilized only if Alternative 3 is implemented. For this alternative, all 200 launch facilities are proposed to be utilized and will affect a number of homeowners. Options available to the homeowners under these circumstances are discussed in FEIS Section 4.4.1.2.

49 1 **COMMENT:** Comment in support of Small ICBM system for national safety.

RESPONSE: Noted.

49 2 **COMMENT:** Could the Air Force utilize available local contractors for the Small ICBM program?

RESPONSE: See response to document 37, comment 2.

50 1 **COMMENT:** Comment in support of Small ICBM program in Montana in the belief we need to stay competitive in the area of ICBMs and the program will have a positive effect on the economic climate in Montana.

RESPONSE: Noted.

51 1 **COMMENT:** Concerned about sonic booms in Harlowton.

RESPONSE: No sonic booms would be induced by this program.

52 1 **COMMENT:** Questions the need for additional new weapons systems as the Small ICBM.

RESPONSE: See response to document 7, comment 2.

52 2 **COMMENT:** Questions the selection of a more populated area such as north-central Montana as opposed to a less populated area such as Alaska or northern Canada.

RESPONSE: Initial screening of potential deployment locations began with a list of 4,200 DOD and DOE installations situated throughout the 50 states. Using existing data on these locations, each was evaluated against minimum technical and operational criteria. From the initial effort, all but 51 areas in 15 states were eliminated. Field visits were used to collect and validate the data needed to conduct comparative analyses to determine the suitability of each location. The list was then reduced to 24 installations at this level of screening. An assessment of the environmental impacts on these locations was presented in the Legislative Environmental Impact Statement (LEIS). On December 19, 1986, the President announced the decision that Malmstrom AFB had been selected for initial deployment of the Small ICBM. The decision was based on operational effectiveness, cost, mission compatibility, and the LEIS.

53 1 **COMMENT:** Comment in support of deployment of the Small ICBM at Malmstrom AFB.

RESPONSE: Noted.

54 1 **COMMENT:** Concerned about noxious weeds.

RESPONSE: Road and bridge upgrading along T/E routes will be conducted by state or county agencies or their contractors. Development and implementation of subsequent reclamation and noxious weed control programs along T/E routes are the responsibility of these agencies. Reclamation and noxious weed control programs for areas disturbed onbase, around launch facilities, and along access roads will be developed, implemented, and monitored by the Air Force in accordance with COE practices for environmental protection (FEIS Section 4.8.1.4).

55 1 **COMMENT:** Concerned about special impact on Augusta and suburban area.

RESPONSE: No major impacts have been identified for the community of Augusta. The discussion in the EIS is concentrated on those areas that will be affected by the program.

56 1 **COMMENT:** The military is too large, expensive, and dangerous to feel safe. The U.S. should stop military buildup and not make Montana a target for all countries who wish to launch against the U.S.

RESPONSE: See responses to document 3, comment 1 and document 52, comment 2.

56 2 **COMMENT:** Concerned that the program will affect air quality in Montana.

RESPONSE: Program-related construction would result in some temporary air quality impacts which would be low and not significant. Long-duration operations impacts would be negligible (FEIS Section 4.11.2).

56 3 **COMMENT:** Concerned that the program will affect clean water in Montana.

RESPONSE: Some short-duration degradation of the quality of streams in the deployment area can be expected to occur during the construction phase. The overall impacts on the receiving streams are expected to be low and not significant (FEIS Section 4.9.2.2).

57 1 **COMMENT:** What is the rationale for deploying the new Small ICBM on Minuteman sites? Wouldn't this arrangement make it easier for any enemy to knock out both missile systems at the same time with the same warhead?

RESPONSE: The President chose deployment of the Small ICBM in HMLs on existing Minuteman launch facilities because it maintains the mobility necessary for survival at a reasonable cost. The Small ICBM will be using 100 to 200 launch facilities located throughout an 8,500-square-mile area in north-central Montana. Upon tactical warning of a launch against the U.S., the HMLs will dash off of the launch facilities, covering an area well in excess of the existing 8,500 square miles. This ability provides the survivability of the system.

57 2 **COMMENT:** Now that the Small ICBM appears to be a real program to be based in the Great Falls area, will the Minuteman missiles be removed? If so, what are the potential socioeconomic impacts of decommissioning the Minuteman?

RESPONSE: There are no present plans to decommission the Minuteman missiles or change their method of operations.

58 1 **COMMENT:** Comment in support of the No Action Alternative.

RESPONSE: Noted.

59 1 **COMMENT:** Comment about psychological and moral impacts, and will of the people.

RESPONSE: The purpose of an EIS is to analyze expected changes resulting from the Proposed Action and its reasonable alternatives, including the No Action Alternative, that could significantly affect the quality of the human environment. It is not the purpose of this EIS to discuss morality, military tactics, or general societal issues. Finally, Congress, in Section 209(c)(4) of the 1986 DOD Authorization Act, directed the Air Force to analyze the environmental effects of "deployment and peacetime operation." The U.S. Supreme Court has held that psychological impacts attributable to the fear that an event like nuclear war may occur in the future is not an appropriate subject for EIS analysis because it is not related to the physical impacts of the program (Metropolitan Edison v. People Against Nuclear Energy, April 1983). Also see FEIS Section 1.7.2.

60 1 **COMMENT:** Additional costs of education (in Conrad) should be paid for by the federal government.

RESPONSE: The federal program set forth in P.L. 81-874 recognizes the responsibility of the U.S. for the impact which certain federal activities have on the local educational agencies. Currently, students whose parents live or work on federal property in the Great Falls Public Schools system qualify for impact aid. However, in order to qualify for the P.L. 81-874 monies, at least 3 percent of the student membership must have parents who live or work on federal property.

The Conrad Public Schools system presently does not qualify for this aid, but may when the Air Force strategic training installation locates in Conrad in 1988.

61 1 **COMMENT:** Will new housing be built or will housing be remodeled in Conrad?

RESPONSE: No new housing construction or major remodeling is expected to occur in Conrad as a direct result of this program.

61 2 **COMMENT:** Could the Air Force utilize available local contractors for the Small ICBM program?

RESPONSE: See response to document 37, comment 2.

62 1 **COMMENT:** Comment in opposition to Small ICBM deployment because of the need to balance the national budget and we must stop the uncontrolled profit in the military.

RESPONSE: See response to document 3, comment 1.

63 1 **COMMENT:** Statement on the injuries sustained by his family as a result of Minuteman missile movements.

RESPONSE: Because of increased vehicular traffic, the risk of automobile accidents would increase during the construction phase and over the life of the Small ICBM program. Increased emphasis on defensive driving by military personnel and normal safety precautions during HML movements would help keep the risks to a minimum. HML drivers will be trained regularly at a special HML vehicle operations training area located at the base.

64 1 **COMMENT:** Comment in support of Small ICBM deployment because the program will not create any additional short- or long-term cost to the local taxpayers.

RESPONSE: Noted.

65 1 **COMMENT:** Comment in support of the No Action Alternative.

RESPONSE: Noted.

66 1 **COMMENT:** Comment in support of deployment of the Small ICBM at Malmstrom AFB.

RESPONSE: Noted.

67 1 **COMMENT:** The EIS didn't address the issue of AIDS and the high influx of military personnel, high-risk group.

RESPONSE: It is not the intent of this EIS to discuss moral or general societal issues. However, the Air Force has taken the following steps to address the spread of the AIDS virus. Since September 1985, all applicants for active duty are tested for the AIDS virus. Anyone who tests positive is denied permission to enter the Air Force. In October 1986, the Air Force began testing of all persons on active duty or in the Air Force Reserves. Testing of all personnel will be completed by September 1988. As of August 31, 1987, 441,119 had been tested and 497 tests showed positive for AIDS virus for an infection rate of 1.1 per 1,000. The infection rate for all DOD employees is 1.6 per 1,000. No comparable figures for the general public are known as there is no widespread testing of the general public. Any Air Force person who tests positive is sent to Wilford Hall Medical Center at Lackland AFB, Texas for evaluation. If active AIDS virus is found to be present in the system, the person is medically retired from active duty.

67 2 **COMMENT:** Will deployment of the Small ICBM affect tourism in Montana?

RESPONSE: A discussion of the tourism industry in Montana has been added to Regional Recreation, FEIS Sections 3.5.3 and 4.5.2.

67 3 **COMMENT:** Concerned that the proposed program will affect the beauty of Montana.

RESPONSE: With the construction of HML enclosures, both local residents and tourists will become more aware of missile deployment in the area. The earth-covered igloos would resemble mounds of earth and be most noticeable in the very flat terrain. Many viewers would be unable to distinguish between the alternative pre-engineered buildings and one of the many agricultural buildings in the area. Along Interstate 15 between Yellowstone National Park and the Canadian border, only three HML enclosures (launch facilities I-6, I-7, and P-9) would be visible.

67 4 **COMMENT:** Statement on how the military should spend its money, the abolishing of the CIA and NSC, forget the Persian Gulf and what Charles Russell would say to "Midgetman."

RESPONSE: See response to document 3, comment 1.

68 1 **COMMENT:** EIS should address psychological effects on children.

RESPONSE: See response to document 59, comment 1.

68 2 **COMMENT:** Statement in opposition to Small ICBM deployment because of the needs of the people of the world for food, clothing, shelter, and that health care monies must not be diverted to unnecessary armaments.

RESPONSE: See response to document 3, comment 1.

69 1 **COMMENT:** Comment in opposition to Small ICBM deployment for numerous reasons as there is no need for further buildup of our nuclear arsenal, can't afford it socially or morally, welfare system now helping the weapon building corporations rather than the poor citizens, financial stress on taxpayers, health hazards and the socioeconomic "boom-bust" impacts that will further erode the fragile Montana environment and society.

RESPONSE: See response to document 3, comment 1.

70 1 **COMMENT:** The City of Great Falls believes that disposal space at their existing landfill, along with the space available on the adjacent leased property, will provide a minimum of 15 years service.

RESPONSE: FEIS Sections 3.2.3.3 and 4.2.2.3 have been revised to reflect this change.

70 2 **COMMENT:** Page 4-84: The last potential mitigation measure listed refers to "alternative sources of state and federal funding to provide for additional staff, and equipment, for local governments." Suggest this statement be augmented with specific sources, if possible.

RESPONSE: No alternative sources of funding have been identified. This mitigation has been deleted from the FEIS.

70 3 **COMMENT:** Specific mitigation measures should be provided to address identified impacts on urban roads.

RESPONSE: Potential mitigation measures have been identified in the FEIS Appendix D.

71 1 **COMMENT:** Why do we need more weapons when some people are not being fed or clothed?

RESPONSE: See response to document 3, comment 1.

72 1 **COMMENT:** Concerned about the impact suffered by low-income Americans due to the proposed program.

RESPONSE: The Small ICBM program's effect on low-income people was studied under various elements. During the construction phase greater employment opportunities will become available, providing a beneficial effect for unemployed or underemployed yet qualified persons. Housing will be supplied to most military personnel, whether onbase or offbase, and therefore, no significant increase in housing prices is expected. During the construction phase, there could also be a temporary increased demand for public assistance programs because of the presence of unsuccessful job seekers, but this increase in service demand should diminish during the operations phase. Program-related increases in demand for utility services are not expected to cause a price increase for local customers. These issues are discussed in FEIS Sections 4.1.2.1, 4.1.2.3, 4.1.2.5, and 4.2.2.

73 1 **COMMENT:** Comment in opposition to Small ICBM deployment in Montana because of religious and family beliefs and difficulty understanding why we need the system.

RESPONSE: Noted. Rationale for the deployment of the Small ICBM system is provided in FEIS Section 1.1.

74 1 **COMMENT:** Was the scope of this EIS specifically and unambiguously limited by legislation?

RESPONSE: The Congress, in Section 209(c)(4) of the 1986 DOD Authorization Act, directed the Air Force to analyze the environmental effects of "deployment and peacetime operation" of the Small ICBM system (FEIS Section 1.7.2). The EIS was prepared in accordance with this statute.

75 1 **COMMENT:** Comment in support of the No Action Alternative.

RESPONSE: Noted.

76 1 **COMMENT:** The EIS does not address the environmental impacts of an accidental or intentional launch of a missile. Without such analysis, the program (Proposed Action and alternatives) will provoke legal action.

RESPONSE: System safeguards have been developed to ensure that there is no possibility of accidental launch. Analysis of intentional launch is beyond the scope of the EIS, since the Congress directed that only peacetime operations be addressed.

77 1 **COMMENT:** The EIS does not address the environmental impacts of an accidental or intentional launch of a missile. Without such analysis, the program (Proposed Action and alternatives) will provoke legal action.

RESPONSE: See response to document 76, comment 1.

78 1 **COMMENT:** Does the Air Force have a hazardous waste management plan?

RESPONSE: Malmstrom AFB has a hazardous waste management plan that identifies the procedures to be followed for the collection, documentation, and disposal of hazardous wastes. Currently hazardous wastes generated onbase are collected, stored onbase, and then transported to an out-of-state, EPA permitted disposal facility (FEIS Sections 3.2.3.3 and 4.2.2.3).

79 1 **COMMENT:** Commentor questions the need and urgency of deploying the system.

RESPONSE: The Congress mandated that the program be pursued as a matter of the highest national security priority with initial operational capability (IOC) by the end of 1992. In order to meet this IOC date and adhere to the requirements of the National Environmental Policy Act, the Air Force is conducting this assessment of the environmental impacts for Malmstrom AFB this year (1987).

79 2 **COMMENT:** Comment in opposition to Small ICBM system for reasons as lack of confidence the system will work; and money better spent on housing, education, medical research, and cleaning up the air and water.

RESPONSE: See response to document 3, comment 1.

80 1 **COMMENT:** Doesn't this program effectively add 100 to 200 possible targets concentrated within a fairly small area?

RESPONSE: See response to document 57, comment 1.

80 2 **COMMENT:** What happens to the area after construction?

RESPONSE: The proposed Small ICBM program at Malmstrom AFB is expected to have a 20-year life span. The construction phase will be followed by a substantial operations phase. Therefore, this program is not expected to follow a "boom-bust" pattern. This issue is covered in FEIS Section 4.1.2.2.

81 1 **COMMENT:** Comment in opposition to Small ICBM deployment for reasons such as more dollars being spent on defense when foreclosures on family farms continue to escalate, cutbacks in education and funds being restricted or no longer available on such things as housing, nutrition, medication, and therapy. The real environment affects everyone in the U.S., not just Montana.

RESPONSE: See response to document 3, comment 1.

82 1 **COMMENT:** Comment in support of the No Action Alternative.

RESPONSE: Noted.

83 1 **COMMENT:** Comment in opposition to Small ICBM deployment because people won't be any safer than now, don't need any more people in Montana, and possible accidents and contamination.

RESPONSE: Noted.

83 2 **COMMENT:** What is to become of the Minuteman system? Where does the money come from to build the Small ICBM system?

RESPONSE: There are no present plans to decommission the Minuteman missile or change the method of operation. The Small ICBM program will be funded by the Congress.

84 1 **COMMENT:** Comment in support of Small ICBM program because it will enhance Montana's economy and help deter aggression.

RESPONSE: Noted.

85 1 **COMMENT:** Comment in opposition to the Small ICBM system because it is only another deterrent in a series of prior deterrents that is costly. The promised boom to the Great Falls economy is paltry compared to what it would buy to enhance life, not destroy it.

RESPONSE: See response to document 3, comment 1.

86 1 **COMMENT:** Comment in opposition to Small ICBM for moral and spiritual reasons.

RESPONSE: Noted.

87 1 **COMMENT:** Comment in opposition to Small ICBM deployment for reasons as gates left open, broken cattle guards, damaged county roads, and increased crime.

RESPONSE: The Air Force has an ongoing program to supplement existing base procedures to educate new construction and operations personnel on local sensitive issues and concerns of property owners in an effort to minimize undesirable consequences.

88 1 **COMMENT:** Comment in opposition to Small ICBM deployment in Montana or any other state because the U.S. needs to decrease nuclear weapons, not add to them.

RESPONSE: Noted.

89 1 **COMMENT:** Comment in support of Small ICBM deployment at Malmstrom AFB because we need to update the missile system and continue deterrence to maintain peace.

RESPONSE: Noted.

90 1 **COMMENT:** Comment in support of Small ICBM deployment at Malmstrom AFB because of the positive economic factors generated by the program for Montana.

RESPONSE: Noted.

91 1 **COMMENT:** Comment objects to placement of 200 Small ICBMs in Montana because the missiles are in violation of SALT I and SALT II treaties.

RESPONSE: See response to document 7, comment 2.

91 2 **COMMENT:** Recent news stories have described the failure of certain components of the Peacekeeper missile. Would the Small ICBM use these components? Is the Air Force certain that the Small ICBM would operate properly?

RESPONSE: Only fully verified components are used in operational systems. The system will be fully tested and verified before it becomes operational. The Air Force is confident that the Small ICBM will perform as designed.

92 1 **COMMENT:** Comment in opposition to Small ICBM deployment in Montana or anywhere on this planet because it is environmentally unsafe, a huge threat to all life and the U.S. should stop the escalation of nuclear weapons.

RESPONSE: See response to document 7, comment 2.

92 2 **COMMENT:** The EIS does not address the threat to all life on this planet.

RESPONSE: See response to document 74, comment 1.

93 1 **COMMENT:** The people of Montana previously voted against any more new weapons. Is this being considered by the state and federal governments?

RESPONSE: See response to document 46, comment 1.

93 2 **COMMENT:** It appears the majority of the public hearing testimony is opposed to the new missile system. These people are not being heard.

RESPONSE: Your comments have been provided to the decision-makers as required by law.

93 3 **COMMENT:** War has never solved anything. Hiroshima and Nagasaki are two very vivid reminders that not even nuclear warfare is an effective deterrent. As long as people are willing to bear arms, we will have war.

RESPONSE: Noted.

94 1 **COMMENT:** Comment in support of Small ICBM deployment at Malmstrom AFB as long as various impacts are dealt with appropriately during construction and operation of the system.

RESPONSE: Noted.

95 1 **COMMENT:** Requests the Miles City District Office of the Bureau of Land Management be notified when affected launch facilities are identified so that further analysis can be accomplished.

RESPONSE: Will notify.

96 1 **COMMENT:** Why wasn't California selected for Small ICBM deployment?

RESPONSE: A number of California military bases, along with other bases in all 50 states, were evaluated for Small ICBM deployment by the Air Force during recently completed siting and environmental investigations. Results of these two exhaustive studies were provided to the Congress and to the President. On the basis of operational effectiveness, cost, mission compatibility, and the assessment of environmental impacts presented in the Small ICBM LEIS, the President, on December 19, 1986, announced the decision to deploy 200 Small ICBMs in Montana.

96 2 **COMMENT:** Concerned that four-lane highways will be built in remote areas of Montana and ruin the land, creeks, and rivers.

RESPONSE: There are no plans for building four-lane highways in the remote areas of Montana as part of the Proposed Action. The need for road improvements is being studied jointly by the U.S. Air Force, Military Traffic Management Command, and federal, state, and local transportation agencies. These damaging mitigation measures are discussed in FEIS Sections 4.8.1.4, 4.8.6, and Appendix D.

96 3 **COMMENT:** Will deployment of the Small ICBM affect tourism in Montana?

RESPONSE: See response to document 67, comment 2.

96 4 **COMMENT:** Concerned about possible accidents that could affect such things as air quality, plant life, etc.

RESPONSE: This issue is addressed in FEIS Sections 5.3.2 and 5.4.

97 1 **COMMENT:** Concerned about the aesthetics, maintenance, and use of existing transportation systems.

RESPONSE: The Air Force is coordinating the maintenance and use of existing transportation system with the Military Traffic Management Command, Federal Highway Administration, Montana Department of Highways, and local agencies through the Defense Access Roads needs process. As a result of the decisions made through this process, the Air Force will conduct or assist local agencies in the maintenance of existing transportation systems.

97 2 **COMMENT:** Concerned about geology and soils impacts due to the proposed program changes to the transportation system.

RESPONSE: Descriptions of the effects of the Small ICBM program, resulting from modification of highways and bridges and construction at launch facilities and Malmstrom AFB, are presented in FEIS Section 4.10.2.1, with soil erosion discussed in FEIS Section 4.10.2.3.

97 3 **COMMENT:** Concerned about biological impacts due to the proposed program changes to the transportation system.

RESPONSE: Potential impacts on biological resources resulting from modification of highways and bridges, as well as program operations are discussed in the FEIS for specific impacts occurring within sensitive areas, (e.g., bridge replacement over important streams or potential disturbance of threatened and endangered species habitat). Additional specific potential mitigation measures have been added in FEIS Appendix D.

97 4 **COMMENT:** Concerned about noxious weeds.

RESPONSE: See response to document 54, comment 1.

97 5 **COMMENT:** Concerned about the disruption of local quality of life due to proposed changes to the transportation system.

RESPONSE: In the absence of appropriate mitigation measures, the proposed Small ICBM program could lead to increased congestion and delay on transportation systems in the affected areas which could affect the quality of life as perceived by local citizens. This issue is discussed in detail in FEIS Section 4.3.2.1.

97 6 **COMMENT:** Will deployment of the Small ICBM affect tourism in Montana?

RESPONSE: See response to document 67, comment 2.

97 7 **COMMENT:** Commentor questions: What is our future? Do we have control?

RESPONSE: See response to document 7, comment 2.

97 8 **COMMENT:** Questions the need for additional new weapons systems as the Small ICBM.

RESPONSE: See response to document 7, comment 2.

97 9 **COMMENT:** What is the susceptibility of the system to electromagnetic pulse?

RESPONSE: The system is being designed to minimize its susceptibility to electromagnetic pulse.

97 10 **COMMENT:** Questions the economic effectiveness "benefit/cost analysis" of adding the weapon system.

RESPONSE: See response to document 3, comment 1.

97 11 **COMMENT:** What is the life span of this program?

RESPONSE: Deployment of the Small ICBM would require approximately 6 years of construction activities in the deployment area, followed by 20 or more years of operations (FEIS Section 1.6).

97 12 **COMMENT:** What is the system susceptibility to terrorism?

RESPONSE: See FEIS Section 5.2.1.3.

97 13 **COMMENT:** How would the HML be able to operate in Montana's normal and winter blizzard conditions?

RESPONSE: The HML was designed to operate under extreme weather conditions. Winter testing was carried out at Malmstrom AFB last winter. To date, all tests indicate that the vehicle will meet design goals. Further tests will be conducted during the winter of 1988.

97 14 **COMMENT:** Statement in opposition to the Small ICBM proposal.

RESPONSE: Noted.

98 1 **COMMENT:** The function of the Montana Department of Family Services (DFS), that is, the protection of children and adults from abuse and neglect, and the prevention of family violence should be discussed in the FEIS.

RESPONSE: The DFS discussion has been included in FEIS Sections 3.1.3.5 and 4.1.2.5.

98 2 **COMMENT:** Section 8.2.2 does not list either the Department of Social and Rehabilitation Services (SRS) or SRS' Community Services Division. Also, the Department of Community Affairs should be deleted.

RESPONSE: Corrections have been made to FEIS Section 9.2.2.

98 3 **COMMENT:** The Cascade County Office of Human Services is discussed in the body of the document. The social workers from Cascade County Office of Human Services have become part of the DFS staff.

RESPONSE: Noted. FEIS Sections 3.1.3.5 and 4.1.2.5 have been revised in response to this comment.

98 4 **COMMENT:** The social workers from Cascade County Office of Human Services have become part of the DFS staff.

RESPONSE: Noted.

98 5 **COMMENT:** The DEIS makes no reference to the protective service functions that DFS has.

RESPONSE: The DFS discussion has been included in FEIS Sections 3.1.3.5 and 4.1.2.5.

98 6 **COMMENT:** The military population projected by the year 2000 would add some additional burdens on the DFS staff and budget for child protective and adult protective services.

RESPONSE: Noted. FEIS Section 4.1.2.5 has been revised to include a discussion of the increased demand for these services.

98 7 **COMMENT:** The FEIS should address impacts on the budget of the DFS because of expansion of child and adult protective services.

RESPONSE: Potential program-related impacts on the caseload and staffing of the Montana Department of Family Services have been discussed in FEIS Section 4.1.2.5. An analysis of the department's budget was not undertaken.

98 8 **COMMENT:** The DEIS implies an increase to family violence, but does not sufficiently acknowledge the extent of the impact.

RESPONSE: The agency for family violence, the Mercy Home, is discussed in FEIS Sections 3.1.3.5 and 4.1.2.5.

98 9 **COMMENT:** The DEIS suggests that the Community Help Line would require additional volunteers to staff, but does not project staffing needs for the Mercy Home.

RESPONSE: The staffing of the Mercy Home is noted in FEIS Sections 3.1.3.5 and 4.1.2.5.

98 10 **COMMENT:** The FEIS should address the possible extent of impact on the need for protective services for children and for emergency assistance for victims of domestic violence at the Mercy Home and related agencies.

RESPONSE: The discussion of these potential impacts have been revised in FEIS Section 4.1.2.5.

98 11 **COMMENT:** The summary statement on impacts to public services does not include reference to the human services, only to the conditions of the Cascade County jail.

RESPONSE: The summary evaluation of impacts for public services in the FEIS has been amended to note the increase for service demand provided by human service agencies (FEIS Section 4.1.2.5).

98 12 **COMMENT:** The FEIS should project the incidence of child abuse and neglect, anticipated staffing requirements, and budget increases.

RESPONSE: FEIS Section 4.1.2.5 has been revised to present projected increases in the number of cases of child abuse and the increased staff needed to meet this demand.

98 13 **COMMENT:** Child abuse and neglect must be addressed in the FEIS for the following reasons: The American Association for the Protection of Children indicates that 14 percent of all children are abused in some way and the DEIS states that about 16 percent of the inmigrating population will be children; because of some special structures and functions of the military which contribute to stress in service members and their families, the incidence of child abuse and neglect in military communities needs to be given special attention; apart from any factors related to the proposed Small ICBM program, the number of child abuse and neglect referrals to Cascade County DFS social workers increased by 7.3 percent from FY85 to FY86, the number of children involved in child abuse and neglect investigations increased by 8.6 percent in that same period, and the number of substantiated abuse and neglect incidents increased by 12.7 percent; and in light of these three factors, the proposed population influx's potential effect on the problem of child abuse and neglect needs to be directly addressed in the FEIS.

RESPONSE: Noted. FEIS Section 4.1.2.5 has been revised.

98 14 **COMMENT:** What are the projected increases for demands for social services, economic assistance and job-securing assistance for the unsuccessful job seekers?

RESPONSE: The FEIS notes the human service agencies likely affected by the unsuccessful job seekers and the staffing projections are made accordingly in FEIS Section 4.1.2.5.

98 15 **COMMENT:** What additional social service burdens can be anticipated if the Small ICBM program begins but is then terminated prior to completion?

RESPONSE: An evaluation study of such an impact would be conducted at the appropriate time.

98 16 **COMMENT:** The FEIS needs to address the issue of potential increase of emotionally disturbed children as as result of the proposed program.

RESPONSE: The number of full-time special education students are projected in FEIS Section 4.1.2.4. This includes the severely emotionally disturbed students.

98 17 **COMMENT:** Provide additional information on employment including type, duration, and wage levels of expected jobs.

RESPONSE: A table presenting construction employment needs by job type has been added to FEIS Section 4.1.2. Additional information is available in the Socioeconomics EPTR.

98 18 **COMMENT:** Could the Air Force utilize available local contractors for the Small ICBM program?

RESPONSE: See response to document 37, comment 2.

98 19 **COMMENT:** Identify geographic area from which jobs are considered to be "local."

RESPONSE: FEIS Section 4.1.2.1 has been amended.

98 20 **COMMENT:** Identify assumptions and analysis used to predict job capture rates for local and nonlocal hires.

RESPONSE: This information has been provided to the commentor and is available in the Socioeconomics EPTR.

98 21 **COMMENT:** Identify which types of jobs will be filled by local and nonlocal workers.

RESPONSE: See response to document 98, comment 20.

98 22 **COMMENT:** Provide information on previous Air Force experience with other large construction projects with areas socioeconomically similar to north-central Montana.

RESPONSE: See response to document 98, comment 20.

98 23 **COMMENT:** Explain basis for predicting larger local economic effects during construction phase vis a vis the operations phase.

RESPONSE: FEIS Section 4.1.2.1 has been amended.

98 24 **COMMENT:** Describe methods used to project employment and population effects.

RESPONSE: See response to document 98, comment 20.

98 25 **COMMENT:** Identify assumptions used to predict secondary economic effects during construction phase and how they differ during operations phase.

RESPONSE: FEIS Section 4.1.2.1 has been amended.

98 26 **COMMENT:** Provide additional information on the results of modeling projections.

RESPONSE: See response to document 98, comment 20.

98 27 **COMMENT:** Describe the difference between long-term derivative effects of military and non-military jobs.

RESPONSE: See response to document 98, comment 20.

98 28 **COMMENT:** Identify differences between income and expenditure patterns of military personnel and civilians.

RESPONSE: See response to document 98, comment 20.

98 29 **COMMENT:** Provide additional details on models and assumptions used to project primary and secondary employment and income effects.

RESPONSE: See response to document 98, comment 20.

98 30 **COMMENT:** Explain low rate of inmigration into impact area.

RESPONSE: FEIS Section 4.1.2.2 has been amended.

98 31 **COMMENT:** Identify assumptions regarding excess capacity in employment and service delivery capabilities among secondary economic activities in the impact area.

RESPONSE: See response to document 98, comment 20.

98 32 **COMMENT:** Explain assumptions regarding labor force participation rates and job capture rates for relatives of Air Force personnel.

RESPONSE: See response to document 98, comment 20.

98 33 **COMMENT:** Expand on the general discussion of income effects on the Proposed Action.

RESPONSE: FEIS Section 4.1.2.1 has been amended.

98 34 **COMMENT:** Differentiate between direct and secondary wage and salary earnings, and also explain how proprietor's income and various nonlabor income would be affected by the program.

RESPONSE: Wage and salary payments have been clarified in FEIS Section 4.1.2.1. Other income effects are covered in the Socioeconomics EPTR.

98 35 **COMMENT:** Provide comparisons of baseline conditions and income characteristics during key phases of system development and system operation.

RESPONSE: FEIS Section 4.1.2.1 has been amended.

98 36 **COMMENT:** Identify the program's per capita income effects in the impact area.

RESPONSE: FEIS Section 4.1.2.1 has been amended.

98 37 **COMMENT:** Discuss the potential for inflationary effects brought on by a reduction in the availability of goods and services during project development, identify potential mitigation measures to be used if population subgroups are adversely affected, and discuss how inflation may affect persons of different age groups, income levels, or other living conditions.

RESPONSE: No significant inflationary effects are expected in the Great Falls area (FEIS Section 4.1.2.1). However, some temporary displacement of other construction would probably occur as resources are drawn to the proposed program. Potential shortages of low- and moderate-income housing will be prevented through the provision of military family housing to Air Force personnel unable to obtain housing in the local markets.

98 38 **COMMENT:** What are estimating equations and other details of the approach used to estimate input-output models for the nine-county area and the state of Montana?

RESPONSE: See response to document 98, comment 20.

98 39 **COMMENT:** What sectors were used in the I/O model?

RESPONSE: See response to document 98, comment 20.

98 40 **COMMENT:** What are the values of the entries in the transactions direct requirements, and total requirements matrices of the I/O model?

RESPONSE: See response to document 98, comment 20.

98 41 **COMMENT:** What are the baseline employment projections by detailed sectors for the I/O model?

RESPONSE: See response to document 98, comment 20.

98 42 **COMMENT:** What is the justification of using a secondary employment multiplier of only 0.4 for the years 1994 and beyond.

RESPONSE: Clarified in FEIS Section 4.1.2.1.

98 43 **COMMENT:** What is the basis for assuming that 50 percent of military wives will seek employment in secondary industries.

RESPONSE: See response to document 98, comment 20.

98 44 **COMMENT:** What is the basis for assuming that nearly all civilian jobs will be filled by local people? Is local defined as north-central Montana or statewide?

RESPONSE: Clarified in FEIS Section 4.1.2.1.

98 45 **COMMENT:** Provide additional information on comparisons of demographic differences including more details on age cohort distribution, race, sex, educational background, etc.

RESPONSE: FEIS Section 4.1.2.2 has been amended.

98 46 **COMMENT:** Discuss how overall demographics will change in the impact area.

RESPONSE: FEIS Section 4.1.2.2 has been amended.

98 47 **COMMENT:** Discuss in detail how demographics may affect lifestyles, social structures, and community values.

RESPONSE: The program is not expected to significantly affect local lifestyles, social structures, or community values. The influx of approximately 7,580 military persons and their dependents would represent about 10 percent of the population in the Great Falls area. While these people would differ, in their demographic characteristics, from the non-military families currently residing in the Great Falls area (they are typically younger, more mobile, and of different geographic origin than Great Falls residents), the Air Force conducts community in-briefings to all new base personnel which provide information to help in their assimilation into the community. The Air Force will also implement a socioeconomic monitoring program to monitor this process.

98 48 **COMMENT:** Identify how well new military personnel will be assimilated into the local community and identify which population subgroups are most capable of coping with social impacts of the program.

RESPONSE: The Air Force provides information and assistance to arriving military personnel and their families to help them get acquainted with and settled in their new community. At Malmstrom AFB, this process has been very effective in maintaining a good relationship between the base and the community. Since the Small ICBM program will not cause any significant changes in the Great Falls population, potential impacts on subgroups cannot be meaningfully projected.

98 49 **COMMENT:** The Montana Department of Institutions operates the Montana Center for the Aged in Lewistown. How might employee turnover (switching to higher paying construction jobs) affect them?

RESPONSE: FEIS Section 4.1.2.1 has been amended.

98 50 **COMMENT:** No assumed mitigation measures are stated for the socioeconomics section.

RESPONSE: FEIS Section 4.1.2.1 has been amended.

98 51 **COMMENT:** FEIS should clearly state the Air Force housing plan.

RESPONSE: FEIS Section 4.1.2.3 has been amended.

98 52 **COMMENT:** What specific locally provided social, public health, and educational services will be directly/indirectly affected? What services are provided to military personnel onbase?

RESPONSE: FEIS Sections 3.1.3.5 and 4.1.2.5 have been amended.

98 53 **COMMENT:** What funding sources are available to support the Great Falls City-County Health Department and the Golden Triangle Mental Health Center and how do they differ with funds to support other public services?

RESPONSE: FEIS Section 4.1.2.5 has been amended.

98 54 **COMMENT:** Discuss the degree to which the Aid to Families with Dependent Children and other public welfare programs will be affected by underemployed or unemployed inmigrants.

RESPONSE: FEIS Section 4.1.2.5 has been amended.

98 55 **COMMENT:** Discuss possible funding sources for some private service agencies whose workloads may increase due to the program.

RESPONSE: FEIS Section 4.1.2.5 has been amended.

98 56 **COMMENT:** Information on state government finance in DEIS is out of date. New tax measures need to be included.

RESPONSE: FEIS Section 3.1.3.6 has been amended to include the latest finance data and discussion of new tax measures.

98 57 **COMMENT:** The proposed program will compete for funding with other federal programs. How will this potentially affect these programs?

RESPONSE: See response to document 3, comment 1.

98 58 **COMMENT:** Provide details on models and their assumptions used to predict revenue and expenditures for local governments and schools. What are implications of the program on mill levies, per capita tax bases and payments by non-military residents of Montana.

RESPONSE: See response to document 98, comment 20.

98 59 **COMMENT:** State government funds a portion of local court, social, and public health expenditures. How would these outlays be influenced by population growth, and would project-induced tax revenues be sufficient to offset possible increases in expenditures? How will this affect funding to the university?

RESPONSE: While it is expected that outlays for local court, social, and public health expenditures would increase in proportion to population growth, the program is also expected to generate additional revenue in the form of personal income taxes, property taxes, license and motor vehicle fees, as examples. However, an analysis of program impacts on the individual agencies within state government is not within the scope of the EIS.

98 60 **COMMENT:** The description of the status of the Montana Power share of Colstrip 4 is not adequate and should be supplemented with the additional data that are provided.

RESPONSE: The additional data have been incorporated into the description and can be found in FEIS Section 3.2.3.4.

98 61 **COMMENT:** The concept of reserve margin is not appropriately applied in the last paragraph on DEIS page 3-52.

RESPONSE: FEIS Section 3.2.3.4 has been amended.

98 62 **COMMENT:** The growth rates and projected loads presented in the first two paragraphs on DEIS page 3-53 are confusing and do not appear to be consistent.

RESPONSE: FEIS Section 3.2.3.4 has been revised incorporating existing sales with projected demands to provide a more coherent discussion of the cooperative's future growth.

98 63 **COMMENT:** In Table 3.2.3-6 on page 3-55 of the DEIS, "Demand Charge/kWh" should read "Demand Charge/kW."

RESPONSE: Correction made in FEIS.

98 64 **COMMENT:** A more recent rate schedule should be used for Montana Power Company in Table 3.2.3-6 on page 3-55 of the DEIS.

RESPONSE: The reference on page 3-55 should have read "1986" instead of "1981" for Montana Power Company. Correction made.

98 65 **COMMENT:** Table 4.2.2-1 should reflect the fact that MPC currently projects a 1986 peak load (base case forecast) to be 1,567 MW.

RESPONSE: The peak-load figure has been updated to 1,567 MW.

98 66 **COMMENT:** The text on pages 4-101 and 4-102 concerning the impacts on the rural electric cooperatives should be revised to indicate

the effect of increased power purchases to service the launch facilities on all customers if the U.S. Air Force does not pay for the full cost of acquiring the power.

RESPONSE: In an effort to cooperate with the rural electric cooperatives, the U.S. Air Force has initiated a series of meetings with representatives of each of the power suppliers. The representatives have been asked, at this early date, to identify their construction and power costs for supplying the additional power to the launch facilities. The U.S. Air Force will arrive at an equitable solution that meets the needs of all parties.

98 67 **COMMENT:** The U.S. Air Force will be required to obtain a nonfee permit from the Department of Highways Gross Vehicle Weight Division to cover the movement of the oversize, overweight HMLs.

RESPONSE: The Air Force will continue its present practice of obtaining nonfee permits to cover the movements of all oversize, overweight vehicles.

98 68 **COMMENT:** Potential mitigations should include accelerated federal funding for parts of Great Falls transportation plans that could help offset program-related impacts, including construction of the south arterial bypass from Gore Hill to 57th Street in Great Falls.

RESPONSE: The Defense Access Roads (DAR) needs process, which is coordinating with the Military Traffic Management Command, Federal Highway Administration, Montana Department of Highways, and local agencies, will determine needed road and bridge improvements. Funding for these identified improvements will be made available through the DAR needs process.

98 69 **COMMENT:** EIS does not reference satellite maintenance sites - economic and safety basis for consideration.

RESPONSE: See response to document 45, comment 1.

98 70 **COMMENT:** The following state permits and/or regulations related to water quality must be secured: Stream Protection "124," Natural Streambed and Land Preservation "310," Water Pollution Control "404," and Short-term Exemption Authorization "3A."

RESPONSE: Generally, activities undertaken by the federal government are not subject to state regulation or control unless the Congress specifically invites that regulation and control. However, the Air Force will cooperate with the appropriate agencies to meet their requirements to the extent possible.

98 71 **COMMENT:** Montana Pollutant Discharge Elimination System permits will be required for any construction dewatering discharges that reach state surface water. This is administered by the Department of Health and Environmental Sciences, Water Quality Bureau.

RESPONSE: The Air Force will apply for MPDES/NPDES permits in accordance with the Congressional authorization contained in

Section 313 of the Federal Water Pollution Control Act, where applicable.

98 72 **COMMENT:** The DEIS is unclear in the statement found on page 2-19 that the 4,900 acre-ft of water required during construction will be met by town and city supplies in the area. In that construction sites will presumably be remote from these towns and cities, will this water be hauled to the construction sites? If water is to be obtained onsite, state water permitting authorizations will apply.

RESPONSE: Revisions to FEIS Sections 2.9.1 and 4.9.2.2 were made to clarify water resource-related impacts in the rural parts of the deployment area.

98 73 **COMMENT:** The text on page 3-48 of the DEIS should be corrected to indicate that hazardous wastes can be stored for greater than 90 days at Malmstrom AFB. The base holds a hazardous waste storage permit from the Montana Department of Health and Environmental Sciences, and is not limited to 90 days of storage time.

