Volume III - Technical Appendices

ENVIRONMENTAL IMPACT STATEMENT

Relocation of U.S. Army Chemical School and U.S. Army Military Police School to Fort Leonard Wood, Missouri

March 1997

ENVIRONMENTAL IMPACT STATEMENT ORGANIZATION

This Environmental Impact Statement (EIS) describes the anticipated impacts of relocating the U.S. Army Chemical School and U.S. Army Military Police School to Fort Leonard Wood. It identifies and describes the proposed actions, alternatives to these actions, and related environmental effects as required by the President's Council on Environmental Quality regulations, the National Environmental Policy Act and Army Regulation 200-2. The main body of the EIS consists of Volumes I and II. In addition, Volumes III and IV have been prepared as supporting documents, with limited distribution. All four volumes of the EIS are available for review at listed information repositories or upon request. A complete Table of Contents for each volume has been included in Volume I. A summary of the contents of Volumes I - IV is provided below.

VOLUME I

EXECUTIVE SUMMARY provides an overview of the information presented in the EIS but is not intended to replace the detailed evaluation presented in the body of the document.

Section 1 **PURPOSE, NEED AND SCOPE** describes the base closure and realignment decision-making process, why the EIS is being prepared, the scope of the document, and the EIS public involvement process.

Section 2 **OVERVIEW OF THE PROPOSED ACTION** describes relevant background information associated with the proposed action and an overview of the proposed action analyzed in the EIS.

Section 3 **DESCRIPTION OF ALTERNATIVES - INCLUDING THE PROPOSED ACTION** provides a discussion of how the EIS study alternatives were developed, and a description of alternatives to be evaluated in the EIS (including a detailed discussion of the Army's proposed implementation action).

Section 4 **AFFECTED ENVIRONMENT** describes the existing physical, social and economic characteristics of Fort Leonard Wood and its environs.

Section 5 **ENVIRONMENTAL CONSEQUENCES** provides an analysis of the environmental and socioeconomic effects of the proposed action and alternatives.

Section 6 **LIST OF PREPARERS** identifies the professional and technical staff responsible for the preparation of the EIS, and provides a summary of their qualifications.

Section 7 **DISTRIBUTION LIST** identifies public officials, public agencies, public interest groups, organizations, and individuals that received copies of the EIS.

Section 8 **INDEX** provides an alphabetical list of topics addressed in the EIS.

Section 9 **REFERENCES** provides a listing of materials used in the development of the EIS.

Section 10 **PERSONS CONSULTED** identifies public agencies, public interest groups, organizations, and individuals that were consulted during the development of the EIS.

VOLUME II

IMPACT ANALYSIS MATRICES have been included to graphically illustrate the anticipated impacts of implementing the proposed BRAC action at FLW. These matrices are intended to be used in association with the narrative and tabular data provided in Section 5, *Environmental Consequences*, of Volume I. **EIS REVIEW COMMENTS AND RESPONSES** for all verbal and written comments received during the comment period have also been included in Volume II.

VOLUME III

TECHNICAL APPENDICES includes materials that support the development of the EIS. Volume III is a supporting document, with limited distribution, which is available for review at listed public repositories (see subsection 1.4.6.3) or upon request.

VOLUME IV

IDENTIFICATION AND SCREENING OF ALTERNATIVES TO ACCOMPLISH TRAINING GOALS AT FORT LEONARD WOOD documents the process used to formulate the training method alternatives that are analyzed in the EIS. Volume IV is a supporting document, with limited distribution, which is available for review at listed public repositories or upon request.

This document is printed on recycled and recyclable paper.

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APPENDIX A: SCOPING MEETING COMMENTS AND HANDOUTS

Appendix A: Scoping Meeting Comments and Handouts

A.1 INTRODUCTION

A scoping process was initiated during the early stages of this EIS to solicit public and agency participation in the identification of issues to be considered. A description of the scoping process and issues identified is provided in Sections 1.3.5 and 1.3.6. This appendix includes: 1) copies of letters received from various federal, state and local jurisdictions and interest groups; 2) copies of selected handout materials provided at the scoping meeting; and 3) other pertinent coordination items developed prior to the release of the Draft EIS to the public.

A.2 PUBLIC AGENCY AND ORGANIZATION SCOPING COMMENTS

This subsection includes copies of written scoping comments received from federal, state and local agencies, and letters submitted as a formal statement from organized interest groups. Other written and oral comments (as described in Section 1.3.5 and 1.3.6) were fully considered in the formulation of the EIS, but have not been included here to reduce the volume of this appendix. However, the official agency and organization letters contained herein provide a representative overview of issues defined through the scoping process.

Letters reproduced in this Appendix, and the page number location of each letter are shown on the following page. Copies of scoping meeting handouts have been included under Section A.3.

Agency Scoping Letters:

Special Interest Groups:

Chamber of Commerce
P.O. Box 209 Eldon, Missouri 65026 (314) 392-3752

November 3, 1995

Mr. Robert Bax
Harland Bartholomew & Associates, Inc.
400 Woods Mill Road South, Suite 330
Chesterfield, MO 63017

Dear Mr. Bax:

Please consider this letter confirmation of receipt of your "Notification of Environmental Impact Statement and Request for Information - *BRAC 1995 Environmental Impact Statement for the US Army Engineer Center and Fort Leonard Wood, Missouri*."

I am currently uncertain if my Board or members will have any concerns or comments regarding the proposed additions to the Fort Leonard Wood site. I will include the necessary information and procedure to comment in my upcoming newsletter and mention this at my 11/15/95 Board Meeting.

Sincerely,

Ellen L. Smith
Executive Director

NOV - 7 1995
Harland Bartholomew & Assoc.
St. Louis, Mo

Explore ELDON

CITY OF LICKING

126 S. MAIN STREET / P. O. BOX 64 / LICKING, MISSOURI 65542 / PHONE 314-674-2521

October 25, 1995

Mr. Robert B. Bax, Project Manager
Harland Bartholomew and Associates, Inc.
Suite 330, 400 Woods Mill Road South
St. Louis, Missouri 63017

Dear Sir,

I write in response to your letter dated October 19, 1995 in reference to the Environmental Impact Statement you are preparing for the relocation of the U.S. Army Chemical School and U.S. Army Military Police School from Fort McClellan, Alabama to Fort Leonard Wood, Missouri.

I can see no negative environmental impact on the City of Licking due to the move of the U.S. Army Chemical School and U.S. Army Military Police School to Fort Leonard Wood. However, I feel it will have a very positive economic impact for us, creating new jobs and in turn increasing our population.

We have a very good relationship with Fort Leonard Wood and we appreciate their willingness to keep us totally informed about the growth and happenings at Fort Leonard Wood.

Sincerely,

City of Licking, Missouri

Mark Rinne, Mayor

Waynesville - St. Robert Area Chamber of Commerce

First State Bank Building • Suite 206 • St. Robert, Missouri
Post Office Box 6 • Waynesville, Missouri 65583
Phone 314-336-5121 • Fax 314-336-5472

Executive Director
Christia A. Morrissey

President
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Past President/Directors
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David Tritten

Directors
Sue Campbell
Judi Tillett
David Johnson
Mike Liebig
Joe Rasmussen
Barbara Peterson

Administrative Secretary
Gloria Culpepper

November 13, 1995

Harland Bartholomew & Associates. Inc.
Attn: Robert B. Bax
400 Woods Mill Road South, Suite 330
Chesterfield, MO 63017

Dear Mr. Bax,

The Waynesville - St Robert Area Chamber of Commerce acknowledges receipt of your letter notifying us of the Public Scoping Open House Meeting on Thursday November 30 1995, from 4:30 pm to 8:30 pm at Waynesville High School.

If our office can assist in accommodations or set up, please let us know in advance.

Sincerely,

Christia A. Morrissey

Christia A. Morrissey
Executive Director

NOV 16 1995
Harland Bartholomew & Assoc.

"Waynesville - St. Robert -- Communities With No Limits"

SCOCOG
South Central Ozark
Council of Governments

P.O. Box 531 | Cabool, Missouri 65689-0531 | (417) 962-3238

December 1, 1995

Mr. Robert Bax
Harland Bartholomew & Associates, Inc.
400 Woods Mill Road South, Suite 330
Chesterfield, MO 63017

Re: Environmental Impact Statement

Dear Mr. Bax:

We are in receipt of your letter dated October 19, 1995 regarding the above referenced activity. We do not have any comments at this time but request our agency be placed on the mailing list to receive a copy of your findings and conclusions. We would also like to be kept informed of results of the "scoping meetings" you conduct as you progress with the EIS.

Sincerely,

John W. Murrell, Jr.
Planner-In-Charge

JWM/sjc

RECEIVED
DEC - 4 1995

*Project Administration · Community Planning & Development · Revolving Loan Fund
Demographic & Census Information · Desktop Publishing · Geographic Information System Mapping · Laboratory Testing
· A Designated Economic Development District ·*

Pulaski County Health Department

HIGHWAY 17 NORTH
CROCKER, MISSOURI 65452

TELEPHONE 736-2217 P. O. BOX 498

October 30, 1995

Mr. Robert B. Bax, Project Manager
Harland, Bartholomew & Associates, Inc.
400 Woods Mill Road South
Suite 330
Chesterfield, Mo. 63017

Re: Environmental Impact Statement

Gentlemen:

In response to your letter of October 19, 1995 requesting our participation in your planned public scoping meeting on Thursday, November 30, 1995.

Mr. Charles Thompson, Environmental Sanitarian, and myself plan to attend the meeting. Please accept this letter as our official acceptance of your invitation.

As far as identification of any key issues are concerned, our concerns would be the possible impact on water aquifiers in Pulaski County and the possibility of air pollution However, we feel that these concerns are being adequately addressed by the State of Missouri Department of Natural Resources and the Air Conservation commission. Please contact them for the needed statements.

Thank you for your invitation and the opportunity to speak of these concerns.

Sincerely;

A. Hutton

A. Hutton
Administrator

AH:ks

NOV - 3 1995
St. Louis, Mo.

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Mel Carnahan
Governor

Richard A. Hanson
Commissioner

State of Missouri
OFFICE OF ADMINISTRATION
Post Office Box 809
Jefferson City
65102

Stan Perovich
Director
Division of General Services

November 13, 1995

Robert B. Bax
Project Manager
Harland Bartholomew and Associates, Inc.
Suite 330
400 Woods Mill Road South
St. Louis, Missouri 63017

Dear Mr. Bax:

Subject: 95100037 - Notification of EIS and Request for Information BRAC 1995 EIS for the US Army Engineer Center and Fort Leonard Wood, Missouri

The Missouri Federal Assistance Clearinghouse, in cooperation with state and local agencies interested or possibly affected, has completed the review on the above project application.

We are enclosing the comments received for your consideration and appropriate action. The remaining agencies involved in the review did not have comments or recommendations to offer at this time.

A copy of this letter is to be attached to the application as evidence of compliance with the State Clearinghouse requirements.

Sincerely,

Lois Pohl, Coordinator
Missouri Clearinghouse

LP:cm

Enclosure

cc: Lake of the Ozarks Council of Local Governments

NOV 16 1995

MISSOURI DEPARTMENT OF CONSERVATION

Headquarters
2901 West Truman Boulevard, P.O. Box 180, Jefferson City, Missouri 65102-0180
Telephone: 314/751-4115 ◆ Missouri Relay Center: 1-800-735-2966 (TDD)

JERRY J. PRESLEY, Director

January 22, 1996

JAN 23 1996

Mr. Robert B. Bax, Project Manager
Harland Bartholomew & Associates, Inc.
400 Woods Mill Road South - Suite 330
Chesterfield, MO 63017

Re: Scoping Comments - BRAC 1995 EIS for Fort Leonard Wood, MO

Dear Mr. Bax:

We appreciate the opportunity to provide scoping comments prior to preparation of the Environmental Impact Statement (EIS) for BRAC 1995 actions at Fort Leonard Wood, Missouri.

The Missouri Department of Conservation has three general areas of concern with regard to impacts of proposed new training exercises on the forest, fish, and wildlife resources of Fort Leonard Wood and vicinity:

1) FOG OIL TRAINING - POTENTIAL IMPACTS

Thus far through the NEPA process, little information has been provided regarding potential impacts of fog oil on natural resources. The particular oil to be used at Fort Leonard Wood has not been used before; little information is available regarding impacts of oils used in the past, on natural resources.

We are also concerned that the review thus far has been focused on bats. While bats are of concern because they are federally-listed and because of their life history and proximity to proposed fog oil training exercise sites, many other aspects of the forest, fish, and wildlife resources on Ft. Wood and in the vicinity have equal potential to be affected by fog oil. These potential resource impacts should also be addressed during the NEPA process. These include water quality and fish and wildlife habitat. If information is not available in the literature, a range of studies and evaluations should be completed in order that an adequate assessment can be made. This will likely include a variety of short and long term monitoring studies prior to and during fog oil training.

Specific information needs and recommendations are attached.

Robert Bax
Page Two
January 22, 1996

2) FOG OIL TRAINING - BATS

Federally-listed Indiana and gray bats are found on Fort Leonard Wood, and in the vicinity of proposed fog oil training exercises (Ballard Hollow, Bailey Hollow, Musgrave Hollow, and Mush Paddle Hollow). Use, including quantity, frequency, location, and timing, are all significant factors in determining effect of fog oil training on these bat species. All of these factors should be examined, and training details designed to ensure that bats are not detrimentally affected.

3) CONSTRUCTION ACTIVITIES

Considerable new construction will occur as a result of the transfer of training responsibilities from Ft. McClellan to Ft. Wood. The EIS should address the extent to which existing buildings and disturbed sites can be used. For proposed new construction, a site selection process should be established to avoid existing high quality wildlife and aquatic habitat. Best management practices which will be used during construction to restrict soil runoff and protect water quality of downstream waters should also be addressed.

Thank you again for the opportunity to comment. Kathy McGrath of my staff is available to address any questions you may have or provide additional information.

Sincerely,

Norman Stucky

DAN F. DICKNEITE
PLANNING DIVISION CHIEF

Attachment
c: LeValley (FWS), Lange (DNR)

Attachment 1 - Fog Oil Training Issues to Be Addressed in the EIS for Fort Leonard Wood

Birds - We are not aware that any studies have been conducted that examine the effects of fog oil on birds. Oil deposition on eggs could affect respiration or embryo development, oil on adults' feathers could affect thermoregulation or flight and could result in transfer of oil to eggs or juveniles, and oil could affect food supplies by inhibiting aquatic macroinvertebrate reproduction.

Seven state-listed species were identified on Fort Wood during the 1994-1995 breeding season, bald eagle nest attempts have been documented on the Big Piney River near Ft. Wood, and Ft. Wood provides habitat for a number of neo-tropical migrant bird species. For these reasons, effects of fog oil on birds should be monitored and assessed.

Reptiles and Amphibians - Ft. Wood provides habitat for over 40 species of herptiles, including two state watch-listed species. Fog oil deposited on soil and leaf litter or on animals themselves may affect transpiration, since some amphibians transpire through their mucous membranes, gills, and/or skin. In addition, oil deposited on the surface of ponds or streams may affect breeding areas and therefore success. Finally, fog oil may affect food supplies by inhibiting aquatic macroinvertebrate production.

Aquatic Fauna - As has been mentioned previously in the context of food supplies, fog oil training may result in deposition of an oil layer on water surfaces, inhibiting aquatic macroinvertebrate production. Reduction in food supply may also detrimentally affect fish and other aquatic fauna. Two federal candidate species, one fish and one mussel, and one state-listed fish species, are known from Roubidoux Creek.

Plants - Fog oil has the potential to coat leaves and interfere with transpiration. In addition, soil particles and other material may adhere to fog oil, potentially inhibiting photosynthesis.

Other Terrestrial Fauna - Impacts on terrestrial insects are not understood and should be addressed.

Bats - Studies designed to assess impacts of fog oil training on bats appear to be ambitious and thorough. We are not clear as to how a one-year study will be completed, and results incorporated into the EIS, when completion of the EIS is on a similar schedule. In addition, a one-year study will likely not be able to examine long-term issues such as oil residues in milk and uptake by offspring. Study should continue after fog oil training is initiated, to address these longer term issues.

Timing of fog oil training should be examined. Gray bats are present from approximately mid-March through early October. Presence of oil during this time period could affect foraging behavior and thermoregulation, as well as availability of the aquatic invertebrate food supply. Some of the sites chosen for fog oil training are in known foraging corridors (Roubidoux Creek, Musgrave Hollow, Smith Hollow, and Mush Paddle Hollow), and are within 2-3 miles of

Attachment 1 (Contd.)

two gray bat caves along Roubidoux Creek (Saltpeter #3 maternity cave and Davis #2). In addition, diurnal timing of fog oil application could affect bats. It is our understanding that dawn and dusk are the best times to generate fog. These times overlap with bats foraging activity, and therefore offer significant potential for conflict.

Indiana bats, including pregnant/lactating females, were captured on Fort Wood during the summer, 1994. Indiana bat use of southern Ozark woods is not well understood, and additional monitoring should be conducted to better evaluate Indiana bat use of Fort Wood.

Four caves on Fort Wood, Brooks Cave, Wolf Den Cave, Davis Cave #2, and Joy Cave, are used as hibernacula. Cave temperature and humidity are important factors in making a cave suitable for hibernation. Potential for oil to enter these caves and affect bat behavior and climate should be examined.

Water Contamination - Use of fog oil has the potential to contaminate surface and ground water supplies. Contamination of surface waters could affect aquatic invertebrates directly, and therefore indirectly affect the food supplies of numerous other species. It could also affect recreational use of downstream waters. In addition, Ft. Wood is in an area of karst geography, known for its susceptibility to ground water contamination. Oil transport during runoff-producing rainfall events, oil breakdown, and other aspects of oil transportation offsite should be examined.

Attachment 2 - Recommendations Regarding Fog Oil Training at Fort Leonard Wood

ADDITIONAL MONITORING - Because essentially no information is available concerning expected effects of fog oil on natural resources of Ft. Wood, monitoring prior to and during fog oil training should include at a minimum: fog oil dissipation (e.g. factors affecting, particle size distribution, range), residue concentrations, and basic biological studies on aquatic invertebrate, bird, and herptile populations, and water quality.

MINIMUM USE OF METHODS INVOLVING OIL RELEASE - The EIS should address alternatives to release of fog oil. This includes use of water, contained oil training, and computer simulation.

MINIMIZATION OF IMPACTS ON BATS - Methods should be considered that would have the least impact on bats. Alternatives should include consideration of diurnal and seasonal timing, location (on Ft. Wood and offsite), and fog oil use quantity, frequency, and proximity to cave openings.

DOCUMENTATION OF USE - Use of fog oil, including quantity, location, particle size distribution, weather conditions, and dissipation and monitoring, should be documented. Frequent chemical testing of oil to ensure that contaminants are not present, should also be included. In addition, disposition of existing Ft. McClellan oil stocks should be addressed, if there is any likelihood that it would be used at Ft. Wood.

STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

OFFICE OF THE DIRECTOR

P.O. Box 176 Jefferson City, MO 65102-0176 (314)751-4422

JAN - 5 1996

St. Louis, Mo.

December 29, 1995

Mr. Robert B. Bax
Project Manager
Harland Bartholomew and Associates, Inc.
400 Woods Mill Road South, Suite 330
St. Louis, Missouri 63017

Re: BRAC 1995 Environmental Impact Statement for the U.S. Army Engineer Center and Fort Leonard Wood, Missouri

Dear Mr. Bax:

The Missouri Department of Natural Resources (DNR) would like to convey the following information as part of the scoping process being conducted for preparation of the Environmental Impact Statement (EIS) for the realignment of the U.S. Army Military Police School and the U.S. Army Chemical School from Fort McClellan, Alabama to Fort Leonard Wood, Missouri. The scoping process for this EIS was formally initiated with the Public Scoping Meeting conducted in Waynesville, Missouri, on the evening of November 30, 1995, which staff members from this department attended. We believe that the following issues should be thoroughly addressed and evaluated in the EIS.

There are two very unique circumstances associated with preparation of this EIS. The first pertains to the fact that the Defense Base Closure and Realignment Act of 1990 exempts the decision-making processes of Defense Base Closure and Realignment Commission from the provisions of the National Environmental Policy Act of 1969 (NEPA). We understand that this law relieves the U.S. Department of Defense from the NEPA requirement to consider the need for closing, realigning or transferring functions and from examining alternative installations to close or realign. It is important to recognize that this law does require preparation of an environmental impact analysis during the process of relocating functions from a military installation being closed or realigned to another military installation after the receiving installation has been selected but before the functions are relocated. As a result of this requirement, this EIS will consider the direct and indirect environmental and

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socioeconomic effects of the action to transfer the U.S. Army Military Police School and the U.S. Army Chemical School from Fort McClellan, Alabama to Fort Leonard Wood, Missouri.

Preparation and publication of this EIS will help to ensure that important environmental information associated with this military training mission relocation will be available to public officials and citizens before final decisions are made and before specific actions are taken at Fort Leonard Wood. The NEPA process is intended to help public officials make decisions that are based on understanding of environmental consequences and take actions that protect, restore and enhance the environment.

The second unique circumstance associated with this EIS development process is due to the fact that the 1993 Defense Base Closure and Realignment Commission directed the Department of the Army to pursue necessary environmental permits before submitting a recommendation to the 1995 Commission to relocate the U.S. Army Military Police School and the U.S. Army Chemical School to Fort Leonard Wood, Missouri. The U.S. Department of Defense recommendation to the 1995 Base Closure and Realignment Commission was based on the assumption that requisite permits could be granted to allow operation of the Chemical Defense Training Facility at Fort Leonard wood, Missouri.

The Army prepared and submitted permit applications to this department in 1995, concurrently with the submittal of recommendations by the Secretary of Defense to the 1995 Base Closure and Realignment Commission. Based on information provided by the Army to this department and this department's review and findings, environmental permits have been issued to the Army that were necessary to conduct chemical defense training mission activities at Fort Leonard Wood.

The NEPA exemption provided by Congress and the 1993 BRAC directive regarding environmental permits are extremely unique circumstances associated with this EIS. This department therefore recommends that a thorough description and clear explanation of these circumstances be accomplished in the EIS so that a clear understanding of these issues can be gained by the public.

Cultural Resources

In accordance with the Programmatic Memorandum of Agreement (PMOA) for ongoing activities at Fort Leonard Wood signed by the Fort, the DNR and the Advisory Council on Historic Preservation in 1986, the Army is required to identify, evaluate and avoid or mitigate cultural resources which might be effected by any changes in military use and/or land-use categories. Procedures for compliance have been set forth in the Plan for Management of Cultural Properties required in section I of the PMOA, including review and comment by the Missouri State Historic Preservation Officer on findings and effects of proposed military uses.

Spill Prevention and Response Plan

The Army's Spill Prevention and Response Plan at Fort Leonard Wood should be updated to address the potential for inadvertent release of hazardous substances associated with the new training missions.

Secondary Impacts

It is our understanding that approximately 25 percent of the permanent military personnel of Fort Leonard Wood live off-post, predominantly in Pulaski County. If the addition of these new training missions at Fort Leonard Wood is anticipated to result in a significant increase in off-post populations, we recommend that the EIS address the associated secondary impacts of an increased demand for solid waste management facilities, wastewater treatment capacities and drinking water supplies.

We appreciate this opportunity to provide input into the scoping process for this EIS. Should you have any questions regarding our comments, please contact Mr. Tom Lange of my office. Thank you.

Very truly yours,

DEPARTMENT OF NATURAL RESOURCES

Sherry L. Boldt
for David A. Shorr
Director

DAS:tl

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION VII
726 MINNESOTA AVENUE
KANSAS CITY, KANSAS 66101

FEB 05 1996

FEB 12 1996

Mr. Robert B. Bax
Project Manager
Harland Bartholomew and Associates, Inc.
Suite 330
400 Woods Mills Road South
St. Louis, Missouri 63107

Dear Mr. Bax:

RE: Scoping Comments for the Draft Environmental Impact Statement (DEIS) for BRAC 95 Actions at Fort Leonard Wood

In accordance with our responsibilities under Section 309 of the Clean Air Act and the National Environmental Policy Act (NEPA), we are providing scoping comments for the above reference project.

We appreciate the efforts that Fort Leonard Wood has made to involve our agency in the discussions regarding the development of the DEIS. The series of interagency meetings you have held have provided good opportunities for us to identify and begin to resolve our concerns regarding the project. Based on the meetings held to date, the following summarizes EPA's issues of concern regarding the project.

Alternatives Analysis

The screening analysis for alternatives is well structured in its attempt to organize a large amount of information about the various training activities that are being transferred to Ft. Leonard Wood. We continue to emphasize the need to use the analysis to identify a full range of reasonable alternatives (§ 1502.14) as identified in the Council on Environmental Quality regulations that implement NEPA.

The Army should continue to explore a full range of alternatives for the proposed smoke training activities. Because the impacts resulting from the type of smoke training proposed for

RECYCLE

Ft. Leonard Wood have not been well documented, the Army needs to use the DEIS as the vehicle to identify the direct, secondary and cumulative impacts of alternatives associated with this training function. The environmental criteria identified at the January 24, 1996, meeting provides a good framework for consideration of environmental impacts and consequences of the proposed actions.

We were pleased to see the use of water rather that fog oil as a tool for certain training activities included in the current alternatives screening. We also think that other alternatives such as the use of controlled environments for appropriate training functions in lieu of training out-of-doors, computer technology to simulate battlefield conditions, modifying training times and locations based on weather and/or special biological or geological conditions and identifying alternative off-base site locations to conduct the smoke training need to be fully explored.

The issue of how much fog oil is actually needed for training purposes was discussed at the January 24, 1996, meeting. It is very important that in the DEIS, the Army clearly identify how much fog oil is being proposed for use based on the various combinations of proposed alternatives. If the proposed amount will result in a violation of the current air permit for the project, then the Army needs to identify the process that Ft. Leonard Wood will use to modify or obtain a new air permit.

Ecological Risk Assessment

It is our understanding that an ecological risk assessment is being prepared as part of the development of the DEIS. The Army should identify in the DEIS the guidance documents and/or other reference materials used to prepare this risk assessment. For example, is the Army using Procedural Guidelines for Ecological Risk Assessments at U.S. Army Sites (ERDEC-TR-221, December 1994), as a basis for the risk assessment? If so, please be aware that EPA is in the process of finalizing and issuing new guidance in 1996 that further clarifies ecological risk procedures. EPA also has a 1992 document entitled, "Framework for Ecological Risk Assessment (EPA/630/R-92/001, February 1992)," which we can provide to you if needed. Because of our interest and expertise in the area of ecological risk assessment, EPA would like the opportunity to review and provide comment on the risk assessment prepared for this project as part of our continued involvement in the development of the DEIS.

Mitigation and Monitoring

The Army needs to clearly identify in the DEIS proposed mitigation for all training activities. If wetlands are to be impacted as a result of the smoke training operations, we would be happy to assist Ft. Leonard Wood in the development of mitigation measures for these areas. In conjunction with mitigation, the Army should identify in the DEIS its plans for long-term monitoring to evaluate the impacts from the smoke training. The plan should identify types, locations and frequency and duration (i.e., over how many years) of monitoring actions, as well as how this information will be used to modify or eliminate training activities if adverse impacts are found.

Thank you for the opportunity to comment. We look forward to our continued involvement in the development of the DEIS for this project.

Sincerely,

Cathryn E. Tortorici
Project Manager

cc: Emily Brown, Ft. Leonard Wood
Gary Frazer, Fish and Wildlife Service, Columbia, MO
Al Gehrt, Corps of Engineers, Kansas City District
Tom Lange, Missouri Department of Natural Resources

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Fish and Wildlife Enhancement
Columbia Field Office
608 East Cherry Street
Columbia, Missouri 65201

IN REPLY REFER TO

FWS/AES-CMFO

JAN 18 1996

JAN 22 1996

Mr. Robert B. Bax
Project Manager
Harland Bartholomew and Associates, Inc.
Suite 330
400 Woods Mill Road South
St. Louis, Missouri 63017

Dear Mr. Bax:

This responds to your October 19, 1995, letter which requested resource information and issues which should be considered in the Environmental Impact Statement for the relocation of the U.S. Army Chemical and Military Police Schools from Fort McClellan, Alabama to Fort Leonard Wood, Missouri. These comments should be considered as the U.S. Fish and Wildlife Service's official scoping comments.

Alternatives:

We support your commitments to evaluate alternative training methods and include environmental considerations in the criteria for "optimizing" training.

Because a petroleum-based oil disbursed over large areas is used to simulate the smoke, and little information on its impacts presently exists, our greatest concern with the new missions is the direct and indirect impacts of smoke training. We urge you to fully explore alternative means of meeting the smoke training objective, including the use of alternative substances (for instance water rather than fog oil), conducting proficiency training in enclosed environments, fully using computer simulation technology, especially to simulate battlefield conditions, and modifying training schedules and locations if warranted by special meteorological, geological or biological conditions.

Scope of Affected Environment and Environmental Consequences:

Federally-Listed Species: We are aware of the extensive studies previously completed, and new studies proposed, that will assist in determining the impacts of the proposed action to the federally endangered Indiana bat, *Myotis sodalis*, and gray bat, *Myotis grisescens*, and federally threatened bald eagle, *Haliaeetus leucocephalus*. Based on our coordination to date with you, the installation, and the study contractor, we believe that completion of these studies will provide the data needed to initiate and complete Section 7 consultation on the proposed action. We recognize and support the extensive efforts made to date by the Army to address the impacts of the BRAC action on federally-listed species.

Important Fish and Wildlife Resources: In addition to the federally-listed species, many other important resident and migratory fish and wildlife resources and habitats exist at Fort Leonard Wood and in the surrounding area. A thorough inventory of these important resources and natural communities should be included in the affected environment section of the EIS, and likely impacts disclosed in the Environmental Consequences section.

There are four federal "species of concern" (formerly termed Category 2 Candidate Species), which have been reported from the installation: bluestripe darter, *Percina cymatotaenia*, (Big Piney River); butternut, *Juglans cinerea*, (several locations on Post); Cerulean warbler, *Dendroica cerulea*, and Central Missouri cave amphipod, *Allocrangonyx hubrichti*. The direct and indirect impacts of new construction and new training missions to these species, neotropical migrant and resident birds (adults, young, and eggs), reptiles and amphibians, large and small mammals, vegetation, water quality, fish, and aquatic invertebrates should be thoroughly reported and disclosed in the EIS.

Some of the impact questions probably can be answered through comprehensive scientific literature review, pre- and post-implementation monitoring, and the results of the Biological Assessment studies (especially those related to fog-oil contamination and fate at Fort McClellan). In the latter, we understand that the impacts of past and ongoing fog-oil deployment on vegetation, soils, aquatic sediments, fish, surface water, and bats at Fort McClellan will be determined. These results should be applicable to not only listed species concerns but many other important fish and wildlife at Fort Leonard Wood.

However, the impacts to birds and herptiles (reptiles and amphibians) from fog-oil deployment are not included in the BA studies. We believe these important fauna should be added to the sampling regimen at Fort McClellan and included in the monitoring program for Fort Leonard Wood. These study modifications should not delay the EIS or add significantly to its cost in our opinion.

As much detail and quantification as possible should be provided concerning construction and training methods and expected impacts. All of the new construction and training activities should be overlaid on maps (scales of 1;24,000 or greater are preferred) which show existing training locations and support facilities, drainage patterns, watersheds, topography, and important resources and habitats. The latter would include the location of federally-listed species, state-listed species, federal "species of concern" and the following habitat types and natural features: wetlands (emergent, forested, shrub/scrub), riparian corridors, karst features (caves and sinkholes), aquatic habitats, upland forests, glades, and warm-season grasslands. Recent wetland, natural history, and timber stand surveys have been completed on the installation, and the Post's Natural Resources Office should have this and other relevant natural resource data.