RESPONSE: The text has been corrected in FEIS Section 3.2.3.3.

98 74 **COMMENT:** The cleanup activities section should include a more complete discussion of handling and final disposition of cleanup materials.

RESPONSE: A recovery plan to cover mishap response, decontamination, and cleanup has been developed and is in use for the existing Minuteman mission at Malmstrom AFB and the deployment area. This existing recovery plan will be updated to include the Small ICBM. The cleanup of a solid propellant, hydrazine or nuclear material will be conducted in accordance with appropriate EPA and state regulations (FEIS Section 5.2.1.1).

98 75 **COMMENT:** The FEIS should include the identification and commitment to U.S. Air Force implementation of appropriate measures for weed control on disturbed areas.

RESPONSE: See response to document 54, comment 1.

98 76 **COMMENT:** Mitigation measures and soil conservation strategies should be implemented to reduce soil erosion and runoff from disturbed sites.

RESPONSE: Noted. (FEIS Appendix D for details.)

98 77 **COMMENT:** Based on the safety analysis in the DEIS, an explosive safety zone of 1,250 feet appears adequate to protect people living or working near launch facilities. However, selecting isolated deployment sites would provide greater safety.

RESPONSE: Noted.

98 78 **COMMENT:** Launch facilities near riparian areas should also be avoided to reduce sedimentation during construction and minimize possible contamination of water if an accident or spill occurs.

RESPONSE: Disturbance to riparian areas will be reduced to the extent possible through the use of standard mitigation techniques and avoidance on a local basis. Disturbed habitat will be restored after construction through grading, soil stabilization, and revegetation. These measures are discussed in FEIS Section 4.8.

98 79 **COMMENT:** The FEIS should include a commitment to mitigating measures necessary to minimize construction disturbance on productive agricultural land. Selection of appropriate measures should involve local county planners, the Agricultural Stabilization and Conservation Service, and should be based on existing soil and land use classifications.

RESPONSE: This mitigation measure has been included in FEIS Section 4.4.1.4 and Appendix D.

98 80 **COMMENT:** The assumption that rangeland or dryland crops are nonproductive should be revised. Although total production may be low for dryland crops, net production may exceed that of irrigated land.

RESPONSE: The DEIS does not make the assumption that rangeland and dry-farmed cropland are nonproductive. The LOI for rural land use presented in FEIS Section 4.4.1.2 has ranked the various types of agricultural land use with irrigated cropland and forest ranked above dry-farmed cropland. Rangeland is ranked lower than dry-farmed cropland. This ranking is not to be interpreted that dry-farmed cropland and rangeland are not productive.

98 81 **COMMENT:** The DEIS is unclear regarding impacts on the 93 occupied residences located in close proximity. What is the possible impact on any recreation areas that are near proposed HML shelters.

RESPONSE: The extent of visual impact on these residences would depend upon intervening topography for individual cases. As indicated in FEIS Section 4.6.3, the pre-engineered buildings are generally more compatible with the deployment area visual environment than the earth-covered igloos. There are no known developed recreation areas or campgrounds within 0.5 mile of any launch facility.

98 82 **COMMENT:** Are the earth-covered igloos to be revegetated? If so, how long would it take to reestablish vegetation and what plant species would be used?

RESPONSE: There are no plans to vegetate the earth-covered igloos or any other area within the launch facility fencelines for security reasons. This is presently the case with Minuteman launch facilities.

98 83 **COMMENT:** Are psychological and fear aspects of nuclear war generated as a result of Small ICBM activities in the deployment area discussed?

RESPONSE: See response to document 59, comment 1.

98 84 **COMMENT:** Page S-21: The DEIS states that "several small wetlands onbase may be eliminated, but these wetlands are not important habitats." All wetlands are important to nongame species. The FEIS should define "important" habitat.

RESPONSE: This has been modified to read "...Several small wetlands onbase may be eliminated, but these areas do not support major local populations of wetland species..." As described in more detail in FEIS Sections 3.8.3.3 and 4.8.2.3, these wetlands are of minor value to wildlife on a local basis. Their loss is not expected to substantially alter local wildlife populations. Mitigations for the loss of these wetlands are discussed in FEIS Sections 4.8.1.4, 4.8.6, and Appendix D.

98 85 **COMMENT:** Page 3-126, Section 3.8 indicates that deployment "may affect" listed species. Therefore, Section 7 consultation is required.

RESPONSE: Section 7 consultation was initiated by the Air Force in February 1987 (FEIS Section 4.8.2).

98 86 **COMMENT:** Page 3-135: The last two paragraphs make no distinction between various zoological taxa and legal classification.

RESPONSE: FEIS Section 3.8.3.2 has been modified to reflect these suggestions.

98 87 **COMMENT:** Page 3-141: The ornate box turtle does not occur in Montana. The sagebrush lizard and prairie lizard are not common in the area. The sagebrush lizard may be found in limited numbers in the southeastern portion of the study area. Horned toads are fairly common, while the prairie lizard does not occur in Montana.

RESPONSE: Changes have been noted for analysis in FEIS Section 4.8.2.

98 88 **COMMENT:** Pages 3-149 and 151: Habitat description for Preble's shrew is reversed. The species occurs in dry habitats with moderate to medium-heavy shrub canopy. Density is low, distribution is wide.

RESPONSE: Biological Abstracts, provided by the Montana National Heritage Program indicate that the Preble's shrew occurs in marshes and along streams. A Guide to Montana Mammals (1968) states that Preble's shrew is found in dry, sagebrush habitats. Further analysis of other data sources indicates dry, sagebrush areas are the shrew's primary habitat. These changes have been incorporated in the analysis and are reflected in FEIS Section 3.8.3.5.

98 89 **COMMENT:** Page 4-199: Threatened and Endangered Species section indicates field surveys would be conducted during spring and summer 1987 for the bald eagle and grizzly bear. The Montana Department of Fish, Wildlife and Parks has received no information on plans, methods or results of these surveys.

RESPONSE: General surveys were conducted in April 1987 at 11 launch facilities that were believed to occur in or near threatened and endangered species habitats. Habitats surrounding these launch facilities were surveyed out to 1,000 feet. See FEIS Section 4.8.2.5 for survey results. The Air Force is currently working with the USFWS and Montana Department of Fish, Wildlife and Parks in developing specific guidelines that will eliminate or substantially minimize any potential impacts on protected species.

98 90 **COMMENT:** Page 4-203: The bottom of the page lists an assumed mitigation as "removal of trees and raptor nests/roosts would be minimized." How does this relate to the Migratory Bird Treaty Act, the Bald and Golden Eagle Protection Act, the Endangered Species Act, and protective sections of state law?

RESPONSE: The Migratory Bird Treaty Act, the Bald and Golden Eagle Protection Act, and the Endangered Species Act deal with the removal of trees which are utilized by raptor species for nesting and roosting activities. FEIS Section 4.8.1.4 has been modified to indicate that impacts on protected species will not occur or mitigations will be implemented.

98 91 **COMMENT:** Page 4-204: First item is not in concert with interagency recommendations for protection and management of bald eagles. The DEIS should reference the guidelines and call for development of site-specific management plans on nesting territories within the zone of influence.

RESPONSE: FEIS Section 4.8.1.4 (Assumptions and Assumed Mitigations) has been modified to more clearly reflect compliance with management guidelines given in the Montana Bald Eagle Management Plan (1986) and the Interagency Rocky Mountain Front Wildlife Monitoring/Evaluation Program (1984). Coordination with the USFWS and the MDFWP will continue.

98 92 **COMMENT:** A new active bald eagle nest has been located in the deployment area. Location and status was confirmed by the MDFWP and is in very close proximity to launch facility I-7, which is missing from Table 4.8.2-4. An exact location is available from the MDFWP. The appropriate mitigation measure is development of and adherence to a site-specific management plan for the Cascade territory.

RESPONSE: The Air Force has entered into consultation with the U.S. Fish and Wildlife Service and other interested agencies to develop guidelines that will eliminate or significantly reduce any potential impacts on the bald eagle nest located 1.5 to 2 miles south of launch facility I-7 and 1.5 to 2 miles south of a bridge on I-15. The USFWS is coordinating with the MDFWP on this issue and has indicated that construction activities at I-7 or the bridge should not have any adverse impacts on nesting activities. Data regarding this new active bald eagle nest have been incorporated into FEIS Section 4.8.2.5 and Table 4.8.2-4.

98 93 **COMMENT:** Page C-3: Section 7 consultation has been completed. The second paragraph calls for development of site-specific plans on

certain bald eagle nest territories to assist recovery of the species. The MDFWP intends to participate with the U.S. Fish and Wildlife Service to accomplish these plans and encourage participation by the Air Force.

RESPONSE: The Air Force is continuing to work with the U.S. Fish and Wildlife Service and Montana Department of Fish, Wildlife and Parks in developing site-specific guidelines for launch facility I-7 and a bridge that are located 1.5 to 2 miles north of a newly discovered bald eagle nest. Coordination with MDFWP has been started by the U.S. Fish and Wildlife Service. Their continued interaction is encouraged.

98 94 **COMMENT:** The rationale for determining level of impact for regional recreation is questioned. Adding additional use to existing peak conditions further compounds problems at popular recreation areas. Recreationists, who are turned away when an area becomes crowded, incur more than a slight decline in the recreational experience.

RESPONSE: The level of impact criteria for regional recreation has been adjusted to reflect this concern (FEIS Section 4.5.1.2).

98 95 **COMMENT:** The DEIS identifies low, not significant impacts on Giant Springs State Park. Giant Springs now has portions of the season when its parking lots and picnic facilities are filled to capacity. A large percentage of the current use of the park is attributable to personnel from Malmstrom AFB, which is located only 1 mile from the park. Additional use by an increased population has the potential to affect this park.

RESPONSE: As a result of additional analysis, the level of impact rating for Giant Springs State Park has been changed to moderate to reflect increased use that would occur not only during peak-use periods, but also during some nonpeak-use periods (FEIS Section 4.5.1.2).

98 96 **COMMENT:** DEIS page 2-18: It is suggested that the sentence reading "Construction is expected to be in compliance with 316" should read "Construction shall be in compliance with 316."

RESPONSE: FEIS Section 2.8.3 has been revised.

98 97 **COMMENT:** The DEIS does not identify heavily used fishing areas such as the Missouri River Recreation Road, Newlan Creek Reservoir, Nilan Reservoir, Bean Lake, Lake Frances, and Tiber Reservoir.

RESPONSE: The regional recreation discussion has been changed to include some of these heavily fished locations. The discussion includes mention of only some of the most heavily used areas (FEIS Section 3.5.3.1).

98 98 **COMMENT:** The DEIS incorrectly states that "Hunting... primarily occurs on National Forest lands..." and that "Big game hunting primarily occurs on National Forests..." A significant amount of hunting pressure in the ROI occurs on private land. Recently, an increasing amount of private land in the ROI is being closed and

hunting rights leased. Additional hunting pressure in the ROI caused by projected population increases may increase this trend, further increasing hunting pressure on public lands.

RESPONSE: The regional recreation discussion has been changed to reflect this (FEIS Section 3.5.3.1).

98 99 **COMMENT:** The DEIS states that "Increases in visitation can result in declines in the perceived quality of the recreational experience..." While this is true, it will also reflect in the success ratio of hunting and fishing. A drop in success will ultimately be a measurable item and not merely perceived.

RESPONSE: The regional recreation discussion has been changed to reflect this (FEIS Section 4.5.1.2).

98 100 **COMMENT:** The DEIS appears to have incorrectly assumed that regional demand and participation in recreation activities will increase at a rate proportional to population growth. We feel that it is a valid assumption that construction workers and Malmstrom AFB employees will increase the proportion of the younger population and have a greater impact on the ROI's recreation resources than the DEIS assumption provides.

RESPONSE: This assumption has been removed from the regional recreation analysis. Program-induced recreation demand is now calculated using participation rates for various age cohorts and not participation rates for the overall population (FEIS Section 4.5.1.1).

98 101 **COMMENT:** Section 4.5.2.1 has not addressed the MDFWP's recreation management plan for the Smith River and the potential impact that increased recreation use associated with the Small ICBM program may have. This increased use may require further management restrictions to be implemented.

RESPONSE: The regional recreation discussion has been changed to reflect this (FEIS Section 4.5.1.2).

98 102 **COMMENT:** Current hunting pressure in the Little Belt Mountains is resulting in the need for the MDFWP to consider a major change in the hunting program for this area. Currently, most hunting districts in the Little Belt Mountain are open for antlered bull elk hunting. Additional hunting pressure related to the Small ICBM program may cause the MDFWP to implement special permit hunting in this area. This will subsequently cause greater hunting pressure in other hunting districts farther to the west.

RESPONSE: The regional recreation discussion has been changed to reflect this (FEIS Section 4.5.1.2).

98 103 **COMMENT:** The DEIS does not address the importance of the Missouri River Recreation Road to area fishing opportunities. The Missouri River Recreation Road from Holter Reservoir to Cascade receives 73,000 angler days of use per year, and provides access to the most heavily fished reach of river per year in Montana. There are

increasing incidents of conflicts among floaters, shore fishermen, and boaters along this stretch of the Missouri River. Additional fishing pressure can be expected to compound these problems.

RESPONSE: The regional recreation discussion has been changed to reflect this (FEIS Section 4.5.1.2).

98 104 **COMMENT:** The U.S. Air Force is requested to submit copies of any pertinent field evaluations conducted on state-owned lands regarding cultural resources, threatened and endangered species, and other resource information to the Helena Office of the Montana Department of State Lands for inclusion in the agency's resource files. If cultural resources are found on state-owned lands, the Department of State Lands should be contacted immediately to initiate mitigation planning procedures.

RESPONSE: No surveys have been conducted on state-owned lands so far. If state lands are involved, copies of evaluation reports will be provided. If cultural resources are found, the Department of State Lands will be immediately notified.

98 105 **COMMENT:** Concerned that there are inadequacies in the current resource data bases for management use as well as limitations of the background research, data synthesis, and organization.

RESPONSE: Available literature suggested by local professionals was considered in the preparation of the EIS. Additionally, a review copy of the cultural resources bibliography was provided to the SHPO in January 1987; no further suggestions resulted from that review.

98 106 **COMMENT:** The collective summary of site impacts on Figures S7 and 2.0-3 should not portray effects to prehistoric resources as beneficial.

RESPONSE: Although some aspects of the program are beneficial to prehistoric resources, it is not argued that overall effects are beneficial. Significant adverse impacts are clearly shown, along with the beneficial effects, in Figure S10 as solid black dots as well as in the text.

98 107 **COMMENT:** There is a need for more contexual information with which to evaluate historic and Native American resources.

RESPONSE: Contextual information is discussed more fully in the Cultural Resources EPTR.

98 108 **COMMENT:** Anticipated impacts on contemporary Native American religious and cultural sites are based on the results of solicited responses from local tribes and arbitrarily derived buffer zones surrounding identified areas of sensitivity.

RESPONSE: The buffers around Native American resources are not arbitrary; they represent bonafide concerns elicited during discussions with ethnographers and recognized Native American religious specialists. Field surveys of individual launch facilities conducted after the publication of the DEIS were accomplished in the presence of a qualified Native American representative.

98 109 **COMMENT:** The DEIS does not address visual impacts which may occur to (historic) sites which retain a high degree of integrity of setting.

RESPONSE: A consideration of visual impacts has been added to the FEIS Sections 4.7.1.2 and 4.7.2.2. Significant impacts are not anticipated because few resources have been identified in close proximity to affected areas.

98 110 **COMMENT:** Since all significant sites within the area of program effects have yet to be identified, contexts which function as the basis for establishing site values and reflect the National Register of Historic Places "Criteria of Evaluation" are warranted. This would provide the foundation for determining how to go about locating significant sites.

RESPONSE: Contextual information is discussed more fully in the Cultural Resources EPTR. Procedures for the identification and evaluation of resources, as well as references to appropriate regulations and standards, are included in the Cultural Resources Management Plan, as called for in the revised Programmatic Agreement (FEIS Appendix B.2).

98 111 **COMMENT:** Chapter 4.0 of the DEIS relies on CEQ regulations for consistency in formatting and for estimating anticipated levels and significance of impacts. For Cultural Resources management planning efforts, this approach is largely uninformative and irrelevant. Chapter 4.0 would be better served by focusing on contextual information and National Register criteria.

RESPONSE: Noted. Contextual information is discussed more fully in the Cultural Resources EPTR.

98 112 **COMMENT:** Potential mitigation measures identified in Chapter 4.0 (Section 4.7.6) are at best a mixed bag of actions, some of which do not constitute mitigation, and overall do not convey a systematic and in-depth consideration of how to reduce the impacts likely to occur. The Cultural Resources Management Plan mentioned in this section and the Draft Programmatic Agreement (Appendix B.2) warrant more discussion since these would appear to be the critical management documents for pulling together background research, site evaluations, and mitigation efforts.

RESPONSE: Mitigation measures are more fully addressed in revised FEIS Section 4.7.6, Appendix D, and the Cultural Resources Management Plan (CRMP) called for in the revised Programmatic Agreement (Appendix B.2). The purpose and scope of the CRMP are elaborated in FEIS Section 4.7.6.

98 113 **COMMENT:** Section 6.0 on "Authorizing Actions" addresses only federal actions. The FEIS must contain a complete identification of required state and local permits and authorizations.

RESPONSE: It should be noted that the Authorizing Actions section does detail those state and local requirements made applicable to federal projects by virtue of Congressional authorizations contained in various federal statutes, such as the Clean Water Act, Clean Air Act, etc.

99 1 **COMMENT:** Page 3-189, Section 3.11.3.3, paragraph 1, line 15 should read "The City of Great Falls has submitted a plan to the EPA for attainment of standard" not "redesignation."

RESPONSE: Change incorporated in FEIS Section 3.11.3.3.

99 2 **COMMENT:** Page 3-189, Section 3.11.3.3, paragraph 1, line 17: 1989 would be the earliest redesignation could be expected.

RESPONSE: Change incorporated in FEIS Section 3.11.3.3.

99 3 **COMMENT:** Pages 3-191 and 192, Section 3.11.3.3, paragraph 3, and Table 2.11.3-2: the table and paragraph should state what year or years these data represent. There have been higher CO 8-hour averages.

RESPONSE: The table in question is 3.11.3-2, not Table 2.11.3-2 as mentioned in the comment. Table and text were changed to reflect the suggested comment. By adding 1986 data, the CO 8-hour average exceeded the NAAQS. The new table is 3.11.3-1, FEIS Section 3.11.3.3.

99 4 **COMMENT:** Section 3.11.3.3, paragraph 5, last sentence: EPA is uncertain that "...no state or federal ambient air standards will be violated" - with or without this program.

RESPONSE: FEIS Section 3.11.3.3 has been revised in response to this comment.

99 5 **COMMENT:** PM_{10} standards replaced TSP primary and secondary standards on 7/31/87. Analysis should address the latest standards.

RESPONSE: PM_{10} standards and PM_{10} monitoring data were included in FEIS Table 3.11.3.1. TSP discussion and monitoring data were retained in the text at the suggestion of EPA Region VIII, Montana Office. PM_{10} analysis is addressed in FEIS Section 4.11.2. TSP LOI definitions were changed to reflect PM_{10} (FEIS Section 4.11.1.2).

99 6 **COMMENT:** CO monitor on 10th Avenue South will be relocated closer to the street this fall per EPA siting criteria. This could result in higher readings despite automobile replacement. CO discussions in Sections 3 and 4 assume attainment. EPA is uncertain about this conclusion.

RESPONSE: Relocating the state's CO monitor on 10th Avenue South closer to the street may result in higher CO concentrations during peak traffic periods. The relocation of the monitor is not expected to result in increased violations of the CO NAAQS from this program since the violations have historically occurred during periods of lowest traffic and appear to be primarily the result of atmospheric conditions and CO emitted from sources other than vehicular exhaust. The other sources include wood-burning stoves for space heating. Details are described in FEIS Section 3.11.3.3.

99 7 **COMMENT:** Define routine maintenance relative to potential impacts.

RESPONSE: The term "routine maintenance" was used for maintenance which would be scheduled at Malmstrom AFB approximately once a year. It has been changed to "major maintenance" since some maintenance would occur at the launch facilities also.

99 8 **COMMENT:** Chapter 2.0 oversimplifies impacts and does not provide site-specific impacts, factual criteria and ratings, definitions of magnitude and significance of impacts, and data sources.

RESPONSE: Chapter 2.0 has been revised in the FEIS to reflect the identification of proposed sets of launch facilities for the Proposed Action and alternatives. Extreme site-level impacts, as well as the range of impacts expected for each alternative, are discussed in this section. Further details on site-specific impacts, factual criteria and ratings, definitions of magnitude and significance of impacts, and data sources are provided in FEIS Chapter 4.0.

99 9 **COMMENT:** DEIS page 3-171, Section 3.10.2.1, paragraph 4: The use of an arbitrary area within 1,000 feet of the T/E route system or expansion areas of the launch facilities for the ROI for soil erosion ignores the factors of slope or terrain which would be locally significant.

RESPONSE: FEIS Section 3.10.2.1 describes the Region of Influence for which baseline conditions were characterized. For Soil Erosion, program impacts are expected to occur within 1,000 feet of the T/E route, consequently, the erosional characteristics (e.g., inherent erodibility, general land slope, probable maximum length of slope) of soils within that 1,000-foot area were compiled and used in the impact analyses presented in FEIS Section 4.10.2.3. Terrain conditions such as slope and length of slope were used in the impact analyses. Further site-specific terrain data will be used in the development of erosion control plans for all construction sites. These plans will present the specific erosion control actions needed at a construction site based on the local terrain conditions, soil type, and the nature of the construction activity (FEIS Section 4.10.2.3 and Appendix D).

99 10 **COMMENT:** Page 3-174, Section 3.10.2.4: What are the effects on vegetation?

RESPONSE: Effects on vegetation are discussed in FEIS Section 4.8.2.1.

99 11 **COMMENT:** Page 3-171, Section 3.10.2.1, paragraph 4: The relationship of erodible soils and terrain characteristics to sensitive aquatic environments should be addressed in this section.

RESPONSE: FEIS Section 3.10.2.1 describes the general analysis methodology used in compiling soil erosion baseline data. Program impacts for soil erosion are discussed in FEIS Section 4.10.2.3 and for aquatic habitats in FEIS Section 4.8.2.3.

99 12 **COMMENT:** Page 4-1, Section 4.0, paragraph 3: In addition to construction impacts, site impacts also include operations impacts from road and facility use such as crew changes, maintenance, and supply traffic.

RESPONSE: Text in FEIS Section 4.0 has been revised in response to this comment.

99 13 **COMMENT:** Assumptions used in determining the fuel use associated with the operations aspects of the program are lacking.

RESPONSE: Fuel consumption associated with the operations aspects of the program are found in FEIS Table 1.5.2-2. Assumptions used in the calculations have been included in FEIS Section 4.2.1.4.

99 14 **COMMENT:** Do the impacts assessed in Chapter 4.0 include the anticipated base increases expressed in Chapter 3.0?

RESPONSE: The impacts in FEIS Chapter 4.0 do include the anticipated base increases (KC-135R Air Refueling Wing) expressed in FEIS Chapter 3.0.

99 15 **COMMENT:** A discussion of the water, wastewater, and waste (solid and hazardous) impacts and mitigations for the launch control facilities and launch facilities should be included in the appropriate sections of the Utilities resource.

RESPONSE: As noted in FEIS Table 1.3.2-1, potable water and wastewater will be removed from the launch facilities under contract with commercial haulers. At this time, it is not possible to identify the source of potable water supplies or the wastewater treatment facilities that will receive the sewage. It is anticipated that these contracts will contain clauses that specify standards of service. Solid and hazardous wastes will be returned to Malmstrom AFB for proper disposal and have been incorporated into the onbase analysis. No changes are programmed at the launch control facilities.

99 16 **COMMENT:** The DEIS notes that the projected maximum day use in the City of Conrad could exceed the treatment capacity of the existing sewage lagoons and lead to a violation of the city's wastewater discharge permit.

RESPONSE: After reviewing additional wastewater flow data, per capita values and peaking factors have been revised. In 1993, average day use will equal 60 percent of capacity while maximum day use will equal 75 percent of capacity (FEIS Section 4.2.2.2).

99 17 **COMMENT:** Are fuels currently stored at the launch facilities and will storage capacity be altered? Has a plan been prepared to address transport of fuel and waste products?

RESPONSE: Launch facilities at Malmstrom AFB have a storage capacity that ranges from about 1,800 to 11,100 gallons. The use of these storage tanks is currently under consideration. The base's Spill Prevention and Response Plan outlines procedures to be instituted in case of a spill at a launch facility. The plan will be updated in response to the transport and handling of fuel and wastes associated with the Small ICBM program (FEIS Sections 3.2.3.3 and 4.2.3.4).

99 18 **COMMENT:** FEIS Section 4.2.3.1 as well as other Utility sections discussing Alternative 3, should identify the impacts of the 200 launch facilities chosen.

RESPONSE: As noted in the text, the impacts associated with Alternative 3 are virtually identical to those identified for the Proposed Action. The utility system impacts associated with the use of all 200 launch facilities have been identified for the relevant utilities such as electricity and fuel.

99 19 **COMMENT:** Is there a contingency plan to provide for emergency vehicles to bypass HML convoys on congested secondary highways or T/E routes?

RESPONSE: Yes, there will be a contingency plan to provide access for emergency vehicles to bypass HML transporter convoys. A Federal Marshall will direct traffic and accommodate emergency vehicles throughout the movement of the HML transporter convoys on T/E routes (FEIS Section 4.3.2.1).

99 20 **COMMENT:** Were requirements for additional road maintenance due to increased use of heavy vehicles included in these evaluations?

RESPONSE: Preliminary evaluation indicates that a need for more maintenance work would be required. The final determination would be made as the result of the Defense Access Road needs program.

99 21 **COMMENT:** In addition to the additive impact of the Peacekeeper in Rail Garrison, cumulative impacts to T/E routes which service more than one HML and variation in the range of local impacts were not addressed.

RESPONSE: The DEIS addressed impacts at multiple sites. No additive impacts from disturbances were identified. The text of FEIS Chapter 4.0 (Sections 4.8.1, 4.8.2, 4.8.3, and 4.9.3.2) has been revised to emphasize this analysis of "cumulative" additive impacts of multiple sites.

99 22 **COMMENT:** Define "meaningful adverse consequences."

RESPONSE: The use of "meaningful adverse consequences" was intended to refer to changes that would alter population levels or habitat carrying capacity. For clarification, these words were replaced by ". . . noticeable, but no consequences are expected that would alter the overall condition of populations and habitats and the integrity of ecological systems."

99 23 **COMMENT:** Page 4-203, Section 4.2.1.4: Wetland areas destroyed or significantly affected by construction should be replaced or remediated under an approved program.

RESPONSE: Wetland loss is expected to be minor. FEIS Section 4.8.1.4 has been modified to address the loss of wetland habitats and their replacement (also see FEIS Appendix D).

99 24 **COMMENT:** A comprehensive plan should be developed which specifically states the measures which will be implemented to monitor and mitigate noise during the operations phase as well as construction.

RESPONSE: The operation as well as construction noise impacts from the program will not be significant. This was demonstrated in FEIS Section 4.12.2 using various modeling techniques. As such, no monitoring plan or mitigation is suggested for the program.

99 25 **COMMENT:** A comprehensive plan should be developed which specifically states the measures which will be implemented to monitor and mitigate sediment runoff into waterbodies during the operations phase as well as construction.

RESPONSE: Mitigation and monitoring plans are addressed in FEIS Sections 4.8.1.4, 4.8.6, and Appendix D.

99 26 **COMMENT:** A comprehensive plan should be developed which specifically states the measures which will be implemented to monitor and mitigate dust during the operations phase as well as construction.

RESPONSE: The operation as well as construction-related dust impacts from the program will not be significant or violate any standards. This was demonstrated in FEIS Section 4.11.2 using various modeling techniques recommended by EPA. As such, no monitoring plan is suggested for the program. Standard dust-suppression measures, such as watering will be used by the construction contractors during land clearance activities.

99 27 **COMMENT:** The soil stabilization program should be specified or referenced and should include the specific techniques under consideration.

RESPONSE: Road and bridge upgrading along T/E routes will be conducted by the appropriate state and/or county agencies or their designated contractors. These agencies will develop revegetation and soil stabilization plans for reclamation of these disturbed sites. The Air Force will be responsible for the development, implementation, and monitoring of reclamation programs in accordance with COE practices for environmental protection for disturbed areas at access roads, launch facilities, and the HML vehicle operations training area onbase. These plans will provide for soil erosion control and revegetation. Specific methods of reclamation (e.g., mixtures, methods of application, fertilization, mulching, and monitoring) will be specified when the plans are developed (FEIS Section 4.8.1.4).

99 28 **COMMENT:** Where removal of trees or raptor nests is unavoidable, suitable replacements might be provided at the nearest appropriate location to the original site.

RESPONSE: FEIS Section 4.8.1.4 has been modified in response to this comment.

99 29 **COMMENT:** Variation in the traffic loads and resulting noise on T/E routes that serve multiple facilities has not been addressed.

RESPONSE: Variation in traffic loads and resulting noise on T/E routes that serve multiple facilities have been addressed in FEIS Section 4.12.2. The potential for noise impacts from traffic increases is considered negligible.

99 30 **COMMENT:** Variation in the traffic loads and resulting dust on T/E routes that serve multiple facilities has not been addressed.

RESPONSE: Fugitive dust emissions from vehicular activity during the operations phase in the deployment area have been assessed. Dust emissions have been calculated for vehicle travel on concrete, asphalt, gravel, and dirt roads in support of the operations phase. The results of the analysis have been discussed in FEIS Section 4.11.2.

99 31 **COMMENT:** Page 4-206, sentence 2: "Disturbance to vegetation in the deployment area during the operations phase is expected to be minimal." Will this be monitored in some fashion to document this statement?

RESPONSE: No off-road activities will occur in the deployment area during the operations phase of the program. Therefore, there will be no disturbance of vegetation in the deployment area during operations (the text has been revised in FEIS Section 4.8.2.1 to clarify this point). There is no need to monitor for impacts that will not occur. A monitoring program will be developed to determine the effectiveness of vegetation reclamation and noxious weed control programs.

99 32 **COMMENT:** Page 4-206, paragraph 3: How will disturbances of forested or riparian areas be minimized? Cumulative effects to the local ecosystem from multiple launch sites in the same area should be addressed. The environmental criteria, including minimizing impacts on local ecosystems, should be considered during identification of actual launch sites under all alternatives except Alternative 3. The additional traffic and operations disturbances which would result from multiple HML sites within the same zoned area of influence should be addressed. Specific revegetation plans should be developed which include an estimate for the recovery time frame for the various categories of vegetation which may be disturbed.

RESPONSE: Disturbances of forested or riparian areas will be minimized through judicious siting of facilities and reclamation of disturbed sites. Specific reclamation plans will be developed as addressed in document 54, comment 1. Although no additive effects from disturbances at multiple sites were identified, the launch facility identification process did account for environmental sensitivity and all probable impacts. These concerns and potential impacts from traffic and operations are discussed in greater detail in FEIS Section 4.8.

99 33 **COMMENT:** The trend in this EIS to "average" the impacts over the entire Region of Influence for each alternative tends to mask the significance of impacts to local environments. It is obvious that numerous specific factors were utilized to reach these general conclusions. This fact, coupled with the efficient use of the Geographic Information System (GIS), should produce a range of specific rating factors which would be displayed to accurately represent the variation on "local" impact under each alternative. A matrix system could be developed to help assess the impacts at individual sites and the additive effects of various combinations of sites when related to sensitive environmental features in a specific area. This approach could provide a more realistic basis for evaluating the relative impacts from various launch site configurations under all alternatives.

RESPONSE: Descriptions of biological resources at each launch facility are presented in FEIS Appendix A. Site-specific impacts to biological resources at launch facilities are presented in FEIS Table 4.0-1. Site-specific impacts along T/E routes are summarized on a county basis in FEIS Table 2.0-3. These specific impacts are discussed in FEIS Section 4.8.2. The rating of overall impacts in FEIS Section 4.8.2 is not an attempt to average impacts, rather it addresses the potential multiple effects that would occur from this program. References to the deployment areas or the greater Region of Influence describe the context of these impacts. Impacts on biological resources at launch facilities would be small, isolated, and dispersed over time. Therefore, local variation of impacts because of effects from multiple sites would not occur and were not dealt with using a GIS.

99 34 **COMMENT:** Page 4-223, Section 4.8.6, paragraph 1: This paragraph suggests that the mitigation of impacts on biological resources from this program may be the responsibility of "other" agencies. Sentence 4 which states that "the Air Force would encourage implementation of these measures through environmental awareness and other programs" is misleading. It suggests that actual mitigating measures would not be undertaken by the Air Force. The roles and responsibilities of the Air Force, as well as the other agencies, should be more clearly stated.

RESPONSE: The role of the Air Force and other agencies has been clarified in FEIS Section 4.8.6. Further details are provided in FEIS Appendix D.

99 35 **COMMENT:** Page 4-224, Section 4.8.7: The ability of biological communities to recover to a "state approximating pre-disturbance conditions once the disturbance ends" is dependent to a large degree on the extent of the "disturbance" and the quality of the commitment to a mitigation program during the life of the operation. This discussion should reflect that fact.

RESPONSE: The extent of disturbance to biological communities was considered when potential impacts and recovery potentials were evaluated and are discussed in FEIS Sections 4.8.2 and 4.8.3. The level of potential impact and existing conditions are summarized in Section 4.8.7. Sections 4.8.1.4 and 4.8.2 have been revised in the FEIS. FEIS Appendix D has been added to further clarify the mitigations program.

99 36 **COMMENT:** Page 4-255, Section 4.9: It is unclear how the water use rates for construction discussed in this section relate to the discussion in Section 4.2 on potable water treatment and distribution. Are the rates discussed here in addition to those covered in the previous section or is this section redundant to some extent? Comparison of water use rate change for the overall program would be clearer if the discussion was limited to one selection and the same units were consistently applied.

RESPONSE: The discussion of water use in FEIS Section 4.9 (Water Resources) covers all water use within the Region of Influence, including that of the municipal water supply utilities discussed in Section 4.2 (Utilities). To the extent that the water use and wastewater discharges of the individual towns are discussed in FEIS Section 4.9, the numbers are equivalent to those cited in Section 4.2. The discussion in FEIS Section 4.2 covers the program impacts on individual utility systems. The units used in that section, such as gpm and MGD, are appropriate in discussing instantaneous flows and the capability of the water and wastewater utilities to handle the additional demands of the program. The discussion in FEIS Section 4.9 deals in part with total water use and wastewater impacts at a local and regional level. The units used (acre-ft and acre-ft/yr) are conventional to this type of discussion.

99 37 **COMMENT:** Page 4-225, Section 4.9: The effects on the total water resource from drawdown of local surface water or groundwater resources are appropriate to discuss in conjunction with water quality issues.

RESPONSE: The amount of water diverted to support program needs is a relatively minor fraction of the available water resource base in all cases. The overall water quality effects of these withdrawals are also expected to be low and not significant (FEIS Sections 4.9.2.2 and 4.9.2.3).

99 38 **COMMENT:** Page 4-226, paragraph 2: The use of the current State Stream Classification system as a guideline to identify sensitivity of a particular stream to water quality degradation is useful. However, revision of the State Classification for some streams in Montana is currently planned. It is not apparent from the text if the State Water Quality Bureau was consulted regarding this possible reclassification of any stream within the program area.

RESPONSE: The Montana Water Quality Bureau is conducting its triannual review of the current water quality classification of all streams in the state (FEIS Section 3.9.3.1). The process will not be completed until early 1988, well after the issuance of this FEIS. Since no official decisions regarding reclassification have been made, it was felt to be most prudent to conduct the analysis using the current state classifications.

99 39 **COMMENT:** What data were used to analyze the major groundwater sources?

RESPONSE: Several general sources of groundwater data for the ROI are now mentioned and may be found in FEIS Section 4.9.1.1.

99 40 **COMMENT:** Define "to the extent reasonable and practicable." Best Management Practices should be designed and implemented to meet all applicable federal, state, and local standards. The wording here implies that depending on the interpretation of "reasonable and practicable," these standards might not be met. We would not necessarily agree with that position and suggest that the statement be reworded to reflect a commitment to full compliance with all federal, state, and local standards.

RESPONSE: The Air Force will adhere to all federal legislation and executive orders requiring compliance with state, county, and local regulations. In addition, the Air Force will cooperate with the agencies and will implement applicable construction standards and environmental restrictions.

99 41 **COMMENT:** Section 4.2 indicated that maximum day use levels could exceed the treatment capacity and cause a reduction in the 90-day retention period. The statement made on page 4-236, paragraph 1 should be reevaluated in light of this possibility.

RESPONSE: The statement in FEIS Section 4.9.2.2 to the effect that Conrad has adequate capacity to treat program-induced wastewater effluent and would meet discharge standards is correct. FEIS Section 4.2 in the Utilities resource has been revised to reflect this fact (see related document 99, comment 16).

99 42 **COMMENT:** What is the total volume of additional wastewater for the HML launch sites and what are the time frames for delivery to specific municipalities. The effects of this increase on the local wastewater treatment facility should be addressed regardless of the contractual nature of the disposal methods.

RESPONSE: The total annual wastewater generated at the HML enclosures is now listed for the Proposed Action and alternatives. It is relatively small, varying from about 0.01 to 0.03 MGD (12 to 29 acre-ft/yr). Disposal of this wastewater will be accomplished by private contractor(s). At present, it is not known which specific wastewater treatment plants would be utilized to receive and treat the effluent or exactly when they would begin receiving it. But, it is likely that only those treatment plants with excess available capacity would agree to receive the effluent that is trucked away from the HML enclosures. The water quality impacts from disposal of this effluent should, therefore, be minor as indicated in the text (FEIS Sections 4.9.2.2 and 4.9.3.2).

99 43 **COMMENT:** What methodology was used to analyze the "quantities of sediment delivered to the streams during the recovery period?"

RESPONSE: Potential upland erosion resulting from land-disturbing activities was determined by application of the Universal Soil Loss Equation, discussed in FEIS Section 3.10.2.4. This amount was multiplied by a sediment delivery ratio to calculate the quantities of sediment delivered to the streams. FEIS Section 4.9.1.1 has been revised to reflect this methodology and Section 4.9.3.2 has been supplemented with a basinwide sedimentation analysis which includes a scenario that depicts the maximum potential program-induced sedimentation impacts.

99 44 **COMMENT:** Mitigations to alleviate potential saline seep problems were not addressed.

RESPONSE: A mitigation measure appropriate to reducing impacts on saline seeps has been added to FEIS Section 4.9.6.

99 45 **COMMENT:** Page 263, Section 4.10.2.3: This section should address specific sensitive areas and the volume of traffic relative to the number of HMLs/site or sites/local impact area.

RESPONSE: FEIS Section 4.10.2.3 describes the potential impacts of program-induced ground disturbance on soil erosion rates and how those rates compare to maximum tolerable soil losses defined by the U.S. Soil Conservation Service. The impacts of program-induced soil erosion at specific construction locations in the deployment area are discussed in FEIS Section 4.10.2.3. Potential impacts at individual launch facilities, along T/E routes, and at bridges are discussed in FEIS Section 4.10.2.3. The influence of the induced soil loss on biological resources is presented in FEIS Section 4.8, with the potential impacts on water resources considered in Section 4.9. Impacts from dust generated by construction vehicles traveling over unimproved roads in the deployment area are discussed in FEIS Section 4.11.

99 46 **COMMENT:** Will the HMLs be exercised within the launch facility sites? What is the nature of maintenance activities at the launch sites?

RESPONSE: The HMLs will be periodically started and moved within the launch facility sites. Except for major maintenance at Malmstrom AFB, they would remain at the launch facilities until ordered to disperse (FEIS Section 1.3.2). Only minimal service and all feasible HML repairs would be performed at the launch facilities.

99 47 **COMMENT:** DEIS Table 1.3.2-1 implies linear relationship to road use. Any number and combination of vehicles could be using the same T/E route simultaneously. These are not addressed in the EIS.

RESPONSE: The impact of operations vehicles using T/E routes was assessed based on routes taken in traveling to the launch facilities identified for the Proposed Action and its alternatives and on the frequency of trips required. The assessment was also made on the assumption that all trips from the base would occur at the same time, that is, during the peak hour, to determine the critical effect (FEIS Section 4.3.2.1).

99 48 **COMMENT:** How will T/E roads be kept open in the winter? Who is responsible for maintaining the roads in winter?

RESPONSE: The local agencies presently responsible for the maintenance of the roads would continue to be responsible. The Air Force will pay the local agencies for any extraordinary work, including snow removal required to support the program.

99 49 **COMMENT:** What is the nature of exercise activities at the training area at Malmstrom AFB? Has the volume and nature of year-round activities been assessed in terms of dust?

RESPONSE: The training activities at Malmstrom AFB include HML movement on the southeast side of the base on gravel and dirt roads. The dust results of the analysis are shown in FEIS Section 4.11.2.

99 50 **COMMENT:** Has the volume and nature of year-round exercise activities been assessed in terms of noise?

RESPONSE: Noise analysis showed negligible impacts as discussed in FEIS Section 4.12.2.

99 51 **COMMENT:** Selecting facilities that may impact Class 1 streams or wetlands should be avoided.

RESPONSE: Impacts on streams or wetlands at launch facilities and along T/E routes were considered in the development of the proposed set. No major impacts on streams are expected to occur from road or bridge construction. Potential impacts on habitats such as prairie potholes at launch facilities are discussed in FEIS Sections 4.8.1.4 and 4.8.2.

99 52 **COMMENT:** Water quality issues discussed in Section 4.9 should include specific data like the existing water quality for streams and groundwater resources within the potential impact area. Methods of analyses should be presented or referenced for all parameters, not just turbidity.

RESPONSE: The diffused nature of the proposed program involves limited construction at hundreds of sites in a large (8,500 sq mi) deployment area. The most appropriate level of water quality characterization is therefore at the stream basin level. A site-specific assessment has been carried out at those locations where construction or operations of the program is likely to have substantial water quality effects. The principal cause of water quality degradation resulting from program activities is sedimentation. Therefore, the study emphasized the analysis on turbidity and suspended solids. It was concluded that these parameters would not increase substantially and that water quality would not be significantly degraded as a result. Therefore, other associated water quality parameters (such as temperature, dissolved oxygen, ammonia, and nitrates) were not analyzed in detail.

99 53 **COMMENT:** Specific examples of proposed mitigation techniques should be provided and the estimates of time frames for the recovery periods associated with revegetation or similar techniques should be listed.

RESPONSE: FEIS Section 4.9 and Appendix D contain sufficient detail with regard to mitigation effectiveness to allow the decision-maker to choose among the potential water resource mitigation measures. Specific application of the mitigation measures will occur after their adoption as outlined in the Record of Decision. The adopted mitigations will then be incorporated into the design of specific program features (see response to document 99, comment 27). As stated in FEIS Section 4.9.2.2, recovery of disturbed areas, followed by decline of local sedimentation to background levels, should occur within about 1 year following construction completion.

99 54 **COMMENT:** A monitoring plan to assess water quality parameters during construction operations should be developed as appropriate. A monitoring plan to assess revegetation success should also be provided.

RESPONSE: Analysis in FEIS Section 4.9 indicates that water quality impacts of the program will be generally localized and of short duration. A water quality monitoring program does not appear justified nor is one usually established for programs of this type which involve limited land disturbance at any particular location. Where revegetation is employed, the site will be monitored for a period sufficient to assure successful reestablishment of the vegetation.

100 1 **COMMENT:** Commentor favors the No Action Alternative. If the Air Force does not accept the No Action Alternative, commentor suggests that the DEIS needs to be redone and resubmitted to the public and Congress.

RESPONSE: Noted.

100 2 **COMMENT:** Case I in the safety section addresses the probability of a fuel truck colliding with the HML on a Montana highway. Did this consider all the extra traffic that is likely to be on the road in an alert situation as eastern Montanans race towards the safety of the mountains?

RESPONSE: See response to document 74, comment 1.

100 3 **COMMENT:** The nuclear dispersion model used in the safety section says aerosolization of 1 percent of the available plutonium is a worst case. Why would aerosolization of 100 percent of the plutonium not be the worst case?

RESPONSE: In order to aerosolize 100 percent of the available plutonium, the fuel fire would have to continue unabated for over 33 hours. The available fuel could burn for not more than 20 minutes assuming no fire control measures are taken. Based on studies done by Lawrence Livermore National Laboratories, the British Atomic Weapons Research Establishment and the U.S. Nuclear Regulatory

Commission; the maximum amount of the available plutonium aerosolized by a 45-minute burn would be less than 1 percent (FEIS Section 5.3.2).

100 4 **COMMENT:** A 4.5 mph wind speed was used in the nuclear dispersion model. Since Montana winds often blow in excess of 30 mph, why was a higher wind not used to illustrate a worst case scenario?

RESPONSE: Model runs were made using higher and lower wind speeds and 4.5 mph was found to have the most severe environmental consequences. As the wind increases beyond 4.5 mph, the radioactive particles are dispersed over an increasingly larger area; therefore, the resulting radiation levels become even smaller as the wind increases (FEIS Section 5.4.1.1).

100 5 **COMMENT:** Since the half-life of Pu-239 is 24,000 years, why were the long-term effects (past 30 years) of a nuclear accident not discussed?

RESPONSE: Long-duration environmental effects on Montana of a nuclear mishap were not considered significant since the Air Force would be required to clean up all contaminated areas in the vicinity of the mishap. Using approved DOE and EPA procedures, contaminated materials would be removed to an approved nuclear waste storage facility.

100 6 **COMMENT:** What will it cost to produce the entire EIS?

RESPONSE: The entire EIS process is estimated to cost between $8 and $9 million.

100 7 **COMMENT:** Who owns Tetra Tech, Inc.?

RESPONSE: Tetra Tech, Inc. is a subsidiary of Honeywell, Inc. Tetra Tech is a major consulting firm with over 2 decades of experience in environmental and engineering programs for both the U.S. government and civilian-sector clients.

100 8 **COMMENT:** Why didn't the Air Force use Montana residents or contractors to prepare the DEIS?

RESPONSE: Contracts with the Air Force are awarded through a federally mandated contracting process that is designed to ensure that the federal government meets its requirements for the program in addition to encouraging a competitive selection process. Tetra Tech was selected from a number of qualified firms competing in this process. The contractor was selected prior to the President's decision of December 1986 to deploy in Montana. Both the Air Force and Tetra Tech recognize the benefit of using local expertise. Tetra Tech has, therefore, established an office in Great Falls and has used several local firms and specialists as subcontractors, including Historical Research Associates (HRA), WESTECH, Montana National Heritage Program, Morrison-Knudsen Engineers, Inc., and the firm of Ethnoscience.

101 1 **COMMENT:** Written testimony from the Governor's office on the preparation of the Small ICBM DEIS.

RESPONSE: Noted.

102 1 **COMMENT:** Is the Small ICBM an offensive or defensive weapon and should we go through the expense of deploying the weapon?

RESPONSE: See response to document 7, comment 3.

103 1 **COMMENT:** Are psychological and fear aspects of nuclear war generated as a result of Small ICBM activities in the deployment area discussed?

RESPONSE: See response to document 59, comment 1.

103 2 **COMMENT:** What curriculum are being developed and implemented by the affected school districts to educate all the children about their unique situation?

RESPONSE: The school district curriculum is a local decision made by the school administrators and governing boards and would not fall within the scope of an EIS (FEIS Section 4.1.3.4).

103 3 **COMMENT:** What happens in the event of an accidental or intentional launch?

RESPONSE: See response to document 76, comment 1.

103 4 **COMMENT:** Will deployment of the Small ICBM affect tourism in Montana?

RESPONSE: See response to document 67, comment 2.

104 1 **COMMENT:** How accurate was the Air Force in estimating the enrollment number of students in Wyoming when the Peacekeeper was deployed?

RESPONSE: The FEIS for the Peacekeeper in Minuteman Silos program in Wyoming cited a projected peak student enrollment of 622 students for Laramie County School District No. 1 (LCSD No. 1) with an additional 180 students projected for other counties in the ROI. The actual Peacekeeper-related LCSD No. 1 enrollment was around 400 in 1986, partly because of the economic slowdown in the energy sector.

104 2 **COMMENT:** How is the money provided during the period when there is a "lag" due to shortfall in local government financing? If money is borrowed from some other source, what about the interest it would have gained had it stayed in a particular account. Will the FEIS address such material?

RESPONSE: Current expenses of local governments are generally funded by existing cash accounts or through short-term borrowing. As revenues accumulate over an accounting period, the cash accounts of the jurisdiction are restored to their original levels and/or the short-term debt is retired. In the case where insufficient revenues are accumulated over the accounting period, the cash balance of a jurisdiction (for that accounting period) is reduced by the amount of the shortfall. These deficits are generally made up in the ensuing fiscal year by increasing the local mill levy, raising other rates (such as fines, fees, charges for services) or other similar revenue-generating mechanisms. Cash held by a jurisdiction is often held in interest-bearing accounts. As these monies are used, the jurisdiction will, in fact, suffer lost interest revenue. The effects of revenue shortfalls to the local governments in the Great Falls area have been identified as significant impacts in FEIS Section 4.1.2.6.

104 3 **COMMENT:** Are the public hearings responsive to citizens' concerns?

RESPONSE: See response to document 93, comment 2.

104 4 **COMMENT:** Does Congress consider EIS results in determining whether to fund such a project?

RESPONSE: The FEIS has been accomplished at the direction of the Congress in accordance with regulations of the President's Council on Environmental Quality. The primary purpose for preparing an EIS is to identify the environmental consequences of the Proposed Action and alternatives, thus alerting the agency decision-maker, the public, and ultimately the Congress and the President to the environmental effects involved. This document is only one tool to aid the Congress and the President on actions such as funding for a project.

104 5 **COMMENT:** Montanans voted against deployment of any more nuclear missiles in Montana. Is this being considered by Congress?

RESPONSE: See response to document 46, comment 1.

104 6 **COMMENT:** Concerned about severe impacts on the Great Falls Public Schools system due to the Small ICBM. Impacts include building of an elementary school, reopening of schools, staffing, boundary changes, and busing. These options are too costly.

RESPONSE: When the Air Force decides which deployment alternative will be implemented a record of decision will be prepared which will state what specific mitigation measures will be adopted. An Intergovernmental Small ICBM Working Group comprised of representatives from city government, county commissioners, state agencies, officials from Malmstrom AFB, and other U.S. Air Force officials has been established to provide a coordinated intergovernmental approach to the exchange of resource information pertinent to the proposed Small ICBM program in Montana and to consider what specific mitigation measures will be adopted.

105 1 **COMMENT:** Concerned about the conclusion that impacts on deployment area roads would be low and not significant.

RESPONSE: Long-duration impacts on deployment area roads have been revised to low and significant (FEIS Section 4.3.2.1).

105 2 **COMMENT:** Practice driving and deployment onbase appears impractical for reliability of the HML and skill of the crew. What is your confidence level in crew reliability?

RESPONSE: The Air Force has great confidence in crew reliability. The HML vehicle operations training area at Malmstrom AFB would duplicate field conditions. It will be used daily, under all weather conditions, in both daylight and darkness. As many as six training vehicles may be operated at the same time. The vehicles would operate on a variety of surfaces and terrains, and would achieve speeds up to 50 miles per hour on a training track. An off-road area would be used for HML emplacements (the "digging-in" operation by which HMLs harden against attack). The training area may be used approximately 240 days per year. In addition, the HML vehicle operations training area may be used for road testing following routine HML maintenance.

105 3 **COMMENT:** What reassurances can you give that the HMLs will not move from launch facilities more than once annually?

RESPONSE: The Air Force prefers to leave the HMLs in place as long as possible. It is not expected that all HMLs would require major maintenance even once a year. It is an average value based on engineering judgment.

105 4 **COMMENT:** What is the configuration of the transporter? If the axle load is above 18,000 pounds, what will be the impacts on the roads?

RESPONSE: The HML will be transported in such a manner as to ensure that the loading on each axle is below 18,000 pounds, will meet state standards, and will not cause additional impacts on roads.

105 5 **COMMENT:** How often will the HML be moved in and out of its protective shelter for maintenance. What will be the noise impact of the large 1,200-horsepower engines running? Where does the HML engine sit on your decibel levels cited on page 3-202. HML engine noise not adequately discussed.

RESPONSE: As a part of the maintenance program, the HML will be moved in and out of its protective enclosure periodically. Major maintenance will be performed at the Integrated Maintenance Complex, an enclosed onbase facility. The CV12-1200 engine at full power (2,300 RPM) will have an 85 dBA noise level at a distance of 50 feet. Noise will be reduced considerably when engines are placed into the vehicles because of various noise reduction techniques. The HML engine noise is less than a freight train noise of 95 dBA at 50 feet and motorcycle noise of 106 dBA at 50 feet.

105 6 **COMMENT:** The Small ICBM has recently been increased from 30,000 to 37,000 pounds to accommodate penetration aids and/or possibly a second warhead. Have you considered the impact of a second warhead?

RESPONSE: The Congress has directed deployment of a single warhead missile weighing approximately 37,000 pounds and this was used in the analysis. Environmental impacts of the peacetime operation are independent of the number of warheads or penetration aids and are not analyzed in this EIS.

106 1 **COMMENT:** Does the term "aggregate" include sand and gravel?

RESPONSE: The term "aggregate" as well as the aggregate numbers shown in FEIS Figure 4.10.2-3 and Table 4.10.2-1 include sand and gravel which will be used to produce concrete for road surfacing and construction activities.

106 2 **COMMENT:** Has a requirement for riprap been determined?

RESPONSE: No. The need for riprap (heavy, irregular rocks used to stabilize slopes along roads and embankments) during program construction activities has not been determined. The numbers shown in FEIS Figure 4.10.2-3 and Table 4.10.2-1 do not include material requirements for riprap.

106 3 **COMMENT:** During initial scoping, 4.5 million tons of material were required for the program. In the DEIS, only approximately 3.0 million tons of material were identified. What dropped the requirements by 1.5 million tons and what is the margin of error on the 3.0 million ton estimate?

RESPONSE: The difference in required aggregate is the result of the ongoing analysis which reduced the number of miles of T/E routes that would need to be upgraded to accommodate the Small ICBM system in Montana.

106 4 **COMMENT:** After deployment won't there be an increase in baseline demand for road and site maintenance? If so, do you have an estimate?

RESPONSE: The Air Force has identified its requirements and is working with federal, state and local agencies through the Defense Access Road needs program to determine measures to meet those requirements. This process will determine the extent to which the Air Force will assist local agencies in road maintenance and snow removal activities. Once the decisions have been made, these measures will become part of the Proposed Action (FEIS Section 4.3.1.4).

106 5 **COMMENT:** Will the Air Force take an active part in determining where new aggregate pits will be located and select the aggregate sources for specific portions of the project; or will the procurement of an aggregate source be left up to the construction contractor?

RESPONSE: While the Air Force may have a part in choosing the contractors who will supply the aggregate for the program, the decision on the locations of pits or aggregate sources will likely be made by the construction contractor or the landowner whose property has been leased for aggregate production.

106 6 **COMMENT:** The Bureau of Land Management would like to work closely with the Air Force on this program, including the handling of additional permitting activity.

RESPONSE: Noted.

107 1 **COMMENT:** New information on the bald eagle requires further consultation.

RESPONSE: The Air Force has entered into consultation with the U.S. Fish and Wildlife Service and the Montana Department of Fish, Wildlife and Parks concerning the bald eagle nest near launch facility I-7. This information has been incorporated in FEIS Section 4.8.2.5. Because of the distance of the launch facility from the nest, impacts are expected to be negligible.

108 1 **COMMENT:** What equivalent spending for the Small ICBM can be used on food, clothing, education, housing, and health care services?

RESPONSE: See response to document 3, comment 1.

108 2 **COMMENT:** Have you a comparison of long-term gains resulting from civilian sector jobs instead of short-term military jobs?

RESPONSE: Of the direct employment increase of 3,100 jobs during the operations phase, approximately 30 positions will be civilian workers. In addition, approximately 1,250 indirect jobs are estimated to be created which would all be filled by civilian workers.

108 3 **COMMENT:** Can civilian radio frequencies set off the Small ICBM accidentally as it is being transported?

RESPONSE: The Small ICBM's electronic systems are not affected by civilian radio frequencies. The Small ICBM can only be activated by specially encoded signals.

108 4 **COMMENT:** Where can you safely store radioactive materials?

RESPONSE: Warheads are stored and guarded in secure weapons storage areas on Malmstrom AFB. There will be no nuclear wastes produced or stored as a result of deployment of the Small ICBM.

108 5 **COMMENT:** What do you plan to do with materials from inactivated warheads?

RESPONSE: Deactivated warheads are returned to the U.S. Department of Energy.

108 6 **COMMENT:** How do you address the safety of the planet 20,000 years from now as a result of storage of radioactive wastes?

RESPONSE: There are no nuclear wastes produced by the Small ICBM at Malmstrom AFB. For decommissioning of nuclear warheads and disposition of associated radioactive materials see FEIS Chapter 5.0 for reference to appropriate environmental documentation.

108 7 **COMMENT:** How can you assure the public that you are "making the world safe" when you add more missiles to the already large stockpile?

RESPONSE: See response to document 7, section 2.

109 1 **COMMENT:** EIS is inadequate in assessing the vehicular traffic hazards that will develop when the system becomes fully operational.

RESPONSE: See response to document 105, comment 1.

110 1 **COMMENT:** Comment in opposition to Small ICBM deployment in Montana.

RESPONSE: Noted.

111 1 **COMMENT:** DEIS lacks any specific mitigation measures which could be implemented to address specifically impacted roadway segments.

RESPONSE: Potential mitigation measures have been identified in FEIS Section 4.3.6 and Appendix D.

112 1 **COMMENT:** Opposed to Small ICBM deployment in Montana because of the beauty and spaceousness of the state and the impacts it will bring to Montanans. Was Montana considered because population ratio and person to square miles are low?

RESPONSE: See response to document 52, comment 2.

113 1 **COMMENT:** The EIS does not address the effects of a nuclear exchange.

RESPONSE: The EIS was prepared in response to Congressional direction, 1986 DOD Authorization Act. Congress directed the Air Force to address the potential environmental impacts of the proposed deployment and peacetime operation of the Small ICBM in Montana.

113 2 **COMMENT:** The EIS does not address the effects of accidental launch or detonation or intentional launch.

RESPONSE: System safeguards have been developed to ensure there is no possibility of accidental launch or detonation. Analysis of intentional launch is beyond the scope of the EIS, since the Congress directed that only peacetime operations be addressed.

113 3 **COMMENT:** Statement made that the Air Force Personnel Reliability Program is not adequate.

RESPONSE: See FEIS Section 5.1.2.2.

113 4 **COMMENT:** The EIS does not address the excessive costs of the system to the taxpayers.

RESPONSE: See response to document 3, comment 1.

114 1 **COMMENT:** Under DEIS Section 4.8.2 and the information on Figure 4.8.2-1 there is a discrepancy. The text indicates moderate short-duration impacts to aquatic habitats, while the figure shows that there will be negligible impacts.

RESPONSE: There is no discrepancy between the text and FEIS Figure 4.8.2-1. The figure shows summary ratings for site-specific impacts on biological resources at launch facilities. Many launch facilities are not near aquatic habitats and impacts at these sites would be negligible. The short-duration rating of moderate and not significant is an overall rating that considers the multiple impacts at all sites (e.g., launch facilities and T/E routes).

114 2 **COMMENT:** Commentor stated that any amount of big game severe wintering habitat that is permanently removed is unacceptable.

RESPONSE: The Air Force consulted with federal and state wildlife agencies. Any habitat lost at launch facilities would be small and isolated. None of these losses are expected to alter wildlife carrying capacities in any area.

114 3 **COMMENT:** What is the basis for the assumption that a recently rebuilt causeway should not require further modification for the program (DEIS Section 4.8.2.4)?

RESPONSE: This conclusion is based on engineering analysis that took into consideration the configuration of and wheel loading of the vehicle.

114 4 **COMMENT:** What criteria were used for determining that sensitive habitats are "distant" from construction areas?

RESPONSE: In this case "distant" refers to areas that are greater than 3 miles from construction and operations areas.

114 5 **COMMENT:** Statement is made in DEIS Section 4.8.2.4 that general concern by natural resource managers for impacts to unique and sensitive habitats is also expected to be low. Commentor wants to know if natural resource managers were asked.

RESPONSE: Yes. State and federal natural resource managers were consulted during the development of the EIS, including members of the U.S. Fish and Wildlife Service, Montana Department of Fish, Wildlife and Parks, Montana Natural Heritage Program, and the Nature Conservancy.

114 6 **COMMENT:** Commentor needs clarification of DEIS Section 4.8.3 which states "...which reduces the opportunity to avoid impacts at the launch facilities through site selection."

RESPONSE: Proposed sets of launch facilities have been identified for the Proposed Action and alternatives in the FEIS. Environmentally sensitive areas exist along some of the T/E routes and at some launch facilities. Therefore, an alternative that would use a larger number of launch facilities would have a greater probability of using an environmentally sensitive area. Text in FEIS Section 4.8.3 has been revised accordingly.

114 7 **COMMENT:** What means have been used to address the road hazard with the HML during blizzard conditions when gravel roads do not receive minimum necessary maintenance?

RESPONSE: To assess the HML operations during winter conditions, a winter test program for operation of both the HML and the overall system has been partially completed and will be continued next winter. So far the vehicle has performed as expected. The vehicle was designed to move off-road, and is expected to operate in winter conditions.

115 1 **COMMENT:** Comment opposed to any additional missile program.

RESPONSE: Noted.

116 1 **COMMENT:** Comment opposed to missile deployment in Conrad because we have enough missiles and firepower.

RESPONSE: Noted.

117 1 **COMMENT:** Comment opposed to ballistic missiles being placed anywhere in Montana.

RESPONSE: See responses to document 46, comment 1 and document 52, comment 2.

118 1 **COMMENT:** Comment objects to the proposed Small ICBM because the weapons system is not necessary for the defense of the United States.

RESPONSE: Noted. Rationale for the deployment of Small ICBM system in Montana is provided in FEIS Section 1.1.

119 1 **COMMENT:** Comment objects to Small ICBM being considered for Malmstrom AFB.

RESPONSE: See responses to document 46, comment 1, and document 52, comment 2.

120 1 **COMMENT:** Statement in support of the defense system needs because of the fine people in the Air Force.

RESPONSE: Noted.

121 1 **COMMENT:** The service area map for Montana Power Company (Figure 3.2.3-2) should be revised to include portions of Flights F, G, H, and T.

RESPONSE: The additional data have been incorporated into the data base and the impact analysis.

121 2 **COMMENT:** The increased load associated with additions at 46 launch facilities serviced by Montana Power Company would equal approximately 4.6 MW and have a considerable impact on the distribution network servicing the launch facilities.

RESPONSE: The increased load associated with the Small ICBM program for Montana Power Company has been revised to reflect the choice of sites for the Proposed Action and the alternatives. The new load is estimated to range from 4.1 to 5.3 MW and is identified in FEIS Table 4.2.2-2. The Air Force has entered into discussions with the current electricity suppliers to develop coordinated strategies toward meeting these demands and arriving at an equitable solution to providing this service.

121 3 **COMMENT:** DEIS Sections 4.2.2.4 and 4.2.3.4 do not address the impact on Montana Power Company for the increased load at the launch facilities separately from the increased load at Malmstrom AFB.

RESPONSE: FEIS Section 4.2.2.4 has been revised to reflect the specific energy loads on Montana Power Company associated with the proposed set of launch facilities for the Proposed Action and three alternatives.

122 1 **COMMENT:** Why doesn't the DEIS discuss the environmental consequences that could result from the use of the Small ICBM?

RESPONSE: The Congress has authority to exempt specific projects, in full or in part, from the requirements of NEPA without altering the structure of the Act itself. In 209(c)(4) of the 1986 Department of Defense Authorization Act, the Congress directed the Air Force to prepare administrative environmental impact statements covering the deployment of the Small ICBM, but limited the scope of those statements to the "deployment and peacetime operation" of the system.

122 2 **COMMENT:** Why doesn't the DEIS discuss the global environmental consequences that could result from the use of the Small ICBM?

RESPONSE: No global environmental effects are expected to result *from the deployment and peacetime operation* of the Small ICBM system.

123 1 **COMMENT:** Concerned that the proposed program could affect the Sun River Project and that operation of the missile system needs to be

conducted so as to avoid any disruption of water supply to the irrigated croplands.

RESPONSE: Peacetime activities of the proposed program do not involve off-road maneuvers of the HML in the deployment area. The HML vehicle operations training area is confined to an extension of Malmstrom AFB, and HML activities in the deployment area would be restricted to deployment at the launch facilities and movement from the launch facilities to Malmstrom AFB along T/E routes. All bridges along these routes would be upgraded, if necessary, to safely bear the HML vehicle. There is a potential for temporary disruption of water supply to irrigated croplands while bridge upgrades over canals are being constructed. However, the construction contractors would be required to plan these upgrades in coordination with the appropriate irrigation district to avoid or minimize disruption of irrigation water supply (FEIS Sections 4.9.1.4 and 4.9.2.1).

123 2 **COMMENT:** Commentor envisions problems with HML training operations during off-road maneuvers with concerns at canal bridges.

RESPONSE: All testing will be conducted onbase and will not pose any threat to canal bridges.

124 1 **COMMENT:** Will the local interstate highway system be expanded or improved?

RESPONSE: See response to document 14, comment 1.

124 2 **COMMENT:** Will deployment of the Small ICBM affect tourism in Montana?

RESPONSE: See response to document 67, comment 2.

124 3 **COMMENT:** Comment opposed to ballistic missiles being placed anywhere in Montana.

RESPONSE: See response to document 52, comment 2.

124 4 **COMMENT:** Could the Small ICBM program be a bargaining chip at peace talk summits.

RESPONSE: These are determinations to be made by the President.

124 5 **COMMENT:** Comment in opposition to deploying 200 Small ICBMs in north-central Montana. Also would like to get rid of the Minuteman silos.

RESPONSE: Noted.

7.0 AUTHORIZING ACTIONS

Table 7.0-1 provides a list of federal authorizing actions that may be required for the Small Intercontinental Ballistic Missile program at Malmstrom Air Force Base, Montana.

Table 7.0-1

Federal Authorizing Actions, Small ICBM Program, Malmstrom AFB, Montana

Authorizing Action	Typical Activity or Facility That May Require the Action	Authorizing Agency	Authority
Utilities Solid and Hazardous Waste			
Authority for Short-Term Storage of Small Quantities of Hazardous Waste, Hazardous Waste Identification Number	Generation during construction and temporary storage of small quantities of hazardous waste including expended or unusable oils and lubricants, machining fluids, cleaning agents, and adhesives.	U.S. Environmental Protection Agency	Resource Conservation and Recovery Act of 1976, 42 USC §6901 et seq. §6921; 40 CFR §261.5, 262.34
Registration, Packaging, and Manifest Requirements	Transportation of hazardous waste generated during construction from generation site to temporary storage site; transportation of propellants.	U.S. Department of Transportation, Federal Highway Administration	Hazardous Materials Transportation Act, 49 USC §1801 et seq.; Resource Conservation and Recovery Act of 1976, 42 USC §3003; 42 USC §6901 et seq.; 49 CFR §170-179; 40 CFR §262.30-262.33; 45 Fed. Reg. 51645
Approval of General Safety Plan and Facility-Specific Safety Plans	Storage and processing of explosives and propellants in facilities that are near inhabited buildings, public traffic routes, recreational facilities, utilities, petroleum storage facilities, or processing facilities for other explosives.	U.S. Department of Defense, Explosive Safety Board	Department of Defense Ammunition and Explosive Safety Standards Directive, 5154.45; Air Force Regulation 127-100
Transportation			
Highway Access Control Approval	Any construction involving new highway access improvements must be approved by the Secretary of Transportation.	U.S. Department of Transportation, Federal Highway Administration	Federal Aid for Highways, 23 USC §111

Table 7.0-1 Continued, Page 2 of 5

Authorizing Action	Typical Activity or Facility That May Require the Action	Authorizing Agency	Authority
Land Use			
Rights-of-Way Consultation	Need to occupy, use, or traverse land for roads or railroads, power and communication distribution systems, and pipelines through wildlife refuges.	U.S. Department of the Interior, Fish and Wildlife Service	Fish and Wildlife Coordination Act, 4 CFR §16; USC §661 et seq.; Department of Transportation Act of 1966, 80 Stat 931, P.L. 89-670; National Wildlife Refuge System Administration Act, P.L. 89-669; Coastal Barrier Resources Act, 16 USC §3501-3510
Right-of-Way Grant (U.S. Forest Service-Managed Lands)	Federal project that requires the use/withdrawal of national forest land.	U.S. Department of Agriculture, Forest Service	National Forest Organic Legislation, 16 USC §475; Multiple-Use Sustained-Yield Act, 16 USC §528-531; Forest and Rangeland Renewable Resources Planning and Research Acts, National Forest Management Act, and Renewable Resource Extension Act, 16 USC §1600-1676; 36 CFR §261
Relocation Benefits Plan	If property owners are relocated as a result of the proposed program, a plan for relocation assistance will be developed.	U.S. Air Force	Uniform Relocation Assistance and Real Property Acquisition Act, 42 USC §4601 et seq.
Free-Use Permit	Quarries or borrow pits on public lands.	U.S. Department of the Interior, Bureau of Land Management	Materials Act of 1947, 30 USC §601-604

Table 7.0-1 Continued, Page 3 of 5

Authorizing Action	Typical Activity or Facility That May Require the Action	Authorizing Agency	Authority
Cultural and Paleontological Resources			
Section 106 Consultation and Comment	Program activities that affect properties with historic, architectural, or cultural value which are listed or eligible for listing in the National Register of Historic Places.	Advisory Council on Historic Preservation	National Historic Preservation Act of 1966, as amended, 16 USC §470 et seq.; Advisory Council on Historic Preservation, 36 CFR §800; National Register of Historic Places, 36 CFR §60; Protection and Enhancement of the Cultural Environment, Executive Order 11593
Consultation	Program activities that affect Native American religious and/or heritage practices and sites.	Native American religious leaders	American Indian Religious Freedom Act, 42 USC §1996 et seq.; Archeological Resources Protection Act, P.L. 96-95
Permit to Survey, Excavate, Analyze, and Curate Archaeological Resources	Program activities that affect cultural resources.	U.S. Department of the Interior, National Park Service, Interagency Archaeological Services	Archeological Resources Protection Act, P.L. 96-95
Cooperative Agreement for Construction and Operation on Historic Trails	Program actions that affect historic trails.	U.S. Department of the Interior, National Park Service	National Trails System Act, 16 USC §1241 et seq.

Table 7.0-1 Continued, Page 4 of 5

Authorizing Action	Typical Activity or Facility That May Require the Action	Authorizing Agency	Authority
Biological Resources and Threatened and Endangered Species			
Section 7 Consultation on Threatened and Endangered Species	Activities and facilities that may affect threatened or endangered species or their critical habitat.	U.S. Department of the Interior, Fish and Wildlife Service	Endangered Species Act, §7; 16 USC §1531-1536 et seq.; 50 CFR §402; Proposed Rules in 48 Fed. Reg. 29990
Consultation on Effects on Fish and Wildlife	Modification, control, or impoundment of a surface water body over 4 hectares. Must consult with federal and state wildlife agencies.	U.S. Department of the Interior, Fish and Wildlife Service	Fish and Wildlife Coordination Act, 16 USC §661-666
Wetlands Assessment	Construction in, modification of, or impacts on wetlands is not allowed unless there is no practicable alternative. Must notify federal, state, and local agencies of expected impacts, alternatives considered, and mitigations.	U.S. Department of the Interior, Fish and Wildlife Service; U.S. Army Corps of Engineers	Executive Order 11990
Water Resources			
Section 404 (Dredge and Fill) Permit, Consultation	Discharge of dredged or fill material into waters of the United States at specified disposal sites, especially for impoundments, bridge crossing improvements, or where cable or pipe corridors traverse streams and wetlands.	U.S. Army Corps of Engineers, in consultation with U.S. Environmental Protection Agency and U.S. Department of Agriculture, Fish and Wildlife Service	Federal Water Pollution Control Act of 1972, as amended (FWPCA), 404, 33 USC §1344, 33 CFR §320-330, 40 CFR §230; Executive Orders 11988 and 11990; Fish and Wildlife Coordination Act, 16 USC §661-666c
Floodplain Avoidance	Construction activities in floodplains or wetlands.	U.S. Air Force	Executive Order 11988

Table 7.0-1 Continued, Page 5 of 5

Authorizing Action	Typical Activity or Facility That May Require the Action	Authorizing Agency	Authority
Section 10 Permit	Construction of structures such as impoundments, bridge improvements, and cable components in or over any navigable water, the excavation from or depositing of material in such waters or any other work affecting the course, location, condition, or capacity of such waters.	U.S. Army Corps of Engineers, in consultation with U.S. Environmental Protection Agency and U.S. Department of Agriculture, Fish and Wildlife Service	Rivers and Harbors Act of 1899, §10, 33 USC §403, 33 CFR §320-330, 40 CFR §230; Fish and Wildlife Coordination Act, 16 USC §661-666c
Approval of Spill Prevention Control and Counter-Measure Plan	Storage or transportation of petroleum products (i.e., gasoline and diesel fuel).	U.S. Environmental Protection Agency	Federal Water Pollution Control Act, 33 USC §1251 et seq., §1321(j)(1)(c); 40 CFR §112
<u>Noise</u>			
Consultation	Federal noise emission standards must be met for equipment. Additional state or local requirements for equipment not covered by federal standards must also be met.	U.S. Environmental Protection Agency	Noise Control Act of 1972, as amended by the Quiet Communities Act of 1978, 42 USC §4901 et seq., particularly 42 USC §4903

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Ph.D., 1978, Biology, University of California, Riverside and San Diego State University
Years of Experience: 11

Patricia A. Turnham, Publications Manager, Tetra Tech, Inc.
A.A., 1974, Business Administration, Orange County Community College, Middletown, New York
Years of Experience: 13

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B.S., 1971, Distributed Studies, Iowa State University, Ames
J.D., 1974, University of Iowa School of Law, Iowa City
LL.M., 1984, Law and Marine Affairs, University of Washington School of Law, Seattle
Years of Experience: 13

Jeff Vitucci, Senior Economist, Niehaus and Associates, Inc.
B.A., 1974, Environmental Studies, California State University, San Jose
M.A., 1979, Economics, University of California, Santa Barbara
Years of Experience: 9

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B.S., 1967, Engineering, San Diego State University, California
M.S., 1968, Civil Engineering, Texas A&M University, College Station, Texas
M.BA, 1981, Auburn University, Montgomery, Alabama
Years of Experience: 20

Lawrence J. Watson, Program Director, Tetra Tech, Inc.
B.Ed., 1960, Science Education, Chicago State University, Illinois
M.A., 1967, Physical Geography (Climatology), Chicago State University, Illinois
Ph.D., 1975, Biogeography and Remote Sensing, University of Oklahoma, Norman
Years of Experience: 19

Jeff Whitman, Staff Programmer, Tetra Tech, Inc.
A.A., 1980, General Education, Mount San Antonio College, Walnut, California
Years of Experience: 4

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B.A., 1967, Mathematics, University of California, Los Angeles
Years of Experience: 20

9.0 LIST OF RECIPIENTS

The environmental issues addressed in this Environmental Impact Statement (EIS) were initially identified by Air Force and contractor personnel who have experience with programs of similar scope. These issues were then presented at scoping meetings held during March and April 1987 in Great Falls, Lewistown, Conrad, and Helena, Montana. Issues and comments identified through this scoping process were included in the evaluation of environmental consequences of the proposed program. A Draft EIS was filed on June 25, 1987 with the Environmental Protection Agency (EPA) in Washington DC, beginning a 58-day comment period. During this period, written comments were received and public hearings were conducted in Lewistown, Harlowton, Great Falls, Conrad, Augusta, and Helena, Montana in July 1987. Public and agency comments are addressed in this statement and revisions have been made where necessary. The list of recipients includes interested federal, state, and local agencies; Native American groups; those individuals who contributed written or spoken comments; and others who have expressed an interest in receiving the document. The list also includes the Governor of Montana, United States senators, and representatives from Montana. Copies of the final document have been provided to libraries throughout the nine-county deployment area, including the state library in Helena, Montana.

9.1 Elected Officials

9.1.1 U.S. Senate

Honorable Max Baucus
Honorable John Melcher

9.1.2 U.S. House of Representatives

Honorable Ron Marlenee
Honorable Pat Williams

9.1.3 State of Montana Officials

Honorable Ted Schwinden, Governor

Honorable Gary Aklestad
Montana State Senate

Honorable Delwyn Gage
Montana State Senate

Honorable Allen Kolstad
Montana State Senate

Honorable Richard Manning
Montana State Senate

Honorable Joe Mazurek
Montana State Senate

Honorable Darryl Meyer
Montana State Senate

Honorable Ted Neuman
Montana State Senate

Honorable Tom Rasmussen
Montana State Senate

Honorable Gene Thayer
Montana State Senate

Honorable Mike Walker
Montana State Senate

Honorable Bob Williams
Montana State Senate

Honorable Jan Brown
Montana House of Representatives

Honorable Tom Bulger
Montana House of Representatives

Honorable John Cobb
Montana House of Representatives

Honorable Gene DeMars
Montana House of Representatives

Honorable Gene Donaldson
Montana House of Representatives

Honorable Edward J. Grady
Montana House of Representatives

Honorable Larry Grindle
Montana House of Representatives

Honorable Hal Harper
Montana House of Representatives

Honorable Harriet Hayne
Montana House of Representatives

Honorable Loren Jenkins
Montana House of Representatives

Honorable Rex Manuel
Montana House of Representatives

Honorable Lloyde J. McCormick
Montana House of Representatives

Honorable Joan Miles
Montana House of Representatives

Honorable Ron Miller
Montana House of Representatives

Honorable Gerald D. Nisbet
Montana House of Representatives

Honorable Helen G. O'Connell
Montana House of Representatives

Honorable John Phillips
Montana House of Representatives

Honorable Paul Pistoria
Montana House of Representatives

Honorable Harold Poulsen
Montana House of Representatives

Honorable William Strizich
Montana House of Representatives

9.1.4 Local Officials

Mayors
- Honorable Roger Anderson
  City of Great Falls
- Honorable Oscar Biegel
  City of Harlowton
- Honorable Irene Spangler Gottfried
  City of Shelby
- Honorable James A. Hamilton
  City of Choteau
- Honorable Thomas Hammerbacker
  City of Conrad
- Honorable John P. Humphrey
  City of Lewistown
- Honorable Ronald S. Jovanovich
  City of Fort Benton
- Honorable Robert W. Patterson
  City of Denton
- Honorable Russ Ritter
  City of Helena
- Honorable Lloyd Schmitt
  City of Stanford

Cascade County Commissioners
Richard G. Gasvoda
Patrick L. Ryan
Jack T. Whitaker

Cascade County Planning Director
Roger B. Sanders

Cascade County Sheriff's Office
Barry Michelotti

Choteau City Manager
Stanley L. Brown, Jr.