Fish and Wildlife Related Recreation: Fort Leonard Wood and its training lands provide an important outlet for both military and civilian fish and wildlife related recreation (mainly hunting and fishing) in this region of the state. Given the likely decreases in recreation use days with increased training, and the increased base population, pressure for such recreation on surrounding public and private lands will increase. The magnitude of this impact should be quantified and discussed in the EIS.

Mitigation and Monitoring: We believe that a long-term, comprehensive monitoring program should be a necessary component of the smoke training so that the training can be accomplished in an environmentally sound manner as better information becomes available over time. Presently, little information exists concerning the impacts of fog oil on natural resources. Monitoring will therefore be needed, and we recommend that the scope of a monitoring program be presented in the EIS.

Thank you for the opportunity to provide these scoping comments. Please contact Mr. Mike LeValley of my staff at (573)876-1911 for future project-level coordination.

Sincerely,

Gary D. Frazer
Field Supervisor

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Fish and Wildlife Enhancement
Columbia Field Office
608 East Cherry Street
Columbia, Missouri 65201

IN REPLY REFER TO:

FWS/AES-CMFO

JAN 31 1996

Major General Robert E. Scales, Jr.
Deputy Chief of Staff for
Base Operations Support
Headquarters United States Army Training
and Doctrine Command
Fort Monroe, Virginia 23651-5000

Attn: Safety, Ammunition, Fire Protection, and Environment Directorate

Dear Major General Scales:

Thank you for your November 8, 1995, letter to Regional Director Hartwig requesting U.S. Fish and Wildlife Service participation as a cooperating agency for the Fort Leonard Wood, Missouri Base Realignment and Closure Commission Environmental Impact Statement (EIS).

The Service would be happy to serve as a cooperating agency in the development of the EIS. As your letter states, the Service, through this office, has worked closely over the past year with the Fort in providing technical assistance to the Fort's Biological Assessment studies and EIS scoping for the BRAC action. We are committed to continuing this level of assistance throughout development of the Final EIS and Record of Decision within the constraints of available staff and funding.

As a cooperating agency we request that advance copies of relevant analyses, supporting documents and the Draft EIS be provided to us for review and comment prior to their formal release. We also request that our expertise and professional judgement regarding impacts to fish and wildlife and their habitats, and mitigation for such impacts, be reflected in your NEPA documentation and be given full consideration during decision-making. Of course, our conclusions and positions will be developed in close coordination with the Army and other state and federal agencies that have jurisdiction and special expertise.

We look forward to receiving the Memorandum of Agreement and continuing our involvement in the EIS process.

Sincerely,

/S/ Gary D. Frazer

Gary D. Frazer
Field Supervisor

cc: U.S. Army Engineer Center ✓
and Fort Leonard Wood (ATZT-BRAC)
FWS, Fort Snelling, MN (AES-HC)

U.S. Department
of Transportation

**Federal Railroad
Administration**

Region VI

City Center Square, Suite 1130
1100 Main Street
Kansas City, MO 64105

November 7, 1995

Mr. Robert B. Bax
Project Manager
Harland Bartholomew & Asso., Inc.
400 Woods Mill Road South
Suite 330
Chesterfield, Missouri 63017

Dear Mr. Bax:

Reference is made to your letter of October 19, concerning the "BRAC 1995 Environmental Impact Statement for the US Army Engineer Center and Fort Leonard Wood, Missouri".

The Federal Railroad Administration has no issues to include.

Sincerely,

D. J. Tisor
Regional Administrator

NOV 13 1995
Harland Bartholomew
& Assoc.
St. Louis, Mo.

Effective Citizen Action Since 1969

Missouri Coalition for the Environment

6267 Delmar Boulevard, Saint Louis, Missouri 63130 (314) 727-0600, FAX: (314) 727-1665

December 27, 1995

Harland Bartholomew & Associates, Inc.
400 Woods Mill Road South, Suite 330
Chesterfield, MO 63017

RE: Fort Leonard Wood Base Realignment & Closure EIS

Dear Preparer:

The following comments are submitted pursuant to the scoping process for the above captioned environmental impact statement.

1. The EIS must deal with the entire proposal, and must not permit unlawful segmentation of the proposal. The entire proposal, as stated in letters from Army commanders to the commanding officers at Fort McClellan and Fort Leonard Wood, is to move the training schools at Fort McClellan to Fort Leonard Wood. That means the entire training schools, not a small part of them.

The potential environmental impact of that proposal is monstrous. Accordingly, the Fort Leonard Wood officials have attempted to segment the proposal. They have applied to the Missouri Department of Natural Resources for permission to move a small part of the training schools. The knowledgeable officials at Fort McClellan have reviewed the Missouri permits, and have pointed out that what is being authorized at the beginning will permit only a small percentage, perhaps 20%, of the training actually conducted at Fort McClellan, all of which is to be moved. The commanding general has attempted to minimize this discrepancy between the fundamental orders and the permit process in Missouri, but in the end has admitted that the Army may well have to seek revision of the Missouri permits in order to carry out the training mission successfully. While Missouri can permit only a small part of the school if Missouri chooses to do so, the EIS must evaluate the environmental impact of the entire school. To limit the EIS to the impact of only the first segment to be permitted in Missouri would constitute unlawful segmentation of the project.

2. The EIS must address the realties, not fictions or suppositions, both in the obscurant training and in the CDTF.

A. As noted in point one above, the EIS must address the various obscurants being used at Fort McClellan in addition to fog oil. Even as to fog oil, the EIS must address the fog oil specified by the Army in its application filed with MDNR, containing 40% hazardous constituents, or at least the fog oil in use at Fort McClellan, one sample of which has been analyzed to contain at least 6% hazardous constituents. The EIS cannot be based upon some hypothetical fog oil which may contain no more than 0.5% hazardous constituents. Until such a fog oil is physically produced, and put into use (at Fort McClellan or selsewhere) successfully; and analyzed, an EIS based on the assumptions that such a hypothetical fog oil would be the fog oil used would itself be a sham.

B. The EIS must address the problems associated with the materials actually used in the CDTF, including the various materials which have now been determined, by independent analysis, to contain hazardous constituents. Those problems include the problems associated with the burning of hazardous materials (no permit has been sought for combustion of hazardous materials), or storing them indefinitely (no permit has been sought for hazardous waste storage), and with the discharge of liquid solutions containing such hazardous materials.

3. The EIS must address the hazards associated with the use of unsealed radioactive materials and nerve gas, including the hazards of accidents, fire, theft, vandalism, and sabotage.

Thank you for the opportunity to provide these comments.

Sincerely,

R. Roger Pryor

R. Roger Pryor
Executive Director
Missouri Coalition for the Environment

Ozark Chapter / Sierra Club

December 29, 1995
PO Box 58
Columbia, MO 65205

Harland Bartholomew & Associates, Inc.
400 Woods Mill Road South, Ste. 330
Chesterfield, MO 63017

SCOPING COMMENTS ON THE BRAC 1995 ENVIRONMENTAL IMPACT STATEMENT FOR THE U.S. ARMY ENGINEER CENTER AND FORT LEONARD WOOD, MISSOURI

The Ozark Chapter Sierra Club has a long standing interest in environmental issues in Missouri. We have over 8,000 members throughout Missouri, and our membership is concerned by any action that threatens to degrade the environment and/or alter our natural areas.

The proposal to relocate the U.S. Army Chemical Defense Training Facility from Fort McClellan, Alabama to Fort Leonard Wood and the need to provide comments on the various environmental permits has lead the Sierra Club to review documents available at the Missouri Department of Natural Resources. Based on our review of the documentation available, the Ozark Chapter Sierra Club has taken a position OPPOSING the relocation of the U.S. Army Chemical Defense Training Facility to Fort Leonard Wood.

The following represent the questions, comments, and concerns of the Ozark Chapter Sierra Club for scoping on the proposed relocation. All of the issues raised here will need to be addressed in the Environmental Impact Statement. If there are any questions or additional information is needed on these issues, please feel free to contact us at the above address.

JAN - 2 1995

Fog Oil

Human Health

How will the fog oil affect people's health in the area?

How will the fog oil affect troops being trained and the trainers? Does the oil have any potential carcinogens or heavy metals?

What studies have been done to determine the short and long term health effects of the oil and the effects of long term exposure?

What are the effects of physical contact with the oil, and what are the effects of

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breathing fumes for the volatilized oil?

What will be the health effects of eating garden vegetables and fruits which have been contaminated by the oil?

What will be the health effects of eating eggs, poultry or meat from animals exposed to the fog oil?

What will be the effects of eating fish from streams and rivers contaminated by the fog oil?

There will be no way of measuring the level of contamination from animals hunted or fish caught near the contaminated areas. How will these people know if they are putting themselves at risk?

Wildlife

What are the effects of the fog oil on insects, amphibians, reptiles, mammals and other wildlife?

Will the fog oil cause mortality to any species?

Will the oil cause any short or long term damage to insect, amphibian, reptile, mammal or bird populations?

Short of mortality, can the fog oil cause any injury, mutagenic effects, cancers or other problems?

What will be the effects of the fog oil as species affected are consumed by others and the fog oil effects move up the food chain and are concentrated?

What are the effects of the bioaccumulation of the contamination on these species?

What studies have been done on the specific elements that the fog oil to be used contains?

If a different oil is used in the future, will an additional Environmental Impact Statement be conducted and additional studies be performed to determine the effects of the new oil?

Neotropical Migrant Birds

Many studies have shown that neotropical bird species are at increasing risk due to habitat loss. This is particularly true of forest interior species. How will the fog oil training affect these species?

Will nesting be disrupted by the training?

Will contamination cause mortality for these species?

Will the oil affect the fertility of these species or cause problems with the ability of eggs to hatch?

How will nestlings and fledglings be affected by the oil?

Will foraging be disrupted for these species?

Will the training result in mortality of adult birds or nestlings, violating the Migratory Bird Treaty Act?

Accipiters

The Sharp-shinned hawk (*Accipiter striatus*) and the Cooper's hawk (*Accipiter cooperi*) may nest on or near Fort Leonard Wood. Both are species of concern in Missouri and the Sharp-shinned hawk in particular is considered rare. Have surveys been made for these species' nesting sites?

If nesting sites are found, how will they be protected?

How large a diameter area will be undisturbed around nesting sites?

Is there a potential of the oil to bioaccumulate in these species?

Will the oil affect the fertility of these species or cause problems with the ability of eggs to hatch?

How will nestlings and fledglings be affected by the oil?

Water Resources

What are the effects of the fuel oil on aquatic organisms in the springs, creeks and rivers downstream of the training exercises as well as the groundwater?

What impacts with the karst geology of the area have on the potential for contamination?

What measures will be taken to prevent run off from the training areas?

How will the fog oil be prevented from reaching the groundwater?

Will the fog oil cause any mortality or injury to aquatic organisms including ranging from benthic and invertebrate communities to fishes?

What are the short term and long term effects to these organisms?

How will the hydrocarbons released impact the water and its communities?

What will be the effects of the fog oil as species affected are consumed by others and the fog oil effects move up the food chain?

What will be the effects of the bioaccumulation of the contamination on these species?

What will be the effect on sport fishing?

Will there be the potential for human consumption of the fuel oil, and what would be the effect on human health?

Will there be a need for or procedures to determine the need for human health advisories?

What will be the effects of contaminated fish and other aquatic organisms on species that feed on them (mammals, birds, etc.)?

How will the fog oil affect Roubidoux Creek and the trout in the creek?

Does the use of the fog oil with its potential for contamination of area streams and rivers conflict with state and federal Clean Water Act anti-degradation policy?

Would these discharges be in violation of Missouri's Clean Water Law?

Will the oil in the creeks and rivers affect gas transfer at the surface, resulting in changes and impacts on dissolved oxygen levels?

How will the oil affect the buffering capacity of the streams and groundwater--currently well buffered by the limestone and dolomite present?

What are the numerical estimates of the anticipated changes in all relevant water quality parameters, including but not limited to oil and grease, toxic substances, etc.?

How will the substances which are released or run off to creeks, rivers, etc. interact with organic precursors to drinking water parameters of concern such as trihalomethanes?

Is there a chance that the hydrocarbons released will combine with other organic compounds to form more dangerous compounds which could end up in drinking water?

Federal Threatened and Endangered Species

What will the effects be on federally Threatened or Endangered species?

Bald eagles (*Haliaeetus leucocephalus*) regularly use the area along the Big Piney and Gasconade Rivers that would be affected and are listed as Threatened by the U.S. Fish and Wildlife Service. What would be the effect on them of consuming contaminated fish or other species?

Is there a possibility they will be contaminated by the fog oil drifting to a roost area?

Are there potential nesting sites that would be affected?

Would contamination from the oil affect the fertility of bald eagles or affect the ability of their eggs to hatch?

Could nestlings or fledglings be affected by the oil?

Indiana bats (*Myotis sodalis*), which are listed as endangered by the U.S. Fish and Wildlife Service, use forested areas to forage for food and also for summer roosts. They could also be present in area caves in winter. What surveys will be done for roosting sites or hibernaculum prior to the implementation of this relocation?

How would Indiana bats be affected by fog oil contaminating a summer roosting tree?

What will be the effect on Indiana bats of consuming insects contaminated by the oil?

What will be the effect on the Indiana bat of reduced insect populations if insect mortality occurs as a result of the fog oil?

Gray bats (*Myotis grisescens*), which are listed as endangered by the U.S. Fish and Wildlife Service, forage over rivers and creeks and may be present in area caves in summer roosts or winter hibernaculum. What surveys will be done for these sites prior to the implementation of this relocation?

Is there the possibility that a cave site may be contaminated by fog oil drifting into the area?

What will be the effect on Gray bats of consuming insects contaminated by the fog oil?

What will be the effect on the Gray bat of reduced insect populations if insect mortality occurs as a result of the fog oil?

The Spectacle case (*Cumberlanida monodonta*) is listed as a candidate species category 2 by the U.S. Fish and Wildlife Service. Its range includes the Big Piney and Gasconade rivers. How will the Spectacle case be affected by the fog oil?

What surveys will be done to determine if the Spectacle case is present in the affected river areas?

Will contaminants for the oil bioaccumulate in the Spectacle case?

Will the Spectacle case be more at risk then other species because it is a filter feeder?

The Central Missouri cave amphipod (*Allocrangonyx hubrichti*) is listed as a candidate species category 2 by the U.S. Fish and Wildlife Service. Its range includes the Great Spirit Cave in Pulaski county and the Saltpeter Cave in Phelps County. How will this species be affected by the oil?

Will groundwater contamination from the training areas be able to impact these caves?

What hydrological studies have been done to determine groundwater flow in this area?

Have dye tracing studies been conducted in this area?

The Bluestripe darter (*Percina cymatotaenia*) is listed as a candidate species category 2 by the U.S. Fish and Wildlife Service. Its range includes the Big Piney River and the Gasconade River. How will this species be affected by the oil?

Will the insects and invertebrate species the Bluestripe darter feeds upon be affected?

Have surveys been conducted to determine if this species is present in areas that will be conducted?

How will the bioaccumulation of contaminated oil affect all these species?

Will incidental take permits be applied for from the U.S. Fish and Wildlife Service as is required when an action may cause harm to a federally threatened or endangered species?

How will training be altered if training activities are shown to threaten federally threatened or endangered species in the future?

Missouri Rare, Endangered and Watch List Species

What will be the effects on Missouri rare, endangered or watch list species?

How will the Salem cave crayfish (*Cambarus hubrichti*), which is present in Pulaski County and is classified as a watch list species by the Missouri Department of Conservation, be affected by the oil?

How will the Blacknose shiner (*Notropis heterolepia*), which is present in the Big Piney River and is classified as an endangered species by the Missouri Department of conservation, be affected by the oil?

How will the fog oil affect Black bear (*Ursus americanus*) in the area, which are classified by the Missouri Department of Conservation as rare?

Will the activities be conducted in foraging or hibernation areas?

Will increased disruption from human activities cause them to avoid the area?

Soils

How will the fog oil affect the soils?

Will they be contaminated?

Will the oil reduce soil fertility or alter vegetative growth?

Will ongoing training with the resultant build up of oil cause any cumulative impacts beyond the initial impacts expected?

Will soil damage lead to increased erosion?

Will soil erosion lead to increased sedimentation in rivers and streams?

The soils in the area are subject to high erosion. Will this potential be increased?

Vegetation

How will the fog oil affect vegetation in the training areas?

Will plants in areas contaminated by the fog oil be stunted or killed?

Will people's gardens be affected?

Will their vegetables and fruits be safe to eat?

Will pasture land be affected and will animals grazing risk contamination?

Fort Leonard Wood is adjacent to the Mark Twain National Forest, with some forest land occurring on base. Will the fog oil affect forest species?

The U.S. Forest Service has already documented a disease known as oak decline as a problem in the Mark Twain National Forest. Will the fog oil affect oak decline?

Will the fog oil add additional stress to forest species, resulting in a cumulative impact of mortality or decline of forest health?

Will timber harvest in surrounding public and private forests suffer due to stunted, damaged or killed trees?

Will fire danger be increased in the area due to the presence of a flammable oil--especially during dry summers?

Will vegetation in the fog oil contamination area die, leading to increased erosion, especially in the training areas with high traffic rates?

The training will cause non-point source releases of contamination. How will the carcinogens and heavy metals be isolated from the environment?

Recreation

How will the fog oil training affect tourism and recreation in the area?

Will people using Fort Leonard Wood areas that are currently available to the public incur further restrictions?

Will they be placing themselves at risk by fishing, swimming, canoeing, hunting or hiking near training areas?

Will public knowledge of the risk of contamination by these activities lead to a loss of tourism dollars to the local economy?

Fog Oil Analysis

What testing has been done concerning fog oil and its use?

What is the exact content of the oil?

What heavy metals are in the oil?

Where have these tests been done and by whom?

Is the environment where these studies were performed directly comparable to the environment at Fort Leonard Wood?

Will these studies be made available to concerned citizens to review as part of the draft Environmental Impact Statement process?

Have the studies been peer reviewed to insure accuracy in methodology and results?

What permits will need to be obtained to conduct the fog oil training?

Fog Oil Alternatives

What are the alternatives to using fog oil for training?

Can the Army use nighttime training, mist by water vapor or nontoxic obscurant substances instead of the current training regime?

Can other oils be used which are less toxic or have fewer environmental consequences?

What is the exact chemical make up of the fog oil?

Have all studies cited used this chemical make up for analysis, or have other oils been used?

Will other oils be used in the future, and what environmental analysis will done on these oils prior to their being used?

Volatilization

At what temperature does the fog oil volatilize completely?

Does the volatilization percentage change with changes in temperature?

Will training be restricted below a specific volatilization rate?
How does the volatilization rate differ with distance from the fog oil generators?

Will changes in volatilization rates change the impacts to the environment, especially to soil, vegetation, groundwater, creeks and rivers?

Will the potential carcinogens, toxics, and heavy metals be volatilized?

Opacity

The issue of the opacity variance is currently being challenged legally. An alternative should be developed with does not violate Missouri law. What alternatives are being generated in the event the courts rule against the opacity variance?

Monitoring

What will be the procedures for monitoring if the fog oil is leaving the training area? It is not sufficient to only train when conditions are acceptable, as weather conditions may change suddenly.

Where will air monitoring devices and opacity devices be located?

Even if training is halted when the fog oil leaves the training area, the fog oil already produced will continue to move. How will traffic be affected on I-44, Route J or Highway 17?

What provisions will be made to halt traffic in an emergency?

How will area residents be warned about contamination potentials?

It is evident that the potential for contamination exists in many environmental areas. What base line monitoring specific to the training areas has been conducted?

A minimum of two years of monitoring of all variables (wildlife, vegetation, aquatic resources, water quality, weather, soils, etc.) is necessary. This base line data would then be able to be compared to ongoing monitoring. What ongoing monitoring will be developed?

At what intervals will monitoring occur?

What will be the frequency and scope of sampling?

Where will analysis of data occur?

How will the results of this monitoring be made available to the public?

How will the results of the monitoring be used to alter or modify training practices?

Will water quality monitoring be conducted before, during and after rainfall events?

At what time periods will samples be taken?

Live Agent Training

Health effects

What specific agents will be used in training?

What is the chemical make up of the agents to be used?

What are the effects of the agents on the health of the troops and the trainers?

What would be the health effects of the agents on the public in the event of an accidental release?

What will the psychological effects on the population be, knowing there is the potential for an accidental release?

What training and equipment are available at area hospitals and clinics in case of an accidental release?

Are full chemical decontamination units available at these hospitals, and how many people can be treated at one time?

What emergency plans will be prepared for treatment, evacuation, etc.

Who will decide if an evacuation is needed?

Who will decide how large an area needs to be evacuated?

What will be the criterion for these decisions?

What experiences has Fort McClellan had with accidental releases? To allow the public to fully evaluate the proposal, it will be necessary to make all records from Fort McClellan available for review.

What has been the frequency and scope of these releases?

Has anyone been harmed in these releases?

Procedures and Methodology

What procedures will this facility have to prevent accidental releases?

What construction methods will be used to prevent releases?

What will be the construction standards for the building?

Will the facility have a vacuum system to prevent chemicals from escaping?

What are the back up systems in case of power loss or equipment failure that will prevent an accidental release to the outside?

What security will be provided for the storage of the chemicals?

What quantity of chemicals will be stored at the facility at any given time?

How will waste chemicals be disposed of?

What storage standards, containment berms and other methods will be used to prevent accidental releases?

Who will be the emergency responders in case of accidental releases?

Will all responses be handled by Fort Leonard Wood, or will there be arrangements made with local communities for assistance?

What training, protective clothing, and equipment will these emergency responders have?

What permits will need to be obtained to operate the facility?

Transportation

How will the agents and chemicals be transported to the facility?

What security will be provided during the transportation of the chemicals and agents?

What permits and licenses will need to be obtained to transport the materials?

What precautions will be taken to prevent accidental releases during transportation to the facility?

Who will be the emergency responders to an accident occurring during the transportation of these materials?

How will the emergency responders be trained, and what equipment will they have?

What will be the transportation routes of the materials coming to this facility?

Will communities the material is transported through have advance warning of the shipments?

What transportation plan will be available, and will it be reviewed by the public?

Decontamination

How will the agents used be decontaminated?

What will be done with contaminated material after training?

What is the chemical make up of the decontamination materials?

Do the decontamination materials have any carcinogens, toxics or heavy metals?

How will these materials be disposed of?

Thermal Treatment Unit

Type of Facility

How large will the thermal treatment unit be?

What are its permitting requirements?

Will additional permits be required in the future?

What material will be burned in the unit?

Will the unit receive waste from any source other then the sealed training facility?

Will any hazardous waste or metals be burned in the unit?

What is the unit's total capacity?

What are the specific requirements this unit must meet under the Resource Conservation and Recovery Act (RCRA)?

Will the capacity need to be expanded in the future as the training regime changes?

If so, will that alter the permitting requirements under RCRA?

What percentage of the material to be burned are metal? Plastic? Chemical?

Will nuclear waste be incinerated?

If not, how will nuclear waste from the various elements of the Chemical Defense Training Facility be disposed of?

Will metal from gas masks, air filters and other sources be incinerated?

How will the operators of this unit be trained and certified?

What design will the unit have?

Has the unit been tested prior to this in its efficiency in removing the hazardous chemicals that will be burned at this facility?

What is the peak expected thermal output of the unit?

What is the extent of the expected thermal plume?

How will this plume affect populations of insects, birds, and other species?

Air Pollution Control

Will chlorine based materials be burned?

Can chlorine based materials create dioxin when burned?

What air pollution control devices will be used on the thermal treatment unit?

How will air pollution control devices be tested for efficiency?

How will air pollution control filters, bags and other devices be disposed of?

Will they be treated as hazardous waste?

What percentage of pollutants will be removed by the unit?

If enough pollutants are not removed from the air, will the unit be redesigned as a hazardous waste incinerator under RCRA?

What are the air quality parameters the unit must meet?

How will the unit alter the air quality of the area?

Could air emissions from the thermal treatment unit combine with other chemicals present in the atmosphere to create more dangerous compounds?

Ash disposal

Will the ash from the thermal treatment unit be tested for hazardous material content?

How will the ash be disposed of?

How would disposing of the ash as a hazardous waste affect the cost of the facility?

Alternatives

What are the alternatives to the thermal treatment unit?

Could the unit be permitted as a hazardous waste incinerator, thereby meeting more stringent RCRA requirements?

Could the contaminated material be disposed of in a more environmentally benign way?

Could the material be disposed of at a hazardous waste landfill?

General Concerns

Quality of Life

How will the relocation affect the quality of life of people living in the area?

Will the less pristine environment resulting from this facility affect people who came to this area for that pristine environment?

Will schools and other social institutions be overcrowded as a result of more people living in the area?

Economics

What are the economic projections for this area with and without the facility?

Who will benefit from jobs created by the move?

How will land values be altered for area residents once their land is contaminated?

Will people moving to the area because of its pristine environment chose to live elsewhere because of the contamination which will occur?

Will new schools or other infrastructure need to be built because of the influx of people into the area as a result of this facility?

Will those changes cause increases in taxes?

What are the long term costs of the environmental damage that will be caused by this facility?

What will be the economic cost of the clean up at Fort McClellan for the same facility?

How would these costs differ at Fort Leonard Wood?

Should short term economic gain created by the relocation of this facility be done at the expense of the environment?

Is the U.S. Army committed to long term economic viability of the surrounding community or to its short term gain?

Recreation

Will tourists and people coming to this area to rest and relax continue to come when they learn that the area is potentially contaminated?

What will be the effects of the facility on hunting, fishing, swimming, canoeing, hiking, camping and picnicking?

Will there be any restrictions on the use of the Big Piney River or Roubidoux Creek because of training activities?

How does the relocation of the Chemical Defense Training Facility to this area conflict with the image portrayed of this area as a pristine environment in which to live and recreate?

Will tourists chose to vacation elsewhere as a result of this facility and the publicity that will be conducted to prevent it from being relocated here?

Will all of the areas that are currently open to the public on Fort Leonard Wood continue to be available to them?

Will there be any risk to troops or trainers during hunting seasons?

Cumulative Impacts

What are the impacts on the environment which will result from the incremental impacts of the various components of the Chemical Defense Training Facility when added to other past, present, and reasonably foreseeable future actions regardless of what individual or agencies undertake such actions? Please address this with as much specificity as possible.

Alternatives

What alternatives to the use of live chemical weapons have been considered?

With the end of the Cold War, what peaceful alternative uses of Fort Leonard Wood have been considered?

What feasibility studies have been conducted?

Could training be conducted on an international level, rather than the United States have its own training facility?

Chemical Weapons Convention

Will this facility be necessary if the Chemical Weapons Convention is ratified?

How would the mission of the facility alter if the Chemical Weapons Convention is ratified?

Would the removal of chemical weapons from the world outweigh the economic benefits of the chemical weapons installation at Fort Leonard Wood?

Would the relocation of this facility to Fort Leonard Wood affect the ratification of the Chemical Weapons Convention by the U.S. Senate?

Has a variance for this facility been obtained from the United Nations and from the ratifying nations?

If not, will it be sought?

Thank you for your consideration of our comments.

Sincerely,

Troy Gordon

cc: Senator Christopher Bond
Senator John Ashcroft
Representative Dick Gephardt
Representative Ike Skelton
Representative Karen McCarthy
Representative Bill Emerson
Emily Brown, Fort Leonard Wood
Rick Hansen, U.S. Fish and Wildlife Service
Randy Moore, U.S. Forest Service
Governor Mel Carnahan
David Shorr, Missouri Department of Natural Resources
Jerry Presley, Missouri Department of Conservation

EIS PREPARERS NOTE:

In response to the Ozark Chapter/Sierra Club's DEIS review comment, G-OCSC.03, subsection A.7 has been added to this appendix. In subsection A.7, a list of all scoping issues raised by the Ozark Chapter/Sierra Club, and the appropriate subsection in the EIS that addresses these scoping issues, has been added.

A.3 SCOPING MEETING HANDOUT MATERIALS

A packet of handout materials were provided to each person who attended the scoping meeting which was held in the Fort Leonard Wood area on November 30, 1995 (see Section 1.3.5 for additional details). These handout materials included:

1. A copy of the information flyer that was widely distributed to announce the scoping meeting to the public.

2. Scoping Meeting Brochure that provided an overview of the purpose of the meeting, how to participate, the EIS methodology, the nature of the planned action and related information.

3. A standard form that could be used to document comments on the planned action.

4. A summary of "Training Objectives and Activities" handout that provided more detailed descriptions of planned training actions to compliment the information provided by a narrated video presentation, display boards, and conversations with Fort Leonard Wood representatives and EIS team members.

Copies of items 1-3 have been included on the following pages. Item 4 has not been reproduced here since the information contained in that scoping meeting handout is essentially identical to the information provided in Section 2 of this EIS, and related appendices.

Notice of

OPEN HOUSE
PUBLIC SCOPING MEETING

To Discuss the Preparation of an

ENVIRONMENTAL IMPACT STATEMENT

For the

REALIGNMENT OF THE U.S. ARMY MILITARY POLICE AND CHEMICAL SCHOOLS TO FORT LEONARD WOOD, MISSOURI

Public Scoping Meeting
(See Back for Details)

DATE: November 30,1995
TIME: 4:30 to 8:30 P.M.
LOCATION: Waynesville High School Library and Cafeteria

Note: Waynesville High School can be reached from westbound and eastbound I-44 by exiting at Highway H; turn at the stop sign and proceed north; turn right (east) onto Business Loop 44 at the second stop sign; and proceed east 1/2 mile to the high school.

Announcement
Of
Open House Public Scoping Meeting
November 30, 1995

WHAT: The Department of the Army will prepare an **Environmental Impact Statement (EIS)** assessing environmental, social and economic impacts associated with the realignment and operation of the U.S. Army Military Police and Chemical schools to Fort Leonard Wood, Missouri.

WHY: The preparation of an EIS is required by section 102(2)(c) of the National Environmental Policy Act of 1969 (NEPA) to document the positive and negative effects of major federal actions such as the realignment of the U.S. Army Military Police School and the U.S. Army Chemical School from Fort McClellan, AL to Fort Leonard Wood, MO. The realignment action was announced as part of a comprehensive package prepared by an independent Commission on Base Closure and Realignment appointed by the president. The action, defined in the Commission's report to the President (dated July 1, 1995), recommended: closure of Fort McClellan; realignment of the Military Police School and Chemical School to Fort Leonard Wood; realignment of the Defense Polygraph Institute to Fort Jackson, SC; and the retention of a U.S. Army Reserve enclave at Fort McClellan. This EIS will only analyze the realignment to Fort Leonard Wood. The other actions will be evaluated in separate environmental documents prepared by other installations.

PURPOSE: The purpose of the Open House Public Scoping Meeting is to: [1] provide a description of the proposed action; [2] receive public and interested agency input on potential impacts and issues that should be included in the EIS, and [3] identify other review, coordination or permit requirements associated with the realignment activities to occur at Fort Leonard Wood.

OPEN HOUSE MEETING FORMAT: The Public Scoping Meeting will be conducted using an Open House format. Participants may arrive at the meeting at any time between 4:30 and 8:30 p.m. Upon arrival participants will receive handout materials that summarize the proposed action and key study issues and will be invited to view a slide presentation that provides additional information. After these introductory materials are reviewed, all participants will be encouraged to view graphic displays and meet with the EIS team members to discuss the proposed action in more detail. Standard comment sheets and a court recorder will be available to document public comments.

WHAT YOU CAN DO: All interested parties are urged to respond to this notice, including representatives of Federal and non-Federal agencies; agricultural, commercial, industrial, business, transportation and utility interests; civic, environmental, recreational, and fish and wildlife organizations; and concerned citizens, property owners and other interests. IN ORDER TO BE HEARD and to facilitate proper consideration, you should attend the Open House Public Scoping Meeting and present your views, or send your written comments to Mr. Robert Bax, Project Manager, Harland Bartholomew & Associates, Inc., Suite 330, 400 Woods Mill Road South, St. Louis, MO 63017. All comments should be received within 30 days following the Open House Public Scoping Meeting.