Chouteau County Commissioners
Lloyd L. Allen
Charles Danreuther
Henry I. Grossman

City of Conrad
Gary Dent, Police Chief
Marvin Klette, Fire Chief

City of Great Falls
  Robert Jones, Police Chief
  Mike Karlovich, Public Safety Director
  Richard Levendowski, Fire Chief
  Robert Stockwell, City Manager

City of Lewistown
  R. Dunnington, Police Chief
  Sonny Moline, Fire Chief

Conrad City Council
  Larry S. Brownell
  Peter Hauer

Fergus County Commissioners
  Otto Jensen
  Alfred B. Miller
  Robert K. Phillips

Fergus County DES
  Thomas Bersuch

Great Falls City Attorney
  David Gliko

Great Falls City Commissioners
  Ardith Aiken
  Judy Deck
  Shirley Kuntz
  Loren Seaver

Great Falls City-County Planning Department
  John Mooney

Great Falls Community Development Department
  Cheryl Bruskotter
  Mike Rattray

Judith Basin County Commissioners
  Arnold Haack
  Russell Hodge
  Barbara B. Skelton

Lewis and Clark County Commissioners
  Jim Campbell
  Bob Decker
  Linda Stoll-Anderson

Lewistown City Alderman
  Al Heckford

Lewistown City-County Planning Board
  Tom Dimke
  Elly Walkowiak

Pondera County Commissioners
  Kenneth G. Duncan
  Donald McClain
  LaNelle E. Petersen

Pondera County Health Department
  Doris Morgan
  H.J. Stordahl

Teton County Commissioners
  Brad DeZort
  William R. Jones
  Scott Mangold

Toole County Commissioners
  J.G. Gottfried
  Tom Sherrard
  Harry A. Simons

Wheatland County Commissioners
  Edgar Lanston
  David Miller
  John R. Nelson

Wheatland County Farm Bureau
  Loren H. Morley

9.2 Public Agencies

9.2.1 Federal Agencies

Advisory Council on Historic Preservation
  Denver, Colorado
  Washington, DC
Federal Highway Administration
  Helena, Montana

U.S. Army Corps of Engineers
  Omaha, Nebraska
U.S. Bureau of Indian Affairs
  Billings, Montana
  Pablo, Montana

- U.S. Bureau of Land Management
  - Billings, Montana
  - Butte, Montana
  - Lewistown, Montana
  - Miles City, Montana
- U.S. Bureau of Reclamation
  - Billings, Montana
- U.S. Environmental Protection Agency
  - Denver, Colorado
  - Helena, Montana
  - Washington, DC
- U.S. Fish and Wildlife Service
  - Helena, Montana
- U.S. Forest Service
  - Great Falls, Montana
  - Helena, Montana
  - Kalispell, Montana
  - Missoula, Montana
- U.S. Geological Survey
  - Billings, Montana
  - Helena, Montana
- U.S. National Park Service
  - West Glacier, Montana
- U.S. National Weather Service
  - Great Falls, Montana
- U.S. Soil Conservation Service
  - Bozeman, Montana
  - Conrad, Montana
  - Great Falls, Montana
  - Lewistown, Montana

9.2.2 State Agencies

- Montana Bureau of Mines and Geology
  - Butte
- Montana Department of Administration
  - Helena
- Montana Department of Commerce
  - Helena
- Montana Department of Family Services
  - Helena
- Montana Department of Fish, Wildlife and Parks
  - Billings, Bozeman, Great Falls, Helena, Missoula
- Montana Department of Health and Environmental Services
  - Helena
- Montana Department of Highways
  - Great Falls, Helena
- Montana Department of Labor and Industry
  - Helena
- Montana Department of Natural Resources and Conservation
  - Helena
- Montana Department of Public Service Regulations
  - Helena
- Montana Department of Revenue
  - Helena
- Montana Department of Social and *Rehabilitation Services*
  - Helena
- Montana Department of State Lands
  - Helena
- Montana Environmental Quality Council
  - Helena
- Montana Legislative Fiscal Analyst
  - Helena
- Montana National Guard
  - Helena
- Montana Office of Public Instruction
  - Helena
- Montana State Historic Preservation Office
  - Helena
- Montana State University, Water Resources Research Center
  - Bozeman

9.2.3 Local Agencies

- Conrad School District, Montana
- Fort Benton Public Schools, Montana
- Great Falls Public Schools, Montana
- Lewistown School District, Montana

9.2.4 Libraries

- Belt Public Library
  - Belt, Montana
- Choteau Public Library
  - Choteau, Montana

Chouteau County Free Library
    Fort Benton, Montana
College of Great Falls Library
    Great Falls, Montana
Conrad Public Library
    Conrad, Montana
Denton Public Library
    Denton, Montana
Fairfield Public Library
    Fairfield, Montana
Glacier County Library
    Cut Bank, Montana
Great Falls Public Library
    Great Falls, Montana
Harlowton Public Library
    Harlowton, Montana
Judith Basin County Free Library
    Stanford, Montana
Lewis and Clark Library
    Helena, Montana
Lewistown City Library
    Lewistown, Montana
Malmstrom Air Force Base Library
    Malmstrom AFB, Montana
Meagher County City Library
    White Sulpher Springs, Montana

Montana Department of Commerce
  Census & Economic Information Center
    Helena, Montana
Montana Legislative Council Library
    Helena, Montana
Montana Office of Public Instruction
  Resource Center
    Helena, Montana
Montana State Department of Natural
  Resources and Conservation
  Research & Information Center
    Helena, Montana
Montana State Library
    Helena, Montana
State Law Library of Montana
    Helena, Montana
Toole County Free Library
    Shelby, Montana
Valier Public Library
    Valier, Montana
Wedsworth Memorial Library
    Cascade, Montana

9.3 Native American Groups

American Indians Against Desecration
    Indianapolis, Indiana
Assiniboine and Sioux
    Poplar, Montana
Blackfeet Agency
    Browning, Montana
Chippewa-Cree
    Box Elder, Montana
Confederated Salish and Kootenai
    Pablo, Montana
Crow Tribal Council
    Montana
Fort Belknap Community Council
    Harlem, Montana
Indian Law Support Center
    Boulder, Colorado
Kootenai Tribal Council
    Bonners Ferry, Idaho

Little Shell Band
    Lame Deer, Montana
Montana Intertribal Council
    Billings
National Congress of American Indians
    Washington, DC
Nez Perce Tribal Executive Council
    Lapwai, Idaho
Northern Cheyenne Tribal Council
    Lame Deer, Montana
Shoshone-Bannock, Fort Hall
    Idaho
Shoshone Tribal Council
    Fort Washakie, Wyoming
Turtle Mountain People
    Belcourt, North Dakota

9.4 Other Organizations

American Red Cross
    Great Falls, Montana

American Wilderness Alliance
    Bozeman, Montana

Aspen Institute
Washington, DC
Bozeman Alliance for a Nuclear Free Future
Montana
Cascade County Health Department
Montana
College of Great Falls
Montana
Committee of the '80s
Great Falls, Montana
Committee of the '90s
Great Falls, Montana
Common Cause
Helena, Montana
Conrad Chamber of Commerce
Montana
Construction and General Laborers Local 1334
Great Falls, Montana
Defenders of Wildlife
Missoula, Montana
Democratic Central Committee
Great Falls, Montana
First Interstate Bank of Great Falls
Montana
Great Falls Catholic Schools
Montana
Great Falls Chamber of Commerce
Montana
Great Falls Federal Savings and Loan
Montana
Last Chance Peacemaker's Coalition
Helena, Montana
Lewistown Chamber of Commerce
Montana
Montana AFL-CIO
Helena, Montana
Montana Association of Counties
Helena
Montana Association of Realtors
Helena
Montana Contractor's Association
Helena
Montana Environmental Information Center
Helena
Montana Low Income Coalition
Helena
Montana Natural Heritage Program
Helena
Montana People's Action
Helena
Montana Power Company
Butte
Montana Society of Natural and Earth Sciences
Bozeman
Montana Tax Foundation, Inc.
Helena
Montana Wilderness Association
Helena
Montana Wildland Coalition
Malta
Montana Wildlife Federation
Bozeman
Montana Wildlife Organization
Helena
National Audubon Society
Helena, Montana
Opportunities, Inc.
Great Falls, Montana
Peace Legislative Coalition
Missoula, Montana
Physicians for Social Responsibility
Butte, Montana
Washington, DC
Sierra Club
Bozeman, Montana
U.S. Federal Emergency Management Agency
Washington, DC

9.5 Individuals Receiving the Final Environmental Impact Statement Not Including Federal, State, and Local Officials

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Darryl Burditt
Ken Byerly
Gerd J. Callant
George & Colleen Campanella

David Carlson
Scott & Jean Carlson
Betty Ceroushi
Betty B. Chamberlain
Liz Ching
Carol Collins
Dan Connors
Deb Corcoran
Harry Cosgriffe
Jerry N. Costeu
Debbie Cotton
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Bob Crotty
Will Crough
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Bruce Norman Day
Doug & Nancy Dear
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Rosanne Donahoe
David Doran
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Rick Duncan
Jim Eagen
Jay Egan
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Opal Fladstol
J. Michael Fleming
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Gretchen Grayum
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Wilbur L. Johnson
Richard A. & Marge Johnsten
Bill Jones
Robert F. Jorgensen, Jr.
Ed & Ruoy Kammerer
John Kammerer
Charley & Sally Karinen
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Bob Killham
Chester Kinsey
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Marjorie Matheson
Marvin L. Mathison
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Joanne Maynard
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Harold McLaughlin
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Frank Michaels
Kay & Bernadette Miller
James & Becky Mitchell
Richard Moffitt
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A.M. Moylan
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Stewart Nash
Ruth Nickol
Mauri & Margaret Novak
Buck O'Brien
Stephen O'Brien
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Rowan Ogden
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Jeff Shelden
David Shipman
Joan Sieffert
Bob Sletten
Robert T. and Alice Smith
Howard & Louise Snyder
Donald L. South
D.M. Sprague
Alice Stanley
D.A. Sternberg
Marcia Staigmiller
Thomas G. Steinbrenner
John T. Stevens
Barbara Stordahl
Norman E. Stordahl
Milo Stubbs
Diana S. Talcott
Irene Terwolbeck
Joan Thomas
Renita Thomas
T.H. Thomas
Bill Thornby
Ronald Torgerson
David Treadway
Helen Trebesch
Mitch Tropila
Tim Troy
James R. Tucker
Judy Tureck
B.J. Tweet
Janice S. Van Riper
Ken Vander Ven
Vernon Venetz
Paul Walker
Shirley C. Walker
Warren Wenz
Gordon Whirry
William & Catherine Wilkerson
Carla M. Williams
Rob R. Wilson
James Yeager
Joe Zahler
Zane Zell
Kenneth A. Ziegler

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11.0 GLOSSARY OF TERMS AND ACRONYMS

11.1 Terms

Acre-Foot. The volume of water that covers 1 acre to a depth of 1 foot. One acre-foot equals 325,800 gallons.

Active Fault. A fault on which movement has occurred during the past 10,000 years and which may be subject to recurring movement, usually indicated by small, periodic displacements or seismic activity.

Activity Day. A single occurrence of a recreation activity lasting for any period of time up to 12 hours; for example, one 8-hour fishing visit would count as 1 fishing activity day, as would a 2-hour visit

Advisory Council on Historic Preservation. A 19-member body appointed, in part, by the President of the United States to advise the President and Congress and to coordinate the actions of federal agencies on matters relating to historic preservation, to comment on the effects of such actions on historic and archaeological cultural resources, and to perform other duties as required by law (Public Law 89-655; 16 USC 470).

Aerosolize. To form minute solid particles or liquid droplets of a substance by mechanical or chemical means (e.g., smoke, fire, or mist).

Age Cohort. A group of individuals having a statistical factor (e.g., age) common in a demographic study.

Aggregate. Any of several hard, inert materials (e.g., sand, gravel, or crushed stone) used for mixing with a cementing material to form concrete, mortar, or plaster, or used alone, as in railroad ballast or graded fill.

Air Installation Compatible Use Zone. A concept developed by the Air Force to promote land use development near its airfields in a manner that protects adjacent communities from noise and safety hazards associated with aircraft operations, and to preserve the operational integrity of the airfields.

Air Quality Control Region. An area based on jurisdictional boundaries, urban-industrial concentrations, and other factors including atmospheric areas, that is necessary to provide adequate implementation of air quality standards.

Alluvium. Sediments deposited by a stream or running water.

Alpha Particle. A product of the radioactive decay process which consists of a helium nucleus (two protons and two neutrons).

Ambient Air Quality Standards. Standards established on a state or federal level that define the limits for airborne concentrations of designated "criteria" pollutants (e.g., nitrogen dioxide, sulfur dioxide, carbon monoxide, total suspended particulates, ozone, lead, and hydrocarbons) to protect public health with an adequate margin of safety (primary standards) and to protect public welfare, including plant and animal life, visibility, and materials (secondary standards).

Ambient Noise. The existing noise characteristics of an area.

Annexation. A legal procedure, usually described in state statutes followed by cities when expanding their boundaries.

Anticline. A fold, convex upward, containing stratigraphically older rocks within its core.

Aquifer. The water-bearing portion of subsurface earth material that yields or is capable of yielding useful quantities of water to wells.

Arch. A broad, open anticlinal fold on a regional scale.

Archaeology. A scientific approach of the study of human ecology, cultural history, and cultural process, emphasizing systematic interpretation of material remains.

Archaic. A stage of prehistoric cultural development, recognized throughout North America, characterized by broad spectrum hunting and gathering economies and seasonal mobility. The material remains are recognized by the development of barbed and stemmed spear points, the extensive use of groundstone tools, and the lack of ceramics. The Archaic is also commonly used to designate a prehistoric period (generally 6000 B.C. to A.D. 500), but the dates vary from one region to another.

Arterial. Signalized streets with signal spacings of 2 miles or less and turning movements at intersections that usually do not exceed 20 percent of total traffic. Urban arterials primarily serve through-traffic, and, as a secondary function, provide access to abutting properties (urban); roadways that provide large traffic volume capacity between major traffic generators, designed to facilitate traffic movement and discourage land access when feasible. Includes primary state roads (functional).

Articulated. Connected; in archaeology and paleontology, skeletal remains distributed in a way reflecting their relative positions in the living body.

Artifact. Anything that owes its shape, form, or placement to human activity. In archaeological studies, the term is applied to portable objects (e.g., tools and the byproducts of their manufacture).

Assembly and Checkout. The process of final assembly and verification of a weapon system.

Assessed Valuation. In Montana, equal to the market valuation of property within a jurisdiction.

Assessment Ratio. Percentage of the market value of a property; used to calculate the taxable valuation against which mill rates are levied.

Atomic Number. The number of protons in the nucleus of a given chemical element equal to the positive charge of the nucleus.

Atomic Weight. The relative mass of the nucleus of a given chemical element in proportion to the mass of a hydrogen atom (one proton).

Attainment Area. An area that has been designated by the Environmental Protection Agency and the appropriate state air quality agency as having ambient air quality levels below the ceiling levels defined under the National Ambient Air Quality Standards.

Available Vacancy. A vacant housing unit that is either for sale or for rent.

Average Annual Daily Traffic. For a 1-year period, the total volume passing a point or segment of a highway facility in both directions, divided by the number of days in the year.

Base Flow. The lower, relatively nonvarying flow that tends to occur in a stream between rainfall-runoff events, often consisting of groundwater discharge to the stream.

Baseline. The existing and future-growth characterization of an area without the proposed program.

Basic Freeway Segment. A section of freeway facility on which operations are unaffected by weaving, diverging, or merging maneuvers.

Basin. A drainage or catchment area of a stream or lake.

Bedrock. Geologic formation or unit, generally solid, which underlies soil or other unconsolidated surficial deposits.

Beta Particle. A product of the radioactive decay process that is physically identical to a high-velocity electron.

Biota. All of the organisms of an area; the flora and fauna of a region.

Bituminous Coal. The most abundant rank of coal, which ranks between sub-bituminous coal and anthracite in calorific value.

Bonds. Financial instruments used by government agencies to fund major capital improvement projects; typically either a general obligation bond or revenue bond.

Breaks. Terrain characterized by abrupt changes in surface slope (e.g., a line of cliffs and associated spurs and small ravines).

Budget. Document prepared by a government unit which estimates future revenues expected to be collected and the expenditure needs of the jurisdiction in a forthcoming fiscal year or years; includes estimates of potential revenues and expected expenditures by major fund groups (governmental funds, proprietary funds, and fiduciary fund types).

Butte. An isolated flat-topped hill or mountain which is formed as a remnant of extensive erosion of flat-lying rock.

Cairn. A distinctly artificial pile of rocks that may mark or enclose burials, vision quests, caches, or geodetic locales.

Cambrian. A period of the Paleozoic era extending from about 570 to 505 million years ago.

Campsite (Cultural Resources). A short-term habitation site containing evidence of daily living activities, as opposed to specialized activities (e.g., quarry site). Campsites are generally open-air occupations of perhaps weeks to months in duration.

Capacity (Transportation). The traffic-carrying ability of a facility while maintaining prescribed operational qualities (e.g., a specific level of service); the maximum amount of traffic that can be accommodated by a given facility. (Note: Traffic facilities generally operate poorly at or near capacity, and facilities are rarely designed or planned to operate within this range.)

Capacity (Utilities). The maximum load a system is capable of carrying under existing service conditions.

Capacity Analysis (Transportation). A set of procedures used to estimate the traffic-carrying ability of facilities within a defined range of operating conditions.

Capital Costs. Expenditures by local governments on physical infrastructure.

Capital Projects Fund. One of the governmental fund types used to account for capital improvement projects other than those financed by proprietary funds or special assessment funds.

Ceramic Scatter. A spatially limited distribution of pot sherds on the ground surface.

Chronology. The science of arranging time in periods and ascertaining the dates and historical order of past events.

Climatology. The prevalent or characteristic meteorological conditions (and their extremes) of any given location or region.

Clovis. The earliest, well documented period of man's occupation in the New World, generally dated at 11,000 B.C., and represented by large, well made, fluted points.

Collector Streets. Surface streets that provide land access and traffic circulation service within residential, commercial, and industrial areas (urban); secondary roads that provide access to higher-type roads, connect small communities and nearby areas, and serve adjacent property (functional).

Component. One location or element within a settlement/subsistence system. Archaeological sites may contain several components that reflect the use of the locality by different groups in different time periods.

Comprehensive Plan. A public document, usually consisting of maps, text, and supporting materials, adopted and approved by a local government legislative body, which describes future land uses, goals, and policies.

Conjunctive Use. The integrated use of surface water and groundwater to maximize water availability in a given area.

Corridor. A strip of land of various widths described on both sides of a particular linear facility such as a highway or transmission line.

Coulee. A deep gulch or ravine; usually dry in summer.

Cretaceous. The last period of the Mesozoic era, extending between 144 and 65 million years ago.

Culture. In general, the system of behavior, beliefs, institutions, and objects human beings use to relate to each other and to the environment.

Cumulative Impacts. The combined impacts resulting from the deployment of the Small Intercontinental Ballistic Missile and the Peacekeeper in Rail Garrison systems at Malmstrom Air Force Base.

Curation. The processes used to care for and preserve historically important artifacts, features, or structures.

Debt Service. The scheduled repayment of a loan made to a local government, usually resulting from the sale of bonds.

Debt Service Funds. One of the governmental funds used to account for annual payments required to pay back money which is borrowed by a governmental unit; generally limited to account for long-term debt from issuance of bonds.

Decibel. A logarithmic unit of measure of sound pressure level used to describe the loudness of sound. When used to correspond to the human range of hearing, decibels are weighted on an A-scale and expressed as dBA.

Decommissioning. The process of removing a weapon system from service.

Deflagration. A very intense, rapidly burning fire accompanied by the ejection of burning particles.

Deformation. A general term for the process of the folding, faulting, etc., of rocks, resulting from various earth forces.

Delay. Additional travel time experienced by a driver, passenger, or pedestrian beyond what would reasonably be desired for a given trip.

Demonstrated Reserves. An area containing 100-percent mineable resources which has been well defined as to areal extent and thickness based on the presence of active mining or production or through thorough geologic investigation.

Deployment. Strategic emplacement of a weapon system.

Deployment Area. Geographic region where missiles would be located.

Design Life. The anticipated functional life of a facility.

Developed. Said of land, a lot, a parcel, or an area that has been built on, or where public services have been installed prior to residential or commercial construction.

Developed Recreation. Recreational use that occurs in areas where facilities are provided for concentrated public use (e.g., campgrounds, picnic areas, and swimming areas).

Direct Effects. Effects that are immediate consequences of program activities. In economics, the initial increase in employment and income resulting from program employment and material purchases before the indirect effects of these changes are measured.

Direct Employment. Military and civilian personnel who are employed by the Department of Defense and its contractors, and who are working onsite on the program.

Direct Expenditure. Expenditures of local governments directly related to the provision of goods or services.

Direct Impact. Effects resulting solely from program implementation.

Dispersed Recreation. Recreational use that occurs outside of developed sites.

Dissected Topography. An area of land characterized by numerous valleys and gullies created by extensive surface erosion.

Dissolved Oxygen. The concentration of molecular oxygen dissolved in water; a vital constituent for most aquatic animals.

District. National Register of Historic Places designation of a geographically defined area (urban or rural) possessing a significant concentration, linkage, or continuity of sites, structures, or objects united by past events (theme) or aesthetically by plan or physical development.

Disturbed Area. Land that has had its surface altered by grading, digging, or other construction-related activities.

Diversity. In biological literature, diversity usually refers to the number of species and their relative abundance in an area or habitat. Also referred to as species diversity.

Dolomite. A variety of limestone or marble that is rich in magnesium carbonate.

Drawdown. The distance between the static water level and the temporarily depressed water level caused by well pumpage.

Dry-Farmed Cropland. Land devoted to the production of crops without the need for irrigation.

Earthquake. A sudden motion or trembling in the earth caused by the abrupt release of accumulated strain.

Econometrics. The application of economic theory and statistical procedures to observed data in order to (1) estimate the degree of influence of one variable on another and (2) forecast endogenous variables from equations that quantify the interrelationships among the variables.

Economies of Scale. The decreases in an entity's long-run average costs that occur when it moves toward a specialization of resources, efficient utilization of equipment and manpower, and a lowering of average production costs.

Edentates. Mammals with few or no teeth including sloths, armadillos, and anteaters.

Effect. A change in an attribute. Effects can be caused by a variety of events, including those that result from program attributes acting on the resource attribute (direct effect); those that do not result directly from the action or from the attributes of other resources acting on the attribute being studied (indirect effect); those that result from attributes of other programs or other attributes that change because of other programs (cumulative effects); and those that result from natural causes (e.g., seasonal change).

Effluent. Wastewater discharge from a wastewater treatment facility.

Electromagnetic Radiation. Radiation produced by atomic or electrical activity. Its range of wavelengths or frequencies extends from very short gamma rays to the longest radio waves and includes visible light.

Electron. A particle of very small mass, carrying a unit negative or positive charge. The term electron, when used alone, commonly refers to negative electrons.

Endangered Species. A species that is threatened with extinction throughout all or a significant portion of its range.

Energy. The capacity for doing work; taking a number of forms which may be transformed from one into another, such as thermal, mechanical, electrical, and chemical; in customary units, measured in kilowatt-hours or British thermal units.

Enterprise Activity. Services provided or goods produced by a local government agency, generally self-supporting in terms of generating revenues that cover operating costs.

Enterprise Funds. In government finance, one of the proprietary fund types used to account for activities which are financed primarily through user charges.

Entitlement. A right to a fixed amount of water from a specific source.

Environmental Impact Analysis Process. The process of conducting environmental studies as outlined in Air Force Regulation 19-2.

Equivalent Sound Level. The level of a constant sound which, in a given situation and time period, has the same sound energy as does a time-varying sound. Technically, equivalent sound level is the level of the time-weighted, mean square, A-weighted sound pressure. The time interval within which the measurement is taken should always be specified.

Escarpment. A long cliff or steep slope separating two comparatively level or more gently sloping surfaces; results from erosion or faulting.

Ethnography. The description of human groups and their behavior by direct observation and/or by transcription of statements by living persons.

Ethnohistory. History of nonliterate human groups consisting of oral, written, or ethnographic records.

Ethnology. A subdiscipline of anthropology that attempts to explain general patterns of human behavior by comparing ethnographic information on different living groups of people.

Expenditure. A disbursement of funds by a government entity; includes operation and maintenance costs, as well as capital costs.

Explosive Safety Zone. The required safe distance between locations where explosive materials are stored or processed and other locations, such as inhabited buildings.

Fault. A fracture or zone of fractures along which there has been movement of the sides relative to one another and parallel to the fracture.

Fauna. Animals; organisms of the animal kingdom of a given area taken collectively.

Feature. Nonportable portion of an archaeological site. These include facilities such as fire pits, storage pits, or foundations.

Fee Simple. Title to real property belonging to a person or government where full and unconditional ownership exists. Such ownership does not necessarily include mineral rights.

Fiduciary Funds. One of the major fund groups, used to account for assets held by a jurisdiction in a trustee capacity, for example, pension funds.

Financial Statement. Document prepared by a government unit which presents actual revenues received and expenditures made in the previous fiscal year; organized to present data along major fund groups (governmental, proprietary, and fiduciary fund types).

Firm Power. The amount of electrical power (in kilowatts) that a wholesaler is contractually bound to supply to a retailer on demand.

Fiscal Year. In government finance, the 12-month period which corresponds to the jurisdiction's accounting period, typically beginning July 1st and ending June 30th.

Flake. A small stone fragment produced as a byproduct of stone tool manufacturing; may also be used unmodified as a tool itself.

Flashpoint. The lowest temperature at which a liquid will give off flammable vapor in sufficient quantity to ignite when mixed with air and exposed to spark or flame.

Floodplain. The surface of relatively smooth land adjacent to a river channel that is covered by water when the river overflows, and the area subject to a 1-percent or greater chance of flooding in any given year (i.e., the area adjacent to a stream expected to be inundated in a 100-year flood). Executive Order 11988, Floodplain Management, places limitations on the construction of projects in floodplains and promulgates guidelines to ensure public health and safety both to protect against property loss and to protect natural and beneficial values of floodplains.

Flora. Plants; organisms of the plant kingdom taken collectively.

Forage. Plant material that can be grazed or cut for hay and used as feed.

Formation. A sequence of similar rock layers that can be traced over a large area.

Freeway. A multilane, divided highway with a minimum of two lanes for exclusive use of traffic in each direction, allowing full control of access and egress.

Frictional Unemployment. Unemployment attributable to time lost in changing jobs rather than to a lack of job opportunities.

Fugitive Dust Emissions. Emissions released directly into the atmosphere that could not reasonably pass through a stack, chimney, vent, or other functionally equivalent opening.

Full-Scale Development. The stage of development of a weapon system when all components are built and tested at full scale.

Full-Time Equivalent. Employment based on a 40-hour work week (i.e., one person working 40 hours would equal 1 Full-Time Equivalent; one person working 20 hours would equal 0.5 Full-Time Equivalent).

Fund Balance. In government finance, the resultant cash balance of an account or group of accounts after actual expenditures made and revenues received have been debited or credited.

Furbearers. Mammalian species that are trapped or hunted for their pelts.

Gamma Radiation. A product of the radioactive decay process which includes very high-frequency electromagnetic waves.

Gastropods. A type of mollusk with a univalve shell (e.g., snail).

General Fund. One of the governmental fund types, used to account for all financial transactions and resources except those required to be accounted for in other funds. Typically supports governmental activities supported by local taxes; for example, public safety, public health, and general administration functions. In school districts, accounts for all direct instructional costs.

General Obligation Bond. Financial instrument used by government agencies to fund major capital improvements; backed by full faith and credit of the issuing agency. Total amount of general obligation bond indebtedness is subject to statutory limitations, measured as a percentage of the jurisdiction's tax base. Used primarily for general purpose projects (e.g., administrative facility construction, parkland acquisition, and law enforcement and fire protection facility construction) which do not lend themselves to revenue bond financing.

Geologic Hazard. A naturally occurring or manmade geologic condition or phenomenon that presents a risk or is a potential danger to life and property.

Geologic Unit. A geologic formation, group, or member.

Glacial. Of or relating to the movement of continental or alpine ice sheets formed by the compaction and recrystallization of snow.

Glacial Lake. Lake derived from meltwater off a glacier commonly formed when an ice sheet dams a natural drainageway.

Glacial Till. Unsorted, generally unconsolidated, nonstratified coarse sediments deposited beneath a glacier which were not reworked by meltwater.

Governmental Funds. One of the major fund groups, consisting of the general fund, special revenue funds, capital projects funds, debt service funds, and special assessment funds, as differentiated from proprietary funds (enterprise and internal service funds) and fiduciary funds (trust and pension fund accounts); accounts for almost all of the financial transactions of a jurisdiction.

Granite. A broadly used term for a quartz-bearing, coarse, crystalline igneous rock formed deep beneath the earth's surface.

Grassland Biome. Major ecological community of plants and animals (e.g., grassland and tropical rain forest).

Groundstone Artifacts. Stone artifacts made by grinding rather than flaking (e.g., milling stones and mortar and pestle).

Hadrosaur. Maiasaura peeblesorum; vegetarian, duck-billed dinosaur.

Half Life. The time required for disintegration or transformation of half of the atoms of a radioactive substance.

Hard Mobile Launcher. Special vehicles, hardened against nuclear attack, which will be used to transport and launch the Small Intercontinental Ballistic Missiles.

Hazardous Waste. A waste, or combination of wastes, which, because of its quantity, concentration, or physical, chemical, or infectious characteristics, may either cause, or significantly contribute to an increase in mortality or an increase in serious irreversible illness; or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

Hearth/Firepit. A feature used for the placement of fires; may be lined with clay or stones.

Heavy Vehicles. Any vehicles with more than four tires touching the pavement; includes trucks, recreational vehicles, and buses.

Herbaceous (plant). Plant without persistent woody stems.

Herpetofauna. Amphibians (e.g., frogs, salamanders, and turtles) and reptiles (e.g., lizards and snakes).

High-Density Wintering Habitat. Areas where large numbers of big game species congregate during the winter months. (See Severe Wintering Habitat.)

Historic. A period of time after the advent of written history. In the Region of Influence, the historic period ranges from about 1800 to the present. It also refers to items primarily of Euroamerican manufacture.

Holocene. The time since the end of the Pleistocene epoch, characterized by the absence of large continental or Cordilleran ice sheets and the extinction of large mammalian life-forms. Generally considered to be the last 10,000 years.

Household Size. The average number of individuals residing in a single dwelling unit.

Hydraulic Capacity. The flow rate that can be delivered by a water-supply system at a specified water pressure under continuously saturated system conditions (i.e., under a continuous demand from all outlets of the distribution system).

Hydrology. The science dealing with the properties, distribution, and circulation of water on the surface of the land and in the soil and underlying rocks.

Hypothetical Reserves. Reserves that have been calculated based on limited field observations, limited aerial-photograph analysis and satellite interpretations, and published data on the areal extent and thickness of geologically similar units.

Hypsilophodont. A small, agile, bipedal dinosaur of the order Ornithopoda.

Igloo. A shelter constructed at launch facility sites to house the HML vehicle. It would be covered with several feet of earth and have access doors in a concrete wall at one end.

Igneous Rock. One of the three basic rock classes, refers to any rock formed by the solidification of molten or partly molten material. Igneous rocks formed by solidification at the surface are termed extrusive or volcanic while those formed below the surface are termed intrusive.

Impact. An assessment of the meaning of changes in all attributes being studied for a given resource; an aggregation of all the adverse effects, usually measured using a qualitative and nominally subjective technique.

Incised. Said of a stream channel that has been downcut or entrenched into the land surface during, and because of, a stream's rejuvenation.

Incorporated City. A city which has been organized pursuant to the laws of the state, having an elected governing body.

Indirect Employment. Employment resulting from the purchases of workers who are directly working on a specified program. Also includes any subsequent employment arising from the increase in purchases in the area.

Indirect Impacts. Program-related impacts (usually population changes and resulting impacts) not directly attributable to the program itself. For example, direct program employees will spend some of their income locally. As a result, local industries will tend to hire more workers as they expand in response to the increased demand. This additional employment is termed an "indirect impact."

Induced Seismic Activity. Seismic activity that is initiated or increased as a result of nontectonic processes (i.e., fluid injection or withdrawal, or reservoir loading).

Inferred Source. Resources that have been defined as to areal extent and thickness based on the presence of active mining or production or geologic investigation of which 15 percent is considered unmineable due to deficiencies in quality or uncertainties in field observations.

Infill. The process of encouraging development of vacant lands that have been bypassed during the growth of a city and now surrounded by development.

Infiltration. Seepage of water into the ground.

Inflow (Sewer System). The entrance of stormwater runoff into a sanitary sewer through defective or deteriorating manhole structures or via the illicit connection of roof drains or street storm drains to sanitary sewers.

Infrastructure. The system of public utility lines, communication facility networks, and roadways that connect all the structures and facilities in a given locale.

Inhabited Structure. Any structure currently being used for the purposes of a dwelling or residence, workplace, place of business or industry, or an institutional function. Agricultural structures such as barns do not generally meet the definition of an inhabited structure.

Initial Operational Capability. The point in time when the first ten missiles of the Small Intercontinental Ballistic Missile system will be operational.

Injection Well. A well in which a fluid is forced into the ground under pressure, commonly used as a technique for secondary recovery of oil and gas (e.g., forcing steam into one well to assist oil or gas recovery at an adjacent well).

Inmigrants. All persons relocating to a defined geographic area as a result of the proposed program, usually calculated on an annual basis.

Input-Output Model. Method of estimating the interrelationship and the flow of goods and services among industrial sectors of the economy. Used to estimate the secondary (indirect and induced) economic effects of an initial change in a specific economic sector.

Intercontinental Ballistic Missile. A large missile capable of accurate weapon delivery over intercontinental ranges (usually greater than 5,000 miles).

Internal Service Funds. One of the proprietary funds, used to account for the financing of goods or services provided by one department or agency to other departments or agencies of the jurisdiction on a cost reimbursement basis; for example, photocopying, typing, and publishing services.

Interstate. The designated National System of Interstate and Defense Highways located in both rural and urban areas; they connect the East and West coasts and extend from Canadian border points to various points on the Mexican border.

Irradiation. Exposure to radiation.

Irrigated Cropland. Land devoted to the production of crops that require and benefit from periodic supplemental moisture other than natural precipitation.

Isolated Artifact. An artifact, or a small, disarticulated group of artifacts, that cannot be associated with, or is situated outside of, a cultural resource site.

Isotopes. Different forms of the same chemical element which have identical atomic numbers but different atomic weights.

Jackson Turbidity Unit. A visual measurement of the turbidity of water. The method involves the extinction of candlelight through a column of water resulting from particles suspended in the water.

Jurassic. A period of the Mesozoic era extending from about 208 to 144 million years ago.

K-Factor. A measure of the resistance of the soil surface to erosion, based on its physical and chemical properties.

Kill Site. An archaeological site indicated by the presence or association of faunal remains, butchering tools, and hunting equipment (e.g., projectile points).

Kilowatt. A unit of power equivalent to 1,000 watts.

Landowner. A person or entity indicated as the owner of property on the various ownership maps and records maintained by the Office of the County Assessor.

Landsat. An orbiting manmade satellite capable of transmitting photographic images of the earth's surface.

Landscape Characteristic Province. An area where all of the landscape is of similar character with similar soil, topography, vegetation, and climate. They are based essentially on landform provinces.

Land Use Plans and Policies. Guidelines adopted by governments to direct future land use within their jurisdictions.

Landslide. The downslope movement of soil and rock material (en masse) under gravitational influence.

Launch Facility. One to three-acre Minuteman silo sites, generally located in the rural areas of the deployment area.

L_{dn} Noise Level. The 24-hour average-energy sound level expressed in decibels, with a 10-decibel penalty added to sound levels between 10:00 P.M. and 7:00 A.M.

L_{eq} Noise Level. A constant amount of acoustic energy equivalent to the energy contained in the time-varying noise measured from a given source for a given time.

Level of Impact. The measure of the magnitude or degree of impact expressed as negligible, low, moderate, or high for each environmental resource.

Level of Service. A qualitative measure describing operational conditions within a traffic stream and how they are perceived by motorists and/or passengers.

Level Terrain. Any combination of grades and horizontal and vertical alignment permitting heavy vehicles to maintain approximately the same speed as passenger cars; this generally includes short grades of no more than 1 to 2 percent.

Limestone. A sedimentary rock consisting chiefly of calcium carbonate.

Linear Energy Transfer. The rate that a charged particle deposits its energy per unit path length.

Lithic Scatter. An archaeological site consisting only of stone artifacts.

Load. The amount of electric power or natural gas required of a system at a given point.

Loam. A rich permeable soil composed of equal amounts of clay, silt, and sand, usually containing organic matter.

Locality. A particular spot within a geologic unit from which a specimen is obtained or may be found; usually a location of dense or well preserved fossils.

Locus/Loci. A place or locality; used archaeologically to define a small area within a larger site.

Long Duration. Impacts that would occur over an extended period of time, whether they start during the construction or operations phase. Most impacts from the operations phase are expected to be of long duration since program operations essentially represent a steady-state condition (i.e., impacts resulting from actions that occur repeatedly over a long period of time). However, long-duration impacts could also be caused by construction activities if a resource is destroyed or irreparably damaged or if the recovery rate of the resource is very slow.

Lot. A parcel of land created by and identified in a subdivision.

Low Flow. The minimum discharge of a stream maintained for a given duration over a specified period of time (e.g., the 7-day, 10-year low flow).

Magnitude (earthquake). A measure of the strength of an earthquake or the strain energy it releases.

Mammoth/Mastodon. Extinct elephants from the Pleistocene epoch.

Mass Fraction. The relative proportion, by weight, of a specific isotope present in a particular element.

Mass Movement. Any downward movement of soil or rock under the force of gravity including soil creep, rockfalls, and landslides.

Maximum Credible Earthquake. The largest earthquake capable of being produced from a source, structure, or region under the currently known tectonic framework.

Mean. A value that is computed by dividing the sum of a set of terms by the number of terms (i.e., average).

Median. The midpoint of a distribution.

Medicine Wheel. Large stone circle with rock alignments radiating from the center to the circle edge, most likely ceremonial features.

Megafauna. Various species of large mammals that became extinct in North America sometime before 6,000 years before present. These mammals include the mammoth, giant bison, camel, and giant sloth.

Megawatt. 1,000 kilowatts or 1 million watts.

Mesozoic. An era in geological history, ranging from about 245 to 66 million years ago, characterized by the development of reptiles.

Meteorology. The scientific study of the atmosphere.

Microgram. One-millionth of a gram.

Midden. Soil horizon resulting from the accumulation of human living debris containing artifacts and cultural refuse (e.g., bone and shell fragments, fire-cracked rocks, charcoal, chipping detritus, stone tools, or organic residues).

Milligram. One-thousandth of a gram.

Milling Station. An area within an archaeological site used for milling seeds or corn; may consist of portable milling stones or may be nonportable milling places in naturally occurring bedrock.

Millirad. One one-thousandth of a rad (a unit of radiation, see Rad).

Miocene. An epoch of the Tertiary period, 24 to 5 million years ago, marked by the development of apes and the appearance of ancestral gibbons.

Mitigation. A method to reduce or eliminate adverse program impacts.

Mobile Home. A single-family dwelling unit that is transportable in one or more sections, built on a permanent chassis, and designed to be used with or without a permanent foundation. Does not include travel trailers or recreational vehicles.

Modified Mercalli Intensity. An arbitrary measure of an earthquake's intensity based on its effect on people and structures. Ranges from I (not felt by people) to XII (almost total damage).

Mollusca. A large phylum of invertebrate animals with soft bodies protected by a calcareous shell (e.g., snails, mussels, bivalves, and octopus).

Most Probable Number. An estimate of the density of coliform bacteria in a water sample based on certain probability formulas applied to standard dilutions of the sample.

Mountainous Terrain. Any combination of grades and horizontal and vertical alignments causing heavy vehicles to operate at crawl speeds for significant distances or at frequent intervals.

Multifamily Housing. Townhouse or apartment units that accommodate more than one family though each dwelling unit is only occupied by one household.

Multilane Highway. A highway with at least two lanes for the exclusive use of traffic in each direction, with no or partial control of access, that may have periodic interruptions to flow at signalized intersections.

Multiple Resource Area. All, or a defined portion of, the cultural resources identified within a specific geographic area that have been identified for inclusion in the National Register of Historic Places.

Multiplier. In economics, used to determine the indirect and induced effects (in terms of increased employment, income, or output) resulting from program activities.

National Landmark (Historic). A site, building, or object in private or public ownership that possesses national significance in American history, archaeology, or culture. In order to achieve landmark status, a property must be, or have the clear potential to be, recognized, understood, and appreciated publicly and professionally for the strength and clarity of its historical association, its architectural or design excellence, or its extraordinary information content on a national scale.

National Register of Historic Places. A register of districts, sites, buildings, structures. and objects important in American history, architecture, archaeology, and culture, maintained by the Secretary of the Interior under authority of Section 2(b) of the Historic Sites Act of 1935 and Section 101(a)(1) of the National Historic Preservation Act of 1966.

National Wildlife Refuge. Lands set aside for their wildlife habitat values and managed by the U.S. Fish and Wildlife Service for the conservation or enhancement of waterfowl, big game, endangered species, and nongame species populations.

Native Americans. Used in a collective sense to refer to all natives of North America; usually excludes Eskimos and Aleuts.

Neighborhood Schools. In the Great Falls Public Schools, students attend the elementary school within walking distance from their homes, unless they live more than 1 mile from the closest school, in which case they are bused.

Nephelometric Turbidity Unit. An instrument-based measurement of the turbidity of water. This method involves inducing a light beam through a water sample and determining how much light is scattered by the turbidity.

Net Equivalent Weight. The amount of TNT required to produce an explosive power equal to that of the component of interest.

Neutron. An electrically neutral atomic particle found in the nuclei of all elements except those of ordinary (light) hydrogen.

Nonattainment Area. An area that has been designated by the Environmental Protection Agency and the appropriate state air quality agency as exceeding one or more National Ambient Air Quality Standards.

Noncompliance. Action contradicting a specified procedure or causing results outside specified limits.

Nonfirm Power. Electric power supplied under a contract that makes seasonal excess power available (i.e., power in excess of contractually firm power) and is generally sold at a lower price than firm power. This type of contract may be offered by a generator with a large hydroelectric capacity that is subject to water shortages during periods of low precipitation.

Nontax Revenue. Revenue of local governments from all other sources other than taxes; includes charges for services, fines, fees, intergovernmental transfers, income from enterprise activities, and other miscellaneous sources.

Nuclei. Small particles around which a chemical substance may collect, e.g., a dust particle around which a raindrop forms.

Nucleus. The small positively charged central region of an atom, which comprises essentially all the mass of the atom.

Operations Activities. Those activities required to maintain the Small Intercontinental Ballistic Missile system in a secure, survivable, launch-ready condition following completion of the construction phase.

Operation and Maintenance Costs. Noncapital costs incurred in providing local government services; includes all direct expenditures, as well as items such as debt service and payments to retirement systems.

Overall Vacancy. Total number of single-family, multifamily, or mobile homes that are not occupied at any given time.

Overdraft. A condition in which groundwater withdrawals exceed the amount of recharge.

Overview. A report that summarizes and generalizes information, usually of a region.

Paleo-. Prefix meaning "old" or "ancient."

Paleontological Resources. Fossilized organic remains from past geological periods.

Paleozoic. An era in geological history occurring between 570 and 245 million years ago, marked by the culmination of almost all invertebrates except the insects; in its later periods, marked by the first appearance of land plants, amphibians, and reptiles.

Parcel. A plot of land with definable boundaries that is not a lot.

Part I Offense. Crimes of violence including homicide, rape, robbery, and aggravated assault. Crimes against property including burglary, larceny/theft, and motor vehicle theft.

Part II Offense. Serious crimes not reported as part of the seven major Part I crimes, including negligent manslaughter, other assaults, arson, forgery and counterfeiting, fraud, embezzlement, stolen property offenses, vandalism, weapons offenses, prostitution, sex offenses, narcotic drug offenses, gambling, and offenses against the family.

Part III Offense. Lesser offenses that are not as serious as Part I or Part II offenses.

Particle Density. The number of particles per unit volume.

Passenger-Car Equivalent. The number of passenger cars that are displaced by a single heavy vehicle of a particular type under prevailing roadway, traffic, and control conditions.

Peacekeeper in Rail Garrison. Concept of deploying Peacekeeper missiles on railroad cars for dispersal upon strategic warning. They would be sheltered in earth-covered igloo-type structures.

Peak Demand. The highest instantaneous amount of electrical power (in kilowatts) that an electrical system is required to supply over a given time frame, usually 1 year.

Peak Hour. The hour of highest traffic volume on a given section of roadway between 7 A.M. and 9 A.M. or between 4 P.M. and 6 P.M.

Peak-Hour Factor. The ratio of total hourly volume to the maximum 15-minute rate of flow within the hour.

Peak Year. The year when a particular program-related effect is greatest.

Pelecypods. A class of bivalve mollusks with bilaterally symmetrical shells.

Pennsylvanian. A period of the Paleozoic era extending from about 320 to 286 million years ago.

Per Capita Expenditures. Amount of expenditures in a given category calculated on a per person basis.

Per Capita Personal Income. Annual income per person.

Per Capita Revenues. Amount of revenues in a given category calculated on a per person basis.

Perennial Stream. A stream that flows continuously throughout the year.

Permanent Housing. Units intended for year-round use.

Permanently Disturbed Land. Surfaces that will be covered by impervious materials or kept in a cleared condition to accommodate buildings, parking lots, roads, and security zones.

Permian. The most recent geologic period of the Paleozoic era dating to 230 million years ago.

Personal Income. Current income received by persons from all sources; includes transfer payments from governments or businesses.

Petroglyph. Schematic or representational art incised or pecked into a rock surface.

pH. An indication of the acidity of a solution defined as log (1/[H]), where [H] denotes the concentration of hydrogen ions in the solution.

Phreatophytes. Plants whose roots reach down to the capillary fringe of the groundwater table; often found in riparian zones.

Physiographic Province. A region with similar geologic structures and climate that has a unified geomorphic history.

Physiography. Physical geographic description of the surface features of the earth.

Pictograph. Schematic or representational art painted or drawn onto a rock surface.

Plasticiser. A chemical agent that is added to make a material more flexible.

Platted. An accurately scaled diagram showing boundaries and subdivisions of a piece of land together with data required for accurate legal identification of various parts or parcels and having the approval of the governing board having jurisdiction over the said land.

Post Boost Vehicle. The portion of the missile containing the reentry vehicle and the guidance and attitude control system.

Postulate. To propose an explanation for a given process or event.

Prairie Pothole. A wetland formed by previous glacial activity.

Precambrian. All geologic time before the beginning of the Paleozoic era, equivalent to about 90 percent of geologic time.

Predictive Model. In archaeology, a statement of the relationships among known sites and between sites and the environment that is used to predict the location, density, and types of sites in areas not yet surveyed.

Pre-Engineered Steel Building. An enclosure constructed at launch facilities to house the Hard Mobile Launcher vehicle. It would have a gable roof and would be finished with corrugated steel panels.

Prehistoric. The period of time before the written record, generally before 1800 in western North America.

Prevention of Significant Deterioration Area. A requirement of the clean Air Act (§160 et seq) for the prevention of emissions of specified air pollutants from significantly deteriorating air quality in areas where concentrations of those air pollutants are lower than the applicable National Ambient Air Quality Standards.

Primary Contact Recreation. Refers to the beneficial use of water involving recreation which results in full body contact with the water, such as swimming and diving.

Primary Road. A consolidated system of connected main roads important to regional, interstate, and statewide travel; they consist of rural arterial routes and their extensions into and through urban areas of 5,000 or more population.

Prime Farmland. Land that has the best combination of physical and chemical characteristics for producing food, feed, fiber, forage, oilseed, and other agricultural crops with minimum inputs of fuel, fertilizer, pesticides, and labor, and without intolerable soil erosion, as determined by the Secretary of Agriculture (Farmland Protection Policy Act, 7 CFR 658).

Principal Aquifer. The particular aquifer that supplies the majority of the groundwater used in a given region.

Probability Analysis. An analysis conducted to evaluate the chance of a given event's occurrence.

Projectile Point. Implement that probably served as the tip of a dart, lance, spear, or arrow.

Property Tax. Tax imposed by local governments based on the value of property within their jurisdiction.

Proposed Wilderness Area. An area under consideration for designation as a wilderness area under the Wilderness Act of 1964 (Public Law 88-577).

Proprietary Funds. One of the major fund groups, consisting of enterprise fund accounts and internal service fund accounts.

Protohistory. The period when nonliterate American Indian cultures were affected by Euroamericans without direct contact. For instance, inland Indian tribes received trade goods and reports of European cultures from coastal tribes before the arrival of European explorers in the interior.

Proton. A positively charged atomic particle physically identical with the nucleus of the ordinary (light) hydrogen atom. All atomic nuclei contain protons.

Provenience. The place where something is produced or found; the location of a fossil or artifact.

Public Domain Land. Any land or interest in land owned by the United States and administered by the Secretary of the Interior through the Bureau of Land Management.

Public Finance. Finances of, or relating to, a government entity.

Quarry (Cultural Resources). A locality where lithic material was extracted and initially prepared for the manufacture of stone implements. In the narrow sense, the term refers to places where raw materials were actually excavated, but its use is commonly extended to localities where materials are collected at the surface (e.g., gravel deposits).

Quaternary. A geologic period including the Pleistocene and Holocene epochs; the last 1.6 million years.

Quartzite. *A metamorphic rock formed by the recrystallization of sandstone or chert* by heat or pressure.

Rad. A unit of absorbed dose of radiation that represents the absorption of 100 ergs of ionizing radiation per gram of absorbing material (e.g., body tissue).

Radioactivity. The spontaneous emission of energy from an unstable atomic nucleus in the form of alpha or beta particles and gamma radiation.

Radiobiological Research. The study of the effects of radiation on living organisms.

Radiocarbon Dating. A method of dating carbon-bearing samples by analysis of radioactive carbon (C-14) content.

Radiometric Dating. Calculating an age in years for geologic materials by measuring the presence of a short-life radioactive element.

Rangeland. Land that produces forage suitable for grazing by livestock, including cattle, sheep, and horses.

Raptors. Those species of birds (e.g., hawks, eagles, falcons, and owls) that are considered birds of prey.

Recharge. The process by which water is absorbed and added to the zone of saturation either directly into a formation, or indirectly by way of another formation.

Reclamation. The process of restoring an area that has been disturbed, or the treatment to restore continued utility of a waste substance.

Recreation Standard. The standard used to predict future recreation needs based on population.

Recreational Vehicle. A heavy vehicle operated by a private motorist and involved in the transport of recreational equipment or facilities.

Region of Influence. That area where program-induced effects of any magnitude may be expected to occur.

Relief. The vertical difference in elevation between the hilltops or mountain summits and the lowlands or valleys of a given region.

Reserve Bonding Capacity. Statutory limit of long-term debt of a jurisdiction minus current outstanding debt.

Reserve Margin. The difference between the net system generating capability and maximum system load requirements.

Restrictive Easement. The right to restrict the erection of habitable buildings, the congregation of people, or other activities within a specified safety clearance distance of munitions storage areas, armed aircraft, and explosives-related facilities.

Revegetation. Regrowth or replacement of a plant community on a disturbed site. Revegetation may be assisted by site preparation, planting, and treatment, or it may occur naturally.

Revenue. Money that a government entity collects or receives.

Revenue Bond. Financial instrument used by government agencies to fund major capital improvements. Used for projects which generate revenue from user charges or similar fees or charges which are applied toward both project operation and debt retirement (e.g., water and sewer plant operations).

Rights-of-Way. Corridors of land that powerlines, pipelines, access roads, or maintenance roads pass through or over that are reserved for such uses.

Riparian. An area (and associated habitat, vegetation, and species) near the edge of water bodies (e.g., streams and lakes).

Rockshelter. A naturally formed sheltered overhang that was commonly inhabited by prehistoric groups; it is generally found on a vertical rock face and is not as deep as a cave.

Rolling Terrain. Any combination of grades and horizontal and vertical alignments causing heavy vehicles to reduce their speeds substantially below those of passenger cars, but not causing them to operate at crawl speeds for any significant length of time.

Runoff. The noninfiltrating water entering a stream or other conveyance channel shortly after a rainfall event.

Rural Area. The area outside towns, cities, or other communities that is characterized by very low-density housing concentrations, agricultural land uses, and a general lack of most public services.

Rural Electric Cooperative. Cooperative sponsored by the Rural Electrification Administration of the U.S. Department of Agriculture to supply electricity to a rural area.

Saline Seep. An area where saline, shallow groundwater reaches the ground surface, precipitating salts and rendering the soil unfit for agricultural production.

Sampling. The selection of a portion of a study area or population, the analysis of which is intended to permit generalization about the entire population. In archaeology, samples are often used to reduce the amount of land area covered in a survey or the number of artifacts analyzed from a site. Statistical sampling is generally preferred since it is possible to specify the bias or probability of error in the results, but judgmental or intuitive samples are sometimes used.

Sandstone. A clastic sedimentary rock composed of sand-size particles in a fine-grained matrix and held firmly in place by a cementing material; the consolidated equivalent of sand.

Scenic Highways. Highways or sections of highways that have been identified and/or designated as scenic passageways by state and/or federal agencies or by commercial road atlases.

Seasonality. Phenomena that show cyclic or repeated behavior according to the season.

Secondary Highways. Rural major collector routes that carry extensive local traffic.

Secondary Employment. In economics, the additional employment and income generated by the economic activity required to produce the inputs to meet the initial material requirements. The term often is used to include induced effects.

Secondary Recovery (Oil and Gas). A process that allows greater production from oil and gas wells by artificially augmenting the reservoir energy (e.g., injection wells).

Secondary Treatment. Wastewater treatment, beyond primary treatment, in which bacteria consume the organic parts of waste. This biochemical action is usually accomplished by the use of trickling filters or the activated sludge process.

Section 7 Consultation. Under Section 7(a) of the Endangered Species Act, each agency must first consult with the affected state and then with the Secretary of the Interior to ascertain the impact of its proposed actions on any endangered or threatened species.

Security Zones. Designated protected areas around a facility or site.

Sediment. Solid fragmental material that originates from weather-beaten rocks and is transported or deposited by air, water, or ice.

Seismic. Pertaining to an earthquake or to earth vibrations; includes those that are artificially induced.

Seismicity. The occurrence of earth movements in the form of earthquakes or ground shaking.

Seismotectonic Province. A region characterized by similar tectonic and seismic characteristics.

Sensitive Noise Receptors. See Noise Sensitive Areas.

Severe Wintering Habitat. Areas where big game congregate during the most severe winter months. (See High-Density Wintering Habitat.)

Shale. A fine-grained sedimentary rock formed by the consolidation of clay, silt, and mud.

Sheet Erosion. Erosion caused by a layer of water moving downward on a surface that has not yet developed channels. Uneven sheet erosion leads to the formation of rills, and finally gullies.

Short Duration. Transitory effects of the proposed program that are of limited duration and are generally caused by construction activities or operations start-up.

Significance. The importance of a given impact on a specific resource as defined under the Council on Environmental Quality regulations.

Single-Family Housing. A conventionally built house consisting of a single dwelling unit occupied by one household.

Site. Any location where humans have altered the terrain.

Site Specific. A study of the geographic program area which is identified at the second tier of the Environmental Impact Analysis Process.

Slag. A rock-like residue that is created after iron or other material is subjected to an intense fire.

Slough. A water-filled channel with little flow; often a former river channel.

Soil. A natural body consisting of layers or horizons of mineral and/or organic constituents of variable thickness and differing from the parent material in their morphological, physical, chemical, and mineralogical properties, and biological characteristics.

Sound Pressure Level. The quantity in decibels measured by a sound level meter satisfying the requirements of American National Standards Specification for Sound Level Meters S1.4-1971. Sound level is the frequency-weighted sound pressure level obtained with the standardized dynamic characteristic "fast" or "slow" and weighting A, B, or C; unless otherwise indicated, the A-weighted is used. The unit of any sound level is the decibel, which has the unit symbol dB.

Special Assessment Funds. One of the governmental fund types, used to account for financing of public improvements or services deemed to benefit the properties against which special assessments are levied (e.g., a charge for sidewalk construction, based on the linear footage of property frontage and a cost per linear foot for sidewalk construction).

Special District. Local government unit charged with provision of a specific service. Examples include water supply districts, lighting districts, and flood control districts. Generally, funding is from property taxes levied on the property benefiting from the service.

Special Revenue Funds. Used to account for the proceeds of special revenue sources (redistributed state-shared revenues such as gasoline taxes) that are legally restricted to expenditures for specific purposes (e.g., road construction); also supported in part by local property taxes.

Species Diversity. See Diversity.

Standard Industrial Classification. A federal scheme classifying industries by major lines of business grouped into categories of similar activity.

State Historic Preservation Officer. The official within each state, authorized by the state at the request of the Secretary of the Interior, to act as liaison for purposes of implementing the National Historic Preservation Act.

Statistical Techniques. Analyses that produce estimates of a dependent variable given specific values of one or more independent variables.

Storage (Groundwater). The total volume of groundwater contained within an aquifer or groundwater basin. In several states, the term refers to the "economically" recoverable volume of water from a groundwater basin.

Stratified Site. An archaeological site exhibiting various strata or layers of occupation; usually implies a large site with a long occupation.

Sub-Bituminous Coal. A black coal, intermediate in rank between lignite and bituminous coal and distinguished from lignite by a higher carbon and lower moisture content.

Subsistence/Settlement Pattern. The distributional patterns of site types in relation to the environment that reflect a particular adaptation. Aspects of land use include the function, duration, and seasonality of individual sites.

Successional Communities. A stage or recognizable condition of a plant community that occurs during its development from bare ground to climax.

Surface Collection. Systematic mapping and removal of artifacts from a site by means not involving excavation.

Survey. A systematic search for cultural resources; may include literature review and records search, but an on-ground field investigation is usually implied. Surveys may be conducted at different levels of intensity, ranging from a reconnaissance or spot check to an intensive inventory study.

Tax Revenue. Revenue of local governments, generally based on the valuation of goods or services; includes property, sales, excise, and other miscellaneous taxes.

Taxable Valuation. Value of property after assessment ratios are applied.

Technical Order. A document issued by the Air Force that defines the technical details of a system or parts of a system, and may include data on assembly, repair, maintenance, storage, operation, and disposal.

Tectonics. A branch of geology that deals with the regional assembling of structural or deformational features, and includes a study of their mutual relations, origin, and historical evolution.

Temporarily Disturbed Land. Surfaces disturbed during construction, but later regraded and/or revegetated; or those able to return to a natural state during the operational life of the program.

10-year, 7-day Low Flow. Based on a statistical analysis of historical flow records, the lowest average flow over a period of 7 successive days that would be expected to occur once during any 10-year period.

Terrace. A flat portion of land created when a stream or river cuts farther into its channel and migrates laterally to a different location. In river valleys, they typically represent former levels of the valley floodplain.

Terrace Deposit. The alluvial materials comprising the topographic terrace.

Tertiary. The first period of the Cenozoic era extending between 66 and 1.6 million years ago.

Then-Year Dollars. Current dollars unadjusted for inflation.

Threatened Species. A species that is likely to become endangered in the foreseeable future.

Tiering. Technique of proceeding from general to specific environmental analyses as a program evolves.

Tipi Ring/Stone Circle. A circle of stones generally measuring from 3.5 to 7 meters in diameter that is thought to represent the remains of various types of structures or to have served a religious or ceremonial function.

Ton. A unit of weight equal to 2,000 pounds.

Total Dissolved Solids. The concentration of solid materials in a solution; determined as the weight of the residue of a water sample upon filtration and evaporation divided by the volume of the sample.

Trail. A two-wheel track created only by the passage of vehicles. A trail is not a road.

Transect. A line, or a narrow corridor along a line, used for surveying the distributions of organisms; in this case, used to chart the distribution of vegetation types in the program area.

Transfer. To convey energy from one system to another via a transmission interconnection.

Transporter-Erector. A vehicle that transports a Minuteman missile between a launch facility and its operating base. The vehicle is also capable of emplacing or removing the missile from its protective structure at the launch facility.

Transporter/Erector Routes. Roads used for the movement of Minuteman transporter/erector vehicles.

Transuranium Series. Elements with atomic numbers greater than 92, which are the products of artificial nuclear changes.

Trend. A general term for the direction or bearing of the outcrop of a geological feature of any dimension, such as a layer, fold, or fault zone.

Triceratops. A large herbivorous dinosaur having a skull with two large horns above the eyes; a horn on the nose; a horned beak; a great bony hood over the neck; and a large, strong tail.

Turnout. A short section of a lane added to a two-lane, two-way highway for the purpose of allowing slow-moving vehicles to leave the main roadway and stop to allow faster vehicles to pass.

Two-Lane Highway. A roadway having a two-lane cross section, with one lane for each direction of flow, and where passing maneuvers must be made in the opposing lane.

Tyrannosaurus rex. A very large bipedal carnivorous dinosaur first discovered in Montana.

Unemployment Rate. The number of civilians, as a percentage of the total civilian labor force, without jobs but actively seeking employment.

Unincorporated. Land not included within the corporate limits of a city.

Universal Soil Loss Equation. An empirical mathematical equation that predicts the amount of soil lost to rainfall erosion, commonly measured in tons per acre per year, based on factors such as rainfall, K-factor, slope, and management practices.

Unsuccessful Job Seekers. Persons seeking employment in a given area in excess of employment demand.

Upland Game. Bird species such as grouse, quail, pheasant, and wild turkeys found in areas elevated above rivers and valleys.

Uplift. A structurally high area in the earth's crust, produced by positive movements that raise or upthrust the rocks, as in a dome or arch.

Utility Corridor. A common route used by more than one utility for transportation of energy resources.

Vacant Developable Land. Vacant land designated for an urban or other non-open space category in the adopted comprehensive plan of a city, county, or regional planning agency.

Visibility Degradation. Any adverse change in visibility consisting of either a reduction of visual range from some reference value, or a reduction in contrast between an object and the horizon sky, or a shift in coloration or light intensity of the sky or distant objects compared to what is perceived on a "clear day."

Vision Quest Site. A sacred area used by American Plains Indians to seek supernatural guidance through fasting and prayer, usually located on a prominence (e.g., butte, mesa, or ridgetop).

Volume (Transportation). The total number of vehicles that pass over a given point or section of a roadway during a given time interval. Volumes may be expressed in terms of annual, daily, hourly, or subhourly periods.

Warhead. The nuclear device contained within a reentry vehicle. Does not include the detonating mechanism and associated equipment.

Warlodges. Vertical pole conical lodges, usually located in wooded breaks and associated with eagle-catching pits.

Water Body. Any surface water, including streams, rivers, ponds, lakes, reservoirs, bays, sounds, estuaries, and oceans.

Water-Short Area. A stream basin with intensive water use where several times each decade water demands exceed the available streamflow during the peak irrigation season (usually late in the summer).

Water Table. The upper surface of an unconfined body of groundwater.

Watershed. See Basin.

Watt. A unit of electrical power equal to 1/756th horsepower.

Way. A vehicle route that has not been improved and maintained by mechanical means to ensure relatively regular and continuous use.

Well Yield. The sustainable volume of water discharged from a well per unit of time, often expressed in gallons per minute.

Wetlands. Transitional lands between terrestrial and aquatic systems where the water table is usually at, or near, the surface, or the land is covered by shallow water. The soil or substrate is at least periodically saturated with water.

Wilderness Area. A tract of land that has been granted congressional approval for incorporation into the National Wilderness Preservation System as mandated by the Wilderness Act of 1964 (Public Law 88-57).

Wind Erodibility Group. An assemblage of soils grouped by their similar properties which affect their resistance to soil blowing.

Wind Erosion. Detachment, transportation, and deposition of loose topsoil by wind action, as in dust storms.

Wind Erosion Equation. An equation that predicts the amount of soil lost as a result of wind erosion based on factors such as soil erodibility, climate, and vegetative cover.

Wind Shear. A stress on a body in a region in which winds of different velocities and directions are close together.

Withdrawn Lands. Federal lands where jurisdiction has been transferred from one department, bureau, or agency, to another.

Woodland. Communities dominated by trees with a usual mean height of less than 15 meters.

Zoning. The division of a municipality (or county) into districts for the purpose of regulating land use, bulk of building, required yards, necessary off-street parking, and other prerequisites to development. Zones are generally shown on a map and the text of the zoning ordinance specifies requirements for each zoning category.

11.2 Acronyms

A&CO	Assembly & Checkout
AADT	Average Annual Daily Traffic
ACHP	Advisory Council on Historic Preservation
ADT	Average Daily Traffic
AFB	Air Force Base
AFRCE	Air Force Regional Civil Engineer
AICUZ	Air Installation Compatible Use Zone
BLM	Bureau of Land Management
BN	Burlington Northern Railroad
BMO	Ballistic Missile Office
B.P.	Before Present
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CMR	Central Montana Railroad
COE	U.S. Army Corps of Engineers
CRMP	Cultural Resources Management Plan
DEIS	Draft Environmental Impact Statement
DFSC	Defense Fuels Supply Center
DOD	Department of Defense
DOE	Department of Energy
DRMO	Defense Reutilization and Marketing Office
EIAP	Environmental Impact Analysis Process
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
EPTR	Environmental Planning Technical Report
FEIS	Final Environmental Impact Statement
FHWA	Federal Highway Administration
FTE	Full-Time Equivalent
FY	Fiscal Year
GFPS	Great Falls Public Schools
HML	Hard Mobile Launcher
ICBM	Intercontinental Ballistic Missile
IHE	Insensitive High Explosives
IOC	Initial Operational Capability
ISC	Industrial Source Complex
JTU	Jackson Turbidity Unit
LCP	Landscape Characteristic Province
LOI	Level of Impact
LOS	Level of Service
MCP	Military Construction Program
MDFWP	Montana Department of Fish, Wildlife and Parks
MDNRC	Montana Department of Natural Resources and Conservation
MIL-STD	Military Standard
MMI	Modified Mercalli Intensity
MNHP	Montana Natural Heritage Program
MPC	Montana Power Company
MTMC	Military Traffic Management Command
MWQB	Montana Water Quality Bureau
NAAQS	National Ambient Air Quality Standards
NEDS	National Emissions Data Systems
NEPA	National Environmental Policy Act

NIOSH	National Institute of Occupational Safety and Health
NRC	Nuclear Regulatory Commission
NRHP	National Register of Historic Places
NTU	Nephelometric Turbidity Unit
NWSSG	Nuclear Weapons System Safety Group
ORV	Off-Road Vehicle
O&M	Operation and Maintenance
PA	Programmatic Agreement
PHS	Potential Hazard System
PMOA	Programmatic Memorandum of Agreement
PSD	Prevention of Significant Deterioration
QF	Qualifying Facilities
REM	Roentgen Equivalent Man
ROI	Region of Influence
ROW	Right-of-Way
SAC	Strategic Air Command
SATAF	Site Activation Task Force
SCS	Soil Conservation Service
SHPO	State Historic Preservation Officer
SIC	Standard Industrial Classification
SPEGL	Short-Term Public Exposure Guidance Level
SPL	Sound Pressure Level
SPR	Spill Prevention and Response Plan
SSG	System Safety Group
STORET	Storage and Retrieval System
S.U.	Standard Unit
T/E	Transporter/Erector
TDS	Total Dissolved Solids
TSP	Total Suspended Particulates
USFWS	U.S. Fish and Wildlife Service
USLE	Universal Soil Loss Equation
VOC	Volatile Organic Compounds
VRM	Visual Resources Management
WAPA	Western Area Power Administration
WATSTORE	Water Data Storage and Retrieval System
WEG	Wind Erodibility Group
WIC	Women/Infant/Children
WSA	Weapons Storage Area

11.3 Units of Measurement

acre-ft	acre-foot
acre-ft/yr	acre-foot per year
bbl/day	barrels per day
°C	degrees Celsius
cfs	cubic foot per second
cy	cubic yard
cy/yr	cubic yard per year
dB	decibel
dBA	decibel on the A-weighted scale
°F	degrees Fahrenheit
ft	foot
gpcd	gallon per capita per day
gpm	gallon per minute
km	kilometer
kV	kilovolt
kW	kilowatt
kWh	kilowatt-hour
lb/ac	pound per acre
L_{dn}	day/night equivalent noise level
L_{eq}	energy-equivalent continuous noise level
m^2	square meter
MBtu/h	million British thermal units per hour
Mcf	thousand cubic feet
MG	million gallons
MGD	million gallons per day
mg/l	milligram per liter
mi	mile
ml	milliliter
MMcf	million cubic feet
mpg	miles per gallon
mph	miles per hour
m/sec	meter per second
MVA	megavolt-ampere
MW	megawatt
PM_{10}	particulate matter
ppm	parts per million
psi	pounds per square inch
sq ft	square foot
sq mi	square mile
T/ac/yr	ton per acre per year
T/day	ton per day
T/yr	ton per year
$\mu g/m^3$	microgram per cubic meter

11.4 Chemical Abbreviations

Al_2O_3	Aluminum Oxide
CO	Carbon Monoxide
CO_2	Carbon Dioxide
H_2	Hydrogen
H_2O	Water
HC	Hydrocarbons
HCl	Hydrogen Chloride
N_2	Nitrogen
NO_2	Nitrogen Dioxide
NO_x	Nitrogen Oxide
Pu-239	Plutonium Isotope 239
Pu-241	Plutonium Isotope 241
SO_2	Sulfur Dioxide
SO_x	Sulfure Oxide

12.0 INDEX

This index lists the cities and counties discussed in this document.

Appendix A

EXISTING ENVIRONMENTAL CONDITIONS AT MINUTEMAN LAUNCH FACILITIES IN MONTANA

This appendix provides a summary of the present environmental conditions at existing Minuteman launch facilities in north-central Montana. The following information is provided for each launch facility:

Surface Area (acres) - The size of Air Force fee-owned land at each launch facility.

Distance to Malmstrom Air Force Base (mi) - The shortest road distance, on the transporter/erector (T/E) route system, from each launch facility to Malmstrom Air Force Base.

Length of Access Road (ft) - The length of gravel access road connecting each launch facility to the T/E route system.

Vegetation - The dominant vegetation types found in a 207-acre study area block surrounding each launch facility.

Wildlife - The wildlife species whose ranges encompass the launch facility.

Proximity of Aquatic Habitats - Aquatic habitats (wetlands, streams, washes, and ponds) were cataloged in three zones (adjacent to, less than 500 ft, and 500-1,000 ft from a launch facility). The listing indicates a presence of an aquatic habitat in one of these zones. "None" indicates that no aquatic habitats occur within 1,000 feet of the launch facility.

Threatened and Endangered Species - Includes federally listed, federal-candidate, and Montana-recognized species whose ranges encompass the launch facility.

Oil and Gas Lease Less Than 0.5 Mile - Existing oil and gas leases which occur within 0.5 mile of a launch facility.

Sheet Erosion K-Factor - Estimated value that predicts long-term average soil loss resulting from sheet erosion. K-factors range from 0.02 to 0.69. Soils with K-factors greater than 0.43 are highly susceptible to sheet erosion. Moderately susceptible soils have K-factors ranging from 0.28 to 0.42. K-factors less than 0.28 are indicative of low susceptibility to sheet erosion.

Wind Erodibility Group - Estimated measure of the soil's susceptibility to wind erosion. Group numbers range from a highest sensitive soil group of 1 to the least sensitive soil group of 8.

Slope (%) - Surface slope at each launch facility.

River Basin - The principal surface drainage basin in which the launch facility is located.

Principal Groundwater Aquifer - The regional groundwater aquifer most likely tapped by any wells which may lie in the vicinity of the launch facility.

Nearby Saline Seep - Saline seeps that lie within 0.5 mile of and downgradient from the launch facility.

Residential Structures Within 2,000 Feet - A census of inhabited residences located within 2,000 feet of the perimeter of each launch facility.

Dominant Land Use - An appraisal of the principal categories of land use (excluding structures) located within 300 feet of the perimeter of each launch facility.

Archaeological Sensitivity - A rating which can range from negligible to high, based on the location of launch facilities within sensitivity zones identified by a logistic regression predictive model of site occurrence and field surveys. Ratings reflect the relative likelihood of encountering sites in a given zone, a characteristic which is directly related to predicted site density.

Paleontological Sensitivity - A rating which can range from negligible to high, based on the relative importance of fossil materials known to occur in surface or near-surface geologic formations at the launch facility location.

Historic Sensitivity - A rating which can range from negligible to high, based on proximity to known National Register of Historic Places-eligible properties. High sensitivity reflects the presence of an eligible site in the area of direct surface disturbance. Lower ratings reflect the presence of known eligible sites at greater distances from the launch facility (moderate, 1 mi; low, 3 mi). These recognize the potential for affecting additional unrecorded sites at the launch facility, and the potential for indirect effects resulting from increased public use of the area.

Native American Sensitivity - A rating which can range from negligible to high, based on proximity to known or projected sacred or traditional use areas, and the resource type. High sensitivity is recorded when a launch facility occurs within 2 miles of known burial grounds in recognition of the potential to cause visual or audible intrusions upon the sacred character of the site, or to affect related, unrecorded sites. Moderate sensitivity is recorded when a launch facility is identified as being within 1 mile of a known site having a ceremonial feature. Launch facilities within 5 miles of known sacred sites were rated low in recognition of the potential for encountering additional sites. Negligible sensitivity is recorded for areas where no resources are known or projected to occur.

Appendix A
Existing Environmental Conditions at Minuteman Launch Facilities in Montana

	Launch Facility					
	A-2	A-3	A-4	A-5	A-6	A-7
Surface Area (acres)	2.314	2.205	2.328	2.059	2.847	1.969
Distance to Malmstrom AFB (mi)	28.0	56.7	38.1	58.0	51.3	45.3
Length of Access Road (ft)	420	150	240	360	1,200	750
Vegetation	Foothills prairie	Nonirrigated agriculture	Foothills prairie	Douglas fir forest	Douglas fir forest	Foothills prairie
Wildlife	White-tailed deer mule deer	White-tailed deer mule deer pronghorn	White-tailed deer mule deer pronghorn	White-tailed deer mule deer	White-tailed deer mule deer	White-tailed deer mule deer
Proximity of Aquatic Habitats (ft)	Adjacent	500-1,000	500-1,000	<500	<500	500-1,000
Threatened and Endangered Species	None	None	None	*Cirsium longistylum*	*Cirsium longistylum*	None
Oil or Gas Lease Less Than 0.5 Mile	No	No	No	No	No	No
Sheet Erosion K-Factor	0.37	0.64	0.2	0.28	0.49	0.37
Wind Erodibility Group	6	7	6	4	4	7
Slope (%)	>20	10-20	>20	>20	>20	10-20
River Basin	Belt Creek	Belt Creek	Belt Creek	Belt Creek	Belt Creek	Belt Creek
Principal Groundwater Aquifer	Kootenai Formation	Kootenai Formation	Mountains or igneous rock	Mountains or igneous rock	Mountains or igneous rock	Mountains or igneous rock
Nearby Saline Seep	No	No	No	No	No	No
Residential Structures Within 2,000 Feet	None	None	2	None	17	2
Dominant Land Use	Rangeland	Dry-farmed cropland	Rangeland	Douglas fir forest	Dry-farmed cropland/ Douglas fir forest	Dry-farmed cropland
Archaeological Sensitivity	Moderate	Moderate	Low	Low	Low	Low
Paleontological Sensitivity	Low	Low	Negligible	Negligible	Low	Low
Historic Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Native American Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

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	Launch Facility					
	A-8	A-9	A-10	A-11	B-2	B-3
Surface Area (acres)	2.463	2.029	2.029	1.753	2.190	2.210
Distance to Malmstrom AFB (mi)	34.8	21.7	25.1	28.0	71.7	83.0
Length of Access Road (ft)	315	325	225	280	375	300
Vegetation	Foothills prairie	Nonirrigated agriculture/ Judith Basin-northern grassland	Foothills prairie/ nonirrigated agriculture	Judith Basin-northern grassland/ nonirrigated agriculture	Judith Basin-northern grassland/ nonirrigated agriculture	Nonirrigated agriculture
Wildlife	White-tailed deer mule deer	White-tailed deer mule deer pronghorn	White-tailed deer mule deer pronghorn	White-tailed deer mule deer	Mule deer pronghorn	Mule deer pronghorn
Proximity of Aquatic Habitats (ft)	Adjacent	None	<500	500-1,000	500-1,000	<500
Threatened and Endangered Species	None	None	None	None	None	None
Oil or Gas Lease Less Than 0.5 Mile	No	No	Yes	No	Yes	Yes
Sheet Erosion K-Factor	0.32	0.2	0.37	0.32	0.37	0.32
Wind Erodibility Group	6	6	5	5	6	4L
Slope (%)	10-20	5-10	10-20	>20	10-20	0-2
River Basin	Belt Creek	Sand Coulee Creek	Upper Missouri River	Belt Creek	Arrow Creek	Arrow Creek
Principal Ground-water Aquifer	Mountains or igneous rock	Mountains or igneous rock	Mountains or igneous rock	Kootenai Formation	Terrace or bench deposits	Terrace or bench deposits
Nearby Saline Seep	No	No	No	No	No	No
Residential Structures Within 2,000 Feet	3	None	None	1	None	1
Dominant Land Use	Rangeland	Dry-farmed cropland/ rangeland	Dry-farmed cropland/ rangeland	Dry-farmed cropland/ rangeland	Rangeland	Rangeland/dry-farmed cropland
Archaeological Sensitivity	Low	Moderate	Moderate	Moderate	Moderate	Moderate
Paleontological Sensitivity	Low	Moderate	Negligible	Moderate	Moderate	Negligible
Historic Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Native American Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

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	Launch Facility					
	B-4	B-5	B-6	B-7	B-8	B-9
Surface Area (acres)	1.818	1.818	2.346	1.931	1.865	1.928
Distance to Malmstrom AFB (mi)	71.0	66.0	56.0	45.1	38.9	47.1
Length of Access Road (ft)	270	290	2,841	771	687	322
Vegetation	Nonirrigated agriculture	Nonirrigated agriculture	Foothills prairie	Nonirrigated agriculture	Nonirrigated agriculture	Judith Basin-northern grassland
Wildlife	Mule deer pronghorn	White-tailed deer mule deer	White-tailed deer mule deer pronghorn	Mule deer pronghorn	Mule deer pronghorn	White-tailed deer mule deer pronghorn
Proximity of Aquatic Habitats (ft)	<500	<500	500-1,000	<500	500-1,000	Adjacent
Threatened and Endangered Species	None	None	None	None	None	None
Oil or Gas Lease Less Than 0.5 Mile	No	No	No	No	No	No
Sheet Erosion K-Factor	0.37	0.17	0.2	0.17	0.32	0.17
Wind Erodibility Group	6	6	5	6	7	6
Slope (%)	5-10	0-2	>20	2-5	5-10	10-20
River Basin	Judith River	Judith River	Arrow Creek	Arrow Creek	Arrow Creek	Arrow Creek
Principal Ground-water Aquifer	Terrace or bench deposits	Kootenai Formation	Kootenai Formation	Terrace or bench deposits	Kootenai Formation	Kootenai Formation
Nearby Saline Seep	No	No	No	No	No	No
Residential Structures Within 2,000 Feet	None	None	None	None	1	None
Dominant Land Use	Dry-farmed cropland	Dry-farmed cropland	Rangeland	Dry-farmed cropland/ rangeland	Dry-farmed cropland	Rangeland
Archaeological Sensitivity	Moderate	Low	Moderate	High	Moderate	High
Paleontological Sensitivity	Negligible	Negligible	Moderate	Negligible	Negligible	Negligible
Historic Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Native American Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

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	Launch Facility					
	B-10	B-11	C-2	C-3	C-4	C-5
Surface Area (acres)	2.109	2.045	1.884	1.990	1.956	1.846
Distance to Malmstrom AFB (mi)	55.9	54	65.5	75.8	77.7	72.7
Length of Access Road (ft)	220	150	255	260	320	265
Vegetation	Douglas fir forest	Judith Basin-northern grassland	Nonirrigated agriculture	Nonirrigated agriculture	Judith Basin-northern grassland/ nonirrigated agriculture	Nonirrigated agriculture
Wildlife	White-tailed deer mule deer	Mule deer pronghorn	Mule deer pronghorn	Pronghorn mule deer	Mule deer pronghorn	Mule deer pronghorn
Proximity of Aquatic Habitats (ft)	<500	<500	500-1,000	500-1,000	Adjacent	None
Threatened and Endangered Species	None	None	None	None	None	None
Oil or Gas Lease Less Than 0.5 Mile	No	No	No	No	No	No
Sheet Erosion K-Factor	0.37	0.37	0.37	0.37	0.17	0.37
Wind Erodibility Group	6	5	6	6	3	6
Slope (%)	>20	2-5	10-20	2-5	10-20	0-2
River Basin	Arrow Creek	Arrow Creek	Judith River	Judith River	Judith River	Judith River
Principal Ground-water Aquifer	Mountains or igneous rock	Kootenai Formation	Kootenai Formation	Kootenai Formation	Kootenai Formation	Terrace or bench deposits
Nearby Saline Seep	No	No	No	No	No	No
Residential Structures Within 2,000 Feet	4	None	2	None	None	1
Dominant Land Use	Douglas fir forest	Rangeland	Dry-farmed cropland	Dry-farmed cropland	Dry-farmed cropland/ rangeland	Dry-farmed cropland
Archaeological Sensitivity	Moderate	High	Moderate	High	High	Low
Paleontological Sensitivity	Moderate	Moderate	Moderate	Moderate	Negligible	Negligible
Historic Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Native American Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