Purpose of Scoping Meeting

This meeting is being held to: 1) provide a description of the action; 2) receive public comments regarding the proposed study approach and issues to be addressed in the Environmental Impact Statement (EIS); 3) identify other coordination or permit requirements associated with the proposed realignment activities to occur at Fort Leonard Wood; and (4) identify additional relevant concerns pertaining to the realignment.

How to Participate

This scoping meeting is being conducted using an "Open House" meeting format. The Open House format is designed to foster communication between study team members and the public. We have planned this meeting so that you can obtain information about actions to occur at Fort Leonard Wood, and talk directly to the meeting facilitators to help answer your questions regarding the study process and proposed actions. **In order to get the most out of your attendance at this meeting, and to ensure that your comments are included in the meeting record, we invite you to follow the 4 steps listed below:**

Step 1 - View Slide Show Orientation. Please proceed to the school library where you can read this handout and view a short narrated slide show that will provide an overview of the scoping meeting process, the proposed action, and related study procedures and issues.

Step 2 - View Displays and Talk with EIS Study Team. After viewing the slide show, we invite you to move to the school cafeteria to review more detailed information and talk with staff from the EIS study team to gain a better understanding of the proposed action.

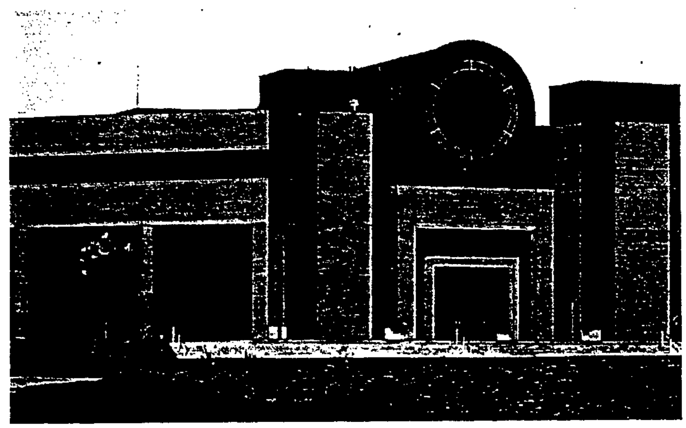
Step 3 - Fill Out Comment Sheet. Use the standard Comment Sheet (printed on blue paper) to identify issues that you would like the study team to consider in preparing the EIS. These comment sheets may be left in one of the collection boxes at this meeting, or mailed to the point of contact listed on the sheet along with any other written materials that you would like to enter into the scoping meeting record.

Step 4 - Provide Oral Statement. If you would prefer to provide an oral statement, a table is available where a court recorder will listen to and record your comments.

How Your Comments Will Be Used

All comments must be mailed within 30 days of this Scoping Meeting to ensure that they are incorporated in the meeting record. The comment period will close on December 30, 1995.

All comments provided at this scoping meeting (written as well as oral comments provided to the court recorder), and any additional written comments received through December 30, 1995 will be documented as part of the Scoping Meeting record. These comments will be used by the EIS study team to help define issues that are of greatest concern to the public, thereby ensuring that these issues are considered in the EIS. A summary of all scoping comments will be presented in the Draft EIS.



Fort Leonard Wood is currently the home of the U.S. Army Engineer Center

Fort Leonard Wood - Today

The U.S. Army Engineer Center (USAEC) and Fort Leonard Wood serves as a military garrison and an Engineer installation for the U.S. Army Training and Doctrine Command (TRADOC), one of eleven major commands in the Department of the Army.

The installation occupies approximately 62,900 acres located primarily in Pulaski County; with smaller portions located in Texas and Laclede counties. The current average daytime population on Fort Leonard is over 24,000 persons. In addition to providing land, equipment and facilities for mission-related activities, the installation provides for the housing and general living needs of many of its residents. This includes support services such as maintenance of installation roadways, buildings, grounds and utility systems; and numerous support functions including public health and welfare, recreation and commercial services.

Base Realignment and Closure (BRAC) Legislation and Process

As a result of changing global security requirements, the United States is reducing and restructuring its forces consistent with revised national military objectives. The process to determine installations for closure and/or realignment was established by the Defense Closure and Realignment Act of 1990 (Public Law 101-510). The military services used criteria established by the Joint Chiefs of Staff to recommend closure and realignment actions. These criteria considered military value, return on investment from cost savings, and environmental and socioeconomic impacts.

Under Public Law 101-510, the BRAC process was conducted in 1991, 1993 and again in 1995. A consolidated Department of Defense (DoD) list of recommended actions was submitted by the Secretary of Defense to a bipartisan commission for each of these BRAC actions. The Defense Base Closure and Realignment Commission evaluated the recommendations, and sent the findings to the President, who approved and forwarded them to Congress. The Commission's 1995 recommendations for base realignments and closure are commonly referred to as "BRAC 95".

Upon signature of the President, Public Law 101-510 stipulated that the Commission's recommendations would be implemented unless Congress disapproved. For BRAC 95, Congress considered the actions, but did not disapprove. Therefore, BRAC 95 recommendations became law on September 28, 1995, and the recommendations are now being implemented as required by law.

Public Law 101-510:
- BRAC 91
  - BRAC 93
    - BRAC 95 (Fort Leonard Wood)

BRAC 95 Recommendations Related to Fort Leonard Wood

As part of the BRAC 95 recommendations, the Commission specifically called for closing Fort McClellan, Alabama (with some exceptions), and relocation of the U.S. Army Military Police School and U.S. Army Chemical School from Fort McClellan to Fort Leonard Wood, Missouri.

The National Environmental Policy Act (NEPA) as Related to BRAC

The National Environmental Policy Act of 1969 (NEPA) requires the analysis and documentation of potential environmental effects associated with all major federal decisions. NEPA legislation is designed to ensure that environmental factors are considered equally with the technical and economic components of a decision, and that the public is fully informed and appropriately involved in the environmental analysis process.

In establishing the base closure and realignment procedures in Public Law 101-510, the Congress waived certain procedural elements of NEPA, thereby limiting the environmental impact analysis process associated with closure and realignment actions. Specifically, Public Law 101-510 waived the procedures of NEPA as it would have applied to the actions of DoD and the Base Realignment and Closure Commission in recommending bases for closure and realignment, and to the actions of the President in approving or disapproving the Commission's recommendations.

In the case of the actions being considered at this scoping meeting, this legislation means that NEPA provisions do not apply to:

- the need to close Fort McClellan, Alabama;
- the need to realign the mission and functions of the U.S. Army Chemical and Military Police schools from Fort McClellan to Fort Leonard Wood; or
- the need to consider alternative closing or receiving installations.

These "limiting" provisions of BRAC do not, however, relieve defense agencies of their responsibilities to use NEPA procedures to consider all subsequent realignment actions and the environmental consequences of those actions. Therefore, the BRAC EIS for Fort Leonard Wood will identify and evaluate:

- mission activities to be realigned to Fort Leonard Wood;
- facilities required to support realigned actions; and
- the change in military and civilian population to occur at Fort Leonard Wood as a result of the realignment action.

Primary EIS Components:

- Proposed Action
- Alternatives
- Affected Environment
- Impact Analysis
- Mitigation Actions

Proposed Action

The proposed action is to relocate the U.S. Army Military Police School and the U.S. Army Chemical School and associated units from Fort McClellan, Alabama to Fort Leonard Wood, Missouri. This action will be described in the EIS in the context of three related elements including:

- Realignment of **Mission Activities**;
- Provision of **Facilities** required to support new mission activities; and
- Realignment of the associated military and civilian **Population**.

Mission Activities - Implementation of the training programs associated with the Chemical and Military Police schools will result in the addition of approximately 70 Plans of Instruction (POIs) to those currently taught at Fort Leonard Wood. Activities associated with these POIs will be described in detail in the EIS.

Facilities - The EIS will describe existing facilities that may be used to accommodate activities to be realigned to Fort Leonard Wood, and identify requirements for facilities that will need to be expanded, modified or constructed. These facilities will include buildings, training ranges and associated support systems such as utility service, roadways and parking areas.

Population - The proposed action will result in an increase of approximately 1,600 military and 400 civilian personnel; and an increase in the average daily student load of approximately 4,000 military and 150 civilian students. This will result in a total Fort Leonard Wood population that is approximately equal to the installation's population in the early 1990s as a result of prior DoD downsizing at Fort Leonard Wood.

Alternatives

A primary purpose of the EIS is to identify and analyze reasonable alternatives to accomplish the proposed action. In this case, EIS alternatives will be developed for each of the three primary elements of the proposed action. It is anticipated that these alternatives will be structured as follows:

Realign Mission:
- No Action Alternative
- Current Training Alternative
- Optimum Training Alternative

Provide Supporting Facilities:
- No Action Alternative
- Land Use & Facility Alternative A
- Land Use & Facility Alternative B
- Land Use & Facility Alternative C

Realign Population:
- No Action Alternative
- Early Move Alternative
- Late Move Alternative
- Phased Move Alternative

For each study element, the No Action Alternative will assume that all existing operations at Fort Leonard Wood, and all future activities that were planned to occur prior to the announcement of BRAC 95 will proceed. Therefore, the No Action Alternative will define pre-BRAC "baseline" conditions to serve as a basis for identification of impacts associated with each alternative.

Affected Environment

The EIS will include a description of existing environmental conditions at Fort Leonard Wood. This information will describe the wide range of natural, cultural, man-made and socioeconomic resources as they currently exist at Fort Leonard Wood.

Impact Analysis & Mitigation

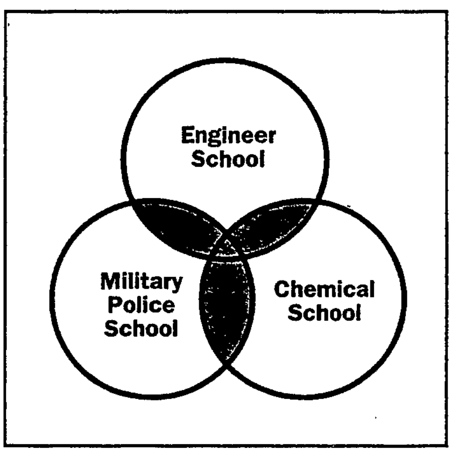
The Environmental Consequences section of the EIS will analyze and describe impacts that could reasonably be expected to occur as a result of implementing each study alternative. For those actions that have the potential to result in significant adverse impacts, the EIS will describe potential ways to reduce or eliminate these impacts.

Fort Leonard Wood Current Mission

The primary mission of the U.S. Army Engineer Center, which is currently located at Fort Leonard Wood (FLW), is to train enlisted and officer personnel in basic combat, military engineering and motor vehicle operations. This includes: bridging, demolitions, placement and removal of landmines; placement and breaching of obstacles designed to prevent movement; and construction and maintenance of buildings, utility systems and roads. Training is also provided in operation, repair and maintenance of heavy equipment, and tracked and wheeled vehicles.

Activities to be Realigned to FLW

BRAC 95 actions include the realignment of the U.S. Army Military Police (MP) and Chemical schools from Fort McClellan to Fort Leonard Wood. Placing these two additional schools at Fort Leonard Wood will provide opportunities for joint training as a three-school unit. Students in these three key support programs will be learning together - just as they would work together on the battlefield. Consolidating these three operations at a single site will also lead to administrative and support efficiencies. A list of the type of training activities that they conduct is provided below in the context of 11 Training Objective Groups that will be used for evaluation in the EIS. Additonal information regarding these training activities is available in the cafeteria area.



List of BRAC 95 Training Activities to Occur at Fort Leonard Wood:

1. **Battlefield Procedures**
   - Call-For-Fire Support
   - Maneuver Operations
   - Mines and Obstacles Designed to Prevent Movement
   - Nuclear, Biological and Chemical Defense
   - Night-Time Squad Engagement
   - Unarmed Self-Defense
   - Urban Terrain Operations
   - Warfighting and Tactical Operations

2. **Biological Agent Detection**
   - Biological Integrated Detection System (BIDS)
   - BIDS Maintenance

3. **Nuclear, Biological and Chemical (NBC) Reconnaissance**
   - FOX Battlefield Employment and Operation
   - FOX Maintenance

4. **General Military Training (GMT)**
   - GMT, Classroom
   - GMT, Field
   - GMT, NBC Personal Protective Equipment
   - Signals and Other Non-Verbal Forms of Communication
   - Radio Communications
   - Computer Operations
   - Physical Fitness and Total Fitness

5. **Military Police Procedures**
   - Basic Military Police Functions
   - Advanced Law Enforcement and Operations

6. **Nuclear Biological and Chemical (NBC) Procedures**
   - NBC Procedure
   - NBC Equipment
   - NBC Decontamination - Advanced Proficiency Test (Toxic Agent)
   - NBC Survival Recovery

7. **Obscurant (Smoke) Procedures**
   - Employment Principles
   - Employment Proficiency (Static Operations)
   - Employment Proficiency Test (Mobile Operations)
   - Employment Proficiency Test (Field Training Exercises)
   - Generator Maintenance
   - Storage Operations

8. **Radiation Safety**
   - Radiation Safety
   - Radiation Test and Operational Equipment Storage

9. **Research Support**
   - Research Support
   - Library, Specialized/Classified Information
   - Museum Operations

10. **Small Arms Procedures**
    - Weapons Familiarization and Qualification
    - Weapons Familiarization and Qualification, Pistol
    - Weapons Storage

11. **Vehicle Operations**
    - Vehicle Operations, Driver Qualification
    - Evasive Driving
    - Vehicle Maintenance

Early Public Information Meetings

During May, 1995 three early public information meetings were conducted by representatives of Fort Leonard Wood to provide factual information to the public about the proposed realignment action being discussed as part of the BRAC 95 decision process. These early meetings were announced in local news media. These early public information meetings occurred in Waynesville, MO; Rolla, MO; and Lebanon, MO. Additional individual and group meetings were conducted both on-post and off-post during this period, prior to initiation of the EIS, as part of the installation's efforts to keep the public informed of pending BRAC actions.

Initial Operating Permits

In response to instructions from the BRAC Commission issued in 1993, Fort Leonard Wood applied for, and has received, three permits required to support the realignment of the Chemical and Military Police schools to the installation. Specifically, the Missouri Department of Natural Resources has issued the following permits associated with proposed BRAC realignment actions:

- **Stormwater Discharge**;
- **Air Quality Permit to Construct the Incinerator** associated with the Chemical Defense Training Facility; and
- **Air Quality Permit** for smoke training activities.

These permits and associated analyses will be described in the Draft EIS addressing all aspects of the Fort Leonard Wood BRAC 95 program.

Regulatory Agency Coordination

Early coordination meetings have been conducted with several key federal and state agencies. These meetings have included representatives from:

- **Agency of Toxic Substances and Disease Registry;**
- **U.S. Environmental Protection Agency;**
- **U.S. Fish and Wildlife Service;**
- **U.S. Forest Service;**
- **Missouri Department of Natural Resources;** and
- **Missouri Department of Conservation.**

To date, five monthly agency coordination meetings have been conducted with the agencies listed above to review proposed actions and develop methods to be used in the preparation of the EIS. These meetings also included representatives from the Kansas City District, Corps of Engineers, Fort Leonard Wood and the EIS consultant team led by Harland Bartholomew & Associates, Inc.

These meetings have been designed to ensure that: the agencies have a complete understanding of the activities to be realigned to Fort Leonard Wood; they are aware of the limitations and procedures involved with an EIS for a BRAC action; the information to be provided in the EIS results in full disclosure of all elements of the proposed action; and that the EIS provides an analysis of meaningful alternatives that support the decision making process.

Additional coordination has occurred with the U.S. Fish and Wildlife Service in association with a Biological Assessment which is being prepared to address potential impacts to threatened and endangered species at Fort Leonard Wood.

Photo from Open House/Public Information Meeting

Public Involvement

In addition to the pre-EIS meetings described above, wide public notice was provided to announce this scoping meeting. Scoping letters were sent to a broad range of federal, state and local agencies; elected officials; and special interest group representatives. A flyer was mailed directly to everyone on an initial project mailing list which includes over 500 names. This mailing list was compiled from lists available from previous meetings held to coordinate environmental issues related to Fort Leonard Wood, and it also includes the names of all individuals who have specifically expressed an interest in the EIS for BRAC 95 actions at the installation. Press releases were sent to media contacts (radio, TV and newspapers) across the state. A legal notice was published in four local/regional papers as well as the Kansas City Star, the St. Louis Post Dispatch, and the Anniston Star in Anniston, Alabama.

The public will be notified when the Draft EIS is published and available for review (anticipated release in mid-summer, 1996). The public will be requested to comment on the Draft EIS and attend a public hearing. Persons listed on Page 6 of this handout can be contacted for additional information.

Ongoing Environmental Protection at Fort Leonard Wood

Fort Leonard Wood's current environmental protection efforts are administered through its own Environment, Energy, and Natural Resources Division. This division contains staff with management and compliance responsibilities for air quality, water quality, hazardous materials and waste, solid waste, archaeologic and historic resources, wildlife, fisheries, threatened and endangered species, timber management and other areas of environmental concern.

Fort Leonard Wood works hard to manage its natural resources in concert with the Army missions assigned to the installation. This is accomplished through development and implementation of resource studies, surveys and management plans.

Fort Leonard Wood Provides Extensive Habitat to Wildlife and Related Recreation Activities

BRAC 95 EIS - Supporting Studies

Two studies are currently underway in support of the EIS for BRAC 95 actions to occur at Fort Leonard Wood. An extensive Biological Assessment (BA) is being prepared in close coordination with the U.S. Fish & Wildlife Service to evaluate the potential impact of proposed actions on threatened and endangered species that are known to occur in the area. These species include the Indiana bat, gray bat and bald eagle. In addition, a Human Health Risk Assessment is being prepared to supplement existing information regarding the potential impacts of smoke training on instructors, students and the general population in and around Fort Leonard Wood.

EIS Preparation Schedule

Major milestones associated with the preparation of the EIS for BRAC 95 actions at Fort Leonard Wood are illustrated in the following table:

Milestone Item	Completion Date
Scoping Process	December 1995
Release of Draft EIS	June 1996
Public Comment & Hearing	July 1996
Release of Final EIS	November 1996
Publication of Record of Decision	January 1997

EIS Preparation Team & Points of Contact

Regulations require the use of an interdisciplinary team of professionals to conduct EIS evaluations. The EIS will be prepared by the consulting firm of Harland Bartholomew & Associates, Inc. in association with Parsons Engineering Science, Inc. and 3D/ Environmental under a contract with the Kansas City District, Corps of Engineers. All work will be developed in close coordination with EIS team representatives from the following U.S. Army elements:

- *Fort Leonard Wood*
- *Fort McClellan*
- *Kansas City District, U.S. Army Corps of Engineers*
- *U.S. Army NEPA Support Team*
- *U.S. Training and Doctrine Command (TRADOC)*
- *Department of the Army (DA)*

Persons that may be contacted for more information regarding the ongoing EIS project include:

Mr. Alan Gehrt (Attn: MRKEP-PR)
Kansas City District, Corps of Engineers
601 E. 12th Street, Kansas City, MO 64106-2896
Phone: (816) 426-3358

Ms. Emily Brown (Attn: ATZT-BRAC)
Fort Leonard Wood BRAC Transition Office
Fort Leonard Wood, MO 65473-5000
Phone: (314) 563-6130

Mr. Robert Bax
Harland Bartholomew & Associates, Inc.
400 Woods Mill Road South, Suite 330
Chesterfield, MO 63017-3427
Phone: (314) 434-2900

printed on recycled paper

Fort Leonard Wood

Base Realignment & Closure (BRAC)
Environmental Impact Statement

Comment Sheet

If you are interested in providing comments concerning the realignment of the U.S. Army Military Police School and U.S. Army Chemical School to Fort Leonard Wood, please provide your written comments below and send to the address noted, or leave this form in one of the comment form collection boxes at the November 30, 1995 Public Scoping Meeting.

(additional space on the back) **>>>>**

SEND COMMENTS TO:

Harland Bartholomew & Associates, Inc.
400 Woods Mill Road South, Suite 330
Chesterfield, MO. 63017

YOUR NAME:

Organization:

Address:

Federal Register / Vol. 60, No. 184 / Friday, September 22, 1995 / Notices

DEPARTMENT OF DEFENSE

Department of the Army

Intent To Prepare Environmental Impact Analyses for Defense Base Realignment and Disposal Actions Resulting from the 1995 Commission's Recommendations

AGENCY: United States Army, Department of Defense.

ACTION: Notice of intent.

SUMMARY: The Defense Base Closure and Realignment Commissions were established by Public Law 101-510, the Defense Base Closure and Realignment Act of 1990, to recommend military installations for realignment and closure. The 1995 Commission's recommendations were included in a report which was presented to the President on July 1, 1995. The President approved and forwarded this report to Congress on July 13, 1995. A joint resolution to disapprove these recommendations did not pass in Congress on September 8, 1995. Thus, if no further action is undertaken to disapprove such recommendations within the statutorily provided time period, then these recommendations will become law and must be implemented consistent with the requirements of the Defense Base Closure and Realignment Act of 1990, Public Law 101-510.

Public Law 101-510 exempts the decision-making processes of the Commission from the provisions of the National Environmental Policy Act of 1969 (NEPA). The law also relieves the Department of Defense from the NEPA requirement to consider the need for closing, realigning, or transferring functions and from looking at alternative installations to close or realign. Nonetheless, the Department of the Army must still prepare environmental impact analyses during the process of property disposal and during the process of relocating functions from a military installation being closed or realigned to another military installation after the receiving installation has been selected but before the functions are relocated. These analyses will include consideration of the direct and indirect environmental and socioeconomic effects of these actions and the cumulative impacts of other reasonably foreseeable actions affecting the installation during the same time.

The Army intends to prepare environmental impact analysis to assess the environmental effects of the actions listed below. Opportunities for public participation will be announced in local newspaper. Comments from public will be considered before action is taken to implement these actions.

a. Environmental Assessments planned for the following realign actions:

(1) Anniston Army Depot, Alab receiving: towed and self-propell combat vehicle mission from Letterkenny Army Depot, Pennsy and material remaining at Defens Distribution Depot Letterkenny (I at the time of disestablishment fr DDLP, Chambersburg, Pennsylva be combined at the Defense Distri Depot Anniston, Alabama (DDAA

(2) Detroit Arsenal, Michigan, receiving: automotive material management functions from Avia Troop Command, St. Louis, Miss align with Tank-Automotive and Armaments Command.

(3) Fort Belvoir, Virginia, recei Concepts Analysis Agency from l facilities in Bethesda, Maryland.

(4) Fort Bliss, Texas, receiving: Army Test and Experimentation missions and functions from Fort Hunter Liggett, California.

(5) Fort Detrick, Maryland, rece 1111th Signal Battalion and 1108 Signal Brigade from Fort Ritchie, Maryland.

(6) Fort Huachuca, Arizona, rec Information Systems Engineering Command elements from Fort Ri Maryland.

(7) Fort Jackson, South Carolin receiving: Defense Polygraph Inst from Fort McClellan, Alabama.

(8) Fort Meade, Maryland, rece Defense Investigative Service, Investigations Control and Auton Directorate from Fort Holabird, Maryland; and Information Syste Software Center from leased facil Fairfax, Virginia.

(9) Fort Monmouth, New Jerse receiving: functions related to ma management of communications-electronics from Aviation-Troop Command, St. Louis, Missouri, to with Communications-Electronic Command.

(10) Fort Wainwright, Alaska, receiving: Cold Regions Test Act and Northern Warfare Training C from Fort Greely, Alaska.

(11) McAlester Army Ammuni Plant, Oklahoma, receiving: U.S. Defense Ammunition Center and from Savanna Army Depot Activ Illinois.

(12) Redstone Arsenal, Huntsv Alabama, receiving: Aviation Re Development & Engineering Cen Aviation Management; and Avia

Continued on Next Page

Program Executive Offices from Aviation-Troop Command, St. Louis, Missouri, to form the Aviation & Missile Command.

(13) Tobyhanna Army Depot, Pennsylvania, receiving: core missile guidance system workload from Letterkenny Army Depot, Pennsylvania; and Common-Use Ground-Communication Electronics from McClellan Air Force Base, California.

b. An Environmental Impact Statement is planned for Fort Leonard Wood, Missouri, receiving: U.S. Army Military Police School and U.S. Army Chemical School from Fort McClellan, Alabama.

c. Environmental Assessments are planned for property disposal actions at the following closure locations:

(1) Bellmore Logistics Activity, New York;
(2) Big Coppett Key, Florida;
(3) Camp Bonneville, Washington;
(4) Camp Kilmer, New Jersey;
(5) Camp Pedericktown, New Jersey;
(6) Defense Distribution Depot, Ogden, Utah;
(7) Detroit Army Tank Plan, Michigan;
(8) East Fort Baker, California;
(9) Fort Buchanan, Puerto Rico;
(10) Fort Dix, New Jersey;
(11) Fort Greely, Alaska;
(12) Fort Holabird, Maryland;
(13) Fort Missoula, Montana;
(14) Fort Pickett, Virginia;
(15) Fort Totten, New York;
(16) Hingham Cohassett, Massachusetts;
(17) Kelly Support Center, Pennsylvania;
(18) Letterkenny Army Depot, Pennsylvania;
(19) Recreation Center #2, North Carolina;
(20) Red River Army Depot, Texas;
(21) Rio Vista Army Reserve Center, California;
(22) Seneca Army Depot, New York;
(23) Sierra Army Depot, California; and
(24) Sudbury Training Annex, Massachusetts.

d. Environmental Impact Statements are planned for property disposal actions at the following closure locations:

(1) Bayonne Military Ocean Terminal, New Jersey;
(2) Defense Distribution Depot, Memphis, Tennessee;
(3) Fitzsimons Army Medical Center, Colorado;
(4) Fort Chaffee, Arkansas;
(5) Fort McClellan, Alabama;
(6) Fort Ritchie, Maryland;
(7) Oakland Army Base, California;
(8) Savanna Army Depot Activity, Illinois; and
(9) Stratford Army Engine Plant, Connecticut.

FOR FURTHER INFORMATION CONTACT: For further information regarding these environmental impact analyses, please contact the Public Affairs Office of the affected installations or the appropriate higher headquarters as indicated below:

Installation	(Area code) commercial No.
Anniston Army Depot, AL	(205) 235-6281
Bayonne Military Ocean Terminal, NJ	(201) 823-6351
Bellmore Logistics Activity, NY	(404) 669-5607/5686
Big Coppett Key, FL	(404) 669-5607/5686
Camp Bonneville, WA	(404) 669-5607/5688
Camp Kilmer, NJ	(404) 669-5607/5686
Camp Pedrick-town, NJ	(404) 669-5607/5686
Defense Distribution Ctr, Memphis, TN	(901) 775-6753
Defense Distribution Ctr, Odgen, UT	(801) 399-7828
Detroit Army Tank Plant, MI	(810) 574-6584
Detroit Arsenal, MI	(810) 574-6584
East Fort Baker, CA	(404) 669/5607/5686
Fitzsimons Army Medical Center, CO	(303) 361-3192/3952
Fort Belvoir, VA	(703) 805-5001
Fort Bliss, TX	(915) 568-4505
Fort Buchanan, PR	(404) 669-5607/5686
Fort Chaffee, AR	(501) 484-2905
Fort Detrick, MD	(301) 619-2018
Fort Dix, NJ	(404) 669-5607/5686
Fort Greely, AK	(907) 873-4661
Fort Holabird, MD	(301) 677-1361
Fort Huachuca, AZ	(602) 533-2752
Fort Jackson, SC	(803) 751-7650
Fort Leonard Wood, MO	(314) 563-4013
Fort McClellan, AL	(205) 848-3643/6716
Fort Meade, MD	(301) 677-1361
Fort Missoula, MT	(404) 669-5607/5686
Fort Monmouth, NJ	(908) 532-6031
Fort Pickett, VA	(404) 669-5607/5686
Fort Ritchie, MD	(301) 878-5729
Foprt Totten, NY	(404) 669-5607/5686
Fort Wainwright, AK	(907) 353-5706
Hingham Cohassett, MA	(404) 669-5607/5686
Kelly Support Center, PA	(404) 669-5607/5686
Letterkenny Army Depot, PA	(717) 267-5102
McAlester Army Ammo Plant, OK	(918) 421-2191
Oakland Army Base, CA	(510) 466-3021
Recreation Center #2, NC	(404) 669-5607/5686
Red River Army Depot, TX	(903) 334-3143
Redstone Arsenal, Huntsville, AL	(205) 876-4161
Rio Vista Army Reserve Center, CA	(404) 669-5607/5686
Savanna Army Depot Activity, IL	(815) 273-8701
Seneca Army Depot, NY	(607) 869-1235
Sierra Army Depot, CA	(916) 827-4343
Stratford Army Engine Plant, CT	(810) 574-6584
Sudbury Training Annex, MA	(404) 669-5607/5686
Tobyhanna Army Depot, PA	(717) 894-7308

End of Notice

LETTER OF AGREEMENT
FOR
THE ENVIRONMENTAL IMPACT STATEMENT:
REALIGNMENT OF THE U.S. ARMY CHEMICAL AND
MILITARY POLICE SCHOOLS TO FORT LEONARD WOOD, MISSOURI

This Letter of Agreement (LOA) is entered into by the U.S. Army Engineer Center and Fort Leonard Wood (FLW) Transition Office and the U.S. Department of the Interior, Fish and Wildlife Service (FWS), Columbia Field Office for the preparation of the "Environmental Impact Statement for the Realignment of the U.S. Army Chemical and Military Police Schools from Fort McClellan, Alabama to Fort Leonard Wood, Missouri" as Cooperating Agencies (CAs).

1. BACKGROUND.

a. The Base Closure and Realignment Act of 1990, Public Law 101-510 (Act), mandates a series of base realignments and closures (BRAC) to be carried out through a BRAC Commission. In June 1995, the Commission recommended the following action in its report to the President:

> "Relocate the U.S. Army Chemical and Military Police Schools to Fort Leonard Wood, upon receipt of the required permits."

> The President subsequently signed the Commission report and forwarded it to Congress where it became law in September 1995.

b. Analysis pursuant to the National Environmental Policy Act (NEPA) was specifically exempted by the Act for consideration of alternative gaining DOD locations. Therefore, the EIS will only assess the environmental and socioeconomic effects associated with realigning the Schools to FLW and surrounding non-DOD lands.

c. The Act mandates that provisions of NEPA apply to DOD actions during execution of the BRAC Commission decision. Therefore, an EIS is being prepared in accordance with the provisions of NEPA, it's implementing regulations, and Army Regulation 200-2, "Environmental Effects of Army Actions." The Department of Army will also comply with the applicable Federal and State environmental laws and implementing regulations. A cost benefit analysis is not required of this action.

2. REFERENCES.

a. National Environmental Policy Act (NEPA), 1969, as amended (Public Law 91-190).

b. Endangered Species Act (ESA), 1973, as amended (Public Law 93-205).

c. Title 40 Code of Federal Regulations, Part 1501.

d. Title 50 Code of Federal Regulations, Part 402.

3. PURPOSE. The purpose of this LOA is to define the roles and responsibilities of the CAs in the preparation and review of the EIS. While coordination and cooperation between the CAs is required, nothing in this agreement shall absolve either party of their respective regulatory responsibilities.

4. ORGANIZATION AND COORDINATION.

a. General:

(1) FLW will facilitate coordination activities with the FWS through the continuation of monthly regulatory agency coordination meetings. Both agencies will be in attendance at these meetings, subject to the availability of staffing and funding. In addition, as issues of concern are identified during the EIS process, both parties will ensure that the other is kept fully informed.

(2) Both agencies will commit to meeting the overall schedule for completion of the EIS, including timely review of draft and final documents.

b. FLW:

(1) Has the lead in the preparation of the EIS. The Kansas City District, U.S. Army Corps of Engineers (KCD), in its role of providing support to FLW, is preparing the EIS through a contract with Harland Bartholomew and Associates (HBA).

(2) Will ensure that responsibilities for public participation throughout the EIS process are fully executed.

(3) Will enter into informal and formal consultations with the FWS pursuant to the Endangered Species Act.

(4) Will ensure that the comments and recommendations of the FWS, which has special expertise and jurisdiction by law regarding the assessment of the impacts to fish and wildlife and their habitats, and identification of appropriate mitigation for such impacts, will be reflected in the EIS and given full consideration during decisionmaking.

c. FWS, as a CA, will:

(1) Provide its expertise in the areas of Federally listed threatened and endangered species, fish and wildlife habitat, regulatory requirements of the Endangered Species Act, and development of appropriate mitigation.

(2) Disseminate information to appropriate personnel within the FWS for comment.

5. DOCUMENT REVIEW AND APPROVAL. Formal reviews of the preliminary draft, draft,

preliminary final, and final EIS will be completed within the times defined in the enclosed schedule. HBA will provide copies of the documents to FLW and FWS for review. Substantive comments on the documents submitted to FWS for review will be provided to FLW and HBA in writing. The Assistant Secretary of the Army for Installations, Logistics, and Environment will sign the Record of Decision.

6. PROJECT FUNDING. The preparation of this EIS is funded by the Army.

7. AGREEMENT DURATION. Either CA may terminate its participation in this agreement upon receipt of written notification to the other party. The LOA is effective upon date of final signature by the parties below. The LOA will terminate upon signature of the ROD.

John A. Durkin
Lieutenant Colonel, EN
Transition Office Director
Fort Leonard Wood

Date: 28 MAY 96

Michael J. LeValley for
Gary D. Frazer
U.S. Department of Interior
Fish and Wildlife Service
Columbia Field Office

Date: June 5, 1996

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Fort Leonard Wood

Base Realignment & Closure (BRAC) Environmental Impact Statement

Newsletter No. 1
April 1996

Purpose of This Newsletter

This newsletter is being issued to help keep you informed of the status of ongoing work efforts to prepare an Environmental Impact Statement (EIS) for relocating the U.S. Army Chemical School and the U.S. Army Military Police School to Fort Leonard Wood, Missouri. You are receiving a copy of this newsletter because your name is included on a list of persons and agencies that have expressed an interest in this project, or previous activities at Fort Leonard Wood.

Project Description

A decision has been made to relocate the Chemical and Military Police schools to Fort Leonard Wood. This decision is based on authority provided by the Defense Closure and Realignment Act of 1990 (Public Law 101-510), subsequent recommendations provided by the Defense Base Closure and Realignment Commission, and approval of these recommendations by the President and Congress.

An EIS is being prepared in compliance with the National Environmental Policy Act (NEPA) to fully define the planned Base Realignment and Closure (BRAC) actions to occur at Fort Leonard Wood, and to help the Army determine the impacts of various alternatives for implementing BRAC-related activities at the installation.

Work Progress to Date

Since the Fort Leonard Wood BRAC 95 EIS was initiated in November 1995, the study team has:

- Conducted a public scoping process to help identify the range of issues to be evaluated in the EIS;
- Developed a detailed understanding of the BRAC-related activities to be relocated to Fort Leonard Wood;
- Identified a wide range of alternatives that could be used to implement these activities at Fort Leonard Wood;
- Collected and documented baseline environmental conditions at Fort Leonard Wood; and
- Initiated numerous technical studies that are required to support the preparation of the EIS.

A summary of work elements completed to date is provided by the *EIS Planning Process Diagram* provided on the inside pages of this newsletter.

Scoping Process

The public "scoping process" is an integral part of the preparation of any EIS. The scoping process is designed to solicit public and agency assistance in identifying critical issues to be addressed in the EIS. The scoping process for this action included a public meeting which was conducted in an open house format at the Waynesville High School on November 30, 1995. Over 135 individuals completed registration cards at this meeting, with total attendance exceeding 150 persons.

Scoping Process Responses

The Army received 191 responses (182 written and 9 provided to court recorder) as a result of the total scoping process (including comments received prior to and during the scoping meeting, and through the close of the scoping comment period). The majority of responses were from individuals. In addition, responses were received from the following organizations and agencies:

Environmental Interest Groups:

- Missouri Coalition for the Environment
- Ozark Chapter/Sierra Club

Local/Regional Government & Organizations:

- Cities of Crocker; Dixon; Eldon; Houston; Lake of the Ozarks; Licking; Waynesville; and Rolla.
- Meremec Regional Planning Commission
- South Central Ozark Council of Governments

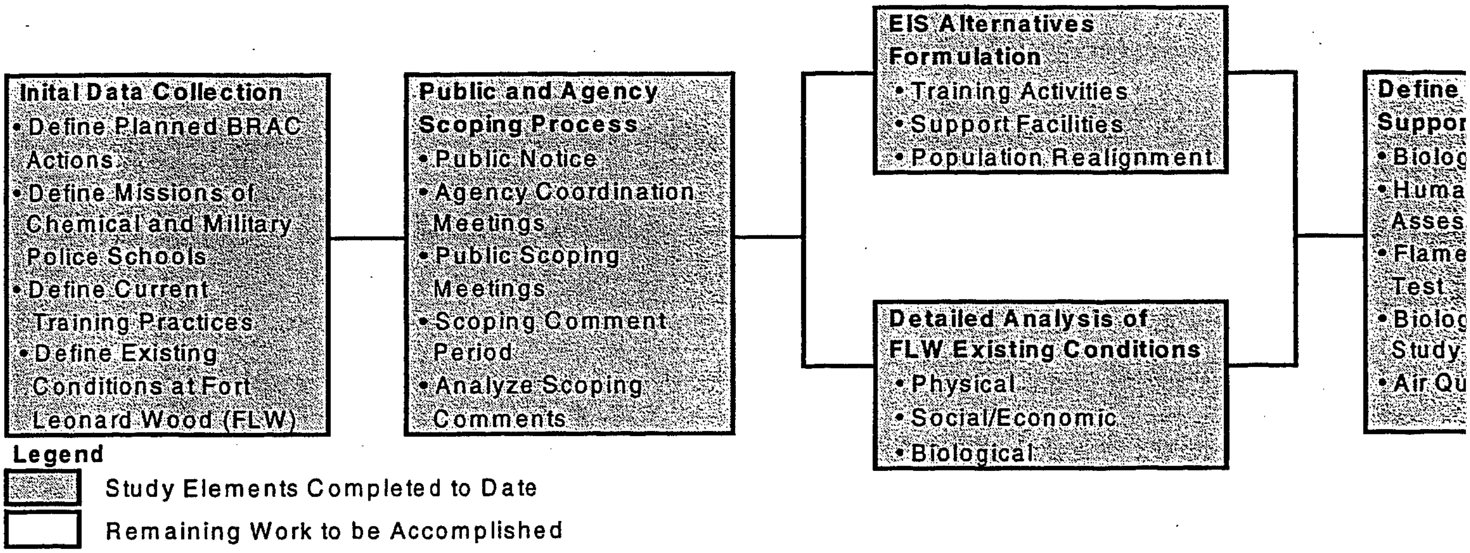
State Agencies:

- Missouri Clearinghouse - Office of Administration
- Missouri Department of Conservation
- Missouri Department of Natural Resources
- Missouri Highway & Trans. Dept., District 9

Federal Agencies:

- U.S. Dept. of Transp., Federal Railroad Adm.
- U.S. Environmental Protection Agency
- U.S. Fish & Wildlife Service

EIS Planning Process Diagram



Summary of Scoping Responses

Comments from each individual or organization were reviewed and marked to identify each type of issue identified. Based on this review, it was determined that the issues raised could be assigned to one of the following group or topic headings:

- Air Quality
- Water Resources
- Soils and Geology
- Hazardous Materials
- Permitting
- Biological Resources
- Social and Economic Resources
- Community Facilities
- Training Value

Of the 191 responses, 155 expressed support of the realignment action and noted positive benefits. Of the remaining 36 responses, 14 focused on a single issue such as chemicals to be used, groundwater contamination, biological resources, or simple acknowledgement of receipt of scoping notices. Multiple environmental concerns were noted by 22 persons or organizations that provided scoping responses.

Summary of Major Scoping Issues Identified. The following paragraphs provide a summary of issues identified in the context of the 9 group headings listed above.

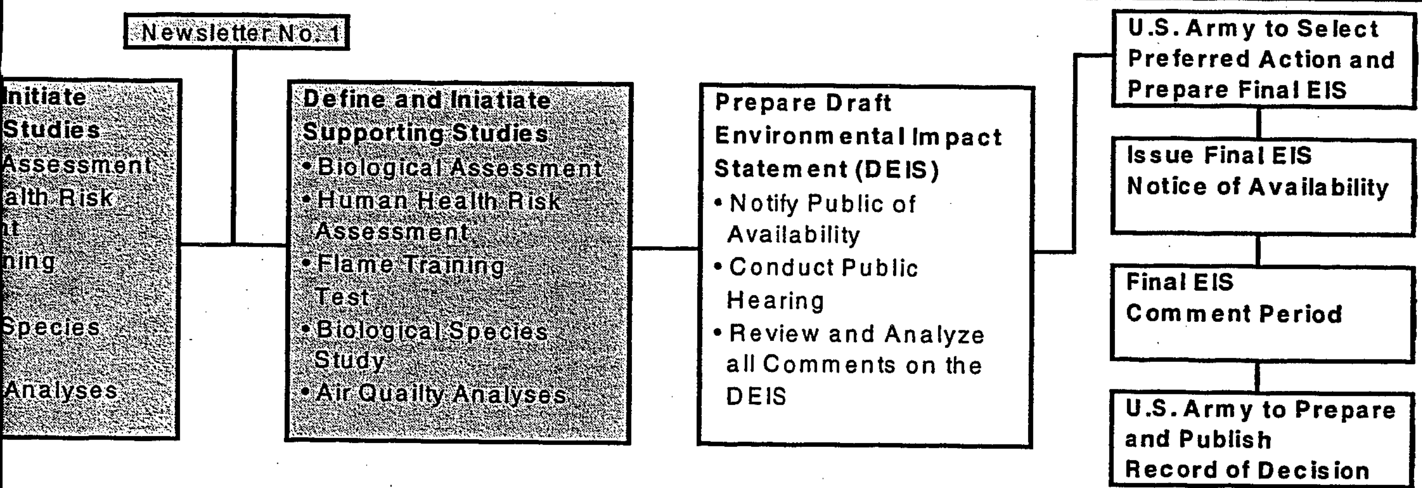
Air Quality. Approximately 70 comments were received addressing air quality issues associated with the planned actions. Over 85% of these comments involved questions and concerns relating to the planned construction of a thermal treatment unit to dispose of non-hazardous materials generated by the planned Chemical Defense Training Facility (CTDF). Most of the remaining air quality comments were related to: potential impacts associated with planned fog oil "smoke" generation; the planned use of biological agents; and expedient flame training associated with Chemical School training activities.

Water Resources. Approximately 30 comments were received addressing water quality and aquatic resources. Concerns were primarily related to the potential impact of fog oil usage on surface and groundwater supplies.

Soils and Geology. Approximately 10 comments expressed concern relating to the relationship of soil resources and geologic conditions within the Fort Leonard Wood area to the use of fog oil.

Hazardous Materials. Approximately 120 comments addressed issues relating to the transportation, storage, use and disposal of hazardous materials associated with planned realignment actions.

The most commonly referenced issues under this category included: the chemical characteristics of fog oil (both prior to and after it is used in smoke generators); the potential health effects of fog oil and other materials on soldiers, instructors and area residents; the potential hazards of shipping materials from Fort McClellan,



Alabama to Fort Leonard Wood, Missouri; the potential impacts of the accidental release of hazardous materials associated with the new training missions; steps that will be taken to monitor the environment to ensure that the use of new materials do not result in adverse impacts; and procedures to be used to decontaminate materials used in the Chemical Defense Training Facility.

Permitting. Approximately 30 comments related to various permitting issues that could be required to conduct the planned BRAC training activities at Fort Leonard Wood. Most of these comments were related to the permitting process associated with smoke training. Several reviewers suggested specific amendments to the existing and future permits for smoke training. Comments were also provided regarding other types of permits that should be considered as part of the EIS process.

Biological Resources. Approximately 100 comments addressed potential impacts to biological resources that exist within and around Fort Leonard Wood. The majority of these comments were associated with planned smoke training activities. Concerns focused on federally-listed threatened and endangered species, state-listed species, and general wildlife populations and vegetation within the area. These comments included specific references to fish species, insects, amphibians, reptiles and birds (including neotropical migrants).

Social and Economic Resources. Approximately 110 comments addressed the relationship of planned BRAC actions to social and economic resources within the Fort Leonard Wood area, and a large region around the installation. Most of these comments stressed the positive relationship of Fort Leonard Wood to the local and regional economy; and the potential for the planned BRAC actions to stimulate long-term development and business sector growth. Some comments requested consideration of any negative impacts that the relocation of the schools might have on the economy as a result of concerns associated with the type and extent of training activities to occur; and the impact of the planned actions on population projections and infrastructure requirements within the region.

Community Facilities. Approximately 10 comments addressed concerns regarding the ability of surrounding communities to deal with the growth that might occur as a result of the planned action. These concerns included the potential need for detailed land use planning and zoning, the availability of area housing, and potential impacts to area schools, roadways, and utility systems.

Training Value. Approximately 13 comments dealt with issues relating to enhanced training values that could accrue to the nation and the Army as a result of the planned consolidation of the Military Engineer, Chemical and Military Police schools at Fort Leonard Wood. These comments suggested that base realignment and closure is a practical and cost-effective way to streamline military activities; that taxpayers will benefit from the consolidation of activities at Fort Leonard Wood; and that the collocation of these schools will have a positive impact on the quality of training that can be provided by combining these schools at one location.

Use of Scoping Comments in EIS

All comments received were grouped under the 9 analysis headings listed above, and a composite document was prepared to allow EIS study team members to focus on issues relating to their particular area of expertise. The results of the scoping process were presented and discussed at one of the ongoing Agency Coordination Workshops which are being conducted on a monthly basis to keep key review agencies informed of the EIS study process. In addition, a workshop was conducted with key EIS study team staff to review all scoping comments, with emphasis on ensuring that the EIS methodology was structured to address all pertinent issues.

Special Issues

Quantity of Fog Oil to be Used at Fort Leonard Wood. The amount of fog oil used for obscurant training at FLW will be much less than the total amount currently used at Fort McClellan. This reduction is due, in part, to the use of new generators that can control the volume of fog oil flow, and adjustments to the time that students will be allowed to use the generators during each training session. However, the EIS study process has identified a potential need to use more fog oil than the amount authorized in the initial air quality permit issued to the Army by the Missouri Department of Natural Resources in June, 1995. This potential increase in fog oil usage is associated with training requirements for military reserve students that were not identified in earlier planning scenarios. The EIS will provide a detailed discussion of alternatives to fog oil training, and identify and evaluate the potential impacts of several training scenarios which require different levels of fog oil use. The Army is required to limit training with fog oil in strict accordance with current or future operating permits.

Potential Use of Graphite Powder at Fort Leonard Wood. The Army is continuing to consider and investigate the use of graphite powder as an obscurant (alone or in combination with fog oil) because of its capabilities to "block" certain target detection systems and protect our military personnel under battlefield conditions. However, the use of graphite as an obscurant during training is still in the developmental stage. It is anticipated that it will take approximately 2 to 4 years for the Army to complete steps that are required to incorporate graphite into their training program. This time is required to identify requirements, conduct field trials, and develop training procedures. Because this training activity is not fully defined, it will not be evaluated in the EIS.

After the training requirements associated with graphite use are fully developed, an appropriate environmental review process will be completed (in accordance with all applicable laws and regulations) prior to initiating this training activity at FLW.

EIS Preparation Schedule

Major milestones associated with the preparation of the EIS for BRAC 95 actions at Fort Leonard Wood are illustrated in the following table. These milestones represent the current timetable for completion of the EIS. However, this timetable may be adjusted by the Army if required by future events or activities that have an impact on overall BRAC implementation schedules.

Milestone	Completion Date
Scoping Process	December 1995
Release of Draft EIS	June 1996
Public Comment & Hearing	July 1996
Release of Final EIS	November 1996
Publication of Record of Decision	January 1997

Additional Information

Persons that may be contacted for more information regarding the ongoing EIS project include:

Mr. Alan Gehrt (Attn: MRKPD-R)
Kansas City District, Corps of Engineers
601 E. 12th Street, Kansas City, MO 64106-2896
Phone: (816) 426-3358

Ms. Emily Brown (Attn: ATZT-DPW-EE)
Building 2101
Fort Leonard Wood, MO 65473-5000
Phone: (573) 596-0131 (Ext. 68620)

Mr. Robert Bax
Harland Bartholomew & Associates, Inc.
400 Woods Mill Road South, Suite 330
Chesterfield, MO 63017-3427
Phone: (314) 434-2900

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Fort Leonard Wood
Base Realignment & Closure (BRAC)
Environmental Impact Statement

Newsletter No. 2
June 1996

Purpose of This Newsletter

This is the second newsletter to be issued to help keep you informed of the status of ongoing work to prepare an Environmental Impact Statement (EIS) for relocating the U.S. Army Chemical School and the U.S. Army Military Police School to Fort Leonard Wood (FLW), Missouri. You are receiving a copy of this newsletter because your name is included on a list of persons and agencies that have expressed an interest in this project, or previous activities at Fort Leonard Wood.

Previous Newsletter Contents

Newsletter No. 1 (distributed in April 1996) provided an update on: work that had been accomplished since the beginning of the EIS process; a summary of the public scoping process and study issues that were identified during scoping; and an overview of the EIS production schedule. If you did not receive a copy of Newsletter No. 1, but would like to receive one at this time, please contact one of the individuals listed on the last page of this document.

Base Realignment and Closure (BRAC) Decision and Related Environmental Analysis Requirements

The decision has been made to relocate the Chemical School and Military Police School to Fort Leonard Wood, Missouri. This decision is mandated by law through the provisions of the Defense Base Closure and Realignment Act of 1990 (Public Law 101-510). Furthermore, the **decision to relocate** these schools to FLW is exempt from further analysis under the National Environmental Policy Act (NEPA) which requires the preparation of an environmental assessment or environmental impact statement to evaluate major Federal actions. However, the Army must still prepare an environmental impact analyses to define ***how*** they plan to implement the mandated Base Realignment and Closure (BRAC) action at FLW, and to identify and evaluate an appropriate range of alternative implementation methods.

EIS Alternatives Formulation Process

The EIS study team (which includes several independent contractors) has worked closely with Army representatives to develop the alternatives to be studied in the EIS. The overall format to be used in this process was presented to the public at the Public Scoping Meeting which was held in the FLW area during the early stages of the EIS. In addition, the alternatives development process has been discussed with key Federal and state review agencies at a series of agency coordination meetings. Comments from these agencies were used to help the Army define the final alternatives to be evaluated in the EIS.

The FLW BRAC EIS has been structured to evaluate planned BRAC actions in the context of the three major elements of the action which include:

1) Realignment of the **training missions** associated with the Chemical School and Military Police School;

2) Providing the **facilities** that will be required at FLW to support these missions and related personnel and equipment; and

3) Realigning the BRAC-related **population** to FLW.

The Draft EIS will provide the public with the opportunity to review the full range of alternatives that were considered for each of these study elements, the rationale for elimination of some alternatives from further consideration, and the environmental impacts of the alternatives that were selected for detailed analysis in the EIS.

Initial Results of the Alternatives Formulation Process - Defining the Army's Proposed Action

The extensive alternatives formulation process has led to some changes in the definition of the Army's proposed implementation action. These changes are most notable as they relate to the analysis of the BRAC training missions to be relocated to FLW.

The EIS study team began the analysis of the training mission by identifying exactly how the Chemical School and the Military Police School currently conduct all training activities at Fort McClellan, Alabama, where they are currently located. This resulted in the identification of 43 distinct training goals that define the activities of these schools. The team then worked with a broad range of Army representatives to identify alternative training methods for consideration. These Army representatives included staff responsible for training course development, training instructors, environmental protection specialists, and facility and land use planners.

As a direct result of this process, the EIS has identified a total of 17 training methods (out of the 43 to be relocated to FLW) where the Army's "Proposed Action" is different than the methods that are currently used at Fort McClellan. The Army's proposed training implementation action was formulated to identify training methods which best met a combination of environmental criteria, and training and operating efficiency criteria. Based on this formulation approach, the implementation of the Army's Proposed Training Actions, when compared to the "Relocate Current Practice (RCP) Alternative" which will also be evaluated in the EIS, might be expected to:

- reduce or eliminate negative environmental or economic impacts associated with the RCP Alternative methods;
- provide improved operational readiness through streamlined or improved training procedures;
- offer cost savings over current training methods with no decrease in operational effectiveness; and/or
- increase the positive benefits associated with training actions through the use of new technology or the synergistic effects of training Engineer, Military Police and Chemical specialists at the same location.

Examples of the NEPA Process in Action

Several examples of how the EIS alternatives formulation process has assisted the Army in defining their Proposed BRAC Training Actions are described below:

Example No. 1 - Expedient Mines and Obstacle Training

Current Practice. This training practice involves the use of "thickened" fuel to construct and detonate "flame" mines that can be used to help defend our troops during military operations. The current practice for this training activity at Fort McClellan requires the use of approximately 900 gallons of thickened fuel per training event to demonstrate how to construct and detonate four different types of expedient mines. This training is conducted with minimal environmental controls, and results in the use of approximately 36,900 gallons of thickened fuel per year.

Army's Proposed Practice at FLW. Based on the alternatives formulation and screening process summarized above, the Army's Proposed Action to meet this training goal includes three fundamental changes that are designed to reduce the potential for environmental impact. These changes include:

1) A training film will be developed to illustrate the proper methods of constructing the expedient mines, proper detonation techniques, and the flame dispersion patterns and area of protection provided by each type of mine. Use of the film will allow students to obtain part of the practical knowledge that they have been obtaining through the extensive field training experience that is provided by the current training method used at Fort McClellan.

2) As a result of the addition of the referenced training film, the amount of thickened fuel used to support each training event will be reduced to approximately one-half the amount currently used. This level of training is still required to allow students to handle the materials used to assemble these expedient mines, detonate

these devices, and witness the effectiveness of these systems.

3) Finally, under the Army's Proposed Action for this activity, this training will be conducted in an area designed to control surface water run-on and run-off. By controlling surface water, the potential for surface water contamination from unburned thickened fuel will be reduced.

Example No. 2 - Disposal of Chemical Defense Training Waste Materials.

Current Practice. The existing Chemical Defense Training Facility (CDTF) at Fort McClellan uses an on-site incinerator to dispose of decontaminated or neutralized waste materials that are generated as a by-product of the training. (The EIS will provide full definition and consideration of these waste types and how they apply to the specific wastes generated by the CDTF.)

Army's Proposed Practice at FLW. As part of the training alternative formulation process, several alternative waste disposal methods were identified and considered. Based on this review, it has been determined that an alternative waste disposal process is preferred by the Army. This alternative method (the Army's Proposed Action) will include the segregation of waste types, and off-site disposal of these decontaminated or neutralized waste items by appropriately licensed contractors in accordance with all applicable Federal, state and local regulations and in accordance with established procedures at Fort Leonard Wood. Therefore, under the Army's Proposed Action for this training activity, a Thermal Treatment Unit would not be constructed to dispose of wastes generated by the CDTF.

Example No. 3 - Obscurrant (Fog Oil Smoke) Operations.

Current Practice. Current obscurrant training activities at Fort McClellan require the use of approximately 125,000 gallons of fog oil per year. This includes all fog oil training activities including "static" training (how to start and stop the fog oil generators); "mobile" training (how to deploy smoke from a moving vehicle); and "field" training (how to deploy and maintain smoke over a specified target for a specified period of time).

Army's Proposed Practice at FLW. As a result of the EIS training alternatives formulation process, the Army's Proposed Action for smoke training at FLW would employ methods that would reduce total annual fog oil use to approximately 84,500 gallons per year. This reduction can be achieved by modifying the training methods used (generally reducing the amount of training time provided to each student), and through the use of new generators for a portion of the smoke training activities that can be adjusted to control the rate of smoke production.

Example No. 4 - Vehicle Maintenance Training

Current Practice. This training practice involves training Military Police School and Chemical School students on proper vehicle maintenance procedures. The training includes demonstration of how to perform required pre-start and operator level maintenance items such as checking the oil and other fluids. This training at FMC is currently conducted in areas that do not provide specific environmental controls for surface water runoff.

Army's Proposed Practice at FLW. Based on a review of this training as part of the EIS process, the Army's Proposed Action will restrict hands-on training to outdoor areas designed to control surface water runoff. Control of the surface water runoff is desired because the training involves the use oil, hydraulic fluid, or other fluids that could be inadvertently spilled. Conducting the training in an area that has proper environmental controls for surface water runoff will help collect and contain fluid that might be inadvertently spilled.

Detailed information regarding each of these examples, and the balance of the EIS alternatives formulation process will be provided for public review and comment as part of the Draft EIS.

EIS Preparation Schedule

Major milestones associated with the preparation of the EIS for BRAC 95 actions at Fort Leonard Wood are illustrated in the following table. As shown, the current schedule calls for release of the Draft EIS in August or September of, 1996, and completion of the EIS process during the first quarter of 1997.

As stated in Newsletter No. 1, this timetable may be adjusted by the Army if required by future events or activities that have an impact on overall BRAC implementation schedules.

Milestone	Completion Date
Scoping Process	December 1995
Release of Draft EIS	August/ September 1996
Public Comment Period & Hearing	September/ October 1996
Release of Final EIS	January/ February 1997
Publication of Record of Decision	February/ March 1997

Planned Publication of the EIS, Public Hearing & DEIS Comment Period

As shown in the schedule above, the Army anticipates that the Draft EIS will be published and available for public review in August or September of this year. A Notice of Availability (NOA) will be published in the *Federal Register* to inform the public of the release of the Draft EIS in compliance with applicable regulations. In addition, a public legal notice will be included in selected newspapers, and copies of the NOA will be sent directly to all persons on the EIS mailing list.

These notices will inform the public regarding where the EIS can be viewed, who may be contacted for more information, and the time and location of a Public Hearing that will be held to present a summary of the EIS findings, and to allow the public to comment on the EIS.

It is anticipated that the Public Hearing will be conducted in two parts.

- Part one will be conducted in the late afternoon hours, and will consist of an Open House meeting where the public will be invited to review information that summarizes the EIS process and findings and talk with Army and EIS study team representatives.
- Part 2 will be conducted during the evening hours of the same day. This part of the meeting will be held using a traditional hearing approach to include a presentation by the Army, followed by receipt of formal comments from the public regarding the EIS.

Additional Information

Persons that may be contacted for more information regarding the ongoing EIS project include:

Mr. Alan Gehrt (Attn: MRKPD-R)
Kansas City District, Corps of Engineers
601 E. 12th Street
Kansas City, MO 64106-2896
Phone: (816) 426-3358

Ms. Emily Brown (Attn: ATZT-DPW-EE)
Building 2101
Fort Leonard Wood, MO 65473-5000
Phone: (573) 596-0131 (Ext. 68620)

Mr. Robert Bax
Harland Bartholomew & Associates, Inc.
400 Woods Mill Road South, Suite 330
Chesterfield, MO 63017-3427
Phone: (314) 434-2900

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A.7 OZARK CHAPTER/SIERRA CLUB SCOPING COMMENTS AND RESOLUTIONS

In response to concerns expressed by the Ozark Chapter/Sierra Club in their DEIS review comments, the following table has been provided to facilitate the review of the EIS with regard to the Ozark Chapter/ Sierra Club's scoping comments. The referenced table of Sierra Club scoping issues has been marked to identify subsections of the EIS that address scoping comments or have been modified in response to comments on the DEIS.