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	Launch Facility					
	C-6	C-7	C-8	C-9	C-10	C-11
Surface Area (acres)	2.178	2.314	2.218	2.571	2.330	2.066
Distance to Malmstrom AFB (mi)	79.3	86.8	76.3	72.9	65.1	58.4
Length of Access Road (ft)	573	474	284	400	440	755
Vegetation	Judith Basin-northern grassland	Judith Basin-northern grassland	Foothills prairie/ Douglas fir forest	Foothills prairie/ Douglas fir forest	Foothills prairie	Nonirrigated agriculture/ Judith Basin-northern grassland
Wildlife	White-tailed deer mule deer pronghorn	White-tailed deer mule deer pronghorn	White-tailed deer mule deer pronghorn	Mule deer	White-tailed deer mule deer pronghorn	White-tailed deer mule deer pronghorn
Proximity of Aquatic Habitats (ft)	<500	<500	500-1,000	None	<500	Adjacent
Threatened and Endangered Species	None	None	None	None	None	None
Oil or Gas Lease Less Than 0.5 Mile	No	No	No	No	Yes	No
Sheet Erosion K-Factor	0.32	0.32	0.43	0.2	0.32	0.17
Wind Erodibility Group	6	6	6	6	7	6
Slope (%)	5-10	10-20	10-20	>20	>20	0-2
River Basin	Judith River	Judith River	Judith River	Judith River	Judith River	Judith River
Principal Ground-water Aquifer	Kootenai Formation	Mountains or igneous rock	Mountains or igneous rock	Mountains or igneous rock	Mountains or igneous rock	Terrace or bench deposits
Nearby Saline Seep	No	No	No	No	No	No
Residential Structures Within 2,000 Feet	None	None	2	None	None	5
Dominant Land Use	Rangeland	Rangeland	Rangeland	Douglas fir forest	Rangeland	Dry-farmed cropland
Archaeological Sensitivity	Moderate	High	Low	Low	Moderate	High
Paleontological Sensitivity	Moderate	Low	Low	Low	Moderate	Negligible
Historic Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Native American Sensitivity	Negligible	Negligible	Negligible	Negligible	Low	Negligible

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	Launch Facility					
	D-2	D-3	D-4	D-5	D-6	D-7
Surface Area (acres)	1.690	2.107	1.940	1.923	2.020	1.990
Distance to Malmstrom AFB (mi)	111	118	112.2	104.9	104.1	98.0
Length of Access Road (ft)	230	900	275	255	270	260
Vegetation	Nonirrigated agriculture	Nonirrigated agriculture	Nonirrigated agriculture	Nonirrigated agriculture	Nonirrigated agriculture	Nonirrigated agriculture/ Judith Basin-northern grassland
Wildlife	Mule deer pronghorn	Mule deer pronghorn	Mule deer pronghorn	Mule deer pronghorn	Mule deer pronghorn white-tailed deer	Mule deer pronghorn
Proximity of Aquatic Habitats (ft)	None	Adjacent	<500	500-1,000	None	500-1,000
Threatened and Endangered Species	None	None	None	None	None	None
Oil or Gas Lease Less Than 0.5 Mile	No	No	No	No	No	No
Sheet Erosion K-Factor	0.37	0.28	0.37	0.32	0.37	0.37
Wind Erodibility Group	6	6	6	4	6	4
Slope (%)	0-2	>20	5-10	5-10	2-5	>20
River Basin	Judith River	Judith River	Judith River	Judith River	Judith River	Judith River
Principal Ground-water Aquifer	Eagle/Virgelle Formation	Eagle/Virgelle Formation	Eagle/Virgelle Formation	Eagle/Virgelle Formation	Kootenai Formation	Kootenai Formation
Nearby Saline Seep	No	No	No	No	Yes	Yes
Residential Structures Within 2,000 Feet	None	None	None	None	1	1
Dominant Land Use	Dry-farmed cropland	Dry-farmed cropland	Dry-farmed cropland	Dry-farmed cropland	Dry-farmed cropland	Dry-farmed cropland/ rangeland
Archaeological Sensitivity	Moderate	Low	Moderate	Moderate	Moderate	Moderate
Paleontological Sensitivity	Negligible	Moderate	Moderate	Moderate	Negligible	Moderate
Historic Sensitivity	Negligible	Negligible	Negligible	Negligible	Low	Low
Native American Sensitivity	Negligible	Negligible	Negligible	Negligible	Low	Low

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	Launch Facility					
	D-8	D-9	D-10	D-11	E-2	E-3
Surface Area (acres)	2.119	1.716	1.690	1.663	2.029	2.129
Distance to Malmstrom AFB (mi)	94.2	90.4	90.2	104.0	150.2	140.2
Length of Access Road (ft)	145	270	235	150	270	750
Vegetation	Nonirrigated agriculture	Nonirrigated agriculture	Nonirrigated agriculture	Nonirrigated agriculture	Nonirrigated agriculture	Central grassland
Wildlife	Mule deer pronghorn	Mule deer pronghorn	Mule deer pronghorn	Mule deer pronghorn	Mule deer pronghorn	Mule deer pronghorn
Proximity of Aquatic Habitats (ft)	<500	500-1,000	None	500-1,000	Adjacent	Adjacent
Threatened and Endangered Species	None	None	None	None	None	None
Oil or Gas Lease Less Than 0.5 Mile	No	No	No	No	Yes	Yes
Sheet Erosion K-Factor	0.28	0.37	0.37	0.32	0.32	0.43
Wind Erodibility Group	6	6	6	5	3	6
Slope (%)	10-20	5-10	0-2	0-2	5-10	10-20
River Basin	Judith River	Judith River	Arrow Creek	Judith River	Dog Creek	Dog Creek
Principal Ground-water Aquifer	Kootenai Formation	Kootenai Formation	Terrace or bench deposits	Eagle/Virgelle Formation	Judith River Formation	Judith River Formation
Nearby Saline Seep	No	No	No	No	Yes	Yes
Residential Structures Within 2,000 Feet	1	1	None	2	None	2
Dominant Land Use	Dry-farmed cropland	Dry-farmed cropland	Dry-farmed cropland	Dry-farmed cropland	Dry-farmed cropland	Rangeland
Archaeological Sensitivity	Low	Low	Low	Moderate	Moderate	Low
Paleontological Sensitivity	Low	Negligible	Negligible	Negligible	Negligible	Moderate
Historic Sensitivity	Negligible	Negligible	Negligible	Negligible	Low	Low
Native American Sensitivity	Negligible	Moderate	Negligible	Negligible	Negligible	Negligible

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	Launch Facility					
	E-4	E-5	E-6	E-7	E-8	E-9
Surface Area (acres)	1.912	1.928	1.894	1.763	1.846	2.755
Distance to Malmstrom AFB (mi)	150.5	145.0	126.9	120.4	118.3	126.9
Length of Access Road (ft)	360	2,711	500	530	245	425
Vegetation	Nonirrigated agriculture	Nonirrigated agriculture/ central grassland	Nonirrigated agriculture/ central grassland	Nonirrigated agriculture	Nonirrigated agriculture/ foothills prairie	Foothills prairie
Wildlife	Mule deer pronghorn	Mule deer pronghorn	Mule deer white-tailed deer pronghorn	Mule deer pronghorn	White-tailed deer mule deer pronghorn	Mule deer pronghorn
Proximity of Aquatic Habitats (ft)	500-1,000	Adjacent	<500	<500	Adjacent	Adjacent
Threatened and Endangered Species	None	None	None	None	None	None
Oil or Gas Lease Less Than 0.5 Mile	No	No	No	Yes	No	No
Sheet Erosion K-Factor	0.37	0.32	0.32	0.37	0.2	0.37
Wind Erodibility Group	4	6	6	4	4L	4
Slope (%)	5-10	5-10	5-10	5-10	5-10	10-20
River Basin	Dog Creek	Dog Creek	Dog Creek	Dog Creek	Judith River	Judith River
Principal Ground-water Aquifer	Judith River Formation	Judith River Formation	Judith River Formation	Eagle/Virgelle Formation	Eagle/Virgelle Formation	Eagle/Virgelle Formation
Nearby Saline Seep	Yes	No	No	Yes	No	No
Residential Structures Within 2,000 Feet	None	None	None	None	None	1
Dominant Land Use	Dry-farmed cropland	Dry-farmed cropland/ rangeland	Dry-farmed cropland/ rangeland	Dry-farmed cropland/ rangeland	Rangeland/dry-farmed cropland	Rangeland
Archaeological Sensitivity	Low	Low	Moderate	Low	Low	Low
Paleontological Sensitivity	Moderate	Negligible	Moderate	Negligible	Negligible	Low
Historic Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Low
Native American Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

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	Launch Facility					
	E-10	E-11	F-2	F-3	F-4	F-5
Surface Area (acres)	2.404	1.837	2.0	1.969	1.873	1.826
Distance to Malmstrom AFB (mi)	143.7	147.6	67.3	73.9	50.7	52.6
Length of Access Road (ft)	1,624	155	380	780	775	270
Vegetation	Douglas fir forest/ nonirrigated agriculture	Nonirrigated agriculture	Judith Basin-northern grassland	Nonirrigated agriculture/ Judith Basin-northern grassland	Irrigated agriculture	Judith Basin-northern grassland
Wildlife	Mule deer pronghorn	Mule deer pronghorn	Mule deer pronghorn	Mule deer pronghorn	Mule deer pronghorn	Mule deer pronghorn white-tailed deer elk
Proximity of Aquatic Habitats (ft)	<500	<500	None	Adjacent	None	<500
Threatened and Endangered Species	None	None	None	None	None	Bald eagle
Oil or Gas Lease Less Than 0.5 Mile	No	No	No	No	No	Yes
Sheet Erosion K-Factor	0.37	0.37	0.37	0.32	0.32	0.37
Wind Erodibility Group	4	7	4L	4	6	4L
Slope (%)	10-20	5-10	10-20	10-20	10-20	5-10
River Basin	Judith River	Dog Creek	Teton River	Sun River	Sun River	Sun River
Principal Ground-water Aquifer	Eagle/Virgelle Formation	Eagle/Virgelle Formation	Eagle/Virgelle Formation	Terrace or bench deposits	Two Medicine Formation	Two Medicine Formation
Nearby Saline Seep	No	Yes	No	No	No	No
Residential Structures Within 2,000 Feet	None	None	None	None	None	None
Dominant Land Use	Rangeland	Dry-farmed cropland	Rangeland	Dry-farmed cropland/ rangeland	Irrigated cropland	Rangeland
Archaeological Sensitivity	High	Low	Moderate	Low	Moderate	Moderate
Paleontological Sensitivity	Negligible	Moderate	Negligible	Negligible	Negligible	Negligible
Historic Sensitivity	Negligible	Low	Negligible	Negligible	Negligible	Negligible
Native American Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

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	Launch Facility					
	F-6	F-7	F-8	F-9	F-10	F-11
Surface Area (acres)	1.791	1.772	2.563	1.808	2.346	2.438
Distance to Malmstrom AFB (mi)	61.3	64.5	77.6	82.3	72.5	70.3
Length of Access Road (ft)	1,100	185	290	20,000	1,070	275
Vegetation	Judith Basin-northern grassland/ nonirrigated agriculture	Judith Basin-northern grassland	Judith Basin-northern grassland	Judith Basin-northern grassland	Judith Basin-northern grassland	Judith Basin-northern grassland
Wildlife	White-tailed deer mule deer	Pronghorn white-tailed deer elk	Mule deer	Mule deer white-tailed deer elk	White-tailed deer mule deer elk	Mule deer white-tailed deer elk
Proximity of Aquatic Habitats (ft)	Adjacent	500-1,000	None	None	None	500-1,000
Threatened and Endangered Species	None	None	None	Bald eagle grizzly bear wolf	Bald eagle grizzly bear wolf	Bald eagle grizzly bear wolf
Oil or Gas Lease Less Than 0.5 Mile	Yes	Yes	No	Yes	No	No
Sheet Erosion K-Factor	0.37	0.37	0.32	0.32	0.37	0.43
Wind Erodibility Group	4L	4	3	4L	5	4L
Slope (%)	10-20	5-10	10-20	0-2	5-10	2-5
River Basin	Sun River	Sun River	Sun River	Teton River	Teton River	Teton River
Principal Ground-water Aquifer	Glacial deposits	Glacial deposits	Two Medicine Formation	Two Medicine Formation	Two Medicine Formation	Two Medicine Formation
Nearby Saline Seep	No	Yes	No	No	No	Yes
Residential Structures Within 2,000 Feet	None	None	None	None	None	None
Dominant Land Use	Dry-farmed cropland/ rangeland	Rangeland	Rangeland	Rangeland	Rangeland	Rangeland
Archaeological Sensitivity	Moderate	Moderate	Moderate	High	Moderate	High
Paleontological Sensitivity	Negligible	Negligible	Moderate	Moderate	High	Moderate
Historic Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Native American Sensitivity	Low	Negligible	Negligible	High	Negligible	Negligible

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	Launch Facility					
	G-2	G-3	G-4	G-5	G-6	G-7
Surface Area (acres)	2.376	2.298	2.029	3.030	1.837	3.182
Distance to Malmstrom AFB (mi)	46.5	42.5	37.0	43.3	64.1	61.1
Length of Access Road (ft)	1,010	250	230	190	370	1,020
Vegetation	Judith Basin-northern grassland	Judith Basin-northern grassland	Nonirrigated agriculture	Foothills prairie	Judith Basin-northern grassland	Foothills prairie
Wildlife	Pronghorn mule deer	Pronghorn	Pronghorn	Pronghorn	Pronghorn mule deer	White-tailed deer pronghorn mule deer
Proximity of Aquatic Habitats (ft)	500-1,000	Adjacent	None	<500	<500	Adjacent
Threatened and Endangered Species	None	None	None	None	*Lesquerella klausii*	*Lesquerella klausii*
Oil or Gas Lease Less Than 0.5 Mile	No	Yes	No	No	No	No
Sheet Erosion K-Factor	0.43	0.28	0.28	0.37	0.24	0.24
Wind Erodibility Group	6	5	7	4L	4L	4L
Slope (%)	2-5	10-20	5-10	>20	2-5	5-10
River Basin	Sun River	Little Muddy Creek	Little Muddy Creek	Little Muddy Creek	Dearborn River	Dearborn River
Principal Ground-water Aquifer	Eagle/Virgelle Formation	Kootenai Formation	Kootenai Formation	Mountains or igneous rock	Two Medicine Formation	Two Medicine Formation
Nearby Saline Seep	Yes	Yes	Yes	No	No	No
Residential Structures Within 2,000 Feet	None	None	None	None	None	None
Dominant Land Use	Rangeland	Rangeland	Dry-farmed cropland/ rangeland	Rangeland	Rangeland	Rangeland
Archaeological Sensitivity	Low	Moderate	Low	Moderate	Moderate	Moderate
Paleontological Sensitivity	Moderate	Low	Low	Moderate	Negligible	Negligible
Historic Sensitivity	Negligible	Negligible	Negligible	Moderate	Negligible	Negligible
Native American Sensitivity	Negligible	Low	Negligible	Low	Negligible	Negligible

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	Launch Facility					
	G-8	G-9	G-10	G-11	H-2	H-3
Surface Area (acres)	2.355	2.367	1.837	2.029	1.894	1.961
Distance to Malmstrom AFB (mi)	69.9	60.5	70.8	55.6	47.6	38.2
Length of Access Road (ft)	375	970	140	3,440	275	155
Vegetation	Foothills prairie	Nonirrigated agriculture/ foothills prairie	Nonirrigated agriculture	Judith Basin-northern grassland	Nonirrigated agriculture	Judith Basin-northern grassland
Wildlife	White-tailed deer mule deer	Pronghorn mule deer	Pronghorn mule deer	Mule deer pronghorn	Pronghorn	Pronghorn
Proximity of Aquatic Habitats (ft)	<500	<500	500-1,000	<500	None	None
Threatened and Endangered Species	*Lesquerella klausii*	*Lesquerella klausii*	None	None	None	None
Oil or Gas Lease Less Than 0.5 Mile	No	No	Yes	Yes	No	No
Sheet Erosion K-Factor	0.37	0.37	0.32	0.43	0.37	0.37
Wind Erodibility Group	4	4	4	6	4	4
Slope (%)	10-20	10-20	5-10	5-10	2-5	5-10
River Basin	Dearborn River	Dearborn River	Sun River	Sun River	Muddy Creek	Muddy Creek
Principal Ground-water Aquifer	Two Medicine Formation	Two Medicine Formation	Terrace or bench deposits	Two Medicine Formation	Kootenai Formation	Kootenai Formation
Nearby Saline Seep	No	No	Yes	No	No	Yes
Residential Structures Within 2,000 Feet	None	None	None	None	None	None
Dominant Land Use	Rangeland	Dry-farmed cropland/ rangeland	Dry-farmed cropland	Rangeland	Dry-farmed cropland	Rangeland/ dry-farmed cropland
Archaeological Sensitivity	Moderate	Moderate	High	Moderate	Low	High
Paleontological Sensitivity	Moderate	Moderate	Moderate	Negligible	Low	Negligible
Historic Sensitivity	Negligible	Negligible	Low	Negligible	Negligible	Negligible
Native American Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

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	Launch Facility					
	H-4	H-5	H-6	H-7	H-8	H-9
Surface Area (acres)	1.894	2.571	2.190	1.990	2.146	1.730
Distance to Malmstrom AFB (mi)	28.9	33.4	35.9	40.3	45.4	44.4
Length of Access Road (ft)	270	325	935	890	965	1,880
Vegetation	Irrigated agriculture	Judith Basin-northern grassland/ nonirrigated agriculture	Judith Basin-northern grassland	Judith Basin-northern grassland	Judith Basin-northern grassland	Irrigated agriculture/ nonirrigated agriculture
Wildlife	Pronghorn	Pronghorn	Pronghorn	Pronghorn	White-tailed deer pronghorn elk mule deer	Pronghorn
Proximity of Aquatic Habitats (ft)	None	500-1,000	Adjacent	<500	Adjacent	None
Threatened and Endangered Species	None	None	None	None	None	None
Oil or Gas Lease Less Than 0.5 Mile	No	No	No	Yes	Yes	No
Sheet Erosion K-Factor	0.37	0.32	0.37	0.32	0.37	0.32
Wind Erodibility Group	4	3	4	3	4L	6
Slope (%)	10-20	10-20	10-20	10-20	5-10	2-5
River Basin	Muddy Creek	Sun River	Sun River	Sun River	Sun River	Sun River
Principal Ground-water Aquifer	Kootenai Formation	Terrace or bench deposits	Kootenai Formation	Kootenai Formation	Alluvium or thick colluvium	Kootenai Formation
Nearby Saline Seep	No	No	No	No	No	No
Residential Structures Within 2,000 Feet	5	1	1	None	None	1
Dominant Land Use	Irrigated cropland	Dry-farmed cropland/ rangeland	Rangeland	Rangeland	Rangeland	Dry-farmed cropland/ irrigated cropland
Archaeological Sensitivity	Moderate	Moderate	Low	Moderate	High	Moderate
Paleontological Sensitivity	Negligible	Low	Moderate	Negligible	Negligible	Negligible
Historic Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Native American Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

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	Launch Facility					
	H-10	H-11	I-2	I-3	I-4	I-5
Surface Area (acres)	1.980	1.791	1.873	1.980	1.834	1.923
Distance to Malmstrom AFB (mi)	53.7	59.6	25.7	46.1	45.6	38.6
Length of Access Road (ft)	495	300	210	180	280	250
Vegetation	Judith Basin-northern grassland/ nonirrigated agriculture	Nonirrigated agriculture	Foothills prairie/ nonirrigated agriculture	Judith Basin-northern grassland/ nonirrigated agriculture	Foothills prairie	Judith Basin-northern grassland
Wildlife	Pronghorn white-tailed deer	Pronghorn	Pronghorn	Pronghorn white-tailed deer	Pronghorn white-tailed deer	Pronghorn white-tailed deer
Proximity of Aquatic Habitats (ft)	None	None	<500	None	500-1,000	500-1,000
Threatened and Endangered Species	None	None	None	None	None	None
Oil or Gas Lease Less Than 0.5 Mile	No	No	No	No	Yes	No
Sheet Erosion K-Factor	0.37	0.37	0.37	0.37	0.1	0.1
Wind Erodibility Group	5	6	5	6	8	6
Slope (%)	5-10	2-5	5-10	2-5	5-10	2-5
River Basin	Teton River	Muddy Creek	Smith River	Smith River	Smith River	Upper Missouri River
Principal Ground-water Aquifer	Kootenai Formation	Kootenai Formation	Mountains or igneous rock	Kootenai Formation	Kootenai Formation	Kootenai Formation
Nearby Saline Seep	No	No	No	No	No	Yes
Residential Structures Within 2,000 Feet	None	None	None	None	None	None
Dominant Land Use	Rangeland/ dry-farmed cropland	Dry-farmed cropland	Rangeland/ dry-farmed cropland	Rangeland/ dry-farmed cropland	Rangeland	Rangeland
Archaeological Sensitivity	Moderate	Low	Moderate	High	Moderate	Moderate
Paleontological Sensitivity	Low	Negligible	Negligible	Negligible	Negligible	Negligible
Historic Sensitivity	Moderate	Negligible	Negligible	Negligible	Negligible	Negligible
Native American Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

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	Launch Facility					
	I-6	I-7	I-8	I-9	I-10	I-11
Surface Area (acres)	1.873	1.923	1.873	1.837	1.763	1.873
Distance to Malmstrom AFB (mi)	31.7	23.5	39.1	37.3	18.4	20.5
Length of Access Road (ft)	490	6,575	260	270	1,065	2,775
Vegetation	Judith Basin-northern grassland/ nonirrigated agriculture	Judith Basin-northern grassland/ nonirrigated agriculture	Judith Basin-northern grassland	Nonirrigated agriculture	Nonirrigated agriculture	Nonirrigated agriculture
Wildlife	White-tailed deer pronghorn	White-tailed deer pronghorn	Pronghorn	Pronghorn	White-tailed deer	Pronghorn
Proximity of Aquatic Habitats (ft)	500-1,000	None	Adjacent	None	None	Adjacent
Threatened and Endangered Species	None	Bald eagle	None	None	None	None
Oil or Gas Lease Less Than 0.5 Mile	No	No	Yes	Yes	No	Yes
Sheet Erosion K-Factor	0.32	0.32	0.37	0.32	0.37	0.37
Wind Erodibility Group	6	5	6	6	6	6
Slope (%)	2-5	5-10	5-10	0.2	2-5	5-10
River Basin	Upper Missouri River	Little Muddy Creek	Little Muddy Creek	Sun River	Muddy Creek	Upper Missouri River
Principal Ground-water Aquifer	Kootenai Formation	Kootenai Formation	Kootenai Formation	Kootenai Formation	Kootenai Formation	Kootenai Formation
Nearby Saline Seep	No	No	No	Yes	No	Yes
Residential Structures Within 2,000 Feet	None	None	None	None	2	None
Dominant Land Use	Rangeland	Dry-farmed cropland/ rangeland	Rangeland/ dry-farmed cropland	Dry-farmed cropland	Dry-farmed cropland	Dry-farmed cropland
Archaeological Sensitivity	High	Moderate	Moderate	Moderate	Moderate	Moderate
Paleontological Sensitivity	Negligible	Low	Low	Negligible	Negligible	Negligible
Historic Sensitivity	Negligible	Negligible	Negligible	Negligible	Moderate	Negligible
Native American Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

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	Launch Facility					
	J-2	J-3	J-4	J-5	J-6	J-7
Surface Area (acres)	2.107	1.894	2.893	1.894	1.837	1.818
Distance to Malmstrom AFB (mi)	61.6	35.5	36.1	29.6	27.2	20.2
Length of Access Road (ft)	205	240	8,861	1,675	155	320
Vegetation	Nonirrigated agriculture	Nonirrigated agriculture	Nonirrigated agriculture	Nonirrigated agriculture	Nonirrigated agriculture	Nonirrigated agriculture
Wildlife	Pronghorn mule deer	Pronghorn mule deer	Pronghorn mule deer	Pronghorn mule deer	Pronghorn mule deer	Pronghorn mule deer
Proximity of Aquatic Habitats (ft)	None	None	<500	None	None	None
Threatened and Endangered Species	None	None	None	None	None	None
Oil or Gas Lease Less Than 0.5 Mile	No	Yes	No	Yes	No	No
Sheet Erosion K-Factor	0.43	0.43	0.43	0.43	0.43	0.37
Wind Erodibility Group	6	6	6	6	6	4L
Slope (%)	2-5	2-5	2-5	0-2	2-5	5-10
River Basin	Teton River	Teton River	Teton River	Teton River	Teton River	Teton River
Principal Groundwater Aquifer	Glacial deposits	Glacial deposits	Glacial deposits	Glacial deposits	Glacial deposits	Glacial deposits
Nearby Saline Seep	No	No	No	No	No	No
Residential Structures Within 2,000 Feet	None	None	*None*	*None*	1 (plus 1 school)	None
Dominant Land Use	Dry-farmed cropland	Dry-farmed cropland	Dry-farmed cropland	Dry-farmed cropland	*Dry-farmed cropland*	*Dry-farmed cropland*
Archaeological Sensitivity	Low	Low	Moderate	Low	Low	Low
Paleontological Sensitivity	Low	Low	Low	Negligible	Low	Negligible
Historic Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Low
Native American Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

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	Launch Facility					
	J-8	J-9	J-10	J-11	K-2	K-3
Surface Area (acres)	1.951	1.865	1.894	1.894	1.627	1.865
Distance to Malmstrom AFB (mi)	37.5	29.4	32.3	36.8	117.0	127.8
Length of Access Road (ft)	245	235	210	290	805	285
Vegetation	Nonirrigated agriculture	Nonirrigated agriculture	Judith Basin-northern grassland/ nonirrigated agriculture	Nonirrigated agriculture	Nonirrigated agriculture	Nonirrigated agriculture
Wildlife	Pronghorn mule deer	Pronghorn mule deer	Pronghorn mule deer	Pronghorn mule deer	Pronghorn	Pronghorn
Proximity of Aquatic Habitats (ft)	None	Adjacent	None	None	None	<500
Threatened and Endangered Species	None	None	None	None	None	None
Oil or Gas Lease Less Than 0.5 Mile	No	No	Yes	No	No	No
Sheet Erosion K-Factor	0.37	0.32	0.43	0.37	0.37	0.37
Wind Erodibility Group	5	7	6	6	4L	4L
Slope (%)	0-2	2-5	2-5	2-5	0-2	0-2
River Basin	Middle Missouri River	Middle Missouri River	Middle Missouri River	Teton River	Musselshell River	Musselshell River
Principal Ground-water Aquifer	Kootenai Formation	Kootenai Formation	Kootenai Formation	Kootenai Formation	Terrace or bench deposits	Judith River Formation
Nearby Saline Seep	No	No	No	No	No	Yes
Residential Structures Within 2,000 Feet	None	None	3	None	None	None
Dominant Land Use	Dry-farmed cropland	Dry-farmed cropland	Rangeland	Dry-farmed cropland	Dry-farmed cropland	Dry-farmed cropland
Archaeological Sensitivity	Low	Low	Moderate	Low	Moderate	Moderate
Paleontological Sensitivity	Negligible	Low	Low	Negligible	Negligible	Negligible
Historic Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Low
Native American Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

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	Launch Facility					
	K-4	K-5	K-6	K-7	K-8	K-9
Surface Area (acres)	1.807	1.846	1.742	1.951	1.923	1.818
Distance to Malmstrom AFB (mi)	150.5	143.4	130.4	142.9	130.3	146.7
Length of Access Road (ft)	240	840	1,970	250	925	260
Vegetation	Central grassland	Nonirrigated agriculture	Judith Basin-northern grassland	Nonirrigated agriculture	Irrigated agriculture/ Judith Basin-northern grassland	Nonirrigated agriculture/ Judith Basin-northern grassland
Wildlife	Pronghorn	Pronghorn	Pronghorn	Pronghorn	Pronghorn	Pronghorn
Proximity of Aquatic Habitats (ft)	*<500*	*None*	Adjacent	500-1,000	500-1,000	500-1,000
Threatened and Endangered Species	None	None	None	None	None	None
Oil or Gas Lease Less Than 0.5 Mile	Yes	No	No	No	No	Yes
Sheet Erosion K-Factor	0.43	0.37	0.2	0.37	*0.37*	*0.24*
Wind Erodibility Group	4	5	5	4	6	3
Slope (%)	2-5	5-10	2-5	5-10	2-5	5-10
River Basin	Musselshell River	Musselshell River	Musselshell River	Musselshell River	Musselshell River	Musselshell River
Principal Groundwater Aquifer	Terrace or bench deposits	Terrace or bench deposits	Kootenai Formation	Kootenai Formation	Kootenai *Formation*	Eagle/Virgelle *Formation*
Nearby Saline Seep	Yes	No	No	No	No	No
Residential Structures Within 2,000 Feet	None	1	None	None	None	None
Dominant Land Use	Rangeland	Dry-farmed cropland	Rangeland	Dry-farmed cropland	Irrigated cropland/ rangeland	Dry-farmed cropland
Archaeological Sensitivity	High	Moderate	High	High	Moderate	Moderate
Paleontological Sensitivity	Negligible	Negligible	Moderate	Moderate	Negligible	Low
Historic Sensitivity	Negligible	Low	Negligible	Negligible	Negligible	Negligible
Native American Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

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	Launch Facility					
	K-10	K-11	L-2	L-3	L-4	L-5
Surface Area (acres)	1.818	1.856	2.346	2.089	1.818	1.837
Distance to Malmstrom AFB (mi)	133.4	141.1	110.3	110.8	117.8	158.0
Length of Access Road (ft)	245	225	220	1,995	230	150
Vegetation	Judith Basin-northern grassland/ nonirrigated agriculture	Nonirrigated agriculture	Nonirrigated agriculture/ foothills prairie	Judith Basin-northern grassland	Judith Basin-northern grassland	Central grassland/ nonirrigated agriculture
Wildlife	Pronghorn	Pronghorn	Pronghorn mule deer	Pronghorn	Pronghorn	Pronghorn
Proximity of Aquatic Habitats (ft)	500-1,000	None	<500	Adjacent	<500	Adjacent
Threatened and Endangered Species	None	None	Mountain plover	Mountain plover	Mountain plover	Mountain plover
Oil or Gas Lease Less Than 0.5 Mile	No	Yes	No	Yes	No	Yes
Sheet Erosion K-Factor	0.15	0.37	0.32	0.32	0.2	0.37
Wind Erodibility Group	4L	4L	6	4L	6	4L
Slope (%)	0-2	0-2	10-20	10-20	2-5	0-2
River Basin	Musselshell River	Musselshell River	Judith River	Musselshell River	Musselshell River	Musselshell River
Principal Ground-water Aquifer	Terrace or bench deposits	Terrace or bench deposits	Mountains or igneous rock	Terrace or bench deposits	Terrace or bench deposits	Terrace or bench deposits
Nearby Saline Seep	No	No	No	Yes	No	No
Residential Structures Within 2,000 Feet	None	None	None	None	None	None
Dominant Land Use	Rangeland/ dry-farmed cropland	Dry-farmed cropland	Dry-farmed cropland/ rangeland	Rangeland	Dry-farmed cropland	Rangeland/ dry-farmed cropland
Archaeological Sensitivity	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Paleontological Sensitivity	Negligible	Negligible	Negligible	Moderate	Negligible	Moderate
Historic Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Native American Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

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	Launch Facility					
	L-6	L-7	L-8	L-9	L-10	L-11
Surface Area (acres)	1.742	1.873	2.068	1.780	1.873	1.912
Distance to Malmstrom AFB (mi)	123.6	109.2	111.9	97.6	99.0	92.3
Length of Access Road (ft)	235	865	500	235	780	765
Vegetation	Judith Basin-northern grassland	Judith Basin-northern grassland	Judith Basin-northern grassland	Nonirrigated agriculture	Nonirrigated agriculture	Nonirrigated agriculture
Wildlife	Pronghorn	Pronghorn	Pronghorn	Pronghorn mule deer	Pronghorn mule deer	Pronghorn mule deer
Proximity of Aquatic Habitats (ft)	500-1,000	None	<500	<500	<500	None
Threatened and Endangered Species	Mountain plover	Mountain plover	Mountain plover	Mountain plover	Mountain plover	Mountain plover
Oil or Gas Lease Less Than 0.5 Mile	Yes	No	No	Yes	No	Yes
Sheet Erosion K-Factor	0.37	0.37	0.15	0.17	0.37	0.37
Wind Erodibility Group	4L	4L	4L	6	6	5
Slope (%)	0-2	0-2	10-20	2-5	2-5	5-10
River Basin	Musselshell River	Musselshell River	Musselshell River	Judith River	Judith River	Judith River
Principal Ground-water Aquifer	Judith River Formation	Terrace or bench deposits	Kootenai Formation	Terrace or bench deposits	Kootenai Formation	Kootenai Formation
Nearby Saline Seep	No	No	No	No	No	No
Residential Structures Within 2,000 Feet	None	None	None	None	None	None
Dominant Land Use	Rangeland	Dry-farmed cropland	Rangeland	Dry-farmed cropland	Dry-farmed cropland	Dry-farmed croplan
Archaeological Sensitivity	High	Moderate	Moderate	High	High	High
Paleontological Sensitivity	Moderate	Negligible	Low	Negligible	Moderate	Negligible
Historic Sensitivity	Negligible	Negligible	Negligible	Negligible	Low	Negligible
Native American Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

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	Launch Facility					
	M-2	**M-3**	**M-4**	**M-5**	**M-6**	**M-7**
Surface Area (acres)	2.119	1.856	1.616	2.0	1.990	2.029
Distance to Malmstrom AFB (mi)	120.4	115.0	110.1	99.9	101.6	87.0
Length of Access Road (ft)	250	2,190	265	670	310	745
Vegetation	Foothills prairie	Nonirrigated agriculture/ foothills prairie	Nonirrigated agriculture/ Judith Basin-northern grassland	Nonirrigated agriculture	Nonirrigated agriculture/ foothills prairie	Nonirrigated agriculture
Wildlife	White-tailed deer mule deer	Mule deer white-tailed deer	Mule deer white-tailed deer	White-tailed deer	White-tailed deer mule deer pronghorn	Pronghorn mule deer
Proximity of Aquatic Habitats (ft)	Adjacent	<500	<500	None	<500	500-1,000
Threatened and Endangered Species	None	None	None	None	Mountain plover	Mountain plover
Oil or Gas Lease Less Than 0.5 Mile	No	No	No	Yes	No	No
Sheet Erosion K-Factor	0.37	0.2	0.37	0.37	0.32	0.37
Wind Erodibility Group	4L	4L	6	6	5	6
Slope (%)	5-10	5-10	5-10	0-2	10-20	5-10
River Basin	Judith River	Judith River	Judith River	Judith River	Judith River	Judith River
Principal Ground-water Aquifer	Kootenai Formation	Kootenai Formation	Kootenai Formation	Terrace or bench deposits	Kootenai Formation	Terrace or bench deposits
Nearby Saline Seep	No	No	No	No	No	No
Residential Structures Within 2,000 Feet	4	None	None	4	None	3
Dominant Land Use	Rangeland	Dry-farmed cropland/ rangeland	Dry-farmed cropland/ rangeland	Dry-farmed cropland	Dry-farmed cropland/ rangeland	Dry-farmed cropland
Archaeological Sensitivity	Moderate	Moderate	Moderate	High	Moderate	High
Paleontological Sensitivity	Moderate	Low	Negligible	Negligible	Negligible	Negligible
Historic Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Moderate
Native American Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

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	Launch Facility					
	M-8	M-9	M-10	M-11	N-2	N-3
Surface Area (acres)	1.894	1.894	2.323	2.037	1.807	1.932
Distance to Malmstrom AFB (mi)	86.5	78.9	87.5	97.2	130.1	135.4
Length of Access Road (ft)	820	820	520	820	235	1,180
Vegetation	Nonirrigated agriculture	Nonirrigated agriculture	Nonirrigated agriculture/ Judith Basin-northern grassland	Nonirrigated agriculture	Nonirrigated agriculture	Nonirrigated agriculture/ central grassland
Wildlife	Pronghorn	Pronghorn	Pronghorn	Pronghorn	Pronghorn	Pronghorn
Proximity of Aquatic Habitats (ft)	500-1,000	500-1,000	<500	500-1,000	None	<500
Threatened and Endangered Species	Mountain plover	None	None	None	None	None
Oil or Gas Lease Less Than 0.5 Mile	Yes	Yes	No	No	No	Yes
Sheet Erosion K-Factor	0.43	0.2	0.37	0.32	0.37	0.32
Wind Erodibility Group	6	5	6	4L	4	6
Slope (%)	2-5	0-2	>20	2-5	5-10	2-5
River Basin	Judith River	Judith River	Judith River	Judith River	Flatwillow Creek	Flatwillow Creek
Principal Ground-water Aquifer	Terrace or bench deposits	Terrace or bench deposits	Kootenai Formation	Terrace or bench deposits	Kootenai Formation	Kootenai Formation
Nearby Saline Seep	No	No	No	No	Yes	Yes
Residential Structures Within 2,000 Feet	None	None	None	None	1	2
Dominant Land Use	Rangeland/ dry-farmed cropland	Dry-farmed cropland	Rangeland/ dry-farmed cropland	Dry-farmed cropland	Dry-farmed cropland	Dry-farmed cropland/ rangeland
Archaeological Sensitivity	Moderate	Moderate	High	Moderate	Low	High
Paleontological Sensitivity	Negligible	Negligible	Low	Negligible	Low	Low
Historic Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Native American Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

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	Launch Facility					
	N-4	N-5	N-6	N-7	N-8	N-9
Surface Area (acres)	4.483	2.013	2.748	2.059	1.951	2.078
Distance to Malmstrom AFB (mi)	124.4	129.1	118.7	117.1	110.2	104.9
Length of Access Road (ft)	235	270	1,725	310	225	625
Vegetation	Nonirrigated agriculture/ ponderosa pine forest/Judith Basin-northern grassland	Nonirrigated agriculture/ Judith Basin-northern grassland	Judith Basin-northern grassland/ ponderosa pine forest	Nonirrigated agriculture	Nonirrigated agriculture	Foothills prairie
Wildlife	Pronghorn	Pronghorn mule deer	Pronghorn mule deer	Pronghorn mule deer	White-tailed deer	Pronghorn
Proximity of Aquatic Habitats (ft)	Adjacent	<500	<500	Adjacent	Adjacent	Adjacent
Threatened and Endangered Species	None	None	None	None	None	None
Oil or Gas Lease Less Than 0.5 Mile	No	No	No	No	No	No
Sheet Erosion K-Factor	0.2	0.37	0.2	0.17	0.28	0.37
Wind Erodibility Group	5	6	5	6	5	6
Slope (%)	>20	>20	>20	10-20	10-20	10-20
River Basin	Flatwillow Creek	Flatwillow Creek	Flatwillow Creek	Judith River	Judith River	Judith River
Principal Ground-water Aquifer	Mountains or igneous rock	Mountains or igneous rock	Mountains or igneous rock	Mountains or igneous rock	Kootenai Formation	Kootenai Formation
Nearby Saline Seep	No	No	No	No	No	No
Residential Structures Within 2,000 Feet	None	None	None	None	1	1
Dominant Land Use	Rangeland	Dry-farmed cropland/ rangeland	Rangeland/ ponderosa pine forest	Dry-farmed cropland	Dry-farmed cropland	Rangeland
Archaeological Sensitivity	Moderate	Low	Moderate	High	Moderate	Moderate
Paleontological Sensitivity	Low	Negligible	Low	Negligible	Negligible	Low
Historic Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Native American Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