Table A.1 OZARK CHAPTER/SIERRA CLUB SCOPING COMMENTS AND RESOLUTIONS

Number	ISSUE	RESOLUTION/ ACTION
	Fog Oil - Human Health	
1	How will the fog oil affect people's health in the area?	Addressed in subsection 5.2.2.15.B.1.1
2	How will the fog oil affect troops being trained and the trainers?	Addressed in subsection 5.2.2.15.B.1.1
3	Does the oil have any potential carcinogens or heavy metals?	Addressed in subsection 5.2.2.15.B.1.1
4	What studies have been done to determine the short and long term health effects of the oil and the effects of long term exposure?	Addressed in subsection 5.2.2.15.B.1.1
5	What are the effects of physical contact with the oil, and what are the effects of breathing fumes for the volatilized oil?	Addressed in subsection 5.2.2.15.B.1.1
6	What will be the health effects of eating garden vegetables which have been contaminated by the oil?	Addressed in subsection 5.2.2.15.B.1.1
7	What will be the health effects of eating eggs, poultry or meat exposed to the fog oil?	Addressed in subsection 5.2.2.15.B.1.1
8	What will be the effects of eating fish from streams and rivers contaminated by the fog oil?	Addressed in subsection 5.2.2.15.B.1.1
9	There will be no way of measuring the level of contamination from animals hunted or fish caught near the contaminated areas. How will these people know if they are putting themselves at risk?	Addressed in subsection 5.2.2.15.B.1.1
	Fog Oil - Wildlife	
10	What are the effects of the fog oil on insects, amphibians, reptiles, mammals and other wildlife?	Addressed in subsections 5.2.2.11.B, 5.2.2.11.D, 5.2.2.11.E
11	Will the fog oil cause mortality to any species?	Addressed in subsections 5.2.2.11.B, 5.2.2.11.D, 5.2.2.11.E

Table A.1 OZARK CHAPTER/SIERRA CLUB SCOPING COMMENTS AND RESOLUTIONS		
Number	**ISSUE**	**RESOLUTION/ ACTION**
12	Will the oil cause any short or long term damage to insect, amphibian, reptile, mammal or bird populations?	Addressed in subsections 5.2.2.11.B, 5.2.2.11.D, 5.2.2.11.E
13	Short of mortality, can the fog oil cause any injury, mutagenic effects, cancers or other problems?	Addressed in subsections 5.2.2.11.B, 5.2.2.11.D, 5.2.2.11.E
14	What will be the effects of the fog oil as species affected are consumed by others and fog oil effects move up the food chain and are concentrated?	Addressed in subsection 5.2.2.11.D.1
15	What are the effects of the bioaccumulation of the contamination on these species?	Addressed in subsection 5.2.2.11.D.1
16	What studies have been done on the specific elements that the fog oil to be used contains?	Literature is cited throughout the document. Addressed in subsections 5.2.2.15.B, 5.2.2.11.B, 5.2.2.11.C, 5.2.2.11.D, 5.2.2.11.E
17	If a different oil is used in the future, will an additional Environmental Impact Statement be conducted and additional studies be performed to determine the effects of the new oil?	Addressed in subsection 1.3.2.2
	Fog Oil - Neotropical Migrant Birds	
18	Many studies have shown that neotropical bird species are at increasing risk to habitat loss. This is particularly true of forest interior species. How will the fog oil training affect these species?	Addressed in subsection 5.2.2.11.B
19	Will nesting be disrupted by the training?	Addressed in subsection 5.2.2.11.B
20	Will the contamination cause mortality for these species?	Addressed in subsection 5.2.2.11.B
21	Will the oil affect the fertility of these species or cause problems with the ability of eggs to hatch?	Addressed in subsections 5.2.2.11.B, 5.2.2.11.C, 5.2.2.11.D, 5.2.2.11.E. Due to the lack of fog oil deposition, as discussed in the above-listed subsections, there will be no impacts.
22	How will nestlings and fledglings be affected by the oil?	Addressed in subsections 5.2.2.11.B, 5.2.2.11.D, 5.2.2.11.E. Due to the lack of fog oil deposition, as discussed in the above-listed subsections, there will be no impacts.
23	Will foraging be disrupted for these species?	Addressed in subsections 5.2.2.11.B, 5.2.2.11.D, 5.2.2.11.E

Table A.1 OZARK CHAPTER/SIERRA CLUB SCOPING COMMENTS AND RESOLUTIONS		
Number	**ISSUE**	**RESOLUTION/ ACTION**
24	Will the training result in mortality of adult birds or nestlings, violating the Migratory Bird Treaty Act?	Addressed in subsections 5.2.2.11.B.4 and 5.2.2.11.D.
	Fog Oil - Accipiters	
25	The sharp-shinned hawk (*Accipiter striatus*) and the Cooper's hawk (*Accipiter cooperi*) may nest on or near Fort Leonard Wood. Both are species of concern in Missouri and the sharp-shinned hawk in particular is considered rare. Have surveys been made for these species nesting sites?	Table F.8 in Appendix F addresses this concern. Accipiter nests are noted during LCTA and MAPS surveys.
26	If nesting sites are found, how will they be protected?	Text has been added to specifically address this issue.
27	How large a diameter area will be undisturbed around nesting sites?	Text has been added to specifically address this issue.
28	Is there a potential of the oil to bioaccumulate in these species?	Addressed in subsections 5.2.2.11.B, 5.2.2.11.D, 5.2.2.11.E
29	Will the oil affect the fertility of these species or cause problems with the ability of the eggs to hatch?	Addressed in subsections 5.2.2.11.B, 5.2.2.11.C, 5.2.2.11.E. Due to the lack of fog oil deposition, as discussed in the above-listed subsections, there will be no impacts.
30	How will the nestlings and fledglings be affected by the oil?	Addressed in subsection 5.2.2.11.B
	Fog Oil - Water Resources	
31	What are the effects of the fuel oil on aquatic organisms in the springs, creeks, and rivers downstream of the training exercises as well as the groundwater?	Addressed in subsections 5.2.2.11.D.1, 5.2.2.11.D.2, and 5.2.2.5.A
32	What impacts with the karst geology of the area have on the potential for contamination?	Addressed in subsection 4.6.1.2
33	What measures will be taken to prevent run off from the training areas?	Addressed in subsections 5.2.2.5.A, 5.2.2.5.A.4, 5.3.2.5.A
34	How will the fog oil be prevented from reaching the groundwater?	Addressed in subsection 5.2.2.5.B.4
35	Will the fog oil cause any mortality or injury to aquatic organisms including ranging from benthic and invertebrate communities to fishes?	Addressed in subsections 5.2.2.11.D.1 and 5.2.2.11.D.2

Table A.1 OZARK CHAPTER/SIERRA CLUB SCOPING COMMENTS AND RESOLUTIONS		
Number	**ISSUE**	**RESOLUTION/ ACTION**
36	What are the short and long term effects to these organisms?	Addressed in subsection 5.2.2.11.D
37	How will the hydrocarbons released impact the water and its communities?	Addressed in subsections 5.2.2.5.A.1 and 5.2.2.5.A.2
38	What will be the effects of the fog oil as species affected are consumed by others and the fog oil effects move up the food chain?	Addressed in subsection 5.2.2.11.D.1
39	What will be the effects of the bioaccumulation of the contamination on these species?	Addressed in subsection 5.2.2.11.D.1
40	What will be the effect on sport fishing?	Addressed in subsections 5.2.2.11.D and 5.2.2.5.A
41	Will there be the potential for human consumption of the fuel oil, and what would be the effect on human health?	Addressed in subsection 5.2.2.15.B.1.1
42	Will there be a need for or procedures to determine the need for human health advisories?	Addressed in subsection 5.2.2.15.B.1.1
43	What will be the effects of contaminated fish and other aquatic organisms on species that feed on them (mammals, birds, etc.)?	Addressed in subsection 5.2.2.11.D.1
44	How will the fog oil affect Roubidoux Creek and the trout in the creek?	Addressed in subsections 5.2.2.11.D.1, 5.2.2.11.D.2, 5.2.2.5.A
45	Does the use of the fog oil with its potential for contamination of area streams and rivers conflict with state and federal Clean Water Act anti-degradation policy?	Addressed in subsections 5.2.2.5.A.1, 5.2.2.5.A.2, 5.3.2.5.A
46	Would these discharges be in violation of Missouri's Clean Water Law?	Addressed in subsections 5.2.2.5.A.1 and 5.2.2.5.A.2
47	Will the oil in the creeks and rivers affect gas transfer at the surface, resulting in changes and impacts on the dissolved oxygen levels?	Addressed in subsections 5.2.2.5.A.1 and 5.2.2.5.A.2
48	How will the oil affect the buffering capacity of the streams and groundwater -- currently well buffered by the limestone and dolomite present?	Addressed in subsections 4.5.3, 5.2.2.5.B.4, 5.2.2.5.B.2.1

Table A.1 OZARK CHAPTER/SIERRA CLUB SCOPING COMMENTS AND RESOLUTIONS		
Number	**ISSUE**	**RESOLUTION/ ACTION**
49	What are the numerical estimates of the anticipated changes in all relevant water quality parameters, including but not limited to oil and grease, toxic substances, etc.?	Addressed in subsections 5.2.2.5.B.2.1
50	How will the substances which are released or run off to creeks, rivers, etc. interact with organic precursors to drinking water parameters of concern such as trihalomethanes?	Addressed in subsections 5.2.2.5.A.1 and 5.2.2.5.A.2
51	Is there a chance that the hydrocarbons released will combine with other organic compounds to form more dangerous compounds which could end up in drinking water?	Addressed in subsections 5.2.2.5.A.1 and 5.2.2.5.A.2
	Fog Oil - Federal Threatened and Endangered Species	
52	What will the effects be on federally Threatened or Endangered species?	Addressed in subsection 5.2.2.11.A
53	Bald eagles *(Haliaeetus leucocephalus)* regularly use the area along the Big Piney and Gasconade Rivers that would be affected and are listed as Threatened by the U.S. Fish and Wildlife Service. What would be the effect on them of consuming contaminated fish or other species?	Addressed in subsection 5.2.2.11.A
54	Is there a possibility they will be contaminated by the fog oil drifting to a roost area?	Addressed in subsection 5.2.2.11.A
55	Are there potential nesting sites that would be affected?	Addressed in subsection 5.2.2.11.A
56	Would contamination from the oil affect the fertility of bald eagles or affect the ability of their eggs to hatch?	Text has been added to specifically address this issue.
57	Could nestlings or fledglings be affected by the oil?	Text has been added to specifically address this issue

Table A.1 OZARK CHAPTER/SIERRA CLUB SCOPING COMMENTS AND RESOLUTIONS		
Number	ISSUE	RESOLUTION/ ACTION
58	Indiana bats *(Myotis sodalis),* which are listed as endangered by the U.S. Fish and Wildlife Service, use forested areas to forage for food and also for summer roosts. They could also be present in area caves in winter. What surveys will be done for roosting sites or hibernaculum prior to the implementation of this relocation?	Addressed in subsection 4.11.5.1
59	How would Indiana bats be affected by fog oil contaminating a summer roosting tree?	Addressed in subsection 5.2.2.11.A.2
60	What will be the effect on Indiana bats of consuming insects contaminated by the oil?	Addressed in subsection 5.2.2.11.A.2
61	What will be the effect on the Indiana bat of reduced insect populations if insect mortality occurs as a result of the fog oil?	Addressed in subsection 5.2.2.11.A.2
62	Gray bats *(Myotis grisescens),* which are listed as endangered by the U.S. Fish and Wildlife Service, forage over rivers and creeks and may be present in area caves in summer roosts or winter hibernaculum. What surveys will be done for these sites prior to the implementation of this relocation?	Addressed in subsection 4.11.5.2
63	Is there the possibility that a cave site may be contaminated by fog oil drifting into the area?	Addressed in subsection 5.2.2.11.A.2
64	What will be the effect on Gray bats of consuming insects contaminated by the fog oil?	Addressed in subsection 5.2.2.11.A.2
65	What will be the effect on the Gray bat of reduced insect populations if insect mortality occurs as a result of the fog oil?	Addressed in subsection 5.2.2.11.A.2
66	The Spectacle case *(Cumberlanida monodonta)* listed as a candidate species category 2 by the U.S. Fish and Wildlife Service. Its range includes the Big Piney and Gasconade rivers. How will the Spectacle case be affected by the fog oil?	Addressed in subsections 5.2.2.11.D.1 and 5.2.2.11.B.4

Table A.1 OZARK CHAPTER/SIERRA CLUB SCOPING COMMENTS AND RESOLUTIONS		
Number	**ISSUE**	**RESOLUTION/ ACTION**
67	What surveys will be done to determine if the Spectacle case is present in the affected river areas?	Addressed in subsection 4.11.5
68	Will contaminants for the oil bioaccumulate in the Spectacle case?	Addressed in subsection 5.2.2.11.D.1
69	Will the Spectacle case be more at risk then other species because it is a filter feeder?	Addressed in subsection 5.2.2.11.D.1
70	The Central Missouri cave amphipod *(Allocrangonyx hubrichti) is* listed as a candidate species category 2 by the U.S. Fish and Wildlife Service. Its range includes the Great Spirit Cave in Pulaski County and the Saltpeter Cave in Phelps County. How will this species be affected by the oil?	Addressed in subsections 5.2.2.11.D.1 and 5.2.2.11.B.4
71	Will groundwater contamination from the training areas be able to impact these caves?	Addressed in subsection 4.6.1.3
72	What hydrological studies have been done to determine groundwater flow in this area ?	Addressed in subsection 4.5.3
73	Have dye tracing studies been conducted in this area?	Addressed in subsection 4.5.3
74	The Bluestripe darter *(Percina cymatotaenia) is* listed as a candidate species category 2 by the U.S. Fish and Wildlife Service. Its range includes the Big Piney River and the Gasconade River. How will this species be affected by the oil?	Addressed in subsection 5.2.2.11.D.1
75	Will the insects and invertebrate species the Bluestripe darter feeds upon be affected?	Text has been added to subsection 5.2.2.11.D
76	Have surveys been conducted to determine if this species is present in areas that will be conducted?	Addressed in subsection 4.11.5
77	How will the bioaccumulation of contaminated oil affect all these species?	Addressed in subsection 5.2.2.11.D.1

Table A.1 OZARK CHAPTER/SIERRA CLUB SCOPING COMMENTS AND RESOLUTIONS		
Number	**ISSUE**	**RESOLUTION/ ACTION**
78	Will incidental take permits be applied for from the U.S. Fish and Wildlife Service as is required when an action may cause harm to a federally threatened or endangered species?	Addressed in subsection 5.2.2.11.A
79	How will training be altered if training activities are shown to threaten federally threatened or endangered species in the future?	Addressed in subsection 5.1.4.3 and Appendix K
	Fog Oil - Missouri Rare, Endangered and Watch List Species	
80	What will be the effects on Missouri rare, endangered or watch list species?	Addressed in subsections 5.2.2.11.B and 5.3.2.11.B
81	How will the Salem cave crayfish *(Cambarus hubrichti),* which is present in Pulaski County and is classified as a watch list species by the Missouri Department of Conservation, be affected by the oil?	Addressed in Table XX in Appendix F. This species is not know to exist in Pulaski County and there is no record of it ever occuring on FLW. Therefore, it was eliminated from consideration.
82	How will the Blacknose shiner *(Notropis heterolepia),* which is present in the Big Piney River and is classified as an endangered species by the Missouri Department of conservation, be affected by the oil?	Addressed in subsections 5.2.2.11.B.4, 5.2.2.11.D, 5.3.2.11.D.
83	How will the fog oil affect Black bear *(Ursus americanus)* in the area, which are classified by the Missouri Department of Conservation as rare?	Addressed in subsections 5.2.2.11.B and 5.2.2.11.E
84	Will the activities be conducted in foraging or hibernation areas?	Addressed in subsections 5.2.2.11.A, B, C, D, E, 5.3.2.11.A, B, C, D, E.
85	Will increased disruption from human activities cause them to avoid the area?	Addressed in subsections 5.2.2.11.B, 5.2.2.11.E, 5.3.2.11.B, 5.3.2.11.E.
	Fog Oil - Soils	
86	How will the fog oil affect the soils?	Addressed in subsections 5.2.2.6.4
87	Will they be contaminated?	Addressed in subsections 5.2.2.6.4
88	Will the oil reduce soil fertility or alter vegetative growth?	Addressed in subsections 5.2.2.6.4
89	Will ongoing training with the resultant build up of oil cause any cumulative impacts beyond the initial impacts expected?	Addressed in subsections 5.2.2.6.4

Table A.1 OZARK CHAPTER/SIERRA CLUB SCOPING COMMENTS AND RESOLUTIONS		
Number	**ISSUE**	**RESOLUTION/ ACTION**
90	Will soil damage lead to increased erosion?	Addressed in subsections 5.2.2.6.1 and 5.3.2.6
91	Will soil erosion lead to increased sedimentation in rivers and streams?	Addressed in subsection 5.2.2.6.1
92	The soils in the area are subject to high erosion. Will this potential be increased?	Addressed in subsection 5.2.2.6.1.
	Fog Oil - Vegetation	
93	How will the fog oil affect vegetation in the training areas?	Addressed in subsection 5.2.2.11.E
94	Will plants in areas contaminated by the fog oil be stunted or killed?	Addressed in subsection 5.2.2.11.E
95	Will people's gardens be affected?	Addressed in subsections 5.2.2.11.E and 5.2.2.15.B.1
96	Will their vegetables and fruits be safe to eat?	Addressed in subsection 5.2.2.15.B.1
97	Will pasture land be affected and will animals grazing risk contamination?	Addressed in subsections 5.2.2.11.E and 5.2.2.15.B.1
98	Fort Leonard Wood is adjacent to the Mark Twain National Forest, with some forest land occurring on base. Will the fog oil affect forest species?	Addressed in subsection 5.2.2.11.E
99	The U.S. Forest Service has already documented a disease known as oak decline as a problem in the Mark Twain National Forest. Will the fog oil affect oak decline?	Impacts to trees addressed in subsection 5.2.2.11.E
100	Will the fog oil add additional stress to forest species, resulting in a cumulative impact of mortality or decline of forest health?	Addressed in subsection 5.2.2.11.E
101	Will timber harvest in surrounding public and private forests suffer due to stunted, damaged or killed trees?	Addressed in subsection 5.2.2.11.D and 5.2.2.11.E
102	Will fire danger be increased in the area due to the presence of a flammable oil--especially during dry summers?	Addressed in subsection 5.2.2.11.D and 5.2.2.11.E
103	Will vegetation in the fog oil contamination area die, leading to increased erosion, especially in the training areas with high traffic rates?	Addressed in subsection 5.2.2.11.E and 5.3.2.11.E

Table A.1 OZARK CHAPTER/SIERRA CLUB SCOPING COMMENTS AND RESOLUTIONS		
Number	**ISSUE**	**RESOLUTION/ ACTION**
104	The training will cause non-point source releases of contamination. How will the carcinogens and heavy metals be isolated from the environment?	Addressed in subsections 5.2.2.5.A, 5.2.2.5.A.4, 5.3.2.5.A
	Fog Oil - Recreation	
105	How will the fog oil training affect tourism and recreation in the area?	Addressed in subsection 5.4.2.14.10
106	Will people using Fort Leonard Wood areas that are currently available to the public incur further restrictions?	Addressed in subsections 5.2.2.15.A.1
107	Will they be placing themselves at risk by fishing, swimming, canoeing, hunting or hiking near training areas?	Addressed in subsection 5.2.2.15.B
108	Will public knowledge of the risk of contamination by these activities lead to a loss of tourism dollars to the local economy?	Addressed in subsection 5.4.2.14.10
	Fog Oil - Fog Oil Analysis	
109	What testing has been done concerning fog oil and its use?	Addressed in subsection 5.2.2.15.B.1.1
110	What is the exact content of the oil?	Addressed in subsection 5.2.2.15.B.1.1
111	What heavy metals are in the oil?	Addressed in subsection 5.2.2.15.B.1.1
112	Where have these tests been done and by whom?	Addressed in subsection 5.2.2.15.B.1.1
113	Is the environment where these studies were performed directly comparable to the environment at Fort Leonard Wood?	Addressed throughout supporting studies and EIS.
114	Will these studies be made available to concerned citizens to review as part of the draft Environmental Impact Statement process?	Addressed in subsection 1.5
115	Have the studies been peer reviewed to insure accuracy in methodology and results?	The *Assessment of Human Health Risks Associated with Fog Oil Training at Fort Leonard Wood, Missouri* (COE KC, 1996b) was reviewed by staff at the Region VII office of U.S. Environmental Protection Agency and Dr. Winifred Palmer at Aberdeen Proving Ground.
116	What permits will need to be obtained to conduct the fog oil training?	Addressed in subsection 5.2.2.10

Table A.1 OZARK CHAPTER/SIERRA CLUB SCOPING COMMENTS AND RESOLUTIONS		
Number	**ISSUE**	**RESOLUTION/ ACTION**
	Fog Oil - Fog Oil Alternatives	
117	What are the alternatives to using fog oil for training?	Addressed in IV.5 and IV.6
118	Can the Army use nighttime training, mist by water vapor or nontoxic obscurant substances instead of the current training regime?	Addressed in IV.5 and IV.6
119	Can other oils be used which are less toxic or have fewer environmental consequences?	Use of other materials to generate obscurant addressed in IV.5
120	What is the exact chemical make up of the fog oil?	Addressed in subsection 5.2.2.15.B.1.1
121	Have all studies cited used this chemical make up for analysis, or have other oils been used?	Addressed in subsection 5.2.2.15.B.1.1
122	Will other oils be used in the future, and what environmental analysis will done on these oils prior to their being used?	Addressed in subsection 1.3.2.2
	Fog Oil - Volatilization	
123	At what temperature does the fog oil volatilize completely?	Text has been added to subsections 5.2.2.5.A.1, 5.2.2.6.4, and 5.2.2.11.B.4.
124	Does the volatilization percentage change with changes in temperature?	Addressed in subsection 5.2.2.5.A.1
125	Will training be restricted below a specific volatilization rate?	Addressed in air quality permit discussed in subsection 5.2.2.10.1
126	How does the volatilization rate differ with distance from the fog oil generators?	Addressed in subsection 5.2.2.5.A.1
127	Will changes in volatilization rates change the impacts to the environment, especially to soil, vegetation, groundwater, creeks and rivers?	Addressed in subsection 5.2.2.5.A.1
128	Will the potential carcinogens, toxics, and heavy metals be volatilized?	Addressed in subsection 5.2.2.5.A.1

Table A.1 OZARK CHAPTER/SIERRA CLUB SCOPING COMMENTS AND RESOLUTIONS		
Number	ISSUE	RESOLUTION/ ACTION
	Fog Oil - Opacity	
129	The issue of the opacity variance is currently being challenged legally. An alternative should be developed with does not violate Missouri law. What alternatives are being generated in the event the courts rule against the opacity variance?	Addressed in subsection 5.2.2.3.7
	Fog Oil - Monitoring	
130	What will be the procedures for monitoring if the fog oil is leaving the training area? It is not sufficient to only train when conditions are acceptable, as weather conditions may change suddenly.	Addressed in subsection 5.2.2.3.8
131	Where will air monitoring devices and opacity devices be located?	Addressed in subsection 5.2.2.3.8
132	Even if training is halted when the fog oil leaves the training area, the fog oil already produced will continue to move. How will traffic be affected on 1-44, Route J or Highway 17?	Addressed in subsection 5.2.2.3.8
133	What provisions will be made to halt traffic in an emergency?	Addressed in subsection 5.2.2.3.8
134	How will area residents be warned about contamination potentials?	Addressed in Appendix L
135	It is evident that the potential for contamination exists in many environmental areas. What base line monitoring specific to the training areas has been conducted?	Addressed in subsection 5.2.2.3.8
136	A minimum of two years of monitoring of all variables (wildlife, vegetation, aquatic resources, water quality, weather, soils, etc.) is necessary. This base line data would then be able to be compared to ongoing monitoring. What ongoing monitoring will be developed?	Addressed in subsection 5.2.2.3.8
137	At what intervals will monitoring occur?	Addressed in subsection 5.2.2.3.8
138	What will be the frequency and scope of sampling?	Addressed in subsection 5.2.2.3.8
139	Where will analysis of data occur?	Addressed in subsection 5.2.2.3.8
140	How will the results of this monitoring be made available to the public?	Addressed in subsection 5.2.2.3.8

Table A.1 OZARK CHAPTER/SIERRA CLUB SCOPING COMMENTS AND RESOLUTIONS		
Number	**ISSUE**	**RESOLUTION/ ACTION**
141	How will the results of the monitoring be used to alter or modify training practices?	Addressed in subsection 5.2.2.3.8
142	Will water quality monitoring be conducted before, during and after rainfall events?	Addressed in subsection 5.2.2.5.A.1 and 5.2.2.5.A.2
143	At what time periods will samples be taken?	Addressed in subsection 5.2.2.5.A.1 and 5.2.2.5.A.2
	Live Agent Training - Health effects	
144	What specific agents will be used in training?	Addressed in subsection 5.2.2.15.B.5
145	What is the chemical make up of the agents to be used?	Addressed in Appendix B and subsection 5.2.2.15.B.5
146	What are the effects of the agents on the health of the troops and the trainers?	Addressed in subsection 5.2.2.15.B.5.1
147	What would be the health effects of the agents on the public in the event of an accidental release?	Addressed in subsection 5.2.2.15.B.5.1
148	What will the psychological effects on the population be, knowing there is the potential for an accidental release?	Text has been added to subsection 5.2.2.13.1
149	What training and equipment are available at area hospitals and clinics in case of an accidental release?	Addressed in subsection 5.2.2.15.A.2
150	Are full chemical decontamination units available at these hospitals, and how many people can be treated at one time?	Addressed in subsection 5.2.2.15.A.2
151	What emergency plans will be prepared for treatment, evacuation, etc.?	Addressed in subsection 5.2.2.8.
152	Who will decide if an evacuation is needed?	Addressed in subsection 5.2.2.8.
153	Who will decide how large an area needs to be evacuated?	Addressed in subsection 5.2.2.8.
154	What will be the criterion for these decisions?	Addressed in subsection 5.2.2.8.
155	What experiences has Fort McClellan had with accidental releases? To allow the public to fully evaluate the proposal, it will be necessary to make all records from Fort McClellan available for review.	Addressed in subsection 5.2.2.2.2
156	What has been the frequency and scope of these releases?	Addressed in subsection 5.2.2.2.2

Table A.1 OZARK CHAPTER/SIERRA CLUB SCOPING COMMENTS AND RESOLUTIONS		
Number	**ISSUE**	**RESOLUTION/ ACTION**
157	Has anyone been harmed in these releases?	Addressed in subsections 5.2.2.2.2 and 5.2.2.15.B.5
	Live Agent Training - Procedures and Methodology	
158	What procedures will this facility have to prevent accidental releases?	Addressed in subsection 5.2.2.15.B.5
159	What construction methods will be used to prevent releases?	Addressed in subsections 5.2.2.2.2 and 5.2.2.6.3
160	What will be the construction standards for the building?	Addressed in subsection 5.2.2.6.3
161	Will the facility have a vacuum system to prevent chemicals from escaping?	Addressed in subsection 5.2.2.2.2
162	What are the back up systems in case of power loss or equipment failure that will prevent an accidental release to the outside?	Addressed in subsection 5.2.2.2.2
163	What security will be provided for the storage of the chemicals?	Addressed in subsection 5.2.2.2.2
164	What quantity of chemicals will be stored at the facility at any given time?	Addressed in subsection B.2.12.3
165	How will waste chemicals be disposed of?	Addressed in Appendix I
166	What storage standards, containment berms and other methods will be used to prevent accidental releases?	Addressed in subsections 5.2.2.2.2 and 5.2.2.6.3
167	Who will be the emergency responders in case of accidental releases?	Addressed in subsection 5.2.2.15.A.2
168	Will all responses be handled by Fort Leonard Wood, or will there be arrangements made with local communities for assistance?	Addressed in subsection 5.2.2.15.A.2
169	What training, protective clothing, and equipment will these emergency responders have?	Addressed in subsections 5.2.2.15.A.2 and 5.2.2.15.B.5
	Live Agent Training - Transportation	
170	What permits will need to be obtained to operate the facility?	Addressed in subsections 5.2.2.10 and 5.2.2.8.5
171	How will the agents and chemicals be transported to the facility?	Addressed in subsection 5.2.2.8.4.2
172	What security will be provided during the transportation of the chemicals and agents?	Addressed in subsection 5.2.2.8.4.2

Table A.1 OZARK CHAPTER/SIERRA CLUB SCOPING COMMENTS AND RESOLUTIONS		
Number	**ISSUE**	**RESOLUTION/ ACTION**
173	What permits and licenses will need to be obtained to transport the materials?	Addressed in subsections 5.2.2.10 and 5.2.2.8.5
174	What precautions will be taken to prevent accidental releases during transportation to the facility?	Addressed in subsection 5.2.2.8.4.2
175	Who will be the emergency responders to an accident occurring during the transportation of these materials?	Addressed in subsection 5.2.2.15.A.2
176	How will the emergency responders be trained, and what equipment will they have?	Addressed in subsection 5.2.2.15.A.2
177	What will be the transportation routes of the materials coming to this facility?	Addressed in subsection 5.2.2.8.
178	Will communities the material is transported through have advance warning of the shipments?	Addressed in subsection 5.2.2.8.
179	What transportation plan will be available, and will it be reviewed by the public?	Addressed in subsection 5.2.2.8.
	Live Agent Training - Decontamination	
180	How will the agents used be decontaminated?	Addressed in subsections 5.2.2.8.5. and 5.2.2.3.6.1
181	What will be done with contaminated material after training?	Addressed in subsection 5.2.2.8.5 and Appendix I
182	What is the chemical make up of the decontamination materials?	Addressed in subsection B.2.12.3.3
183	Do the decontamination materials have any carcinogens, toxics or heavy metals?	Addressed in subsection B.2.12.3.3
184	How will these materials be disposed of?	Addressed in subsection 5.2.2.8.5 and Appendix I
	Thermal Treatment Unit - Type of Facility	
185	How large will the thermal treatment unit be?	Addressed in subsection 5.2.2.3.6.1
186	What are its permitting requirements?	Addressed in subsection 5.2.2.3.6.1
187	Will additional permits be required in the future?	It is beyond the scope of the EIS to speculate whether additional permits may be required in the future. It is not a reasonably foreseeable action. All required environmental documentation will be carried out.

Table A.1 OZARK CHAPTER/SIERRA CLUB SCOPING COMMENTS AND RESOLUTIONS		
Number	**ISSUE**	**RESOLUTION/ ACTION**
188	What material will be burned in the unit?	Addressed in subsection 5.2.2.3.6.1
189	Will the unit receive waste from any source other than the sealed training facility?	Addressed in subsection 5.2.2.3.6.1
190	Will any hazardous waste or metals be burned in the unit?	Addressed in subsection 5.2.2.3.6.1
191	What is the unit's total capacity?	Addressed in subsection 5.2.2.3.6.1
192	What are the specific requirements this unit must meet under the Resource Conservation and Recovery Act (RCRA)?	Addressed in 5.2.2.3.6
193	Will the capacity need to be expanded in the future as the training regime changes?	Addressed in subsection 1.3.2.2
194	If so, will that alter the permitting requirements under RCRA?	Addressed in 5.2.2.3.6
195	What percentage of the material to be burned are metal? Plastic? Chemical?	Addressed in subsection 5.2.2.3.6.1
196	Will nuclear waste be incinerated?	Addressed in subsection 5.2.2.3.6.1
197	If not, how will nuclear waste from the various elements of the Chemical Defense Training Facility be disposed of?	Addressed in subsections 4.8.8 and 5.2.2.8.4
198	Will metal from gas masks, air filters and other sources be incinerated?	Addressed in subsection 5.2.2.3.6.1
199	How will the operators of this unit be trained and certified?	Addressed in subsection 5.2.2.3.6.1
200	What design will the unit have?	Addressed in subsection 5.2.2.3.6.1
201	Has the unit been tested prior to this in its efficiency in removing the hazardous chemicals that will be burned at this facility?	Text has been added to clarify this issue.
202	What is the peak expected thermal output of the unit?	Addressed in subsection 5.2.2.3.6.1
203	What is the extent of the expected thermal plume?	Text has been added to subsection 5.2.2.3.6.1 to clarify this issue.
204	How will this plume affect populations of insects, birds, and other species?	Text has been added to subsection 5.2.2.3.6.1 to clarify this issue.
	Thermal Treatment Unit -Air Pollution Control	
205	Will chlorine based materials be burned?	Addressed in subsection 5.2.2.3.6.1

Table A.1 OZARK CHAPTER/SIERRA CLUB SCOPING COMMENTS AND RESOLUTIONS		
Number	**ISSUE**	**RESOLUTION/ ACTION**
206	Can chlorine based materials create dioxin when burned?	Addressed in subsection 5.2.2.3.6.1
207	What air pollution control devices will be used on the thermal treatment unit?	Addressed in subsection 5.2.2.3.6.1
208	How will air pollution control devices be tested for efficiency?	Addressed in subsection 5.2.2.3.6.1
209	How will air pollution control filters, bags and other devices be disposed of?	Addressed in subsection 5.2.2.3.6.1 and 5.2.2.8
210	Will they be treated as hazardous waste?	Addressed in subsection 5.2.2.3.6.1 and 5.2.2.8
211	What percentage of pollutants will be removed by the unit?	Addressed in subsection 5.2.2.3.6.1
212	If enough pollutants are not removed from the air, will the unit be redesigned as a hazardous waste incinerator under RCRA?	Addressed in subsections 5.2.2.3.6.1, 5.2.2.10.1, 5.2.2.10.3
213	What are the air quality parameters the unit must meet?	Addressed in subsection 5.2.2.3.6.1
214	How will the unit alter the air quality of the area?	Addressed in subsection 5.2.2.3.6.1
215	Could air emissions from the thermal treatment unit combine with other chemicals present in the atmosphere to create more dangerous compounds?	Text has been added to subsection 5.2.2.3.6.1 to clarify this issue.
	Thermal Treatment Unit -Ash disposal	
216	Will the ash from the thermal treatment unit be tested for hazardous material content?	Addressed in subsection 5.2.2.8.5.1
217	How will the ash be disposed of?	Addressed in subsection 5.2.2.8.5.1
218	How would disposing of the ash as a hazardous waste affect the cost of the facility?	Text has been added to subsection 5.2.2.3.6.1 to clarify this issue.
	Thermal Treatment Unit -Alternatives	
219	What are the alternatives to the thermal treatment unit?	Addressed in Appendix I
220	Could the unit be permitted as a hazardous waste incinerator, thereby meeting more stringent RCRA requirements?	Addressed in subsection 5.2.2.3.6
221	Could the contaminated material be disposed of in a more environmentally benign way?	Addressed in Appendix I

Table A.1 OZARK CHAPTER/SIERRA CLUB SCOPING COMMENTS AND RESOLUTIONS		
Number	**ISSUE**	**RESOLUTION/ ACTION**
222	Could the material be disposed of at a hazardous waste landfill?	Addressed in Appendix I, subsection I.2
	General Concerns - Quality of Life	
223	How will the relocation affect the quality of life of people living in the area?	Addressed in subsections 5.2.2.15, 5.2.3.15, 5.2.4.15, 5.3.2.15, 5.3.3.15, 5.3.4.15, 5.4.2.15
224	Will the less pristine environment resulting from this facility affect people who came to this area for that pristine environment?	Potential effects to nearby community members are addressed throughout Section 5.
225	Will schools and other social institutions be overcrowded as a result of more people living in the area?	Addressed in subsection 5.4.2.14
	General Concerns - Economics	
226	What are the economic projections for this area with and without the facility?	Addressed in subsection 5.4.2.14
227	Who will benefit from jobs created by the move?	Addressed in subsection 5.4.2.14
228	How will land values be altered for area residents once their land is contaminated?	Addressed in subsection 5.4.2.14
229	Will people moving to the area because of its pristine environment chose to live elsewhere because of the contamination which will occur?	Addressed in subsection 5.4.2.14
230	Will new schools or other infrastructure need to be built because of the influx of people into the area as a result of this facility?	Addressed in subsection 5.4.2.13
231	Will those changes cause increases in taxes?	Addressed in subsection 5.4.2.14
232	What are the long term costs of the environmental damage that will be caused by this facility?	Addressed in subsection 5.4.2.14
233	What will be the economic cost of the clean up at Fort McClellan for the same facility?	Addressed in subsection 1.4.6.5
234	How would these costs differ at Fort Leonard Wood?	It is beyond the scope of the EIS to speculate on the cost of disposal and reuse of FLW. It is not a reasonably foreseeable action.

Table A.1 OZARK CHAPTER/SIERRA CLUB SCOPING COMMENTS AND RESOLUTIONS		
Number	**ISSUE**	**RESOLUTION/ ACTION**
235	Should short term economic gain created by the relocation of this facility be done at the expense of the environment?	Addressed in subsection 5.4.2.14
236	Is the U.S. Army committed to long term economic viability of the surrounding community or to its short term gain?	Addressed in subsection 5.4.2.14
	General Concerns - Recreation	
237	Will tourists and people coming to this area to rest and relax continue to come when they learn that the area is potentially contaminated?	Addressed in subsection 5.4.2.14
238	What will be the effects of the facility on hunting, fishing, swimming, canoeing, hiking, camping and picnicking?	Potential effects on hunting, fishing, swimming, canoeing, hiking, camping and picnicking are addressed throughout Section 5.
239	Will there be any restrictions on the use of the Big Piney River or Roubidoux Creek because of training activities?	Addressed in subsections 5.2.2.15.A.1
240	How does the relocation of the Chemical Defense Training Facility to this area conflict with the image portrayed of this area as a pristine environment in which to live and recreate ?	Addressed in subsection 5.2.2.13.1
241	Will tourists chose to vacation elsewhere as a result of this facility and the publicity that will be conducted to prevent it from being relocated here?	Text has been added to subsection 5.4.2.14.10 clarify this issue.
242	Will all of the areas that are currently open to the public on Fort Leonard Wood continue to be available to them?	Addressed in subsections 5.2.2.15.A.1 and 5.2.2.2
243	Will there be any risk to troops or trainers during hunting seasons?	Text has been added subsection 5.2.2.15.A.1 clarify this issue.

Table A.1 OZARK CHAPTER/SIERRA CLUB SCOPING COMMENTS AND RESOLUTIONS		
Number	**ISSUE**	**RESOLUTION/ ACTION**
	General Concerns - Cumulative Impacts	
244	What are the impacts on the environment which will result from the incremental impacts of the various components of the Chemical Defense Training Facility when added to other past, present, and reasonably foreseeable future actions regardless of what individual or agencies undertake such actions? Please address this with as much specificity as possible.	Addressed in subsection 5.5
	General Concerns - Alternatives	
245	What alternatives to the use of live chemical weapons have been considered?	Addressed in subsection IV.5
246	With the end of the Cold War, what peaceful alternative uses of Fort Leonard Wood have been considered?	It is beyond the scope of the EIS to speculate on alternate uses for FLW.
247	What feasibility studies have been conducted?	It is beyond the scope of the EIS to speculate on alternate uses for FLW.
248	Could training be conducted on an international level, rather than the United States have its own training facility?	Addressed in subsection 2.3.4. Text has been added to emphasize that training is international, involving foreign military, as well as civilian personnel.
	General Concerns - Chemical Weapons Convention	
249	Will this facility be necessary if the Chemical Weapons Convention is ratified?	Addressed in subsection 1.4.6.5
250	How would the mission of the facility alter if the Chemical Weapons Convention is ratified?	Addressed in subsection 1.4.6.5
251	Would the removal of chemical weapons from the world outweigh the economic benefits of the chemical weapons installation at Fort Leonard Wood?	It is beyond the scope of the EIS to speculate on the impact of global removal of chemical weapons versus the benefits of the chemical defense training program at FLW.
252	Would the relocation of this facility to Fort Leonard Wood affect the ratification of the Chemical Weapons Convention by the U.S. Senate?	Addressed in subsection 1.4.6.5

Table A.1 OZARK CHAPTER/SIERRA CLUB SCOPING COMMENTS AND RESOLUTIONS		
Number	**ISSUE**	**RESOLUTION/ ACTION**
253	Has a variance for this facility been obtained from the United Nations and from the ratifying nations?	Addressed in subsection 1.4.6.5
254	If not, will it be sought?	Addressed in subsection 1.4.6.5

Appendix B
ANALYSIS OF NEW MISSIONS

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APPENDIX B: ANALYSIS OF NEW MISSIONS

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Appendix B: Analysis of New Missions

B.1 INTRODUCTION

This appendix documents the results of the analysis of training missions and associated activities to be realigned to FLW in the context of 15 mission "activity groups" as listed in Table B.1. These same mission activity groups were used to facilitate a comparison of current (FLW baseline) and planned (Chemical and Military Police) activities.

A general description of new activities to occur under the training group heading and a discussion of incremental changes to occur within other activity groups are provided in this appendix. As shown in Table B.2 although there will be changes in the level of existing activities in all of these activity groups, the mission activity group in which most of the new actions will occur (i.e., actions that do not already occur at FLW) is the "Training" group. As a result of this analysis, it was determined that:

1) Impacts associated with changes in the level of base operations support activities (as included in the screening of Ongoing Mission Activity Groups 1-11 and 13-15 in Table B.1, and defined in this appendix) are expected to be minor and very similar to the type of impacts previously identified in the Environmental Assessment of the Master Plan and Ongoing Mission for FLW (FLW, 1995c). Therefore, these actions will be analyzed as part of the evaluation of BRAC-related construction and alteration projects and personnel realignments; and that

2) This EIS should focus on further definition and analysis of the training actions associated with the Chemical and Military Police schools.

There are numerous training programs and interrelated activities associated with these major Army schools. In order to analyze these actions in the EIS, each planned training activity was assigned to one of 11 "Training Activity Groups" that were developed to support the EIS analysis. These training activity groups are shown as a subset below the "Training" ongoing mission category in Table B.1. A detailed analysis of all planned (BRAC 95) training activities is presented in Volume III of this EIS (*Identification and Screening of Alternatives to Accomplish Training Goals of the U.S. Army Chemical School and U.S. Army Military Police School at Fort Leonard Wood, Missouri*).

Table B.1: Fort Leonard Wood BRAC 95 EIS - Ongoing Mission Activity Groups and Training Activity Groups Evaluated		
Fort Leonard Wood - Ongoing Mission Activity Group No. [1]	Chemical School and Military Police School - Training Activity Group No.[2]	Activity Group Headings
1		Administration
2		Airfield Operations
3		Facilities Maintenance and Repair
4		Fuel and Petroleum Products Storage and Dispensing
5		Grounds Maintenance
6		Hospital Operations
7		Installation Support Services
8		Minor Construction and Alteration
9		Natural Resources Management
10		Recreation
11		Road and Right-of-Way Maintenance
12		Training
	1	Battlefield Procedures
	2	Biological Agent Detection
	3	Nuclear, Biological and Chemical (NBC) Reconnaissance Operations
	4	General Military Training
	5	Military Police Operations
	6	Nuclear, Biological and Chemical (NBC) Procedures
	7	Obscurant (Smoke) Procedures
	8	Radiation Safety
	9	Research Support
	10	Small Arms Procedures
	11	Vehicle Operations
13		Utility Systems
14		Warehousing and Supply Storage
15		Vehicle and Equipment Maintenance and Repair

Notes: [1] Ongoing Mission Activity Groups used to screen proposed BRAC actions and compare with baseline activities currently occurring at FLW. Furthermore, these activities were previously assessed in the 1995 Environmental Assessment of the Master Plan and Ongoing Mission. EIS study alternatives will not be developed for these activities since the planned action will result in minor changes in existing or ongoing mission activities that occur at FLW.

[2] Training Activity Groups as formulated to support definition and alternatives analysis of BRAC 95 training missions and related actions to occur at FLW. See Volume III for a detailed discussion.

Source: Harland Bartholomew & Associates, Inc.

All of the existing ongoing actions at FLW are completed in compliance with applicable Federal, State of Missouri and U.S. Army environmental regulations. FLW has established a series of management programs. A summary of each of these management programs is included in Appendix D of the Environmental Assessment (FLW, 1995c). Plans that have been developed include:

- Asbestos Removal Plan;
- Community Facilities Area Traffic Study;
- Energy Conservation Plan;

- Environmental Quality, Environmental Protection and Enhancement Plan;
- Hazardous Waste Management Facility Closure Plan;
- Hazardous Waste Management Plan;
- Historic Preservation Plan (HPP);
- Installation Building Survey (IBS);
- Installation Compatible Use Zone Study (ICUZ);
- Installation Design Guide (IDG);
- Installation Pest Management Plan;
- Integrated Training Area Management Program (ITAM);
- Integrated Natural Resources Management Plan (INRMP);
- Sludge Management Plan;
- Solid Waste Closure and Post-Closure Plan;
- Solid Waste Management Unit Investigation Plan;
- Spill Prevention and Response Plan (SPRP);
- Underground Storage Tank Management Plan; and
- Waste Analysis Plan.

B.2 DESCRIPTION OF NEW MISSION ACTIVITIES

Representative new mission activities that occur at FLW are listed in Table B.2, Comparison of Mission Activities. This table summarizes information contained in Table E.5 of the FLW Environmental Assessment (FLW, 1995c). Each activity has been reviewed and annotated (with a Yes to reflect activity or a No to reflect no activity) to reflect either Base Realignment and Closure actions will be involved or that BRAC actions will not affect existing ongoing missions. If a similar ongoing mission is not currently occurring at FLW a new mission has been added to the table. No attempt has been made to quantify the exact location or magnitude of all ongoing operations and activities.

Items which indicate a new BRAC activity are discussed in additional detail following the table. Existing, ongoing mission activities at FLW (including similar activities that will be relocated from Fort McClellan) are discussed in detail in the Environmental Assessment (FLW, 1995c). Please refer to Appendix E of the Environmental Assessment for additional information.

Table B.2: Comparison of Mission Activities

Activity	Current Activity	BRAC Activity
Administrative		
Engineering	Yes	Yes
General Purpose	Yes	Yes
Photographic Labs	Yes	Yes
Printing	Yes	Yes
Unit Administration	Yes	Yes
Airfield Operations		
Cleaning and Sweeping	Yes	No
Crash Fire Protection and Air Rescue	Yes	No
MEDEVAC	Yes	Yes
Passenger and Supplies Processing	Yes	Yes
Reconstruction	Yes	No
Repair and Maintenance	Yes	No
Runway Operations	Yes	Yes
Snow Removal and Deicing	Yes	No

Table B.2:
Comparison of Mission Activities

Activity		Current Activity	BRAC Activity
Facilities Maintenance and Repair			
	Asbestos Removal	Yes	Yes
	Carpenter Shop and Lumber Yard	Yes	Yes
	Electrical Repairs	Yes	Yes
	Furniture Repair Shop	Yes	Yes
	Heating, Ventilation and Air Conditioning Equipment Maintenance	Yes	Yes
	Identify and order maintenance or repair work	Yes	Yes
	Metal Plating	Yes	Yes
	Painting	Yes	Yes
	Plumbing and Steam Fitting	Yes	Yes
	Radon Testing	Yes	Yes
	Roofing	Yes	Yes
	Self-Help	Yes	Yes
	Sheet Metal Work	Yes	Yes
	Welding	Yes	Yes
Fuel and Petroleum Products Storage and Dispensing			
	Airfield Operations	Yes	No
	Bulk Storage	Yes	Yes
	Commercial Filling Stations	Yes	No
	Repair and Removal of Bulk Storage Tanks	Yes	No
	Transportation Motor Pool	Yes	Yes
	Waste Oil Collection and Recycling	Yes	Yes
Grounds Maintenance			
	Entomology and Pesticide Application	Yes	Yes
	Fertilizer Application	Yes	Yes
	Firebreak Maintenance	Yes	Yes
	Herbicide Application	Yes	Yes
	Lawn Mowing	Yes	Yes
	Leaf Collection	Yes	Yes
	Tree Trimming	Yes	Yes
	Tree Removal	Yes	Yes
Hospital Operations			
	Dental Clinics	Yes	Yes
	Medical Clinics	Yes	Yes
	Medical Waste Handling and Disposal	Yes	Yes
	Mortuary	Yes	Yes
	Pathological Incinerator	Yes	Yes
	Radioactive Material Storage and Use	Yes	Yes
	Sterilization Discharge	Yes	Yes
Installation Support Services			
	Banks and Credit Unions	Yes	Yes
	Cemetery	Yes	Yes
	Child Development and Teen Centers	Yes	Yes

Table B.2: Comparison of Mission Activities		
Activity	**Current Activity**	**BRAC Activity**
Commissary	Yes	Yes
Community Centers	Yes	Yes
Community Service and Emergency Relief	Yes	Yes
Defense Reutilization and Marketing Office Disposal	Yes	Yes
Dependent Schools	Yes	Yes
Dry Cleaning	Yes	Yes
Electronics Repair	Yes	Yes
Employment Service Organizations and Unions	Yes	Yes
Exchange and Mini Mart Shopping Centers	Yes	Yes
Family Housing	Yes	Yes
Fire Protection	Yes	Yes
Fire Training	Yes	Yes
Food Service	Yes	Yes
Guest Housing	Yes	Yes
Libraries	Yes	Yes
Museum	Yes	Yes
Police Services	Yes	Yes
Postal Services	Yes	Yes
Recycling Center	Yes	Yes
Religious Programs	Yes	Yes
Service Clubs and Organizations	Yes	Yes
Solid Waste Disposal	Yes	Yes
Travel Services	Yes	Yes
Truman Education Center	Yes	Yes
Unaccompanied Personnel Housing	Yes	Yes
University Extension Programs	Yes	Yes
Minor Construction and Alteration		
Facilities Alteration	Yes	Yes
Facilities Construction	Yes	Yes
Site Improvement Alteration	Yes	Yes
Site Improvement Construction	Yes	Yes
Utilities Alteration	Yes	Yes
Utilities Construction	Yes	Yes
Natural Resources Management		
Controlled Burning	Yes	Yes
Fish and Wildlife Management	Yes	Yes
Forestry Management	Yes	Yes
Soil Erosion Control	Yes	Yes
Recreation		
Arts and Crafts Centers	Yes	Yes
Auto Craft Centers	Yes	Yes
Baseball, Softball, Football, Soccer and General Purpose Athletic Fields	Yes	Yes
Bowling Centers	Yes	Yes

Table B.2:
Comparison of Mission Activities

Activity		Current Activity	BRAC Activity
	Campgrounds	Yes	Yes
	Girl and Boy Scouts	Yes	Yes
	Golf Course and Clubhouse	Yes	Yes
	Gymnasiums	Yes	Yes
	Horse Stables	Yes	Yes
	Open Messes	Yes	Yes
	Recreation Centers	Yes	Yes
	Recreational Fishing and Hunting	Yes	Yes
	Rod and Gun Club	Yes	Yes
	Special Olympics	Yes	Yes
	Swimming Pools	Yes	Yes
	Tennis, Basketball, Handball, Racquetball and Volleyball Courts	Yes	Yes
	Theaters	Yes	Yes
Road and Right-of-Way Maintenance			
	Cleaning and Sweeping	Yes	Yes
	Erosion Control	Yes	Yes
	General Repair and Maintenance	Yes	Yes
	Lawn Mowing	Yes	Yes
	Reconstruction	Yes	Yes
	Snow Removal and Road Salting	Yes	Yes
	Tree Removal	Yes	Yes
	Tree Trimming	Yes	Yes
Training			
	Advanced Individual Training	Yes	Yes
	Advanced Non-Commissioned Officer Course (ANCOC), Chemical	No	Yes
	Advanced Non-Commissioned Officer Course (ANCOC), Engineer	Yes	No
	Advanced Non-Commissioned Officer Course (ANCOC), Military Police	No	Yes
	Armored Carrier Operations	No	Yes
	Basic Non-Commissioned Officer Course (BNCOC), Chemical, Reserve Component	No	Yes
	Basic Non-Commissioned Officer Course (BNCOC), Chemical	No	Yes
	Basic Non-Commissioned Officer Course (BNCOC),Engineer	Yes	No
	Basic Non-Commissioned Officer Course (BNCOC), Military Police	No	Yes
	Basic Training/One Station Unit Training	Yes	Yes
	Bridge Specialist and Crewman	Yes	No
	Calibrator, Chemical	No	Yes
	Carpentry and Masonry Specialist	Yes	No
	Chemical Officer, Advanced	No	Yes
	Chemical Officer, Advanced	No	Yes
	Chemical Officer, Advanced, Reserve Component	No	Yes
	Chemical Officer, Basic	No	Yes
	Chemical Officer, Joint Senior Leader	No	Yes
	Chemical Officer, Pre-Command	No	Yes
	Chemical One Station Unit Training	No	Yes

Table B.2: Comparison of Mission Activities		
Activity	Current Activity	BRAC Activity
Child Abuse Prevention Training, Military Police	Yes	Yes
Combat Engineer	Yes	No
Combatting Terrorism, Military Police	Yes	Yes
Concrete & Asphalt Equipment Operator	Yes	No
Construction Equipment Operator	Yes	No
Construction Equipment Repairer	Yes	No
Construction Surveyor	Yes	No
Counterdrug Clandestine Lab Raid Team, Military Police	Yes	Yes
Counterdrug Core, Military Police	Yes	Yes
Counterdrug Marksman/Observer, Military Police	No	Yes
Counterdrug Special Weapons and Tactics, Military Police	No	Yes
Counterdrug Training, Military Police	Yes	Yes
Counternarcotics Field Tactical Police Operations, Military Police	No	Yes
Counternarcotics Investigations, Military Police	No	Yes
Counternarcotics Narcoterrorism Physical Protection, Military Police	No	Yes
Counternarcotics Narcoterrorism Physical Security, Military Police	No	Yes
Crane Operator	Yes	No
Decontamination for Non-United States Personnel, Chemical	No	Yes
Decontamination Operations	Yes	Yes
Detector Dog Handler, Military Police	Yes	Yes
Disaster Preparedness	Yes	Yes
Domestic Violence Intervention, Military Police	Yes	Yes
Drill Sergeant	Yes	Yes
Drug Crime Intelligence Systems, Military Police	No	Yes
Drug Demand Reduction, Military Police	No	Yes
Engineer Equipment Repair Technician	Yes	No
Engineer Officer, Advanced	Yes	No
Engineer Officer, Basic	Yes	No
Engineer Officer, Candidate	Yes	No
Engineer Tracked Vehicle Crewman	Yes	No
Evasive Driving for General Office Drivers, Military Police	No	Yes
Evasive Driving for Senior Officers and Selected Personnel, Military Police	No	Yes
Explosive Ordnance	Yes	Yes
Explosive Ordnance Disposal	Yes	Yes
Flame Field Expedient Deterrent	Yes	Yes
General Construction Equipment Operator	Yes	No
Heavy Construction Equipment Operator	Yes	No
Host Country-Foreign Nation Counternarcotics, Military Police	No	Yes
Hostage Negotiations, Military Police	Yes	Yes
Interior Electrician	Yes	No
Land Navigation	Yes	Yes
Light Wheel Vehicle Recovery Specialist	Yes	No
Light Wheeled Vehicle Mechanic	Yes	No

Table B.2:
Comparison of Mission Activities

Activity	Current Activity	BRAC Activity
Materials Quality Specialist	Yes	No
Military Police Investigator, Military Police	Yes	Yes
Military Police Officer, Advanced	No	Yes
Military Police Officer, Advanced, Reserve Component	No	Yes
Military Police Officer, Basic	No	Yes
Military Police Officer, Pre-Command	No	Yes
Military Police One Station Unit Training (95C10) Corrections Specialist	No	Yes
Military Police One Station Unit Training (95B10)	No	Yes
Military Working Dog Handler, Military Police	Yes	No
Military Working Dog Supervisor, Military Police	No	No
Military Working Dog Training, Military Police	Yes	No
Mobile Smoke	No	Yes
Motor Transport Operator	Yes	Yes
Motor Vehicle Operators Training	Yes	Yes
Nuclear, Biological and Chemical Defensive Training	Yes	Yes
Nuclear Biological and Chemical Reconnaissance, Chemical	No	Yes
Operational Radiation Safety (Radiation Lab), Chemical	No	Yes
Patrol Handler, Military Police	No	Yes
Physical Security and Crime Prevention, Military Police	Yes	Yes
Plumber	Yes	No
Protective Service Training, Military Police	No	Yes
Protective Services/Special Reaction Team Training, Military Police	Yes	Yes
Quarrying Specialist	Yes	No
Radiological Safety, Chemical	No	Yes
Recruit Reception Training	Yes	Yes
Rehabilitation Training Instructor Course, (RITC) Military Police	No	Yes
Reserve Component Training	Yes	Yes
Security Training, Military Police	Yes	Yes
Special Ammunition Security, Military Police	Yes	Yes
Special Reaction Team Training, Marksmanship/Observer, Phase II, Military Police	No	Yes
Special Reaction Team Training, Phase I, Military Police	No	Yes
Static Smoke	No	Yes
Technical Drafting Specialist	Yes	No
Toxic Agent Training (Chemical Defense Training Facility)	No	Yes
U.S. Marine Corps, Military Police Occupational Skill (95C19) Training, Phase I, Military Police	No	Yes
U.S. Marine Corps: Nuclear, Biological and Chemical Defense, Chemical	No	Yes
U.S. Navy: Applied CBR-D for Damage Control Assistants, Chemical	No	Yes
U.S. Navy: Disaster Preparedness, Chemical	No	Yes
U.S. Navy: Shipboard CBR-D Operations and Training Specialists, Chemical	No	Yes
Utilities Operations and Maintenance	Yes	No
Vehicle and Equipment Maintenance	Yes	No
Weapons Inspector, Chemical	No	Yes

Table B.2: Comparison of Mission Activities		
Activity	**Current Activity**	**BRAC Activity**
Weapons Marksmanship	Yes	Yes
Utilities Systems		
Boiler and Power Plant Operations	Yes	Yes
Communications Systems - Cable Television	Yes	Yes
Communications Systems - Radio	Yes	Yes
Communications Systems - Telephone	Yes	Yes
Electrical Distribution	Yes	Yes
Natural Gas Distribution	Yes	Yes
PCB Control Program	Yes	Yes
Sanitary Sewage Collection, Treatment and Disposal	Yes	Yes
Storm Water Collection	Yes	Yes
Transformer Maintenance	Yes	Yes
Water Collection, Treatment and Distribution	Yes	Yes
Warehousing and Supply Storage		
Ammunition Storage	Yes	Yes
Central Issue and Receiving	Yes	Yes
Clothing Issue	Yes	Yes
Cold Storage Warehouse	Yes	Yes
General Storage	Yes	Yes
Hazardous Materials Storage and Disposal	Yes	Yes
Weapons Storage, Cleaning and Repair	Yes	Yes
Vehicle and Equipment Maintenance and Repair		
Auto Body Repair and Paint Shop	Yes	Yes
Battery Shop	Yes	Yes
Communications Equipment	Yes	Yes
Equipment Yard	Yes	Yes
Intrusion and Security Detection Systems	Yes	Yes
Maintenance Shops	Yes	Yes
Steam Cleaning	Yes	Yes
Vehicle Dispatch	Yes	Yes
Wash Racks	Yes	Yes
Wrecker	Yes	Yes
Source: Harland Bartholomew and Associates, Inc.		

B.2.1 Administration

The proposed action will increase the number of personnel involved in administrative actions and increase the number of administrative units at FLW. The proposed action will result in:

- the establishment, reorganization and reallocation of administrative offices for the directorate staffs of the Chemical School and Military Police School, including two additional school Commandant's offices;
- an increase in the anticipated work load at the Directorate of Public Works Engineering Offices associated with the operation, maintenance and repair of the additional facilities that will be constructed;

- the expansion of existing printing operations to ensure adequate materials to support the increased number of classes that would be taught;
- an increase in the workload at the photographic lab associated with increased training aid production; and
- the establishment of new tenant general administrative areas, and operational unit headquarters including battalion, company and detachment headquarters for relocated units.

Information on the number of personnel that will be relocated to FLW is contained in 2.4.3 and 3.5 of Volume I, Main Report.

B.2.2 Airfield Operations

No changes in the number of flights or the type of aircraft are anticipated as a result of the proposed BRAC action; therefore, no change in the level of environmental impact is anticipated. The increased number of personnel and dependents at FLW will increase the number of personnel that are using the airfield and the amount of luggage and supplies that are processed.

B.2.3 Facilities Maintenance and Repair

The proposed action includes the extension of existing ongoing maintenance and repair activities to new facilities. Additionally the implementation of the proposed construction plan will include the demolition of existing deteriorated facilities, renovation of existing facilities and the modification of existing structures.

B.2.4 Fuel and Petroleum Products Storage and Dispensing

Impacts of implementing the proposed action on Fuel and Petroleum Products Storage and Dispensing will include:

- the use of existing storage, dispensing and fuel recycling and recovery facilities and systems to services the vehicles and equipment that will relocated as a part of the proposed action;
- the use of existing fuel dispensing facilities to service the additional vehicles that will be relocated to FLW;
- the use of existing waste oil collection and recycling efforts to include fog oil, FOX Vehicle Maintenance and Evasive Driving oil storage areas;
- the construction of a small oil storage facility at the HMMWV/Evasive Driving area (which will be constructed as part of the proposed action); and
- the requirement to store up to 27,500 gallons of fog oil in approximately five hundred 55-gallon drums. These drums of oil will be stored in a new oil storage facility that will be constructed as a part of the proposed action. Additionally, the new facility will include internal catchment provisions and a protected loading dock.

B.2.5 Grounds Maintenance

Implementing the proposed action will include:

- the removal and trimming of trees at proposed construction, training sites, and along new utility and roadway easements;
- the planting of native and ornamental landscapes at new facilities; and
- an increase in grounds maintenance requirements as a result of the increased number and the diverse location of facilities that will be constructed (including approximately 565,000 square yards of area that will be seeded or sodded with grass as part of the construction effort). This area will include approximately 350,000 square yards of additional grassed

area and approximately 210,000 square yards which will be at range areas where the level of maintenance will be much lower as the primary purpose of the new grass seed and sod is to limit soil erosion.

B.2.6 Hospital Operations

Hospital operations include both the operation of General Leonard Wood Army Community Hospital and the Troop Medical and Troop Dental clinics. Current hospital operative, ward, clinic, administrative, supply and storage, and lab facilities can support anticipated requirements. No expansion of these facilities is anticipated as a part of the proposed action, although the existing medical staff will increase by approximately 135 persons. These additional personnel are intended to support the additional demand for medical and dental services that the additional students, staff and dependents will generate.

B.2.7 Installation Support Services

Installation Support Services include the commercial and service facilities which support personnel who work or live on-post. Together these items form the nucleus of the installation's community center. The commercial aspects of the community center make it the installation's market place. The implementation of the proposed action will include:

- the conversion of approximately 190 available Enlisted Family Housing Quarters into Unaccompanied Personnel and Guest housing;
- the conversion of approximately 190 available, deteriorated Unaccompanied Personnel Housing, Officer Guest Housing rooms into Unaccompanied Personnel Housing, Officer for use by permanent party personnel;
- the reallocation of existing UP, Enlisted (Barracks) in the 600-, 700-, 800- and 1000-areas for use by Basic Training and One Station Unit Training missions;
- the reallocation of existing Enlisted Barracks in the 1700-area (Specker Barracks) for use by ITRO and permanent party enlisted personnel, including the reactivation of a now closed dining facility;
- the construction of additional Enlisted Barracks spaces to support the increased number of enlisted permanent party cadre and students, including a new dining facility and support facilities;
- the construction of two new General Officer Family Housing Quarters with approximately 2,100 net square feet in each quarters;
- the development of an area to house the U.S. Army Chemical School and the U.S. Army Military Police School Library collections;
- the development of an area to store and display the U.S. Army Chemical School and the U.S. Army Military Police School Museum collections; and
- an increase in the level of Police Services as students from the U.S. Army Military Police School provide additional patrol presence as part of their training.

B.2.8 Construction and Alteration

The proposed action (as discussed in subsections 2.4.2 and 3.4) will include the construction of between $200 and $300 million worth of new facilities, including additional general and applied instruction facilities, barracks, and general administrative areas; and the reuse, renovation, alteration and conversion of existing, available facilities.

Construction, alteration, repair, rehabilitation and maintenance of buildings, structures, site improvements, and utility systems are required to ensure that assets are capable of meeting the facilities' requirements of changing educational initiatives and programs, administrative philosophies and organizations, weapons systems, and mission requirements. Implementation of the proposed action will require that ongoing minor construction and alteration actions be expanded to include the new facilities identified for construction as a part of the proposed action.

B.2.9 Natural Resources Management

Implementation of the proposed action will include the construction of new facilities. In locations where these construction projects will require clearing, erosion control and sediment ponds will be constructed to reduce the potential for surface runoff and erosion.

FLW has an Integrated Natural Resources Management Plan which is designed to enhance the existing diverse fish, wildlife and plant habitats present on the installation. This plan and continued coordination with the U.S. Department of Interior and the Missouri Department of Conservation, will guide ongoing management actions.

B.2.10 Recreation

Personnel relocated to FLW will use the existing recreation facilities at the installation. The increased number of users will increase the usage of the facilities requiring minor modification in current management practices, but the existing facilities are adequate to support the increased population. Additionally, as part of the proposed action, any Unaccompanied Personnel Housing construction will also include the construction of recreational facilities for use by residents.

B.2.11 Road and Right-of-Way Maintenance

Implementation of the proposed action includes the continuation of current road (including concrete, asphaltic concrete, rock and gravel roads, parking areas, sidewalks, troop trails, and service drives) and rights-of-way maintenance efforts, plus the expansion of these efforts to include newly constructed roads, parking areas, sidewalks, troop trails and service drives.

B.2.12 Training

Relocation of the Chemical School and Military Police School will result in the addition of approximately 70 POIs to those already taught at FLW. These POIs cover numerous training classes that include both General Military Training and Military Occupational Skill (MOS) specific training requirements.

Training offered by the **U.S. Army Military Police School** concentrates on the development of technically and tactically proficient military police soldiers. Military Police students are trained in traditional police functions such as traffic control and crime investigation, fraud investigation, combating terrorism, hostage negotiation, protective services, and counter narcotics investigations. Students are also trained in the areas of: Battlefield Circulation, Area Security, Enemy Prisoner of War and Civilian Prisoner handling, and Police Intelligence.

The **U.S. Army Chemical School** has the mission to provide education and training of selected U.S. military, foreign military and civilian personnel in: the detection and identification of Nuclear, Biological and Chemical (NBC) agents; protection against NBC agents; cleanup of NBC agents; employment of smoke and other obscurant systems; and flame field expedient deterrent operations.