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	Launch Facility					
	N-10	N-11	O-2	O-3	O-4	O-5
Surface Area (acres)	3.057	2.561	2.303	1.932	2.037	1.970
Distance to Malmstrom AFB (mi)	117.6	124.3	144.2	151.1	146.0	152.0
Length of Access Road (ft)	550	770	270	2,945	305	435
Vegetation	Judith Basin-northern grassland	Central grassland	Central grassland	Central grassland/ nonirrigated agriculture	Central grassland	Nonirrigated agriculture/ central grassland
Wildlife	Pronghorn	Mule deer white-tailed deer pronghorn	Pronghorn	Pronghorn	Pronghorn	Pronghorn
Proximity of Aquatic Habitats (ft)	Adjacent	<500	Adjacent	500-1,000	500-1,000	<500
Threatened and Endangered Species	None	None	None	None	None	None
Oil or Gas Lease Less Than 0.5 Mile	No	No	No	No	No	Yes
Sheet Erosion K-Factor	0.2	0.37	0.37	0.37	0.37	0.37
Wind Erodibility Group	5	4	4	4	6	4
Slope (%)	10-20	10-20	5-10	5-10	2-5	10-20
River Basin	Flatwillow Creek	Flatwillow Creek	Musselshell River	Musselshell River	Flatwillow Creek	Flatwillow Creek
Principal Ground-water Aquifer	Kootenai Formation	Kootenai Formation	Judith River Formation	Judith River Formation	Judith River Formation	Kootenai Formation
Nearby Saline Seep	No	Yes	Yes	Yes	Yes	No
Residential Structures Within 2,000 Feet	None	None	None	None	None	None
Dominant Land Use	Rangeland	Rangeland	Rangeland	Dry-farmed cropland/ rangeland	Rangeland	Rangeland/ dry-farmed cropland
Archaeological Sensitivity	Moderate	Moderate	Low	Low	Low	Low
Paleontological Sensitivity	Moderate	Low	Moderate	Moderate	Negligible	Low
Historic Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Native American Sensitivity	Negligible	Low	Negligible	Negligible	Negligible	Negligible

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	Launch Facility					
	O-6	O-7	O-8	O-9	O-10	O-11
Surface Area (acres)	2.312	2.009	2.596	3.013	2.107	1.997
Distance to Malmstrom AFB (mi)	157.4	144.2	120.3	126.7	132.9	138.5
Length of Access Road (ft)	910	235	1,050	710	1,330	3,970
Vegetation	Central grassland	Judith Basin-northern grassland/ nonirrigated agriculture	Nonirrigated agriculture	Judith Basin-northern grassland	Judith Basin-northern grassland	Central grassland
Wildlife	Pronghorn	Pronghorn	Pronghorn White-tailed deer mule deer	White-tailed deer mule deer pronghorn	Mule deer White-tailed deer pronghorn	Mule deer White-tailed deer pronghorn
Proximity of Aquatic Habitats (ft)	<500	<500	Adjacent	Adjacent	<500	<500
Threatened and Endangered Species	None	None	None	None	None	None
Oil or Gas Lease Less Than 0.5 Mile	Yes	No	No	Yes	No	No
Sheet Erosion K-Factor	0.43	0.43	0.17	0.17	0.37	0.24
Wind Erodibility Group	4	8	6	6	4	3
Slope (%)	10-20	5-10	5-10	5-10	10-20	5-10
River Basin	Flatwillow Creek	Flatwillow Creek	Armell's Creek	Armell's Creek	Flatwillow Creek	Armell's Creek
Principal Ground-water Aquifer	Kootenai Formation	Eagle/Virgelle Formation	Eagle/Virgelle Formation	Eagle/Virgelle Formation	Judith River Formation	Judith River Formation
Nearby Saline Seep	No	No	No	Yes	No	No
Residential Structures Within 2,000 Feet	None	1	None	None	None	None
Dominant Land Use	Rangeland	Rangeland	Rangeland	Rangeland	Rangeland	Rangeland
Archaeological Sensitivity	Low	Moderate	Low	Low	Moderate	Low
Paleontological Sensitivity	Low	Negligible	Negligible	Low	Negligible	Negligible
Historic Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Native American Sensitivity	Negligible	Low	Negligible	Negligible	Negligible	Negligible

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	Launch Facility					
	P-1	P-2	P-3	P-4	P-5	P-6
Surface Area (acres)	2.009	2.009	2.009	2.009	2.009	2.009
Distance to Malmstrom AFB (mi)	84.2	78.9	72.6	69.4	81.5	81.7
Length of Access Road (ft)	687	655	698	1,051	694	593
Vegetation	Nonirrigated agriculture	Nonirrigated agriculture/ Judith Basin-northern grassland	Nonirrigated agriculture	Nonirrigated agriculture	Nonirrigated agriculture	Nonirrigated agriculture
Wildlife	Mule deer	Mule deer	Mule deer	Mule deer	Mule deer	Mule deer
Proximity of Aquatic Habitat (ft)	None	500-1,000	500-1,000	None	None	None
Threatened and Endangered Species	None	None	None	None	None	None
Oil or Gas Lease Less Than 0.5 Mile	Yes	Yes	Yes	Yes	Yes	No
Sheet Erosion K-Factor	0.37	0.2	0.43	0.37	0.43	0.43
Wind Erodibility Group	3	4L	6	4L	6	6
Slope (%)	0-2	5-10	2-5	0-2	2-5	2-5
River Basin	Marias River	Marias River	Marias River	Marias River	Marias River	Marias River
Principal Ground-water Aquifer	Kootenai Formation	Glacial deposits	Glacial deposits	Kootenai Formation	Glacial deposits	Glacial deposits
Nearby Saline Seep	No	No	No	No	No	No
Residential Structures Within 2,000 Feet	None	None	None	None	None	1
Dominant Land Use	Dry-farmed cropland	Dry-farmed cropland/ rangeland	Dry-farmed cropland	Dry-farmed cropland	Dry-farmed cropland	Dry-farmed cropland
Archaeological Sensitivity	Moderate	High	Moderate	Moderate	Moderate	Moderate
Paleontological Sensitivity	Low	Low	Low	Moderate	Low	Moderate
Historic Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Native American Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Low

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	Launch Facility					
	P-7	P-8	P-9	P-10	Q-11	Q-12
Surface Area (acres)	2.009	2.009	2.009	2.009	2.169	2.009
Distance to Malmstrom AFB (mi)	74.0	84.2	77.2	92.9	92.1	93.8
Length of Access Road (ft)	800	700	700	569	682	570
Vegetation	Nonirrigated agriculture/Judith Basin-northern grassland	Nonirrigated agriculture	Nonirrigated agriculture	Nonirrigated agriculture	Nonirrigated agriculture	Nonirrigated agriculture
Wildlife	Mule deer	White-tailed deer mule deer	White-tailed deer mule deer	Mule deer	Mule deer	Mule deer
Proximity of Aquatic Habitats (ft)	<500	None	500-1,000	None	None	None
Threatened and Endangered Species	None	None	None	None	None	None
Oil or Gas Lease Less Than 0.5 Mile	Yes	No	Yes	No	No	No
Sheet Erosion K-Factor	0.43	0.43	0.43	0.37	0.43	0.43
Wind Erodibility Group	4L	4L	5	6	4L	6
Slope (%)	10-20	2-5	2-5	0-2	2-5	2-5
River Basin	Marias River	Marias River	Marias River	Marias River	Marias River	Marias River
Principal Ground-water Aquifer	Glacial deposits	Glacial deposits	Glacial deposits	Kootenai Formation	Glacial deposits	Glacial deposits
Nearby Saline Seep	No	No	No	No	Yes	Yes
Residential Structures Within 2,000 Feet	None	None	1	None	None	None
Dominant Land Use	Dry-farmed cropland/ rangeland	Dry-farmed cropland	Dry-farmed cropland	Dry-farmed cropland	Dry-farmed cropland	Dry-farmed cropland
Archaeological Sensitivity	High	Moderate	Moderate	Low	Moderate	Low
Paleontological Sensitivity	Moderate	Low	Low	Low	Low	Low
Historic Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Native American Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

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	Launch Facility					
	Q-13	Q-14	Q-15	Q-16	Q-17	Q-18
Surface Area (acres)	2.009	2.009	2.009	2.089	2.009	2.009
Distance to Malmstrom AFB (mi)	86.3	75.7	75.5	79.4	99.8	93.7
Length of Access Road (ft)	578	690	578	693	573	1,153
Vegetation	Nonirrigated agriculture	Nonirrigated agriculture	Nonirrigated agriculture	Nonirrigated agriculture	Nonirrigated agriculture	Nonirrigated agriculture
Wildlife	Mule deer	Mule deer	Mule deer	Mule deer	Mule deer	Mule deer
Proximity of Aquatic Habitats (ft)	None	None	None	None	None	None
Threatened and Endangered Species	None	None	None	None	None	None
Oil or Gas Lease Less Than 0.5 Mile	No	No	Yes	No	No	No
Sheet Erosion K-Factor	0.43	0.43	0.37	0.43	0.37	0.37
Wind Erodibility Group	5	6	7	6	6	6
Slope (%)	0-2	2-5	0-2	2-5	0-2	2-5
River Basin	Marias River	Marias River	Marias River	Marias River	Marias River	Marias River
Principal Ground-water Aquifer	Glacial deposits	Glacial deposits	Glacial deposits	Glacial deposits	Glacial deposits	Glacial deposits
Nearby Saline Seep	No	No	No	No	No	No
Residential Structures Within 2,000 Feet	None	None	1	1	None	1
Dominant Land Use	Dry-farmed cropland	Dry-farmed cropland	Dry-farmed cropland	Dry-farmed cropland	Dry-farmed cropland	Dry-farmed cropland
Archaeological Sensitivity	Low	Low	Moderate	Low	Low	High
Paleontological Sensitivity	Low	Low	Low	Low	Low	Low
Historic Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Native American Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

	Launch Facility					
	Q-19	Q-20	R-21	R-22	R-23	R-24
Surface Area (acres)	2.009	2.129	2.009	2.169	2.009	2.009
Distance to Malmstrom AFB (mi)	89.6	98.4	85.7	72.4	78.7	75.5
Length of Access Road (ft)	795	620	708	620	574	650
Vegetation	Nonirrigated agriculture	Nonirrigated agriculture	Nonirrigated agriculture	Nonirrigated agriculture/Judith Basin-northern grassland	Nonirrigated agriculture	Nonirrigated agriculture
Wildlife	Mule deer	Mule deer	Mule deer	Mule deer	Mule deer	Mule deer
Proximity of Aquatic Habitats (ft)	None	None	None	None	None	<500
Threatened and Endangered Species	None	*None*	None	*None*	*None*	*None*
Oil or Gas Lease Less Than 0.5 Mile	Yes	No	No	No	Yes	Yes
Sheet Erosion K-Factor	0.43	0.37	0.37	0.43	0.37	0.43
Wind Erodibility Group	6	6	6	6	4	6
Slope (%)	0-2	0-2	2-5	2-5	2-5	0-2
River Basin	Marias River	Marias River	Marias River	Marias River	Teton River	Teton River
Principal Ground-water Aquifer	Glacial deposits	Glacial deposits	Glacial deposits	Glacial deposits	Kootenai Formation	Kootenai Formation
Nearby Saline Seep	No	No	No	No	No	No
Residential Structures Within 2,000 Feet	None	None	None	None	None	None
Dominant Land Use	Dry-farmed cropland	Dry-farmed cropland	Dry-farmed cropland	Dry-farmed cropland	Dry-farmed cropland	Dry-farmed cropland
Archaeological Sensitivity	Moderate	Low	Moderate	Low	Moderate	Low
Paleontological Sensitivity	Low	Low	Low	Low	Low	Low
Historic Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Native American Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

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	Launch Facility					
	R-25	R-26	R-27	R-28	R-29	R-30
Surface Area (acres)	2.009	2.009	2.009	2.009	2.009	2.009
Distance to Malmstrom AFB (mi)	65.9	72.3	66.8	52.5	77.8	79.0
Length of Access Road (ft)	650	650	650	655	680	698
Vegetation	Nonirrigated agriculture	Nonirrigated agriculture	Nonirrigated agriculture	Nonirrigated agriculture	Irrigated agriculture/ nonirrigated agriculture	Nonirrigated agriculture
Wildlife	Mule deer	Mule deer	Mule deer	Mule deer	Mule deer	Mule deer
Proximity of Aquatic Habitat (ft)	None	None	500-1,000	<500	None	<500
Threatened and Endangered Species	None	None	None	None	None	None
Oil or Gas Lease Less Than 0.5 Mile	No	Yes	Yes	Yes	No	No
Sheet Erosion K-Factor	0.43	0.43	0.43	0.43	0.43	0.37
Wind Erodibility Group	6	6	6	6	5	4
Slope (%)	0-2	0-2	2-5	0-2	2-5	0-2
River Basin	Teton River	Teton River	Teton River	Teton River	Marias River	Marias River
Principal Ground-water Aquifer	Glacial deposits	Glacial deposits	Kootenai Formation	Glacial deposits	Glacial deposits	Glacial deposits
Nearby Saline Seep	No	No	No	No	No	No
Residential Structures Within 2,000 Feet	None	None	None	None	None	None
Dominant Land Use	Dry-farmed cropland	Dry-farmed cropland	Dry-farmed cropland	Dry-farmed cropland	Dry-farmed cropland/ irrigated cropland	Dry-farmed cropland/ rangeland
Archaeological Sensitivity	Moderate	Moderate	Low	Low	High	Low
Paleontological Sensitivity	Low	Low	Low	Low	Moderate	Low
Historic Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Native American Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

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	Launch Facility					
	S-31	S-32	S-33	S-34	S-35	S-36
Surface Area (acres)	2.009	2.009	2.009	2.009	2.009	2.009
Distance to Malmstrom AFB (mi)	60.7	51.1	58	76.8	79.3	60.9
Length of Access Road (ft)	692	563	650	564	650	693
Vegetation	Nonirrigated agriculture	Nonirrigated agriculture	Nonirrigated agriculture	Nonirrigated agriculture	Nonirrigated agriculture	Nonirrigated agriculture
Wildlife	*Mule deer*	*Mule deer*	*Mule deer*	*Mule deer*	*Mule deer*	*Mule deer*
Proximity of Aquatic Habitats (ft)	500-1,000	None	None	None	500-1,000	None
Threatened and Endangered Species	None	None	None	None	None	None
Oil or Gas Lease Less Than 0.5 Mile	Yes	Yes	No	No	Yes	No
Sheet Erosion K-Factor	0.37	0.32	0.24	0.37	0.37	0.43
Wind Erodibility Group	4	4	3	6	4L	6
Slope (%)	0-2	0-2	0-2	2-5	0-2	2-5
River Basin	Marias River	Teton River	Teton River	Teton River	Teton River	Teton River
Principal Ground-water Aquifer	Glacial deposits	Glacial deposits	Glacial deposits	Glacial deposits	Kootenai Formation	Glacial deposits
Nearby Saline Seep	No	No	No	No	No	Yes
Residential Structures Within 2,000 Feet	None	None	1	1	None	None
Dominant Land Use	Dry-farmed cropland	Dry-farmed cropland	Dry-farmed cropland	Dry-farmed cropland	Dry-farmed cropland	Dry-farmed cropland
Archaeological Sensitivity	Low	High	Moderate	Low	Moderate	High
Paleontological Sensitivity	Low	Low	Low	Low	Low	Low
Historic Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Native American Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

Appendix A Continued, Page 32 of 34

	Launch Facility					
	S-37	**S-38**	**S-39**	**S-40**	**T-41**	**T-42**
Surface Area (acres)	2.009	2.009	2.009	2.009	2.009	2.009
Distance to Malmstrom AFB (mi)	70.9	57.6	65.4	64.9	98.9	94.4
Length of Access Road (ft)	555	663	650	700	654	695
Vegetation	Nonirrigated agriculture	Nonirrigated agriculture	Nonirrigated agriculture	Nonirrigated agriculture	Nonirrigated agriculture	Nonirrigated agriculture
Wildlife	Mule deer	Mule deer	Mule deer	Mule deer	White-tailed deer mule deer	White-tailed deer mule deer
Proximity of Aquatic Habitats (ft)	500-1,000	None	500-1,000	None	500-1,000	500-1,000
Threatened and Endangered Species	None	None	None	None	None	None
Oil or Gas Lease Less Than 0.5 Mile	Yes	No	No	Yes	No	No
Sheet Erosion K-Factor	0.43	0.37	0.43	0.43	0.43	0.32
Wind Erodibility Group	6	5	6	6	6	4
Slope (%)	2-5	2-5	0-2	2-5	2-5	2-5
River Basin	Marias River	Marias River	Marias River	Marias River	Two Medicine River	Marias River
Principal Ground-water Aquifer	Glacial deposits	Glacial deposits	Glacial deposits	Glacial deposits	Eagle/Virgelle Formation	Eagle/Virgelle Formation
Nearby Saline Seep	No	No	No	No	No	No
Residential Structures Within 2,000 Feet	None	None	None	None	None	1
Dominant Land Use	Dry-farmed cropland	Dry-farmed cropland	Dry-farmed cropland	Dry-farmed cropland	Dry-farmed cropland	Dry-farmed cropland
Archaeological Sensitivity	Moderate	Low	Moderate	Low	High	Moderate
Paleontological Sensitivity	Low	Low	Low	Low	Moderate	Moderate
Historic Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Native American Sensitivity	Negligible	Negligible	Negligible	Negligible	Moderate	Low

Appendix A Continued, Page 33 of 34

	Launch Facility					
	T-43	T-44	T-45	T-46	T-47	T-48
Surface Area (acres)	2.009	2.009	2.009	2.009	2.009	2.755
Distance to Malmstrom AFB (mi)	86.4	76.4	89.6	84.1	81.6	84.1
Length of Access Road (ft)	570	676	721	651	686	573
Vegetation	Nonirrigated agriculture	Nonirrigated agriculture	Nonirrigated agriculture	Nonirrigated agriculture	Nonirrigated agriculture	Judith Basin-northern grassland/ nonirrigated agriculture
Wildlife	Mule deer	Mule deer	Mule deer	Mule deer	Mule deer	Mule deer
Proximity of Aquatic Habitats (ft)	None	None	500-1,000	500-1,000	500-1,000	None
Threatened and Endangered Species	None	None	None	None	None	None
Oil or Gas Lease Less Than 0.5 Mile	No	No	No	No	Yes	Yes
Sheet Erosion K-Factor	0.37	0.37	0.37	0.37	0.37	0.37
Wind Erodibility Group	4	6	6	6	6	4L
Slope (%)	2-5	2-5	2-5	0-2	5-10	5-10
River Basin	Marias River	Marias River	Marias River	Teton River	Teton River	Marias River
Principal Ground-water Aquifer	Glacial deposits	Eagle/Virgelle Formation	Kootenai Formation	Eagle/Virgelle Formation	Eagle/Virgelle Formation	Eagle/Virgelle Formation
Nearby Saline Seep	No	No	Yes	No	No	No
Residential Structures *Within 2,000 Feet*	None	1	None	None	None	None
Dominant Land Use	Dry-farmed cropland	Dry-farmed cropland	Dry-farmed cropland	Dry-farmed cropland	Dry-farmed cropland	Dry-farmed cropland/ rangeland
Archaeological Sensitivity	*Moderate*	*Moderate*	*High*	*Low*	*High*	*High*
Paleontological Sensitivity	Moderate	Moderate	Low	Moderate	Moderate	Moderate
Historic Sensitivity	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
Native American Sensitivity	*Negligible*	*Negligible*	*Negligible*	*Negligible*	*Low*	*Negligible*

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	Launch Facility	
	T-49	T-50
Surface Area (acres)	2.009	2.009
Distance to Malmstrom AFB (mi)	97.5	90.8
Length of Access Road (ft)	1,013	573.0
Vegetation	Nonirrigated agriculture	Nonirrigated agriculture
Wildlife	Mule deer	White-tailed deer mule deer
Proximity of Aquatic Habitats (ft)	None	500-1,000
Threatened and Endangered Species	None	None
Oil or Gas Lease Less Than 0.5 Mile	No	No
Sheet Erosion K-Factor	0.37	0.37
Wind Erodibility Group	4L	5
Slope (%)	5-10	2-5
River Basin	*Marias River*	*Marias River*
Principal Groundwater Aquifer	Two Medicine Formation	Two Medicine Formation
Nearby Saline Seep	No	Yes
Residential Structures Within 2,000 Feet	None	None
Dominant Land Use	Dry-farmed cropland	Dry-farmed cropland
Archaeological Sensitivity	High	Moderate
Paleontological Sensitivity	Low	Moderate
Historic Sensitivity	Negligible	Negligible
Native American Sensitivity	Negligible	Negligible

Appendix B.1

PROGRAMMATIC MEMORANDUM OF AGREEMENT

PROGRAMMATIC MEMORANDUM OF AGREEMENT

AMONG

THE UNITED STATES DEPARTMENT OF DEFENSE

THE ADVISORY COUNCIL ON HISTORIC PRESERVATION

AND THE

NATIONAL CONFERENCE OF STATE HISTORIC PRESERVATION OFFICERS

WHEREAS, the Department of Defense (DoD) has been directed by United States Senate Armed Services Committee Report 97-440 to the Military Construction Authorization Bill for 1983 to demolish World War II (1939-1946) temporary buildings (buildings); and

WHEREAS, these buildings were not constructed to be permanent facilities and were intended to be demolished; and

WHEREAS, DoD has determined that these buildings may meet the criteria of the National Register of Historic Places; and

WHEREAS, DoD has determined that its program of demolition of these buildings (program) may have an effect on their qualities of significance and has requested the comments of the Advisory Council on Historic Preservation (Council) pursuant to Section 106 of the National Historic Preservation Act, as amended, (16 U.S.C. 470f) and its implementing regulations, "Protection of Historic and Cultural Properties" (36 CFR Part 800).

NOW, THEREFORE, DoD, the National Conference of State Historic Preservation Officers (NCSHPO), and the Council agree that the Program will be carried out in accordance with the following stipulations in order to take into account the effect of the undertaking on historic properties.

STIPULATIONS

I. DoD will ensure that the following actions are carried out:

A. In consultation with the Historic American Buildings Survey/Historic American Engineering Record (HABS/HAER) (National Park Service, Washington, DC), DoD will develop documentation that includes:

1. A narrative overview of WW II military construction establishing the overall historical context and construction characteristics of each major type of building and including:

a. Explanation of the origins and derivations of the construction techniques and designs.

6/6/86

b. Chronology that summarizes the political and military decisions that affected scheduling, locations, quantity, design, and construction techniques. Photocopies shall be made of all military manuals used to guide significant aspects of design or construction.

c. Summary statements of major installations' WW II development including site plans, lists of buildings, photocopies of appropriate photographs, and evaluations of the significance of the various building types and groups.

2. Documentation of one example of all major building types that includes: drawings (title sheet, floor plans, sections, elevations, and isometrics of framing systems and other pertinent construction details), photographs (perspective corrected, large format negative and contact print), and appropriate explanatory data. All documentation shall meet HABS/HAER Standards for format and archival stability.

3. Submission of the above documentation to HABS/HAER, for deposit in the Library of Congress, not later than three years from the date of this agreement.

4. Development of the above documentation will be undertaken with periodic reviews by HABS/HAER to ensure that completed documentation will meet HABS/HAER Standards.

B. In consultation with the Council and the NCSHPO, DoD will select some examples of building types or groups to treat in accordance with historic preservation plans (HPP), until such time as demolished or removed from DoD control. The HPPs will be submitted to the Council and the NCSHPO within three years from the date of this agreement. Work done in accordance with the HPPs will require no further review by a SHPO or the Council.

C. All buildings that are identified within sixty days of the Federal Register publication of this Agreement by organizations and individuals will be considered by DoD in its selection of examples to be documented and/or treated in accordance with Stipulations A and B above.

D. Until the documentation program is completed and HPPs have been developed for the representative sample of building types and groups, DoD will continue its current program of building demolition with caution, avoiding disposal of obviously unique and well-preserved, original buildings that are not documented.

II. NCSHPO agrees to:

A. Assist the appropriate SHPO in informing DoD within sixty days of the Federal Register publication of this agreement of buildings that they wish to have considered in the selection of examples to be documented and/or treated in accordance with Stipulations I.A and I.B.

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B. Represent all SHPOs in the consultation on a selection of examples buildings to be treated in accordance with Stipulation I.B.

III. If any of the signatories to this Agreement determines that the terms the Agreement cannot be met or believes that a change is necessary, the signatory will immediately request an amendment or addendum to the Agreement Such an amendment or addendum will be executed in the same manner as the original Agreement.

EXECUTION of this Agreement evidences that DoD has afforded the Council a reasonable opportunity to comment on its program of disposal of temporary WW II buildings and that DoD has taken into account the effects of this program on historic resources.

7/2/86

cting Executive Director, Advisory Council on Historic Preservation

7/7/86

Chairman
Advisory Council on Historic Preservation

6/6/86

President CHARLES E. LEE
National Conference of State Historic Preservation Officers

7/13/86

Historic American Buildings Survey/
Historic American Engineering Record

Department of Defense

Department of Army

Department of Navy

U. S. Marine Corps

Department of Air Force

B. Represent all SHPOs in the consultation on a selection of examples of buildings to be treated in accordance with Stipulation I.B.

III. If any of the signatories to this Agreement determines that the terms of the Agreement cannot be met or believes that a change is necessary, the signatory will immediately request an amendment or addendum to the Agreement. Such an amendment or addendum will be executed in the same manner as the original Agreement.

EXECUTION of this Agreement evidences that DoD has afforded the Council a reasonable opportunity to comment on its program of disposal of temporary W II buildings and that DoD has taken into account the effects of this program on historic resources.

John M Fowler 7/2/86
Executive Director, Advisory Council
on Historic Preservation

Baker 7/7/86
Chairman
Advisory Council on Historic
Preservation

Charles E. Lee 6/6/86
President CHARLES E. LEE
National Conference of
State Historic Preservation
Officers

5.13.86
Historic American Buildings Survey/
Historic American Engineering Record

Department of Defense

Paul W.
Department of Army

Department of Navy

U. S. Marine Corps

Department of Air Force

B. Represent all SHPOs in the consultation on a selection of examples c buildings to be treated in accordance with Stipulation I.B.

III. If any of the signatories to this Agreement determines that the terms c the Agreement cannot be met or believes that a change is necessary, the signatory will immediately request an amendment or addendum to the Agreement. Such an amendment or addendum will be executed in the same manner as the original Agreement.

EXECUTION of this Agreement evidences that DoD has afforded the Council a reasonable opportunity to comment on its program of disposal of temporary W. II buildings and that DoD has taken into account the effects of this program on historic resources.

7/2/86

Executive Director, Advisory Council
on Historic Preservation

7/7/86

Chairman
Advisory Council on Historic
Preservation

6/6/86

President CHARLES E. LEE
National Conference of
State Historic Preservation
Officers

5.13.86

Historic American Buildings Survey/
Historic American Engineering Record

Department of Defense

Department of Army

F. S. STERNS
Department of Navy

U. S. Marine Corps

Department of Air Force

B. Represent all SHPOs in the consultation on a selection of examples of buildings to be treated in accordance with Stipulation I.E.

III. If any of the signatories to this Agreement determines that the terms of the Agreement cannot be met or believes that a change is necessary, the signatory will immediately request an amendment or addendum to the Agreement. Such an amendment or addendum will be executed in the same manner as the original Agreement.

EXECUTION of this Agreement evidences that DoD has afforded the Council a reasonable opportunity to comment on its program of disposal of temporary WW II buildings and that DoD has taken into account the effects of this program on historic resources.

John M. Fowler 7/2/86

Executive Director, Advisory Council on Historic Preservation

7/7/84

Chairman
Advisory Council on Historic Preservation

6/6/86

President CHARLES E. LEE
National Conference of State Historic Preservation Officers

6.13.86

Historic American Buildings Survey/
Historic American Engineering Record

Department of Defense

Department of Army

Department of Navy

U. S. Marine Corps

Department of Air Force

E. Represent all SHPOs in the consultation on a selection of examples of buildings to be treated in accordance with Stipulation 1.b.

III. If any of the signatories to this Agreement determines that the terms of the Agreement cannot be met or believes that a change is necessary, the signatory will immediately request an amendment or addendum to the Agreement. Such an amendment or addendum will be executed in the same manner as the original Agreement.

EXECUTION of this Agreement evidences that DoD has afforded the Council a reasonable opportunity to comment on its program of disposal of temporary WW II buildings and that DoD has taken into account the effects of this program on historic resources.

7/2/86
Executive Director, Advisory Council
on Historic Preservation

7/7/86
Chairman
Advisory Council on Historic
Preservation

6/6/86
President CHARLES E. LEE
National Conference of
State Historic Preservation
Officers

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Historic American Buildings Survey/
Historic American Engineering Record

Department of Defense

Department of Army

Department of Navy

U. S. Marine Corps

Department of Air Force

Appendix B.2

PROGRAMMATIC AGREEMENT AMONG THE AIR FORCE, THE ADVISORY COUNCIL ON HISTORIC PRESERVATION, AND THE MONTANA STATE HISTORIC PRESERVATION OFFICE

PROGRAMMATIC AGREEMENT
AMONG
THE UNITED STATES AIR FORCE
THE ADVISORY COUNCIL ON HISTORIC PRESERVATION
AND THE
MONTANA STATE HISTORIC PRESERVATION OFFICE

WHEREAS, the U.S. Air Force, Department of Defense, proposes to deploy the Small Intercontinental Ballistic Missile System (Small ICBM) (undertaking) within the State of Montana; and,

WHEREAS, the Air Force has responsibilities with regard to Section 106 of the National Historic Preservation Act of 1966 (16 U.S.C. Sec. 470f, as amended), and the implementing regulations of the Advisory Council on Historic Preservation, "Protection of Historic Properties" (36 CFR Part 800), the American Indian Religious Freedom Act of 1978, and the Archaeological Resources Protection Act of 1979; and,

WHEREAS, the Air Force acknowledges responsibilities for the proper management of paleontological materials and localities affected by this undertaking, and the Air Force and the State of Montana have determined that these management responsibilities are best fulfilled by being integrated with fulfillment of the Air Force's responsibilities under the above-cited Federal authorities; and,

WHEREAS, the Air Force, in consultation with the Montana State Historic Preservation Officer (SHPO), has determined that the proposed undertaking could have effects upon properties included in or eligible for the National Register of Historic Places (historic properties);

WHEREAS, the Air Force has developed extensive compilations and analyses of the existing literature regarding historic properties known to exist within the area to be affected by the undertaking (project area) and has developed a model (predictive model) indicating the types, numbers, and locations of historic properties likely to exist within the project area; and,

WHEREAS, pursuant to Section 106 of the National Historic Preservation Act of 1966 and 36 Section 800.13, the Air Force has requested the comments of the Council through the development, execution, and implementation of this Programmatic Agreement (Agreement); and,

WHEREAS, the Air Force, the Council, and the SHPO have consulted and will continue to consult and review the undertaking to consider feasible and prudent approaches to avoid, minimize, or satisfactorily mitigate the adverse effects of the proposed undertaking on historic properties,

NOW, THEREFORE, it is mutually agreed that the implementation of the proposed undertaking in accordance with the following stipulations will take into account the effects of the proposed undertaking on historic properties.

STIPULATIONS

The Air Force shall ensure that the following measures are carried out:

I. General

A. The Air Force shall afford the SHPO and Council an opportunity to review and comment on all scopes of work relating to historic preservation, and the opportunity to review and comment on the historic preservation reports and other products generated under this Agreement.

B. The Air Force shall provide data and reports generated under this Agreement to the SHPO.

C. The Air Force, in consultation with the SHPO, shall notify the public of significant actions proposed under this Agreement, shall provide timely notice to news media, and shall afford the public the opportunity to comment to the Air Force, the SHPO, or the Council regarding these actions.

D. The Air Force, in consultation with the SHPO, shall ensure that all historic preservation activities are carried out by or under the supervision of qualified persons as described in 36 CFR Part 61, Appendix A.

E. The Air Force shall ensure that the measures required by this Agreement are carried out by its contractors and agents.

F. The Air Force, in consultation with the SHPO, shall ensure that its contractors and personnel and resident departments are advised against the illegal collection of historic and prehistoric materials, including human remains, and will encourage those with interests in such materials to participate in nondestructive activities.

II. Preliminary Tasks for the Identification and Evaluation of Historic Properties

A. The Air Force, in consultation with the SHPO, shall complete a survey for historic properties of ten percent (10%) of the transporter/erector (T/E) routes. The purposes of this reconnaissance survey are to provide information on existing conditions along T/E routes, and to test the predictive model. The Air Force shall consider the results of the test and the predictive model as part of the narrowing process for the selection of final deployment sites. (In keeping with the desire to reach cultural resource management goals in a timely manner, the reconnaissance survey was completed in August 1987.)

B. The Air Force shall consult with representatives of Native American tribal groups who lived on or used the study area for traditional, sacred, or ceremonial use regarding their comments or concerns about the effects of the proposed undertaking on areas of Native American traditional sacred, ceremonial, or other use within the project area, which are or might be eligible for inclusion in the National Register. The Air Force shall consider the comments and expressions of concern and shall attempt to accommodate them in the Cultural Resources Management Plan (CRMP), and other aspects of the planning and implementation of the undertaking.

III. Development and Implementation of a Cultural Resources Management Plan

A. Contents of the CRMP

In consultation with the SHPO, the Air Force shall develop and implement a CRMP. The CRMP shall address effects from launch facility expansions and associated access roads, areas affected by road and bridge upgrading, proposed base housing expansion areas, portions of Malmstrom AFB affected by the proposed undertaking, Hard Mobile Launcher (HML) vehicle operations training area, and other elements of the proposed undertaking with the potential to affect historic properties. It is understood that the primary kinds of historic properties to be affected by the proposed undertaking are archaeological and historic sites, architectural and engineering structures especially including historic bridges, and Native American traditional sacred, ceremonial, and other use areas and that the CRMP will give special attention to such kinds of properties. The CRMP shall be responsive to the guidelines in Attachment I. (As part of ongoing efforts to identify affected historic properties, surveys of proposed base housing areas, the HML vehicle operations training area, and most launch facility expansions have recently been conducted.)

B. Review of the CRMP

The Air Force shall afford the Council and the SHPO an opportunity to review and comment on the CRMP in its final draft form. The Air Force shall provide the final draft CRMP to the Council and SHPO by 15 February 1988. The Council and SHPO shall provide their comments within 45 days of receipt of all relevant documentation. The Air Force shall make every effort to accommodate the comments of the Council and the SHPO when finalizing the document. Upon finalization of the CRMP, the Air Force shall implement it. Should the Council and the Air Force not have any comments within that 45-day period, the Air Force shall implement the CRMP as proposed. Disagreements regarding the CRMP shall be resolved in accordance with the dispute resolution mechanism in stipulation VI of this Agreement.

IV. The Consideration of Paleontological Materials and Localities

The Air Force has accepted a collateral responsibility to consider the effects of the proposed undertaking on paleontological materials and localities. The Air Force has decided to fulfill this responsibility by integrating the consideration of effects on paleontological materials and localities with the CRMP and other measures called for by this Agreement. Consideration of paleontological properties and localities affected by the proposed undertaking shall be carried out by the Air Force and Montana SHPO, and need not involve the Council.

V. Avoiding Inadvertent Damage During Preconstruction Studies and Activities

A. The Air Force shall ensure that proper coordination occurs between its personnel and contractors to minimize the danger to historic properties from testing, survey teams, and other activities and personnel. The Air Force shall complete a survey for historic properties prior to all ground-disturbing activities. The level and standards of surveys undertaken pursuant to this Agreement shall be in conformance with the recommendations of the CRMP or shall have the prior written approval of the SHPO. No surveys for historic properties shall be necessary if the SHPO has determined in writing that local conditions or circumstances make such a survey unnecessary.

B. Archaeological test excavations may be necessary to obtain data needed to determine if properties meet the criteria for inclusion in the National Register. Test excavations undertaken pursuant to this Agreement shall not be allowed to exceed the scope necessary for such evaluation; procedures for the use of mechanical equipment will be detailed in the CRMP, and will be carried out in accordance with strict archaeological controls.

VI. Dispute Resolution Mechanism

At any time during the implementation of the measures stipulated by this Agreement, should an objection related to historic preservation issues be raised by the Council, the SHPO, a tribally sanctioned representative of an Indian tribe, a representative of local or state government, or a member of the public, the Air Force shall consult with the objecting party to resolve the matter. If the matter cannot be resolved satisfactorily, the Air Force shall forward all documentation relevant to the matter to the Council. Within 30 days after receipt of all relevant documentation, the Council shall:

A. Notify the Air Force that it concurs in the Air Force's position regarding the matter;

B. Notify the Air Force of changes that would make the Air Force's position acceptable, agreement with which by the Air Force would resolve the matter; or,

C. Notify the Air Force that it will comment in accordance with 36 CFR Section 800.6(b).

VII. Definitions of Terms Used in this Agreement

A. Air Force means the AFRCE-BMS acting by itself or through agents or contractors.

B. Historic Properties means any prehistoric or historic district, site, building, structure, or object included in or eligible for inclusion in the National Register of Historic Places. Further, this term includes, for the purposes of 36 CFR Part 800 and this Agreement, artifacts, records, and remains that are related to and located within such properties. The term, "eligible for inclusion in the National Register," includes both properties formally determined as such by the Secretary of the Interior and all other properties that meet the criteria for inclusion in the National Register.

C. Historic Preservation means activities that include, but are not limited to, the identification, evaluation, protection, rehabilitation, reuse, recording of, and the archaeological excavation, analysis, and reporting of historic properties.

D. Paleontological Materials or Localities means physical remains or other traces of an animal or plant of a former geological age.

Execution of this Programmatic Agreement evidences that the U.S. Air Force has afforded the Council a reasonable opportunity to comment on the deployment of the Small Intercontinental Ballistic Missile System and its effects on historic properties and that the U.S. Air Force has taken into account the effects of this undertaking on historic properties.

AFRCE-BMS/DEV
Norton Air Force Base, California

21 Oct 87
BY: Peter Walsh, Lt. Colonel, U.S. Air Force (date)

Montana State Historic Preservation Officer

11-4-87
BY: Marcella Sherfy (date)

Advisory Council on Historic Preservation

3 Dec. '87
BY: Cynthia Grassby Baker (date)

Attachment 1
CULTURAL RESOURCES MANAGEMENT PLAN OUTLINE

The Air Force shall ensure that the Cultural Resources Management Plan (CRMP) is responsive to the following guidelines and includes the following contents.

I. Guidelines

A. The data generated by the preliminary and intensive historic preservation studies.

B. The concerns of local communities and social and ethnic groups.

C. The American Indian Religious Freedom Act.

D. 36 CFR Part 61 and its appendices, Department of the Interior, July 1, 1986.

E. The standards of the Society of Professional Archaeologists.

F. Secretary of the Interior's "Standards and Guidelines for Archaeology and Historic Preservation," 1983.

G. Advisory Council on Historic Preservation's "Guidelines for the Consideration of Traditional Cultural Values in the Historic Preservation Review," draft, 1985.

H. Advisory Council on Historic Preservation's "Preservation Planning in Context", 1983.

I. Advisory Council on Historic Preservation's "Treatment of Archaeological Properties: A Handbook," 1980.

J. Other applicable federal regulations, standards, and guidelines.

II. Contents

A. Overview

An overview of the cultural and natural history of the project area, consisting of a discussion and assessment of: i) the adequacy of efforts to identify and preserve historic properties; ii) the location and relative significance of known historic properties in the study area; iii) approaches used in the past in the treatment of historic properties, including but not limited to the use of such properties for historic or contemporary purposes, research questions and topics that have been the subject of past investigations, and efforts to interpret for the public and preserve historic properties; iv) the effectiveness of past approaches to treatment.

B. Identification and Evaluation of Historic Properties

1. A discussion of the type and number of historic properties likely to be found within the project area and their relative significance, based on the overview and on the results of the preliminary tasks to identify and evaluate historic properties.

2. A system for intensive survey to identify historic properties and paleontological materials and localities that could be affected by the proposed undertaking. The system will provide for archaeological or paleontological testing to determine if significant archaeological "deposits" exist, and for knowledgeable Native American representatives to participate in or be consulted during surveys to identify areas of Native American traditional, sacred, or ceremonial use.

3. Project-specific criteria for determining whether properties meet the criteria for inclusion in the National Register of Historic Places, based both on the data needs identified in the research design (cf., II.C.2. of this Attachment I) and on values other than research potential.

C. Treatment of Historic Properties

1. A system for avoiding adverse effects on historic properties, paleontological materials and localities, and areas of Native American traditional, sacred, ceremonial, or other use. These means may include, but not be limited to, redesigning project elements to avoid effects on such properties, providing for security monitors to prevent vandalism during project construction, and restricting access during and after such construction.

2. A system for the use of historic properties where feasible for continuing historic or for contemporary or future purposes in a manner that maintains their historic integrity.