Table B.3 includes a listing of the new courses which will be offered at FLW following the relocation of the U.S. Army Chemical School, with an annotation (●) of the types of training goals that are included in each course. Table B.4 provides a similar listing of courses which will be relocated to FLW as part of the relocation of the U.S. Army Military Police School. Primary training activities which will be introduced to FLW involve:

Table B.3
Chemical School, Goals Associated with Programs of Instruction

Training Goals / Program of Instruction	U.S. Army Chemical Programs of Instruction																			U.S. Arr			
	Biological Integrated Detection System (BIDS) Spec.	Chem Ops Specialist Skill 1 (RC) ADT phase	Chemical Officer Advanced	Chemical Officer Advanced - RC	Chemical Operations Spec. Skill 1 (RC) IDT phase	Chemical Pre-Command	Decontamination Procedures Non-US	Master FOX Scout	NBC Reconnaissance	Officer Basic	Operational Radiation Safety	Operations Specialist (ANCOC)	Operations Specialist (BNCOC)	Operations Specialist (BNCOC-Reclassification)	Operations Specialist (OSUT)	Operations Specialist Skill 2/3 (Reclassification)	RADIAC Calibrator Custodian	Radiological Safety	Weapons Inspector/Escort, Phase 3	STRAP - Automatic Chemical Agent Alarm	STRAP - Biological Integrated Detection System	STRAP - Gen./Smoke, Mechanical	STRAP - Generator/Mechanical Smoke Sys.
Battlefield Procedures																							
BP, Call-For-Fire Support								●	●	●													
BP, Maneuver Operations	●		●	●		●		●	●	●		●	●	●	●	●							
BP, Maneuver Operations Night	●		●	●					●	●		●	●	●	●	●							
BP, Mines, Demolition										●		●	●	●	●	●							
BP, Mines, Field Expedient (Flame Range)			●	●			●			●		●	●	●	●	●							
BP, NBC	●	●	●	●	●	●	●	●	●	●		●	●	●	●	●	●		●				
BP, Night-Time Squad Engagement	●									●		●	●	●	●	●							
BP, Obstacles Placement (mines etc.)							●			●		●	●	●	●	●							
BP, Unarmed Self-Defense (Press. Point)															●								
BP, Urban Terrain																							
BP, Warfighting & Tactical Ops, Field	●	●	●	●	●			●	●	●		●	●	●	●	●							
BP, Warfighting & Tact Ops, Simulators	●		●	●	●			●	●	●		●	●	●		●							
BIDS Operations																							
BIDS Battlefield Employment	●		●	●						●		●	●	●	●	●							
BIDS Maintenance	●																						
BIDS Operation	●																				●		
NBCRS Operations																							
FOX Battlefield Employment			●	●		●		●	●	●		●	●	●	●	●							
FOX Maintenance								●	●														
FOX Operation																							
General Military Training																							
GM, Code of Conduct			●	●						●		●	●	●	●	●							
GM, Communications - Oral	●		●	●				●	●	●	●	●	●	●	●	●	●	●			●		
GM, Communications - Written	●		●	●				●	●	●	●	●	●	●	●	●	●	●			●		
GM, Communications - Signals	●		●	●				●	●	●		●	●	●	●	●					●		
GM, Communications - Radio	●							●	●	●		●	●	●	●	●					●		
GM, Computer Operations	●		●	●				●	●	●		●	●	●	●	●		●			●		
GM, Customs, Courtesies and Traditions			●	●						●		●	●	●	●	●							
GM, Defensive Procedures	●	●	●	●	●			●	●	●		●	●	●	●	●	●						
GM, Drill and Ceremony			●	●						●		●	●	●	●	●		●					
GM, First Aid (including CPR)	●				●		●	●		●		●	●	●	●	●	●		●				
GM, Leadership Skills	●		●	●		●		●	●	●		●	●	●	●	●	●	●					

Instruction							U.S. Army STRAPS									U.S. Air Force									USMC		U.S. Navy		
Operations Specialist (BNCOC)	Operations Specialist (BNCOC-Reclassification)	Operations Specialist (OSUT)	Operations Specialist Skill 2/3 (Reclassification)	RADIAC Calibrator Custodian	Radiological Safety	Weapons Inspector/Escort, Phase 3	STRAP - Automatic Chemical Agent Alarm	STRAP - Biological Integrated Detection System	STRAP - Gen./Smoke, Mechanical	STRAP - Generator/Mechanical Smoke Sys.	STRAP - Long Range Bio Standoff Detect. Sys.	STRAP - Modular Decontamination System	STRAP - Multiple Integrated Chemical Agent Alarm	STRAP - Pocket Radiacmeter	STRAP Light NBC Reconnaissance System	Readiness Craftsman	Readiness Flight Officer	USAF, Air Base Operability Concept	USAF, Disaster Preparedness Apprentice, Phase I	USAF, DP Officer, Phase I	USAF, DP Officer/Apprentice, Phase II	USAF, DP Refresher	USAF, NBC Cell Operations	USAF, NBC Cell Ops Familiarization	USMC Basic NBC Defense		US Navy Disaster Preparedness Operations Spec.	USN Shipboard CBR-D Ops and Training Spec.	
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Table B.3
Chemical School, Goals Associated with Programs of Instruction

	U.S. Army Chemical Programs of Instruction																			U.S.		
Training Goals / **Program of Instruction**	Biological Integrated Detection System (BIDS) Spec.	Chem Ops Specialist Skill 1 (RC) ADT phase	Chemical Officer Advanced	Chemical Officer Advanced - RC	Chemical Operations Spec. Skill 1 (RC) IDT phase	Chemical Pre-Command	Decontamination Procedures Non-US	Master FOX Scout	NBC Reconnaissance	Officer Basic	Operational Radiation Safety	Operations Specialist (ANCOC)	Operations Specialist (BNCOC)	Operations Specialist (BNCOC-Reclassification)	Operations Specialist (OSUT)	Operations Specialist Skill 2/3 (Reclassification)	RADIAC Calibrator Custodian	Radiological Safety	Weapons Inspector/Escort, Phase 3	STRAP - Automatic Chemical Agent Alarm	STRAP - Biological Integrated Detection System	STRAP - Gen./Smoke, Mechanical
GM, Land Navigation (GPS/Map Reading)	●		●	●	●	●		●		●		●	●	●	●	●					●	
GM, Operational Tactics	●	●	●	●	●			●		●		●	●	●	●	●	●					
GM, Org. Structure/Chain-of-Command	●		●	●		●		●		●		●	●	●	●	●						
GM, Personal NBC Protective Equipment	●		●	●	●	●	●	●		●		●	●	●	●	●	●	●	●			
GM, Physical Fitness/Total Fitness			●	●		●	●			●		●	●	●	●	●						
GM, Preventive Medical/Hygiene	●		●	●						●	●	●	●	●	●	●		●				
GM, Rights and Responsibilities			●	●						●		●	●	●	●	●		●				
GM, Standards of Conduct and Behavior			●	●						●		●	●	●	●	●						
GM, Time Management			●	●						●		●	●	●	●	●						
GM, Total Army Quality			●	●		●				●		●						●				
GM, UCMJ & Military Law			●	●						●		●	●	●	●	●						
Military Police Procedures																						
MP, Law Enforcement																						
MP, Advanced Law Enforcement																						
MP, Arms Room Operations																						
MP, Confinement Facility/EPW Ops																						
MP, Counter-drug Procedures																						
MP, Counter-terrorism Operations																						
MP, Crime Scene Investigation																						
MP, Crime Scene Response																						
MP, Domestic Law Enforcement																						
MP, Domestic Violence/Abuse Invest.																						
MP, Domestic Violence/Abuse Response																						
MP, Evidence Chain-of-Custody																						
MP, Evidence Storage																						
MP, Hostage Negotiation																						
MP, Incident Investigation																						
MP, Incident Response																						
MP, Interview/Interrogations																						
MP, Operations Other-Than-War																						
MP, Patrol Procedures																						
MP, Phys Security and Crime Prevention																						
MP, Protective Services																						

f Instruction							U.S. Army STRAPS									U.S. Air Force									USMC		U.S. Navy		
Operations Specialist (BNCOC)	Operations Specialist (BNCOC-Reclassification)	Operations Specialist (OSUT)	Operations Specialist Skill 2/3 (Reclassification)	RADIAC Calibrator Custodian	Radiological Safety	Weapons Inspector/Escort, Phase 3	STRAP - Automatic Chemical Agent Alarm	STRAP - Biological Integrated Detection System	STRAP - Gen./Smoke, Mechanical	STRAP - Generator/Mechanical Smoke Sys.	STRAP - Long Range Bio Standoff Detect. Sys.	STRAP - Modular Decontamination System	STRAP - Multiple Integrated Chemical Agent Alarm	STRAP - Pocket Radiacmeter	STRAP Light NBC Reconnaissance System	Readiness Craftsman	Readiness Flight Officer	USAF, Air Base Operability Concept	USAF, Disaster Preparedness Apprentice, Phase I	USAF, DP Officer, Phase I	USAF, DP Officer/Apprentice, Phase II	USAF, DP Refresher	USAF, NBC Cell Operations	USAF, NBC Cell Ops Familiarization	USMC Basic NBC Defense		US Navy Disaster Preparedness Operations Spec.	USN Shipboard CBR-D Ops and Training Spec.	
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Table B.3

Chemical School, Goals Associated with Programs of Instruction

Program of Instruction	U.S. Army Chemical Programs of Instruction																			U.S. A			
Training Goals	Biological Integrated Detection System (BIDS) Spec.	Chem Ops Specialist Skill 1 (RC) ADT phase	Chemical Officer Advanced	Chemical Officer Advanced - RC	Chemical Operations Spec. Skill 1 (RC) IDT phase	Chemical Pre-Command	Decontamination Procedures Non-US	Master FOX Scout	NBC Reconnaissance	Officer Basic	Operational Radiation Safety	Operations Specialist (ANCOC)	Operations Specialist (BNCOC)	Operations Specialist (BNCOC-Reclassification)	Operations Specialist (OSUT)	Operations Specialist Skill 2/3 (Reclassification)	RADIAC Calibrator Custodian	Radiological Safety	Weapons Inspector/Escort, Phase 3	STRAP - Automatic Chemical Agent Alarm	STRAP - Biological Integrated Detection System	STRAP - Gen./Smoke, Mechanical	STRAP - Generator/Mechanical Smoke Sys
MP, Station Operation																							
MP. Special (Reaction Team) Operations																							
MP, Tactical Response																							
MP. Rehabilitation Instructor Training																							
Nuclear Biological and Chemical Procedures																							
NBC, Accident Response/Base Recovery			●	●							●						●	●	●				
NBC, Contingency Support			●	●	●					●	●	●	●	●	●	●		●	●				
NBC, Detection and Reconnaissance	●		●	●	●	●	●	●		●	●	●	●	●	●	●	●	●	●				
NBC, Decon, Equipment		●	●	●	●	●	●			●		●	●	●	●	●		●	●				
NBC, Decon, Personnel		●	●	●	●	●	●			●		●	●	●	●	●		●	●				
NBC, Decon, proficiency test (live agent)		●	●	●	●	●	●			●		●	●	●	●	●			●				
NBC, Protective Equipment (use, donning, doffing and fit testing)			●	●	●	●	●			●		●	●	●	●	●			●				
NBC, Protective Equipment, Proficiency Test/Fit Test (gas chamber)			●	●			●			●		●	●	●	●	●			●				
NBC, Survival Recovery			●	●	●		●			●		●	●	●	●	●		●	●				
Obscurant Procedures																							
Obs, Employment Principles		●	●	●		●	●	●		●		●	●	●	●	●							
Obs, Proficiency (static operations)		●	●	●						●		●	●	●	●	●							
Obs, Proficiency (mobile operations)		●	●	●						●		●	●	●	●	●							
Obs, Generator Maintenance		●	●	●						●		●	●	●	●	●							
Obs, Generator Operations		●	●	●						●		●	●	●	●	●							
Obs, Storage Operations		●								●		●	●	●	●	●							
Radiation Safety																							
Rad, Detection and Identification			●	●	●	●		●		●	●	●	●	●	●	●	●	●					
Rad, Laboratory Operations			●	●	●					●	●	●	●	●	●	●	●	●					
Rad, Test and Operational Equip. Maint.			●	●	●					●	●	●	●	●	●	●	●	●					
Rad, Test & Op. Equipment Operation			●	●	●					●	●	●	●	●	●	●	●	●					
Rad, Test & Op. Equipment Storage					●					●	●	●	●	●	●	●	●	●					
Research Support																							
Library, General Information			●	●						●	●	●	●	●	●	●		●					
Library, Historical Information			●	●						●		●	●	●	●	●							
Library, Historical/Branch Traditions			●	●						●		●	●	●	●	●							

of Instruction							U.S. Army STRAPS									U.S. Air Force									USMC		U.S. Navy		
Operations Specialist (BNCOC)	Operations Specialist (BNCOC-Reclassification)	Operations Specialist (OSUT)	Operations Specialist Skill 2/3 (Reclassification)	RADIAC Calibrator Custodian	Radiological Safety	Weapons Inspector/Escort, Phase 3	STRAP - Automatic Chemical Agent Alarm	STRAP - Biological Integrated Detection System	STRAP - Gen./Smoke, Mechanical	STRAP - Generator/Mechanical Smoke Sys.	STRAP - Long Range Bio Standoff Detect. Sys.	STRAP - Modular Decontamination System	STRAP - Multiple Integrated Chemical Agent Alarm	STRAP - Pocket Radiacmeter	STRAP Light NBC Reconnaissance System	Readiness Craftsman	Readiness Flight Officer	USAF, Air Base Operability Concept	USAF, Disaster Preparedness Apprentice, Phase I	USAF, DP Officer, Phase I	USAF, DP Officer/Apprentice, Phase II	USAF, DP Refresher	USAF, NBC Cell Operations	USAF, NBC Cell Ops Familiarization	USMC Basic NBC Defense		US Navy Disaster Preparedness Operations Spec.	USN Shipboard CBR-D Ops and Training Spec.	
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Table B.3

Chemical School, Goals Associated with Programs of Instruction

	U.S. Army Chemical Programs of Instruction																			U	
Training Goals / **Program of Instruction**	Biological Integrated Detection System (BIDS) Spec.	Chem Ops Specialist Skill 1 (RC) ADT phase	Chemical Officer Advanced	Chemical Officer Advanced - RC	Chemical Operations Spec. Skill 1 (RC) IDT phase	Chemical Pre-Command	Decontamination Procedures Non-US	Master FOX Scout	NBC Reconnaissance	Officer Basic	Operational Radiation Safety	Operations Specialist (ANCOC)	Operations Specialist (BNCOC)	Operations Specialist (BNCOC-Reclassification)	Operations Specialist (OSUT)	Operations Specialist Skill 2/3 (Reclassification)	RADIAC Calibrator Custodian	Radiological Safety	Weapons Inspector/Escort, Phase 3	STRAP - Automatic Chemical Agent Alarm	STRAP - Biological Integrated Detection System
Library, Specialized/Classified Information			●	●						●		●	●	●		●					
Museum, Artifact Display										●		●	●	●	●	●					
Museum, Artifact Storage																					
Small Arms Procedures																					
SM, 308 Cal																					
SM, 50 Cal										●		●	●	●	●	●					
SM, 60 Cal										●		●	●	●	●	●					
SM, AT4 anti-tank										●					●						
SM, Combat Pistol																					
SM, Crew-Served Weapons								●		●		●	●	●	●	●					
SM, Employment (Shoot/no-shoot)			●	●				●		●		●	●	●	●	●					
SM, M16										●		●	●	●	●	●					
SM, M203										●		●	●	●	●	●					
SM, M240 machine gun								●													
SM, M250 grenade launcher																					
SM, Marksman/Observer Proficiency																					
SM, mark 19																					
SM, Pistol (45Cal/9mm)																					
SM, shotgun																					
SM, Sniper Proficiency																					
SM, Special Reaction Team Proficiency																					
SM, Special Weapons			●	●						●											
Weapons Storage, NBC											●						●		●		
Weapons Storage, Small Arms			●	●																	
Weapons Storage, Transport											●	●	●	●	●	●	●		●		
Weapons Storage, Treaty Monitoring																			●		
Vehicle and Equipment Operations																					
Veh, Convoy Procedures	●		●	●			●			●	●	●	●	●		●		●	●		
Veh, Evasive Driving	●																				
Veh, Tracked, Maintenance										●		●	●	●		●					
Veh, Tracked, Operation			●	●						●		●	●	●		●					
Veh, Wheeled/Non-Tactical, Ops & Maint.		●	●	●						●		●	●	●		●		●			●
Veh, Wheeled/Tactical, Ops & Maint.	●	●	●	●				●		●		●	●	●		●		●			●

...of Instruction							U.S. Army STRAPS									U.S. Air Force									USMC		U.S. Navy		
Operations Specialist (BNCOC)	Operations Specialist (BNCOC-Reclassification)	Operations Specialist (OSUT)	Operations Specialist Skill 2/3 (Reclassification)	RADIAC Calibrator Custodian	Radiological Safety	Weapons Inspector/Escort, Phase 3	STRAP - Automatic Chemical Agent Alarm	STRAP - Biological Integrated Detection System	STRAP - Gen./Smoke, Mechanical	STRAP - Generator/Mechanical Smoke Sys.	STRAP - Long Range Bio Standoff Detect. Sys.	STRAP - Modular Decontamination System	STRAP - Multiple Integrated Chemical Agent Alarm	STRAP - Pocket Radiacmeter	STRAP Light NBC Reconnaissance System	Readiness Craftsman	Readiness Flight Officer	USAF, Air Base Operability Concept	USAF, Disaster Preparedness Apprentice, Phase I	USAF, DP Officer, Phase I	USAF, DP Officer/Apprentice, Phase II	USAF, DP Refresher	USAF, NBC Cell Operations	USAF, NBC Cell Ops Familiarization	USMC Basic NBC Defense		US Navy Disaster Preparedness Operations Spec.	USN Shipboard CBR-D Ops and Training Spec.	
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Table B.4

Military Police School, Goals Associated with Programs of Instruction

Training Goals \ Program of Instruction	U.S. Army Military Police Progra																					
	Advanced Fraud Investigation, Phase I	Advanced Fraud Investigation, Phase II	Basic Military Police (OSUT)	Basic MP/Corrections Spec (OSUT)	Child Abuse Prevention & Investigative Techniques	CID Apprentice Special Agent	CID Apprentice Special Agent - RC	CID Apprentice Special Agent - RC, Ph IV	CID Certification	CID Warrant Officer, Advanced	CID WO Technical & Tactical Certification	CID WO Tech. & Tact. Certification - RC, Ph II	CID WO Tech. & Tact. Certification - RC, Phase I	Combating Terrorism on Military Installations	Conventional Physical Security & Crime Prevention	CounterDrug Commanders	CounterDrug Criminal Intelligence Systems	CounterDrug, Drug Demand Reduction	CounterDrug Field Tactical Police	CounterDrug Investigations	CounterDrug Narcoterrorism Personnel Protection	CounterDrug Police Sniper Team
Battlefield Procedures																						
BP, Call-For-Fire Support																						
BP, Maneuver Operations			●	●							●			●	●				●		●	
BP, Maneuver Operations Night			●	●							●			●	●	●			●		●	
BP, Mines, Demolition			●	●																		
BP, Mines, Field Expedient (Flame Range)																					●	
BP, NBC			●	●																		
BP, Night-Time Squad Engagement																						
BP, Obstacles Placement (mines etc.)															●				●		●	
BP, Unarmed Self-Defense (Press. Point)			●	●		●															●	
BP, Urban Terrain			●	●							●				●							
BP, Warfighting & Tactical Ops, Field										●	●	●	●									
BP, Warfighting & Tact. Ops, Simulators											●											●
BIDS Operations																						
BIDS Battlefield Employment																						
BIDS Maintenance																						
BIDS Operation																						
NBCRS Operations																						
FOX Battlefield Employment																						
FOX Maintenance																						
FOX Operation																						
General Military Training																						
GM, Code of Conduct			●	●		●	●	●		●	●	●	●									
GM, Communications - Oral	●	●	●	●	●	●	●	●		●	●	●	●	●	●				●	●	●	●
GM, Communications - Written	●		●	●		●	●	●		●	●	●	●	●					●		●	
GM, Communications - Signals			●	●						●	●	●	●		●				●		●	●
GM, Communications - Radio			●	●						●	●	●	●	●	●							
GM, Computer Operations		●		●		●	●	●		●	●	●	●									
GM, Customs, Courtesies and Traditions			●	●						●	●	●	●									
GM, Defensive Procedures			●	●		●	●			●	●	●	●	●	●							
GM, Drill and Ceremony			●	●						●	●	●	●									
GM, First Aid (including CPR)			●	●																		
GM, Leadership Skills			●	●		●	●	●		●	●	●	●	●								

Programs of Instruction

Programs of Instruction																				USMC	
Counter Drug Investigations	CounterDrug Narcoterrorism Personnel Protection	CounterDrug Police Sniper Team	CounterDrug Special Weapons & Tactics	Domestic Violence Intervention	Evasive Driving for General Officer's Drivers	Evasive Driving, Senior Off. & Selected Personnel	Host Country-Foreign Nation Counternarcotics	Hostage Negotiations	Military Police Advanced (ANCOC)	Military Police Basic (BNCOC)	Military Police Investigator	MP Officer Advanced	MP Officer Advanced - RC	MP Officer Basic	MP Pre-Command	Protective Service Training	Rehabilitation Instructor Training	Small Group Leader Instructor Training	Special Reaction Team Marksman/Observer, Ph II	USMC Basic Military Police	
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Table B.4
Military Police School, Goals Associated with Programs of Instruction

	U.S. Army Military Police Programs of																						
Training Goals / **Program of Instruction**	Advanced Fraud Investigation, Phase I	Advanced Fraud Investigation, Phase II	Basic Military Police (OSUT)	Basic MP/Corrections Spec (OSUT)	Child Abuse Prevention & Investigative Techniques	CID Apprentice Special Agent	CID Apprentice Special Agent - RC	CID Apprentice Special Agent - RC, Ph IV	CID Certification	CID Warrant Officer, Advanced	CID WO Technical & Tactical Certification	CID WO Tech. & Tact. Certification - RC, Ph II	CID WO Tech. & Tact. Certification - RC, Phase I	Combating Terrorism on Military Installations	Conventional Physical Security & Crime Prevention	CounterDrug Commanders	CounterDrug Criminal Intelligence Systems	CounterDrug, Drug Demand Reduction	CounterDrug Field Tactical Police	CounterDrug Investigations	CounterDrug Narcoterrorism Personnel Protection	CounterDrug Police Sniper Team	CounterDrug Special Weapons & Tactics
GM, Land Navigation (GPS/Map Reading)			●	●							●				●				●				
GM, Operational Tactics			●	●		●	●	●		●	●	●	●	●	●				●			●	
GM, Org. Structure/Chain-of-Command			●	●		●	●			●	●	●	●										
GM, Personal NBC Protective Equipment			●	●							●												
GM, Physical Fitness/Total Fitness	●	●	●	●		●	●	●		●	●	●	●						●				
GM, Preventive Medical/Hygiene			●	●		●	●	●		●	●	●	●										
GM, Rights and Responsibilities			●	●						●	●	●	●										
GM, Standards of Conduct and Behavior			●	●	●	●	●	●		●	●	●	●										
GM, Time Management			●	●		●	●	●		●	●	●	●										
GM, Total Army Quality										●	●	●	●										
GM, UCMJ & Military Law	●	●	●	●	●	●	●			●	●	●	●		●								
Military Police Procedures																							
MP, Law Enforcement			●	●					●		●								●	●			
MP, Advanced Law Enforcement	●				●	●	●	●		●	●	●	●		●				●	●	●		●
MP, Arms Room Operations																							
MP, Confinement Facility/EPW Ops			●	●		●	●																
MP, Counter-drug Procedures						●		●		●	●	●	●						●	●	●	●	●
MP, Counter-terrorism Operations						●		●		●	●	●	●							●	●		●
MP, Crime Scene Investigation	●	●			●	●	●			●	●	●	●							●			
MP, Crime Scene Response	●	●	●		●	●	●			●	●	●	●										
MP, Domestic Law Enforcement			●		●	●	●	●						●						●			
MP, Domestic Violence/Abuse Invest.					●	●	●	●															
MP, Domestic Violence/Abuse Response			●		●	●	●	●															
MP, Evidence Chain-of-Custody	●	●	●	●	●	●	●			●	●	●	●	●									
MP, Evidence Storage					●	●		●		●	●	●	●						●				●
MP, Hostage Negotiation						●	●	●		●	●	●	●	●							●		●
MP, Incident Investigation						●	●	●		●	●	●	●							●			
MP, Incident Response			●							●	●	●	●										●
MP, Interview/Interrogations			●		●	●		●		●	●	●	●							●			
MP, Operations Other-Than-War	●					●	●			●	●	●	●	●	●		●	●	●	●	●		●
MP, Patrol Procedures			●			●	●	●							●				●				
MP, Phys Security and Crime Prevention	●		●	●		●	●	●		●	●	●	●	●	●					●	●		
MP, Protective Services								●		●	●	●	●	●	●						●		

tary Police Programs of Instruction																							USMC	
	CounterDrug, Drug Demand Reduction	CounterDrug Field Tactical Police	CounterDrug Investigations	CounterDrug Narcoterrorism Personnel Protectio	CounterDrug Police Sniper Team	CounterDrug Special Weapons & Tactics	Domestic Violence Intervention	Evasive Driving for General Officer's Drivers	Evasive Driving, Senior Off. & Selected Personnel	Host Country-Foreign Nation Counternarcotics	Hostage Negotiations	Military Police Advanced (ANCOC)	Military Police Basic (BNCOC)	Military Police Investigator	MP Officer Advanced	MP Officer Advanced - RC	MP Officer Basic	MP Pre-Command	Protective Service Training	Rehabilitation Instructor Training	Small Group Leader Instructor Training	Special Reaction Team Marksman/Observer, Ph II	USMC Basic Military Police	
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Table B.4
Military Police School, Goals Associated with Programs of Instruction

	U.S. Army Military Police Programs of																						
Program of Instruction	Advanced Fraud Investigation, Phase I	Advanced Fraud Investigation, Phase II	Basic Military Police (OSUT)	Basic MP/Corrections Spec (OSUT)	Child Abuse Prevention & Investigative Techniques	CID Apprentice Special Agent	CID Apprentice Special Agent - RC	CID Apprentice Special Agent - RC, Ph IV	CID Certification	CID Warrant Officer, Advanced	CID WO Technical & Tactical Certification	CID WO Tech. & Tact. Certification - RC, Ph II	CID WO Tech. & Tact. Certification - RC, Phase I	Combating Terrorism on Military Installations	Conventional Physical Security & Crime Prevention	CounterDrug Commanders	CounterDrug Criminal Intelligence Systems	CounterDrug, Drug Demand Reduction	CounterDrug Field Tactical Police	CounterDrug Investigations	CounterDrug Narcoterrorism Personnel Protectior	CounterDrug Police Sniper Team	CounterDrug Special Weapons & Tactics
Training Goals																							
MP, Station Operation			●			●	●	●							●								
MP. Special (Reaction Team) Operations														●	●				●	●	●		●
MP, Tactical Response						●	●							●	●				●		●		●
MP. Rehabilitation Instructor Training																							
Nuclear Biological and Chemical Procedures																							
NBC, Accident Response/Base Recovery																							
NBC, Contingency Support																							
NBC, Detection and Reconnaissance																							
NBC, Decon, Equipment			●	●																			
NBC, Decon, Personnel			●	●																			
NBC, Decon, proficiency test (live agent)																							
NBC, Protective Equipment (use, donning, doffing and fit testing)			●	●																			
NBC, Protective Equipment, Proficiency Test/Fit Test (gas chamber)			●	●																			
NBC, Survival Recovery																							
Obscurant Procedures																							
Obs, Employment Principles			●	●																			
Obs, Proficiency (static operations)																							
Obs, Proficiency (mobile operations)																							
Obs, Generator Maintenance																							
Obs, Generator Operations																							
Obs, Storage Operations																							
Radiation Safety																							
Rad, Detection and Identification																							
Rad, Laboratory Operations																							
Rad, Test and Operational Equip. Maint.																							
Rad, Test & Op. Equipment Operation																							
Rad, Test & Op. Equipment Storage																							
Research Support																							
Library, General Information	●	●								●													
Library, Historical Information										●													
Library, Historical/Branch Traditions										●													

	ry Police Programs of Instruction																						USMC	
	CounterDrug, Drug Demand Reduction	CounterDrug Field Tactical Police	CounterDrug Investigations	CounterDrug Narcoterrorism Personnel Protectior	CounterDrug Police Sniper Team	CounterDrug Special Weapons & Tactics	Domestic Violence Intervention	Evasive Driving for General Officer's Drivers	Evasive Driving, Senior Off. & Selected Personnel	Host Country-Foreign Nation Counternarcotics	Hostage Negotiations	Military Police Advanced (ANCOC)	Military Police Basic (BNCOC)	Military Police Investigator	MP Officer Advanced	MP Officer Advanced - RC	MP Officer Basic	MP Pre-Command	Protective Service Training	Rehabilitation Instructor Training	Small Group Leader Instructor Training	Special Reaction Team Marksman/Observer, Ph II	USMC Basic Military Police	
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Table B.4

Military Police School, Goals Associated with Programs of Instruction

	U.S. Army Military Police Programs																						
Training Goals / **Program of Instruction**	Advanced Fraud Investigation, Phase I	Advanced Fraud Investigation, Phase II	Basic Military Police (OSUT)	Basic MP/Corrections Spec (OSUT)	Child Abuse Prevention & Investigative Techniques	CID Apprentice Special Agent	CID Apprentice Special Agent - RC	CID Apprentice Special Agent - RC, Ph IV	CID Certification	CID Warrant Officer, Advanced	CID WO Technical & Tactical Certification	CID WO Tech. & Tact. Certification - RC, Ph II	CID WO Tech. & Tact. Certification - RC, Phase I	Combating Terrorism on Military Installations	Conventional Physical Security & Crime Prevention	CounterDrug Commanders	CounterDrug Criminal Intelligence Systems	CounterDrug, Drug Demand Reduction	CounterDrug Field Tactical Police	CounterDrug Investigations	CounterDrug Narcoterrorism Personnel Protection	CounterDrug Police Sniper Team	CounterDrug Special Weapons & Tactics
Library, Specialized/Classified Information																							
Museum, Artifact Display																							
Museum, Artifact Storage																							
Small Arms Procedures																							
SM, 308 Cal																						●	●
SM, 50 Cal																							
SM, 60 Cal			●	●																			
SM, AT4 anti-tank			●																				
SM, Combat Pistol			●																			●	●
SM, Crew-Served Weapons			●	●										●									
SM, Employment (Shoot/no-shoot)			●	●										●		●	●				●		●
SM, M16			●	●										●								●	●
SM, M203			●	●																			
SM, M240 machine gun																							
SM, M250 grenade launcher																							
SM, Marksman/Observer Proficiency																						●	
SM, mark 19			●	●																			
SM, Pistol (45Cal/9mm)				●		●	●														●		●
SM, shotgun				●		●	●													●	●		●
SM, Sniper Proficiency																						●	
SM, Special Reaction Team Proficiency																					●		●
SM, Special Weapons																			●	●	●		●
Weapons Storage, NBC																					●		●
Weapons Storage, Small Arms																							
Weapons Storage, Transport																							
Weapons Storage, Treaty Monitoring																							
Vehicle and Equipment Operations																							
Veh, Convoy Procedures			●	●							●										●		
Veh, Evasive Driving																							
Veh, Tracked, Maintenance																							
Veh, Tracked, Operation																							
Veh, Wheeled/Non-Tactical, Ops & Maint.																							
Veh, Wheeled/Tactical, Ops & Maint.			●	●																			