3. A research design that explicates important research questions, topics, or themes that will make a substantial contribution to the understanding of prehistory and history and means of answering these research questions, topics, or themes. These questions, topics, or themes will address regional and theoretical data gaps or research inadequacies derived from the overview. Further, the research design will justify the importance of the questions, topics, or themes posed, will identify the number of type of historic properties necessary to answer these questions, topics, or themes, and will discuss both field and laboratory research tasks necessary to answer these questions, topics, or themes.

4. A system for treating types of historic properties that are important for reasons other than their historical and archaeological research potential. This may include but not be limited to the marketing of historic bridges for relocation and reuse outside the study area, reuse or rehabilitation of historic properties, and documenting historic properties to the standards of the Historic American Engineering Record/Historic American Building Survey (HAER/HABS), and maintaining or enhancing the character of, and appropriate access to, areas of Native American traditional sacred, ceremonial, and other use areas, and shall include provisions for the treatment and disposition of human remains that takes into account the beliefs and wishes of Native American groups, based on consultation with their representatives.

5. A system for monitoring ground-disturbing activities in areas where historic properties may exist but are obscured or otherwise invisible on the ground, and treating such properties if found. Should construction monitoring be necessary, the monitors shall be professional archaeologists with qualifications meeting the standards in 36 CFR Section 61, Appendix A, and/or appropriate representatives of Native American groups.

Appendix C

RESULTS OF CONSULTATION WITH THE U.S. FISH AND WILDLIFE SERVICE IN ACCORDANCE WITH THE ENDANGERED SPECIES ACT OF 1973

Section 7 of the Endangered Species Act of 1973 requires the evaluation of potential program impacts on threatened and endangered species. Five species were identified by the U.S. Fish and Wildlife Service (USFWS) as potentially occurring in the program area. A biological assessment of potential impacts on these species, the bald eagle, American peregrine falcon, grizzly bear, gray wolf (Northern Rocky Mountain wolf), and the black-footed ferret, was sent to the USFWS for their review. This biological assessment concluded that there would be no threat to the continued existence of threatened and endangered species. The response of the USFWS, which agrees with the finding of no effect, is presented in the following letter dated May 22, 1987. Informal consultation was reinitiated by the USFWS concerning the discovery of a new bald eagle nest in the deployment area that was believed to occur near launch facility I-7. This consultation is described in the following letter dated August 11, 1987. Further analysis indicated that potential disturbances at launch facility I-7 should not adversely affect this new nest site. The USFWS agreed with the conclusion as stated in the letter dated September 4, 1987.

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
Endangered Species, Field Office
Federal Bldg., U.S. Courthouse
301 South Park
P.O. Box 10023
Helena, Montana 59626

IN REPLY REFER TO:
M.37 Small ICBM Missile

May 22, 1987

Peter Walsh, Lt. Col., USAF
Director, Environmental Planning Division
Department of the Air Force
Regional Civil Engineer
Ballistic Missile Support (AFESC)
Norton Air Force Base, California 92409

Dear Colonel Walsh:

We have reviewed the biological assessment and your determination of "no effect" on listed species for the Small Intercontinental Ballistic Missile System at Malmstrom Air Force Base near Great Falls, Montana.

We have discussed the assessment and your determination of "no effect" with Mr. John Gill of your staff. We needed to discuss and add some protective measures for endangered raptors and grizzly bears before we could concur with your "no effect" decision.

We asked Mr. Gill whether the Air Force would adopt the specified management guidelines for the grizzly bear as published in the "Interagency Rocky Mountain Front Management Guidelines for Selected Species" if construction activities occur in occupied grizzly habitat along the Rocky Mountain Front. We also requested Air Force concurrence on a 1 mile nest inventory area for endangered bald eagles and peregrine falcons around any construction in previously undisturbed rights-of-way proposed by this program. Mr. Gill assured us that these additional grizzly bear, bald eagle and peregrine falcon standards and guidelines were acceptable to the Air Force and would become conditions of the program.

Therefore, based upon the information and commitments you provided in your assessment and the Air Force's commitment to the additional above described standards and guidelines, we concur with your "no effect" determination for the grizzly bear, gray wolf, black-footed ferret, bald eagle and peregrine falcon.

During our review we noticed that the Air Force made no commitments to carry out programs for the conservation of listed species as per Section 7(a)(1) of the Endangered Species Act. To assist you in using your authorities to conserve listed species, we provide the following recommendations for your participation in projects that will further the conservation of endangered bald eagles and peregrine falcons.

First, since the peregrine falcon has long been an Air Force symbol, the Air Force could commit to provide logistical support, equipment or funds to establish and maintain a peregrine falcon hacksite within or adjacent to the proposed project. This program involves erecting artificial structures in which captive-reared peregrine falcons are released into the wild to enhance the re-establishment of wild breeding pairs in areas historically occupied by these endangered raptors. A peregrine falcon hacksite is being planned north of Helena, in Gates of the Mountains Wilderness Area, and within the scope of the proposed Small ICBM Program. Future plans call for hacksites for peregrine falcons along the Rocky Mountain Front, also within view of numerous Air Force launch facilities.

A second program, which would assist the recovery of bald eagles, involves financial assistance to develop specific management plans for bald eagle territories in the project area. There is a need for funds to delineate bald eagle territories and describe breeding pair behavior so management plans can be specifically designed for these eagles. This will allow maximum protection for each pair and the particular habitats they use. These plans will establish minimum areas that should be protected for each pair. There are four known bald eagle eyries within the scope of the proposed Small ICBM Project that need management plans.

We hope you will seriously consider participating in these programs or another conservation program for listed species in Montana. Thank you for your efforts to conserve threatened and endangered species. If you have questions about the additional guidelines we agreed to incorporate into this project, or if you wish to discuss and participate in the conservation measures we suggested, please contact us again.

Sincerely,

Ron Crete

Ron Crete
Acting Field Supervisor
Endangered Species

cc: ES, FWS, Billings, MT

RAC/lal/clh

"Take Pride in America"

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
Fish and Wildlife Enhancement
Federal Bldg., U.S. Courthouse
301 South Park
P.O. Box 10023
Helena, Montana 59626

IN REPLY REFER TO:

M.37 Small ICBM Program

August 11, 1987

Lt. Col. Peter Walsh
AFRCE - BMS/DEY
Morton Air Force Base, California
97409-6448

Dear Colonel Walsh:

We have reviewed the Draft Environmental Impact Statement (Statement) for the Small Intercontinental Ballistic Missile Program at Malmstrom Air Force Base, Montana. We have previously provided a concurrence with your "no adverse affects" determination for threatened and endangered species.

We have new information regarding endangered bald eagles in the project area which requires further informal consultation with you regarding potential impacts of the proposed action on this species. The Statement refers to actions near Cascade, Montana, which may have impacts on a newly established bald eagle nest along the Missouri River in T18N, R1E, Sections 17 and 18.

We request that you provide us with specific information about locations of construction activities in the area near launch facility I-7 for our review regarding potential construction impacts. A site specific management plan for this territory as recommended in the Montana Bald Eagle Management Plan may be necessary. We discussed these plans in our letter of May 22, 1987 as a possible conservation measure the Air Force may wish to incorporate into project plans. Other bald eagle nests and future expected eagle territories in the missile project area should be considered as candidates for site specific management plans also.

The Statement also discusses field surveys for listed species (page 4-199). We would like to discuss these surveys with you and establish a mechanism to review the methods and to coordinate surveys and results with on-going status surveys conducted by various wildlife and resource agencies in the project area. After receiving information on activities in the I-7 launch facility area, we may propose a meeting of our staffs and personnel of the Montana Department of Fish, Wildlife and Parks to further discuss these impacts and management plans for eagles.

This concludes our comments on the Statement. Thank you for the opportunity to review the Statement and for your continued efforts to meet our joint responsibilities under the Endangered Species Act as amended.

Sincerely,

Wayne G Brewster

Wayne G. Brewster
State Supervisor
Montana State Office

cc: D. Flath, MDFW&P, Bozeman, MT
FWE, FWS, Billings, MT

RAC/clh

"Take Pride in America"

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
Fish and Wildlife Enhancement
Federal Bldg., U.S. Courthouse
301 South Park
P.O. Box 10023
Helena, Montana 59626

IN REPLY REFER TO:
M.37 Small ICBM Program

September 4, 1987

Peter Walsh, LT. COL., USAF
Director, Environmental Planning Division
Dept. of the Air Force
Ballistic Missile Support (AFESC)
Norton Air Force Base, CA 92409

Dear Colonel Walsh:

We have reviewed the proposed Small Intercontinental Ballistic Missile Program in light of a recently discovered active bald eagle nest near Cascade, Montana. The nest is within two (2) miles of the I-7 Launch Facility.

The proposed action doesn't present additional impacts for these eagles because the I-7 facility is not scheduled for enhancement to accommodate the ICBM Program. Under the alternatives presented in the DEIS certain activities at the facility could have impacts to the assumed territory of this pair. Some construction activities and additional operation activities could present disturbances to foraging eagles. We would predict the potential for significant impacts to be low. We therefore, do not request that formal consultation be initiated on this program at this time. If your analysis and information suggests that this program "may adversely affect" these eagles then you should initiate consultation with us.

We believe that the bald eagle conservation measures we discussed in our May 22, 1987 letter takes on additional significance as a result of finding this nest site. A nest site (territory) management plan for this site and other nests along the Missouri River near Craig and Holter Lake would add valuable data and insight about the seasonal and spacial management prescriptions for various proposed actions near these territories. There is high probability that other eagle nests will be established in the Small ICBM Program area during the life of the project which will benefit from management prescriptions developed for Missouri River nests upstream of Great Falls.

Finally, we request that pre-construction surveys for endangered or threatened species be coordinated with this office and Montana Fish, Wildlife and Parks. We can review methods and timing of surveys and avoid unnecessary impacts due to the survey while minimizing survey redundancy due to ongoing surveys being conducted by Federal and State wildlife and land management agencies.

We also have new data on bald eagle territories presumed to exist on the Blackfeet Indian Reservation along the Two Medicine River. We previously noted that there were active nests in this area (T31N, R10W and T31N, R12W). Surveys this year indicate that these are not active territories in these two townships. Please update your records accordingly.

Thank you for your continued cooperation and assistance in meeting our joint responsibilities under the Endangered Species Act, as amended.

Sincerely,

Dale R. Harms
Acting State Supervisor
Fish and Wildlife Enhancement

cc: Dennis Flath, MFWP, Bozeman

RAC/lal

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Appendix D

MITIGATIONS

D.1 Introduction

The proposed construction and operations of the Small Intercontinental Ballistic Missile (ICBM) system in Montana would cause significant impacts on some elements of both the physical and human environment. It is the policy of the Air Force to make every effort practicable to avoid adverse environmental impacts through careful design, siting, and construction of the Small ICBM system, as well as in activating the system for operation.

Public comments' including those from the Montana office of the U.S. Environmental Protection Agency (EPA) suggesting additional mitigations and requesting information on proposed mitigation measures, were received since publication of the Draft Environmental Impact Statement (DEIS). The Air Force has given due consideration to all comments, and this appendix summarizes the assumed and potential mitigation measures presented in Chapter 4.0, Environmental Consequences.

D.2 Approach

Mitigation measures are the means by which adverse environmental impacts can be reduced or eliminated. These may include any of the following: (1) avoiding the impact altogether by not taking an action or part of an action or changing the design; (2) minimizing impacts by limiting the degree or magnitude of the action and its implementation; (3) rectifying the impact by repairing, rehabilitating, or restoring the affected environment; (4) reducing or eliminating the impact over time by preservation and maintenance operations during the life of the program; and (5) compensating for the impact by replacing or providing substitute resources.

It is important to distinguish among mitigation measures according to the federal, state, or local agencies required to implement the various measures. Such agencies are identified in parentheses at the end of each mitigation measure in Chapter 4.0 in the Potential Mitigation Measures sections. Insofar as those potential mitigation measures for which the Air Force is solely or primarily responsible, it must be understood that, like any other federal agency, the Air Force can accomplish only those measures for which it receives legal authority and for which funds are appropriated. Therefore, determination as to which potential measures will ultimately be undertaken by the responsible agencies must await future developments.

In general, the Air Force, through the U.S. Army Corps of Engineers (COE), will implement mitigation measures during construction at Malmstrom AFB, launch facilities, and launch facility access roads which will be directly under the control of the COE. Mitigation measures along the deployment area roads and bridges will be implemented by the Montana Department of Highways, which is responsible for road and bridge construction. Finally, some measures will be more appropriately developed and implemented by other institutions. In such cases, the Air Force will support the local agencies to the extent possible.

For the Small ICBM program, mitigation planning will be done in two phases: (1) preoperational planning and (2) operational planning. Preoperational planning includes close coordination with responsible federal, state, and local agencies on impact identification and mitigation alternatives. In some instances, there will be memorandums of agreement with agencies describing procedures to be followed. This phase also includes a design stage and the construction/deployment stage In the design stage, the major step of mitigation by avoidance is implemented to the extent practicable. The construction and deployment stage requires implementation and monitoring of mitigation measures adopted in earlier stages. The operational planning phase incorporates those planning and environmental mitigations normal to an Air Force base. These ensure wise protection, provision, use, and management of human, financial, natural, and manmade resources; and promote public health, safety, welfare, and overall quality of life for the Air Force personnel as well as the local community that supports the Air Force base.

D.3 Impact Mitigations

Table D-1 presents those mitigation measures which the Air Force expects to implement through commonly practiced construction methods or by standard Air Force and COE procedures. These assumed construction practices and other assumed mitigation measures have been incorporated into the environmental impact analysis. Table D-2 describes potential mitigation measures which could further reduce impacts identified in the Final EIS (FEIS). These measures could be taken by the Air Force or by state and/or local agencies depending on the location of impacts and the jurisdictions involved in dealing with the impacts most appropriately. The Air Force will encourage and facilitate the agencies responsible to adopt these potential mitigation measures, as appropriate.

In Tables D-1 and D-2 the mitigations presented are grouped according to the two main "drivers" or causes of program impacts: land disturbance and population change. Most of the impacts on the physical environment are caused by surface disturbance at construction sites. Population inmigration is the fundamental cause of most impacts on the human environment in communities which accommodate inmigrating workers.

Table D-1

Small ICBM Potential Impacts, Assumed Mitigations, and Effectiveness of Mitigations

Potential Impacts	Assumed Mitigations	Effectiveness of Mitigations
Part I. Impacts Related to Land Disturbance		
Removal of active energy resource production facilities	1. All active oil- or gas-production facilities or active coal-mining operations within the expanded explosive safety zones will be compatible with the terms of the easement.	Eliminates monetary impacts on active producers.
Limitations to energy resource exploration	1. Oil, gas, or coal exploration will not be restricted in the explosive safety zone.	Does not restrict access to potential resources.
Interference with mineral and energy lease-holders	1. Just compensation will be made for mineral and energy resource interests that must be extinguished to allow launch facility expansion.	Eliminates monetary impacts on lease-holders.
Excessive soil erosion rates at construction sites	1. Grading plans will be developed to limit lengths of disturbed slopes to the extent possible.	Reduces soil erosion rates by minimizing slope lengths.
	2. *Ground disturbed* as a result of construction activity will be mulched immediately upon completion of construction.	*Major reduction in overall soil loss.*
	3. The mulch will be maintained until new vegetative cover is well established.	Maintains effectiveness of straw mulch mitigation.

Table D-1 Continued, Page 2 of 8

Potential Impacts	Assumed Mitigations	Effectiveness of Mitigations
Part I. Impacts Related to Land Disturbance		
Disruption of irrigation water supply as a result of T/E route and bridge upgrades	1. Close coordination of road and bridge contractors with the affected irrigation districts.	Completely effective if construction across irrigation canals occurs during the nonirrigation season (October to April). Moderately to highly effective in minimizing impact during the irrigation season.
Water quality degradation resulting from improper disposal of wastes	1. Provide waste and wastewater collection and disposal systems during program construction and operations phases.	Highly effective in minimizing water quality degradation resulting from construction-related wastes (including equipment fluids and fuels), construction activities (such as dewatering of trenches or construction sites), and wastewater generated in the field by workers.
Changes in stream hydraulics at bridges and along T/E routes	1. Design bridge to minimize or eliminate abutments or supports between streambanks.	Highly effective in avoiding changes in streamflow that could result in increase channel erosion or scour; could increase bridge costs.
Degradation of water quality and aquatic habitats at or near launch facilities, access roads, T/E routes, and at bridge replacement sites	1. Avoid equipment operation in the stream or wetland.	Effective in reducing downstream turbidity increases.
	2. Limit construction to the roadside upgradient of the stream.	Increases flow path for eroded materials; slightly to moderately effective in reducing sediment transport to nearby streams.
Wetland/aquatic habitat loss at or near launch facilities, access roads, T/E routes, and at Malmstrom AFB	1. Replace wetlands.	Replacing lost or disturbed wetland habitats with new or restored habitat at a ratio acceptable to natural resource managers can compensate for lost productivity until the new habitats have become established.
Loss of vegetation and wildlife habitat at launch facilities, access roads, T/E routes, and HML vehicle operations training area	1. Limit disturbance.	Limiting or restricting disturbance in an area is the most effective means for reducing impacts on the area. Could increase construction costs.

Table D-1 Continued, Page 3 of 8

Potential Impacts	Assumed Mitigations	Effectiveness of Mitigations
Part I. Impacts Related to Land Disturbance		
	2. Revegetate disturbed areas and control noxious weed invasion.	Revegetation and noxious weed control will be considered through the Defense Access Roads needs process. Revegetation can help restore areas to predisturbance conditions or, in some cases, provide enhancement in a very short time. It will also limit the spread of noxious weeds into new areas.
	3. Avoid disturbance of federal-candidate or Montana-recognized plant species.	Incorporation of the results of surveys for sensitive plant species in the early planning and siting processes can reduce disturbance to these species.
Wildlife disturbance resulting from noise and activity at launch facilities, access roads, T/E routes, and HML vehicle operations training area	1. Schedule activities to avoid wildlife disturbance.	Scheduling activities to avoid disturbing wildlife during critical periods (e.g., during reproductive periods and during winter in severe wintering habitats) will often allow otherwise sensitive species to coexist with program activities.
	2. Coordinate with appropriate agencies.	Coordination of mitigation plans with appropriate natural resource agencies will ensure consistency with agency goals, objectives, and procedures, and generally will improve effectiveness of the mitigation plan.
	3. Control unnecessary noise.	Controlling unnecessary noise (e.g., with mufflers) can substantially reduce disturbances (disruption of daily/seasonal activities) to nearby wildlife in all habitats.
	4. Conduct surveys for threatened and endangered wildlife species.	Identifying the presence of a threatened and endangered species can allow for avoidance of the site or planning to reduce or eliminate disturbance during critical periods.
Spill of hazardous materials (e.g., oil and fuel) in terrestrial habitats or degrading water quality near launch facilities, along T/E routes, at bridge sites, or on Malmstrom AFB	1. Observe safety guidelines.	Observing speed limits during transport, following safe handling guidelines, and implementing other safety measures, can greatly reduce the probability of a spill of hazardous material from occurring.

Table D-1 Continued, Page 4 of 8

Potential Impacts	Assumed Mitigations	Effectiveness of Mitigations
Part I. Impacts Related to Land Disturbance		
	2. Provide compensation for environmental damage following a spill.	Natural resource regulatory agencies should seek compensation for environmental damages from the responsible party. Monetary compensation often allows for restoration of damage to aquatic species and/or aquatic/terrestrial habitat as well as to the downstream water users. Compensation can also provide incentive to prevent recurrence of the event.
	3. Update the Spill Prevention and Response Plan.	An updated Spill Prevention and Response Plan will outline procedures for rapid spill detection, response, and reporting (including containment, recovery, cleanup, and disposal) of Air Force-controlled hazardous materials. Adherence to the plan will minimize the potential entry of contaminants into receiving waters or reduce the amount of terrestrial habitat or soil affected (spills in terrestrial environments will often remain in the local area).
	4. Update Hazardous Waste Management Plan.	An updated Hazardous Waste Management Plan will identify the procedures involved with the classification, handling, storage, and transport of hazardous wastes. Adherence to these requirements reduces the opportunity for mishaps that would expose the waste to the environment.
Land grading for construction could leave unsightly cuts and fills on the landscape	1. Restore land to its original character with good grading practices and revegetate with appropriate species.	Such mitigations would be very effective in reducing plant recovery time and visual contrasts.
Dust created by construction equipment could detract from views of the landscape	1. Use dust-suppression methods such as watering and/or placement of gravel or oil on soil that would create dust when heavily used. Wetting is especially important during windy periods.	Such mitigations would be only moderately successful because heavily used areas could not be kept continuously wet.

Table D-1 Continued, Page 5 of 8

Potential Impacts	Assumed Mitigations	Effectiveness of Mitigations
Part I. Impacts Related to Land Disturbance		
New buildings at Malmstrom AFB could look "out of place" and detract from the visual environment of the base.	1. New onbase facilities should be designed to visually blend with existing base facilities. Landscaping can also reduce visual impacts by lessening contrasts.	Such mitigations would be very effective in reducing visual contrasts onbase.
Direct disturbance of subsurface cultural resources	1. Avoid through redesign or rerouting of facilities.	The Air Force will avoid significant cultural resources whenever possible. Avoidance would preserve the important historic/cultural characteristics of a resource and/or its research potential. It would also be possible to avoid the costs of data recovery and possible construction delays. Avoidance is the preferred treatment for cultural resources, though redesigned facilities may potentially affect areas sensitive for other resources.
Disturbance of Native American resources	1. Consult with Native American representatives during survey and monitoring activities and for reburials, if necessary.	In the event that human burials are encountered during construction, tribal representatives would evaluate the finds. May entail some construction delays while appropriate reburial or other ceremonial activities are carried out. Delays will be minimized by having monitoring arrangements planned in advance of construction. Costs will vary depending on the tribe and the nature of any resources encountered.
Part II. Impacts Related to Population Changes		
Inmigration of population may cause unforeseen adverse impacts on the local economy and community	1. Develop and implement a socioeconomic monitoring program during the construction and early operations years of the program.	Monitor socioeconomic changes in the area to provide up-to-date projection of key indicators and identify deviations in projected impacts. This measure would allow the Air Force, in conjunction with state agencies, to develop new mitigation measures or revise existing measures, as required. Examples of indicators that could be incorporated include program employment, inmigration, demographic characteristics, earnings, housing, school enrollments, service demands for public services, and revenues and expenditures of different jurisdictions.

Table D-1 Continued, Page 6 of 8

Potential Impacts	Assumed Mitigations	Effectiveness of Mitigations
Part II. Impacts Related to Population Changes		
Assimilation of military population into the Great Falls area	1. Continue community orientation program for all new base personnel.	A comprehensive community in-briefing should assist newcomers in adapting to the area.
Housing shortages for *low and moderate rental units* may occur as a result of inmigration of lower-rank military personnel	1. Provide housing units for Air Force personnel.	By providing housing that cannot be supplied through the private sector, adverse impacts will be avoided. At the same time, beneficial effects resulting from the occupancy of existing vacancies and profitable new development will be realized.
Increased electrical load on Montana Power Company and rural cooperatives	1. Coordinate energy planning with local and regional suppliers to ensure a timely and efficient energy supply.	This action would provide the lead time necessary to deliver power at the least cost and with the least amount of disruption to the existing system. Local and regional suppliers and the Air Force would coordinate this action as soon as possible.
	2. Incorporate energy conservation design requirements into all new Air Force buildings.	This action would reduce onbase demands for natural gas and electricity. This action would occur as new base buildings are constructed.
	3. Upgrade substations, transformers, and transmission lines in the deployment area.	This action would reduce the likelihood of increases to customer ratios in the deployment areas, but implementation could be costly. A plan would be defined by the Air Force in the early 1990s and the local suppliers would have to make the upgrades.
Disruption of traffic during road and bridge improvements	1. Implement normal construction practices such as identifying and advertising detour routes if available, doing stage construction to allow continuous traffic flow during construction, etc.	This would provide alternate routes to motorists or would allow motorists to pass construction sites with minimal delays and hazards.

Table D-1 Continued, Page 7 of 8

Potential Impacts		Assumed Mitigations	Effectiveness of Mitigations
Part II. Impacts Related to Population Changes			
Increased wear and tear of roads on T/E network as a result of program-related traffic	1.	The Air Force will assist local agencies for any extraordinary maintenance work on roads.	This action would increase the service life and quality of roads. This would also reduce instances of road closures or detours.
Relocation of inhabited structures located within explosive safety zones	1.	Provide fair market value and relocation benefits as legally mandated under the provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (P.L. 91-646).	This action would compensate the property owner for economic loss due to relocation.
	2.	Allow the owner to request exemption.	This action would allow the owners to continue to reside within the explosive safety zone, but it is a discretionary decision on the part of the Secretary of the Air Force.
Loss of productive agricultural lands due to land acquisition	1.	Pay fair market value for any crops destroyed or taken out of production on private or leased lands as a result of program construction.	This action would compensate landowners or lessees for lost agriculture production.
	2.	Implement erosion-control measures in disturbed areas.	This action would reduce disturbance of agricultural production.
	3.	Participate in cooperative planning with federal, state, and local governmental agencies.	This action will promote communication among the representatives dealing with the preservation of agricultural productivity.
	4.	Provide alternate routes during road construction.	This action would reduce the occurrences of impedance of access to agricultural land and/or to market.

Table D-1 Continued, Page 8 of 8

Potential Impacts	Assumed Mitigations	Effectiveness of Mitigations
Part II. Impacts Related to Population Changes		
Increased use of regional recreation resources; potential disruption of agricultural practices and disturbance of cultural and biological resources	1. Present an environmental awareness program to new Air Force personnel and contractors.	This action will inform program-related inmigrants about precautions (and applicable regulations) necessary to preserve the unique environment of the region and preserve the goodwill of the residents. This may be effective in minimizing potential indirect impacts on these resources and reducing the potential for conflicts with private landowners and illegal hunting and fishing actions.
Air quality degradation resulting from fugitive dust during construction activity	1. Fugitive dust will be controlled by watering the construction areas.	This measure will reduce fugitive dust emissions by 50 percent.
Increased noise levels create potential annoyance at sensitive receptors such as schools, churches, hospitals, and residential areas	1. Construction equipment will operate with noise-suppression baffles and mufflers.	Very effective.

Table D-2

Small ICBM Potential Impacts, Potential Mitigations, and Effectiveness of Mitigations

Potential Impacts	Potential Mitigations	Effectiveness of Mitigations
Part I. Impacts Related to Land Disturbance		
Soil erosion and sedimentation at surface disturbance sites resulting in aquatic habitat degradation, vegetation loss, terrestrial habitat degradation, and decreased agricultural productivity	1. Apply straw mulch in excess of assumed mitigation.	Major reduction in overall soil loss.
	2. Develop stormwater runoff control measures.	Less effective than straw mulch but could reduce high impacts with extensive measures.
	3. Apply sediment retention measures.	Most effective when implemented together with mulching and/or stormwater control. These measures could be taken separately or collectively on a case-by-case basis.
Degradation of water quality and aquatic habitats at or near launch facilities, access roads, T/E routes, and at bridge replacement sites	1. Avoid steep grades or embankments along road segments lying less than 0.5 mile from streams.	Highly effective in reducing potential transport of sediments to nearby streams.
	2. Schedule construction during periods of no flow for intermittent streams.	Highly effective in avoiding downstream transport of suspended sediments; reduced construction costs.
	3. Avoid building temporary culverts at bridge sites.	Effective in minimizing downstream turbidity resulting from bridge construction; possible traffic inconvenience because of lengthy detours.
	4. Avoid simultaneous construction of multiple bridges on the same stream.	Moderately effective in minimizing the length of stream subjected to elevated turbidity levels; avoids overlapping turbidity effects.
Increases in peak stormwater runoff from Malmstrom AFB	1. Construct runoff detention ponds at new military housing site on northwest side of Malmstrom AFB.	Highly effective in preventing local increases in stormwater runoff and associated downstream problems.

Table D-2 Continued, Page 2 of 10

Potential Impacts		Potential Mitigations	Effectiveness of Mitigations
Part I. Impacts Related to Land Disturbance			
Intensification of saline seeps near launch facilities	1.	Grade any cleared areas to drain completely for any launch facilities in the vicinity of saline seeps.	Moderately effective in minimizing increases in local groundwater recharge and the resulting intensification of a nearby saline seep. May increase sedimentation.
Wetland/aquatic habitat loss at or near launch facilities, access roads, T/E routes, and at Malmstrom AFB	1.	Assist other programs.	When it is not possible to provide onsite restoration, assistance with other, often unrelated programs, may provide the most successful means of compensating for lost resources.
Loss of vegetation and wildlife habitat at launch facilities, access roads, T/E routes, and HML vehicle operations training area	1.	Provide offsite restoration.	Onsite disturbances cannot always be repaired. Offsite mitigations may effectively compensate for onsite losses.
	2.	Assist other programs.	When it is not possible to provide onsite restoration, assistance with other, often unrelated programs, may provide the most successful means of compensating for lost resources.
Direct disturbance of subsurface cultural resources	1.	Implement data-recovery measures (survey, excavation, and artifact analysis).	Under the terms of the Programmatic Agreement, appropriate data-recovery procedures will be identified through consultation. If a resource is significant for its scientific research potential, implementation of the appropriate data-recovery measures can result in a finding of no adverse impact. Data recovery is labor intensive (i.e., costly), but is the most widely accepted treatment for affected resources which cannot be avoided. Can lead to delays in construction.
	2.	Implement monitoring program during site clearance.	Allows the identification and evaluation of resources encountered during construction. Complies with cultural resources regulations and the Programmatic Agreement. Involves the cost of field personnel and the potential for schedule delays resulting from data recovery.

Table D-2 Continued, Page 3 of 10

Potential Impacts	Potential Mitigations	Effectiveness of Mitigations
Part I. <u>Impacts Related to Land Disturbance</u>		
Direct disturbance of aboveground cultural resources	1. Avoid or implement a preservation program for historic resources.	Responds to regulations and Programmatic Agreement by preserving properties of a resource that make it historically significant. Only applicable to certain types of resources, generally architectural remains. Includes cost of stabilization and rehabilitation work, and may imply ongoing management responsibilities.
	2. Conduct documentation procedures following Historic American Building Survey (HABS) and Historic *American Engineering Record* (HAER) standards for engineering characteristics.	For certain types of resources (e.g., bridges and dams), detailed recording may be used to support the conclusion that impacts are adverse but acceptable. Acceptable documentation consists of recording following HABS standards for architectural characteristics and HAER standards for engineering characteristics. Requires detailed mapping and photography.
	3. Remove structure for reuse at another location.	May involve rehabilitation of a structure or removal for reuse at another location or donation to a museum, park, etc. Funds that would otherwise be used in demolishing or removing a resource can often be applied to reuse. This measure is widely used for small bridges and for small historic buildings such as log cabins.
Direct disturbance of paleontological resources	1. Conduct evaluation and data-recovery programs.	Individual localities would be evaluated for significance. If significant, the information contained in the deposit would be recovered through scientific excavation methods. Excavation is labor intensive and costly, and the potential for construction delays exists.

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Potential Impacts	Potential Mitigations	Effectiveness of Mitigations
Part II. Impacts Related to Population Changes		
Inmigration of short-duration population during construction may place burdens on local communities	1. Encourage local contractors to participate in the competitive bidding process.	Although not guaranteed, this approach has been successful in previous projects. By providing the opportunity for greater participation of local firms and workers, inmigration of construction workers from outside the ROI can be reduced.
	2. Discourage the inmigration of individual job seekers.	Although not guaranteed, this approach has been successful in previous projects. Most potential workers do contact local sources prior to relocating to a new area.
Assimilation of new population into the Great Falls area	1. Expand community orientation program to include all new employees.	Although the Air Force provides a community in-briefing for all of its personnel, expansion to include all new workers, including contractors, should assist in newcomers adapting to the area.
	2. Coordinate the community orientation program with local government, social, and religious organizations.	This coordination will assure a comprehensive program.
Elementary enrollments will exceed capacity in the neighborhood schools in Great Falls	1. Utilize an intergovernmental working group to plan and suggest preferred mitigations and to participate in any follow-up monitoring programs.	This action would aid in identifying timing problems in enrollments, would be effective for planning purposes, and would define communication links among the participants.
	2. Hire additional staff.	This action would retain preferred pupil-to-teacher ratios. The cost of this change would be at the district level.

Table D-2 Continued, Page 5 of 10

Potential Impacts	Potential Mitigations	Effectiveness of Mitigations
Part II. <u>Impacts Related to Population Changes</u>		
	3. Transport pupils from overcapacity to undercapacity facilities; redefine neighborhood school boundaries.	This would allow for the utilization of existing school facilities that could accommodate additional enrollment. The cost of this action would be modest, including new buses and drivers, but the result would contradict current policies for neighborhood schools that preclude the busing of elementary students.
	4. Convert Paris Gibson Junior High to an elementary school.	This would allow for the use of an existing facility. The cost of this action would include facility renovation, staffing, and pupil transportation. The result would be a very large elementary school which could contradict current policies for neighborhood schools.
	5. Convert to a middle-school concept (K-5, 6-8, 9-12).	This would increase capacity in neighborhood elementary schools since busing would occur 1 year earlier. It would require changes in curriculum, facilities, staffing, and pupil transportation. The cost of this change would be systemwide and cannot be directly determined as a result of the proposed Small ICBM program.
	6. Construct a new elementary school in a location of inmigrant enrollment concentration.	This action would eliminate the overcrowding of elementary schools and would preserve the neighborhood school concept. However, this option is costly not only in terms of the initial capital outlay, but also for long-term operations.
Increased pressure on public and private human services may occur as a result of inmigrant needs	1. Utilize an intergovernmental working group to coordinate human service activities between local and state agencies.	This action would be effective for identifying areas of potential increased demands, allow for planning, and would not be too costly.

Table D-2 Continued, Page 6 of 10

Potential Impacts	Potential Mitigations	Effectiveness of Mitigations
Part II. Impacts Related to Population Changes		
	2. Supply detailed construction site maps and schedules to local emergency service agencies.	This action would reduce response times for potential calls for emergency services. It would allow for agencies to plan ahead in terms of construction schedules which would result in more traffic in identified areas.
	3. Develop education programs for pertinent social issues.	This action would help to prevent child abuse, spouse abuse, and substance abuse. It would also alleviate many of the service demands placed on local agencies.
	4. Summarize and distribute information on available services.	This action would be effective in optimizing available services.
	5. Promote volunteerism by compiling lists of needs by agencies.	This action would promote effective use of local talent, increase social awareness, assist in assimilation process of inmigrants, and build good relations between the base and the community.
	6. Encourage construction contractors to participate in the local United Way Campaign.	This action would increase revenue to local human service agencies and would build goodwill between the community and the base.
	7. Expand onbase human and social service programs for military personnel.	This action would reduce many of the service demands on local agencies.
Overcrowding of the Great Falls jail facility	1. Continue cooperative agreements with neighboring county jails to intern prisoners.	This action would alleviate overcrowding of jails, and circumvent the need for reduced sentences and/or prosecution. However, there would be costly transportation and out-of-county internment fees and this action would reduce patrol time because of transportation duties.

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Potential Impacts	Potential Mitigations	Effectiveness of Mitigations
Part II. Impacts Related to Population Changes		
	2. Help promote private construction of a new jail facility.	This action would eliminate overcrowding of the jail, the start-up costs would be financed by a third party, and the facility would add to the local tax base. Additional staff would be required to man the new facility.
Revenue shortfalls in local government finances	1. Explore existing funding sources for impact aid to schools such as P.L. 874 and P.L. 815 for capital construction.	This action would assist local school district officials in seeking federal aid; however, it is known that these programs currently have limited funding. The Air Force, school district officials, and Montana Department of Education representatives would coordinate this action.
	2. Encourage participation in P.L. 874 program by implementing an orientation meeting for all program-related employees and including information on program data needs.	This action would help maintain the financial position of the school districts, but would depend on the funding level of the program.
	3. Identify and implement new revenue sources that would capture fiscal benefits associated with program activities (e.g., sales and use taxes).	This action would assist in maintaining the financial position depending on the type of tax and extent of the tax base.
	4. Reduce expenditures.	This action would assist in maintaining the financial position of local governments. The reduction in service levels may be unacceptable to local residents.
Increased congestion on city streets in Great Falls	1. Schedule work hours for program-related employees and encourage ride sharing to avoid commuting during normal traffic peak hours.	This would reduce peak-hour traffic flow therefore reducing delay and accidents.

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Potential Impacts		Potential Mitigations	Effectiveness of Mitigations
Part II. Impacts Related to Population Changes			
	2.	Institute transportation management measures for 10th Avenue South, River Drive, and 57th Street such as the installation of signs, pavement markings, traffic lights, etc.	This would improve the quality of flow on city streets.
Increased vehicles on T/E route network	1.	Use of buses to transport crew members to launch facilities.	This would reduce the number of vehicles on deployment area roads therefore reducing delays and accidents.
Possible traffic delays and accidents on T/E routes as a result of HML convoy movements	1.	Widen road where warranted to avoid conflicts between oncoming traffic and the HML convoy based on projected traffic volumes and HML convoy movements.	This would reduce traffic delays and allow oncoming public vehicles to travel at normal speed.
	2.	Construct turnouts and/or passing lanes on *HML T/E* routes where significant delays are anticipated because of high-to-moderate traffic volumes and the frequency of HML convoy movements.	This would reduce traffic delays and allow public vehicles to pass the HML convoy.
	3.	Improve 10th Avenue South, use other existing routes, or construct a bypass to mitigate traffic impacts on 10th Avenue South.	This would reduce delays on 10th Avenue South or could provide for an alternate T/E route if bypass is constructed.
	4.	Schedule HML convoy movements, when possible, during off-peak hours of traffic flow.	This would avoid increasing congestion and delay during peak traffic hours.

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Potential Impacts	Potential Mitigations	Effectiveness of Mitigations
Part II. Impacts Related to Population Changes		
	5. Schedule HML convoy movements, when possible, around less than acceptable road conditions such as freeze thaw, heavy rain/snow, or poor visibility.	This would avoid occurrence of traffic accidents resulting from poor weather or road conditions.
	6. Provide greater maintenance and missile component changeout capabilities at HML enclosures.	This would reduce HML travel times, trip frequencies, and weight of vehicles since only the missile would be transported to Malmstrom AFB. Secruity implications, cost, and maintenance effectiveness considerations may offset advantages of this mitigation.
Disruption of traffic during road and bridge construction/improvements	1. Advertise the schedule for major road and bridge improvements.	This action would allow the public to avoid the construction sites.
	2. Identify and advertise detour routes.	This action would allow the public to avoid the construction sites.
Relocation of inhabited structures located within explosive safety zones	1. Adjust HML enclosure layouts, when feasible, to avoid the relocation of existing inhabited structures.	This action would reduce the number of inhabited structures requiring relocation.
	2. If possible, avoid launch facilities containing existing inhabited structures.	This action would reduce the number of inhabited structures requiring relocation.
Increased pressure on local recreation resources in Great Falls	1. Construct/develop new facilities and parkland.	This action would provide additional recreation facilities to accommodate increased demand. The cost for some facilities may be high.
	2. Adjust scheduling of facility use or perform minor upgrading of facilities (e.g., adding lights).	This action would accommodate increased demand by providing for more hours of use.

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Potential Impacts	Potential Mitigations	Effectiveness of Mitigations
Part II. Impacts Related to Population Changes		
	3. Place time limitations on use of facilities.	This action would allow more people to use facilities but limits length of use.
	4. Expand cooperative agreements for use of city and school district recreation facilities.	This will be effective in accommodating increased demand resulting from the program.
Air quality degradation at Malmstrom AFB, Great Falls, launch facilities, and along T/E routes (during construction and operations phases)	1. Transport workers to and from construction site to a central parking facility.	Will lower dust and carbon monoxide; depends on the degree to which this potential mitigation is enforced.
	2. Encourage carpooling and van pools for Air Force employees during operations phase.	Will have low to moderate effectiveness in minimizing air pollutants.
	3. Provide flextime for Air Force employees during operations phase.	Will have low to moderate effectiveness in minimizing air pollutants.
	4. Maintain construction vehicle engines requiring air pollution equipment.	Very effective in minimizing local air degradation.
	5. Place conservative speed restrictions for construction and operations vehicles on unpaved roads.	Very effective in reducing fugitive dust.