Police Programs of Instruction

CounterDrug Field Tactical Police	CounterDrug Investigations	CounterDrug Narcoterrorism Personnel Protection	CounterDrug Police Sniper Team	CounterDrug Special Weapons & Tactics	Domestic Violence Intervention	Evasive Driving for General Officer's Drivers	Evasive Driving, Senior Off. & Selected Personnel	Host Country-Foreign Nation Counternarcotics	Hostage Negotiations	Military Police Advanced (ANCOC)	Military Police Basic (BNCOC)	Military Police Investigator	MP Officer Advanced	MP Officer Advanced - RC	MP Officer Basic	MP Pre-Command	Protective Service Training	Rehabilitation Instructor Training	Small Group Leader Instructor Training	Special Reaction Team Marksman/Observer, Ph II	USMC USMC Basic Military Police	
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Table B.5: Training Support Materials; Exterior Use Items or Simulants			
Material	Current Usage[1] in Training at Engineer Center	Estimated Usage[1] as a Result of BRAC Action (English units)	Estimated Usage[1] as a Result of BRAC Action (metric units)
Charge demolition shaped	273 per year	273 per year	
Charge demolition shaped	239 per year	239 per year	
Cord detonation reinforced (quantity of linear feet used)	470,206 per year	534,006 per year	
Dynamite military	11,895 per year	11,895 per year	
Firing device demolition pressure release	68 per year	68 per year	
Fuze time blasting (quantity of 25-foot long sections used)	89,364 per year	96,176 per year	
Charge assembly demolition	113 per year	113 per year	
Igniter fuze blast time	12,049 per year	12,706 per year	
Firing device multipurpose	132 per year	132 per year	
Light Sticks, number of boxes with 25 per box	24 per year	36 per year	
CS (Tear) Gas, Obscurant (Smoke) Grenades, Obscurant Fog Oil (Smoke) and other Obscurants			
Grenade, Hand, CS (Tear) Gas	730 per year	2,126 per year	
Grenade smoke screening	None	48 per year	
Grenade & launcher smoke	None	36 per year	
Grenade, Hand			
Smoke, Green (MILES)	467 per year	3,764 per year	
Smoke, Red	311 per year	798 per year	
Smoke, Violet	585 per year	825 per year	
Smoke, Yellow	623 per year	2,027per year	
Grenade, Hand, Smoke (M8 and M82)	110 per year	998 per year	
Fuze hand grenade, practice	251,988 per year	318,559 per year	
Grenade hand incendiary	121 per year	149 per year	
Grenade hand smoke HC	None	None	
Grenade hand smoke TPA, M83	1,612 per year	3,136 per year	
Obscurant, Fog Oil	None	85,000 gallons per year[2]	323,000 liters per year[2]
Signal Illumination			
Green Star, Parachute	19 per year	19 per year	
Parachute, Red Star	44 per year	304 per year	
White Star Cluster	344 per year	701 per year	
Red Star Cluster	46 per year	106 per year	
White Star Parachute	3,918 per year	5,122 per year	
Green Star	119 per year	326 per year	
Illuminated Projectile ground burst	3,360 per year	6,204 per year	
Simulated Ordnance			
Projectile Air Burst (M9)	None	26 per year	
Simulated booby trap	1,428 per year	1,552 per year	
Simulated booby trap, illuminated	518 per year	664 per year	
Simulated booby trap, whistle	319 per year	1,509 per year	

Table B.5: **Training Support Materials;** Exterior Use Items or Simulants			
Material	**Current Usage[1] in Training at Engineer Center**	**Estimated Usage[1] as a Result of BRAC Action (English units)**	**Estimated Usage[1] as a Result of BRAC Action (metric units)**
Grenade Hand (M116/L601)	2,304 per year	3,383 per year	
Flare surface trip	433 per year	869 per year	
ATWESS (MILES)	27 per year	27 per year	
Smoke Pot, (M8 TPA)	110 per year	950 per year	
Smoke pot M5, HC	None	None	
Ammunition			
12 gauge shotgun	538 per year	43,419 per year	
5.56 mm ball	0	1,584,005 per year	
5.56 mm tracer	0	52,200 per year	
5.56 mm ball	10,095,213	10,124,813 per year	
5.56 mm blank	1,677,717 per year	3,111,735 per year	
5.56 ball tracer rounds	429,248per year	429,249 per year	
7.62 mm blank linked	163,961per year	702,161 per year	
7.62 mm ball linked (4 ball plus 1 tracer round)	958,082per year	1,610,682 per year	
7.62 mm ball	2,010 per year	6,764 per year	
7.62 mm ball linked for machine gun	29,355 per year	48,155 per year	
7.62 mm 4 ball	164,680 per year	241,480 per year	
0.30 mm ball	429 per year	429 per year	
9 mm practice AT-4	84,524 per year	102,470 per year	
9 mm ball pistol	73,537 per year	1,095,274 per year	
0.38 caliber blank (sentry dog)	0	16,800 per year	
0.50 caliber ball 1 tracer	40,625 per year	40,625 per year	
0.50 caliber cartridge chamber ball machine gun	10 per year	10 per year	
0.50 caliber ball	200 per year	200 per year	
0.50 caliber (4 ball with 1 tracer round)	27,044 per year	115,343 per year	
0.50 caliber blank for machine gun	5,350 per year	5,350 per year	
0.50 caliber plastic	24 per year	24 per year	
40 mm practice M781	27,502 per year	37,140 per year	
40 mm high explosive duel purpose low pressure	21,024 per year	21,303 per year	
40 mm high explosive	0	4,404 per year	
40 mm training practice M918	13,608 per year	131,824 per year	
40 mm sub-caliber for Combat Engineer Vehicle	162 per year	162 per year	
Cartage 84 mm M136 AT-4 and launcher	134 per year	177 per year	
165 mm training practice M623	360 per year	360 per year	
Military Police Chemicals			
Ethyl 2-cyanoacrylate	None	200 ounces per year	6 liters per year

Note: 1 Approximate quantity used by all training and operational units
2 Existing State of Missouri Air Quality Permit limits this amount to 65,000 gallons per year. Training will not exceed this permit limit until a modification of the permit is issued.

Source: Harland Bartholomew & Associates, Inc.

Table B.6:
Training Support Materials, Toxic Agents

Material	Current Usage[1] in Training at Engineer Center	Estimated Usage[1] as a Result of BRAC Action (English units)	Estimated Usage[1] as a Result of BRAC Action (metric units)
Toxic-Agent Chemical Training - Interior Use Only			
Agent - GB (Sarin)	None	6 ounces per year	200 milliliters per year
Agent - VX	None	9 ounces per year	300 milliliters per year
Decontaminant - DS-2	None	2,670 gallons per year	10,146 liters per year
Note: 1 Approximate quantity used by all training and operational units			
Source: Harland Bartholomew & Associates, Inc.			

Table B.7:
Training Support Materials, Interior Use Only

Material	Estimated Usage[1] as a Result of BRAC Action (English units)	Estimated Usage[1] as a Result of BRAC Action (metric units)	Waste Disposal Classification following training activities	
			Special Waste[2]	Other Waste
Acetone	99 pints per year	47 liters per year	X	
Alkali powder	100 pounds per year	45 kilograms per year	X	
Aluminum oxide	0.35 ounces	10 grams per year	X	
Ammonia	96 ounces per year	2,880 milliliters per year		X
Buffer solutions (biphthalates)	24 ounces per year	800 milliliters per year	X	
C-2 Mask Canisters	7,250 per year		X	
Calcium hypochloride	20,000 pounds per year	9,000 kilograms per year	X	
Carbon disulfide	1 ounce per year	30 milliliters per year	X	
Charcoal (activated)	7 ounces per year	200 grams per year	X	
Chloroform	1.5 ounces per year	50 milliliters per year	X	
Chromosorb 10G	2 ounces per year	50 grams per year	X	
Corrosion Inhibitor	64 ounces per year	1,920 milliliters per year		X
Cyclohexane	0.3 ounces per year	10 milliliters per year	X	
DF	3 ounces per year	100 milliliters per year	X	
Dry Cleaning Solvent	3 bottles per year		X	
Ethyl alcohol	30 ounces per year	1,000 milliliters per year	X	
FC-43	18 ounces per year	540 milliliters per year	X	
Gelbands	150 bands per year		X	
Glass wool (silicon treated)	1 container per year		X	
Hexanes	3 ounces per year	100 milliliters per year	X	
Hydrochloric acid	3 ounces per year	100 milliliters per year	X	
Isopropyl alcohol	240 pints per year	113 liters per year	X	
Isopropyl alcohol	24 ounces per year	720 milliliters per year		X

Table B.7: Training Support Materials, Interior Use Only				
Material	Estimated Usage[1] as a Result of BRAC Action (English units)	Estimated Usage[1] as a Result of BRAC Action (metric units)	Waste Disposal Classification following training activities	
			Special Waste [2]	Other Waste
Isopropyl amine	4.5 ounces per year	150 milliliters per year	X	
M13 filters	1,500 sets per year		X	
Megabore test mix	0.3 ounces per year	10 milliliters per year	X	
Methyl alcohol	6 ounces per year	200 milliliters per year	X	
Methyl chloride	1.5 ounces per year	50 milliliters per year	X	
Mineral oil	120 pints per year	56 liters per year	X	
Nitric acid	3 ounces per year	100 milliliters per year	X	
Potassium iodide	350 ounces per year	100 grams per year	X	
Potassium fluoride	2 ounces per year	60 grams per year	X	
Potassium chloride	0.15 ounce per year	5 milliliters per year	X	
Potassium dichromate	0.1 ounce per year	3 grams per year	X	
QL	28 ounces per year	800 grams per year	X	
Snoop liquid leak detection	15 ounces per year	500 milliliters per year	X	
Sodium hydroxide	250 pounds per year	112.5 kilograms per year	X	
Sodium hypochlorite	4,500 gallons per year	17,100 liters per year	X	
Sodium thiosulfate	1.75 ounces per year	50 grams per year	X	
Sodium bicarbonate	7 ounces per year	200 grams per year	X	
Sodium carbonate (Soda ash)	20,000 pounds per year	9,000 kilograms per year	X	
Stannic chloride tubes	2,460 tubes per year		X	
Sulfuric acid	3 ounces per year	100 milliliters per year	X	
Sulphur	4 ounces per year	120 grams per year	X	
Talc powder	7 ounces per year	200 grams per year	X	
Tenax	0.35 ounce per year	10 grams per year	X	

Note: 1 Approximate quantity used by all training and operational units
2 Treated as a decontaminated special waste by-product of toxic agent training in the CDTF

Source: Harland Bartholomew & Associates, Inc.

B.2.12.1 BIDS Simulants. BIDS simulants include naturally occurring bacteria, clay and proteins. The materials, as described below, are used in relatively small quantities and are not known to be toxic or pathogenic. English unit/metric unit conversions have been provided for quantity descriptions. The scientific study information is presented in the original units used in the studies.

B.2.12.1.1 *Bacillus subtillis* var. niger (BG)

B.2.12.1.1.1 Usage. BG is used in a liquid form within the BIDS system and Component Laboratories. It is also aerosolized and used in training areas to simulate a biological warfare agent attack. BG will be used in one BIDS Component Laboratory, inside the BIDS and at exterior training areas.

B.2.12.1.1.2 Quantity. When used in the BIDS or Component Lab, approximately .3 ounce (9 milliliters) are used per day for 20 training days per year, for a total estimated annual usage of approximately 180 milliliters. When aerosolized, approximately 3.3 pounds (1.5 kilograms) are used per day for 15 training days. The total estimated average annual training usage is approximately 50 pounds (23 kilograms). The projected maximum amount to be stored at any given time is 3 ounces (90 milliliters) in liquid form and 49.5 pounds (22.5 kilograms) for aerosolization.

B.2.12.1.1.3 Safety Information.

- Oral Ingestion: Ingestion of 1.9 x 108 CFU (colony forming units) of *B. subtillis* by rats caused no symptoms of toxicity or infection (USEPA, 1992b). Studies show *B. subtillis* is not toxic, infective or a pathogen by oral exposure (USEPA, 1992b).

- Dermal Absorption: Humans and animals are exposed to normal amounts found in soil worldwide. Studies show *B. subtillis* is not a pathogen, infective or toxic to animals by dermal exposure (USEPA, 1992b). A dose of 3.6 x 109 CFU administered to skin of rabbits caused no toxic effects (USEPA, 1992b). Protease type X-A from *B. subtillis* may cause allergic respiratory and skin reactions. *B. subtillis* may cause infection when contacted via deep tissue wounds, but absorption from skin surface rarely causes infection. It is irritating to mucous membranes and eyes (HMIS, 1994). Slight to severe ocular irritation caused by 0.1 g of *B. subtillis* dissipated within 1 week (USEPA, 1992b).

- Inhalation: Intratracheal administration of 2.84 x 108 CFU of *B. subtillis* to rats caused no pathogenic or toxic symptoms (USEPA, 1992b). *B. subtillis* is identified as a harmless, non-pathogen by the Center for Disease Control and the National Institute of Health. There is no evidence of pathogenicity in healthy adult humans or in animals. It is not thought to be communicable from biota to humans. Exposure to large quantities of aerosolized *B. subtillis* may cause allergic sensitization.

Data for environmental fate were not required because the organism is a naturally occurring species. BG is not expected to be pathenogenic or toxic to aquatic organisms, wild mammals or non-target insects including honey bees (USEPA, 1992b).

B.2.12.1.2 *Erwinia herbicola*

B.2.12.1.2.1 Usage. *Erwinia herbicola* is used as a simulant in liquid form within the BIDS system and one component laboratory. Training consists of providing the operators with 0.5 ml of *Erwinia herbicola* in solution in a tube/vial. The sample is then analyzed by equipment in the BIDS. Exterior training consists of injecting/pipetting the solution containing *Erwinia herbicola* into the analytical equipment of the BIDS. Following detection and identification of the material by personnel using the equipment any remaining solution is destroyed using a 5 percent bleach solution.

B.2.12.1.2.2 Quantity. Approximately .3 ounce (9 milliliters) are used per day for 20 training days per year. The projected maximum amount to be stored at any given time is 6.1 ounces (180 milliliters) and the annual requirement is approximately 6.1 ounces (180 milliliters).

B.2.12.1.2.3 Safety Information. *Erwinia herbicola* is described as non-pathogenic bacteria which reduces the incidence of fire blight in fruit trees (Pelczar, 1965).

- Oral Ingestion: *Erwinia herbicola* is considered a human non-pathogen. It is encountered in nature on a daily basis. There are no reported incidents of human infection due to ingestion of *E. herbicola*, nor of associated health risks.

- Dermal Absorption: There are few reported incidents of human infection due to dermal exposure to *E. herbicola*. Associated health risk is low. *E. herbicola* may cause infection when contacted via deep tissue wounds, but rarely is infective by absorption from surface of skin.

- Inhalation: Personnel involved in shredding wood treated by *E. herbicola* may develop mucosal sensitization.

- Carcinogenicity/Teratogenicity: There are no reported incidents of human infection due to exposure to *E. herbicola*, nor of associated health risks.

- Metabolism: There are no reported incidents of human infection due to exposure to *E. herbicola*, nor of associated health risks.

B.2.12.1.3 Kaolin Dust (KD)

B.2.12.1.3.1 Usage. KD is aerosolized and used in training areas to simulate a biological warfare agent attack. KD will be used at exterior training areas.

B.2.12.1.3.2 Quantity. Approximately 12 pounds (5.5 kilograms) are used per day for two training days per year, resulting in a total annual requirement of 24.2 pounds (11 kilograms).

B.2.12.1.3.3 Safety Information. KD is a non-toxic nuisance dust which is a constituent of china clay.

- Oral Ingestion: The total dose which was lethal (oral) (TDLo) for a female rat is 590 g/kg over a 37-day test period. Exposure may cause stomach granuloma (USDHHS, 1994). Repeated ingestion of a diet containing 20 percent kaolin has been associated with anemia and low birth-weight pups in pregnant rats (Patterson, 1977).

- Dermal Absorption: Brief contact may cause dermatitis and may be irritating to eyes (Lewis, 1992).

- Inhalation: Kaolin is registered as a nuisance dust. Toxicity depends upon SiO_2 content (Lewis, 1992). Acute and chronic effects of exposure to kaolin have not been thoroughly studied (HMIS, 1994). Inhalation may cause local irritation of nose, throat and lungs; short periods of inhalation may cause asthma, edema and hives (Lewis, 1992). Chronic respiration of kaolin may cause chronic bronchitis, pulmonary fibrosis, emphysema, bronchial asthma (Lewis, 1992; and USDHHS, 1994). The exposure limit established by the National Institute for Occupational Safety and Health (NIOSH) and OSHA is a time weighted average (TWA) of 10 mg/m^3 for total dust and TWA of 5 mg/m^3 for the portion which can be breathed in (USDHHS, 1994).

- Carcinogenicity/Teratogenicity: Kaolin is not classifiable as a human carcinogen (HMIS, 1994; and USDHHS, 1994). Currently, no data concerning teratogenicity of ingested or inhaled kaolin are available.

- Metabolism: No information was available about the metabolism of Kaolin.

B.2.12.1.4 Male Specific (MS2) Coliphage

B.2.12.1.4.1 Usage. MS2 is used as a simulant in liquid form within the BIDS and one component laboratory. Training consists of providing the operators with 0.5 ml of MS2 in solution in a tube/vial. Exterior training consists of injecting/pipetting the solution containing MS2 into the analytical equipment of the BIDS. Following detection and identification of the material by personnel using the equipment any remaining solution is destroyed using a 5 percent bleach solution.

B.2.12.1.4.2 Quantity. Approximately 0.3 ounce (9 milliliters) are used per day for 20 training days per year. The total estimated annual requirement is approximately 6.1 ounces (180 milliliters). The projected maximum amount to be stored at any given time is 6.1 ounces (180 milliliters).

B.2.12.1.4.3 Safety Information. Male Specific Coliphage is a virus which infects bacteria, specifically only certain strains of *E. coli* (Davis, 1961). These bacteria are found regularly in the environment, as well as in wastewater treatment facilities (Fannin, 1976).

- Oral Ingestion: Male Specific Coliphage is not considered a human pathogen. It is fairly common and is encountered in nature on a daily basis. There are no reported incidents of human infection due to exposure to MS2, nor of associated health risks.

- Dermal Absorption: There are no reported incidents of human infection due to exposure to MS2, nor of associated health risks.

- Inhalation: There are no reported incidents of human infection due to exposure to MS2, nor of associated health risks.

- Carcinogenicity/Teratogenicity: There are no reported incidents of human infection due to exposure to MS2, nor of associated health risks.

- Metabolism: There are no reported incidents of human infection due to exposure to MS2, nor of associated health risks.

B.2.12.1.5 Ovalbumin

B.2.12.1.5.1 Usage. Ovalbumin is used as a simulant in liquid form within the BIDS and one component laboratory. Training consists of providing the operators with 0.5 ml of Ovalbumin in solution in a tube/vial. Exterior training consists of injecting/pipetting the solution containing ovalbumin into the analytical equipment of the BIDS. This sample is then analyzed by equipment in the BIDS. Following detection and identification of the material by personnel using the equipment any remaining solution in the test tube/vial is destroyed using a 5 percent bleach solution.

B.2.12.1.5.2 Quantity. Approximately .3 ounce (9 milliliters) are used per day for 20 training days per year. The estimated annual total requirement is 6.1 ounces (180 milliliters). The projected maximum amount to be stored at any given time is 6.1 ounces (180 milliliters).

B.2.12.1.5.3 Safety Information. The main risk associated with exposure to Ovalbumin is allergic response, especially in individuals with known allergies to egg/egg products. Asthma has been reported by workers repeatedly exposed to aerosolized egg whites in poultry processing plants. Individuals complaining of allergies have worked in plants processing raw eggs into powdered egg products. These exposure levels are 11-31 mg/m^3 dust containing 50 percent protein. This level of exposure has been documented in enclosed, non-ventilated work environments.

- Oral Ingestion: There are no reported incidents of toxic effects due to exposure to ovalbumin, nor of associated health risks.

- Dermal Absorption: Risk is associated with allergic response, especially in organisms sensitive to egg products.

- Inhalation: Asthma has been reported in workers subjected to repeated exposure to aerosolized egg whites in poultry processing plants (Fine, 1990). An aerosol of 11-31 mg/m^3 containing 50 percent protein may cause allergies, especially in non-ventilated situations.

- Carcinogenicity/Teratogenicity: No information was available about the carcinogenicity/teratogenicity of ovalbumin.

- Metabolism: No information was available about the metabolism of ovalbumin. A single study found indicates pyrolized (burned) ovalbumin may increase cellular mutagenic activity in microorganisms (Matsumoto, 1978).

B.2.12.2 FOX Simulants. The following simulants are used in FOX training. The simulants are used in small quantities, controlled conditions, and have low toxicity levels. The chemical simulants do not biomagnify and are attenuated by the environment quickly because they are readily degraded by microbes, are volatile, photodecompose, are quickly metabolized and/or readily excreted. The majority of the simulants, even in large quantities or high doses, are not considered carcinogens. English unit/metric unit conversions have been provided for quantity descriptions. The scientific study information is presented in the original units used in the studies.

B.2.12.2.1 Anisole

B.2.12.2.1.1 Usage. Anisole is used as a chemical agent simulant in the FOX simulator.

B.2.12.2.1.2 Quantity. Approximately .3 ounce (9 milliliters) are used in each training event. The estimated yearly requirement is approximately 2.4 ounces (72 milliliters). The total on-hand quantity is approximately 2 pints (1 liter).

B.2.12.2.1.3 Safety Information.

- Oral Ingestion: Anisole is recognized as a safe food additive by Flavoring Extract Manufacturers Association and is approved by the FDA for use in foods. Anisole is moderately toxic ingested in large amounts. In rats and mice, an oral dose causing death in 50 percent of an experimental population (LD_{50}) is 3,700 mg/kg of body weight and 2,800 mg/kg of body weight, respectively (Aldrich, 1995a; and Lewis, 1992). Symptoms of ingestion include depression, salivation, deposits near eyes and bloody urine; death occurred within 8 days (Taylor, 1964). Ingestion of 50 mg per day for 10 days caused no change or increased liver regeneration in rats (Gershbein, 1977).

- Dermal Absorption: Anisole can be a skin irritant; 500 mg/24 hour caused moderate irritation (redness and edema) when applied to rabbits (Lewis, 1992). However, two-day application of 4 percent anisole (in petrolatum) produced no irritation on human skin (Epstien, 1976).

- Inhalation: Inhalation of vaporous anisole is irritating to mucous membranes and the upper respiratory tract (Aldrich, 1995a). In rats and mice, the LD_{50} for inhaled anisole is > 5,000 mg/m^3/3 hour and 3,021 mg/m^3/2 hour (Aldrich, 1995a).

- Carcinogenicity/Teratogenicity: Anisole may be mildly tumor promoting. When a 20 percent solution of anisole in acetone was applied twice weekly to the skin of female mice, 34 of 36 mice survived, but 9 percent had papillomas and 3 percent had carcinomas (Boutwell, 1959).

- Metabolism: Anisole is absorbed from the digestive tract by passive diffusion. A major metabolite, p-hydroxyphenyl methyl ether, is formed through para-hydroxylation. The metabolite is demethylated and excreted via urine unconjugated or conjugated with glucuronic or sulfuric acid (HSDB, 1987).

B.2.12.2.2 Benzaldehyde

B.2.12.2.2.1 Usage. Benzaldehyde is used as a chemical agent simulant in the FOX simulator. Benzaldehyde will be used inside at the FOX simulation area only.

B.2.12.2.2.2 Quantity. Approximately .15 ounce (5 milliliters) are used in each training event. The estimated yearly requirement is approximately 1 ounce (30 milliliters). The total on-hand quantity is approximately 2 pints (1 liter).

B.2.12.2.2.3 Safety Information.

- Oral Ingestion: Benzaldehyde is listed by the U.S. Food and Drug Administration as generally-recognized-as-safe (USDHHS, 1994). Acute toxicity of benzaldehyde is relatively low. In guinea pigs and rats, oral LD_{50} is 1,000-1,300 mg/kg (Aldrich, 1995b; HMIS, 1994; Lewis, 1992; and USDHHS, 1994). In mice, the oral LD_{50} is 28 mg/kg (Aldrich, 1995b; and Lewis, 1992). In rats, effects of acute exposure to 800-1,600 mg/kg/day for 12 days included decrease in weight gain, hyperexcitability, tremors, inactivity and death (Kluwe, 1983). These symptoms were not observed in mice that received similar doses. No gross lesions were detected in rats or mice upon necropsy. In humans, small doses cause central nervous system (CNS) depression (HMIS, 1994) while larger doses cause convulsions. A dose of 600-900 mg/kg would likely cause death (USDHHS, 1994). The acceptable daily intake (ADI) for humans, established by the Joint Expert Committee on Food Additives, is 0-5 mg/kg (USDHHS, 1994). Toxic effects due to subchronic exposure to benzaldehyde resulted in mice and rats from ingestion of 800 mg/kg/day for 90 days (Kluwe, 1983). Symptoms included hyperactivity, trembling and periodic inactivity. Necropsy revealed toxic lesions in brain, kidney and forestomach. Necrosis of the cerebellum and hippocampus was found. These lesions were not present in groups of rats exposed to 400 mg/kg/day for 90 days. Considering this study, oral no observable effect level (NOEL) and lowest observed adverse effect level (LOAEL) values were established at 143 mg/kg/day (corrected for chronic exposure) and 400 mg/kg/day, respectively and the RfD is 0.1 mg/kg/day (IRIS, 1995). In other studies of effects of chronic (two-year) exposure to benzaldehyde, abnormalities of the forestomach were observed, while lesions of kidney and brain did not develop (USDHHS, 1994).

- Dermal absorption: Benzaldehyde is strongly irritating to human skin and may cause contact dermatitis (Lewis, 1994; Lewis, 1992; and USDHHS, 1990b). However, the compound is also reported to have local anesthetic properties (Lewis, 1992). Moderate irritation (redness and edema) occurred within 24 hour following application of 500 mg to skin of rabbits (Lewis, 1992).

- Inhalation: Although benzaldehyde is a volatile compound, no information regarding effects of acute or chronic inhalation of benzaldehyde has been found. However, the American Industrial Hygiene Association recommends an 8 hour TWA limit of 8.7 mg/m^3 and a 15 minute TWA of 17.4 mg/m^3 (USDHHS, 1994).

- Carcinogenicity/Teratogenicity: Ingestion of 200-400 mg/kg/day produced no evidence of carcinogenic activity in rats. There was limited evidence of carcinogenic activity in mice that received similar doses (USDHHS, 1994). Benzaldehyde has potential antitumor properties and has been proposed as a chemotherapeutic agent. Benzaldehyde generally is non-genotoxic, but may produce weak mutagenic effects in some bioassays (USDHHS, 1994). Precautionary label states that benzaldehyde may cause inheritable genetic damage (Aldrich, 1995b).

- Metabolism: In animals, benzaldehyde is extensively metabolized, primarily through enzymatic oxidation or reduction of the carbonyl group (USDHHS, 1994). Resulting products are conjugated for rapid excretion in the urine. However, benzaldehyde is an allergen and may cause adverse effects after certain types of exposure (Lewis, 1992).

B.2.12.2.3 Chemical Agent Disclosure Solution. Chemical Agent Disclosure Solution (CADS) consists of 2,2 Dipyridyl 0.5 percent, phenolphthalein 1 percent, isopropanol (isopropyl alcohol) 70 percent and distilled water 29 percent.

B.2.12.2.3.1 Usage. Chemical Agent Disclosure Solution is used as a chemical agent detector.

B.2.12.2.3.2 Quantity. Training will use 9 pints (4 liters) per training event and have an estimated yearly requirement for 225 gallons (1,800 pints) (846 liters). The estimated on-hand quantity required is approximately 75 gallons (600 pints) (282 liters).

B.2.12.2.3.3 Safety Information.

2,2 Dipyridyl.

- Oral Ingestion: Dipyridyl administered orally to rats caused tremors and slight ptosis that completely disappeared in 24 hours (HSDB, 1987).

- Dermal Absorption: Dipyridyl caused conjunctivitis and alopecia with dermal contact (HSDB, 1987).

- Inhalation: No information was found on inhalation.

- Carcinogenicity/Teratogenicity: Genotoxic effects to mammalian cells have been shown in in vitro assays. Effects included damage to DNA and mutagenic effects (Kuo, 1993). When rats were given a single dose of 60 or 75 mg/kg, fetuses were low in weight and had limb defects (Oohira, 1978).

- Metabolism: Pyridine and its alkyl derivatives are absorbed from the gastrointestinal (GI) tract, intraperitoneal cavity and lungs. Peritoneal absorption is slightly more rapid and complete than GI absorption. Typically, bases are absorbed rapidly through intact skin (HSDB, 1987).

- Wildlife Exposure: No information was found on wildlife exposures.

Phenolphthalein.

- Oral Ingestion: Phenolphthalein is most commonly absorbed into the body by ingestion. In humans, it is toxic only via intraperitoneal exposure (Lewis, 1992). In a 13-week experiment with rats, exposure to phenolphthalein, at doses much higher than normally encountered, produced little evidence of toxicity in rats (Dietz, 1992). However, elevated liver and kidney weights did occur. Reproductive changes also resulted. Side effects included: depressed testis and sperm densities, increases in abnormal sperm production, and morphological changes in seminiferous tubules (Dietz, 1992). Changes occurred between exposure quantities of 3,000 parts per million (ppm) to 50,000 ppm (Dietz, 1992). In rats the peritoneal lowest dose lethal (oral) LDLo is 500 mg/kg (Lewis, 1992).

- Dermal Absorption: Exposure to phenolphthalein caused edema of eyelids and accompanying reactions of the skin, some of which were severe (HSDB, 1987).

- Inhalation: Phenolphthalein can also create a health risk to humans and animals during thermal decomposition. Thermal decomposition emits acrid smoke and irritating fumes (Dietz, et al, 1992; and Lewis, 1992).

- Carcinogenicity/Teratogenicity: No data were found regarding the carcinogenic effects of phenolphthalein exposure. However, experiments, data and information reviewed did not mention carcinogenic effects. Teratogenic effects are limited to a few reproductive side effects. Phenolphthalein fed to mice for 3 generations failed to produce teratogenesis (HSDB, 1987). Ingestion of phenolphthalein by pregnant mice caused significant reduction in fertility and number of litters (Gulati, 1991).

- Metabolism: Up to 15 percent of therapeutic doses of phenolphthalein is absorbed and eliminated by the kidney. Some also is excreted in bile (HSDB, 1987).

- Wildlife Exposure: No information was found on exposure to wildlife.

Isopropanol.

- Oral Ingestion: Ingestion of isopropyl alcohol in humans may produce gastrointestinal pain, cramps, nausea and vomiting. Extreme concentrations result in coma, shock, respiratory failure and death (Baker, 1990; Lewis, 1992; NIOSH, 1976; and HMIS, 1994). Small doses (2.6 mg/kg to 6.4 mg/kg) produced no adverse effects among adult human males. In juvenile rats, the oral LD50 is 5.6 ml/kg; in adult rats the oral LD50 is 6.8-6.0 ml/kg (HMIS, 1994; and NIOSH, 1976). The oral LD_{50} reported for rabbits is 10.2 ml/kg (HMIS, 1994).

- Dermal Absorption: Isopropyl alcohol is not a strong dermal irritant and rarely causes contact dermatitis. Acute dermal LD_{50} in rabbits was 16.4 ml/kg (NIOSH, 1976). Isopropyl alcohol failed to produce adverse effects when applied dermally to guinea pigs, dogs and white rats (no dosage given) (NIOSH, 1976). Contact with eyes may cause damage and severe corneal burns (HMIS, 1994)

- Inhalation: Isopropyl alcohol vapors may cause irritation of eyes, nose and throat. Inhalation of high concentrations causes narcosis (Baker, 1990; Lewis, 1992; NIOSH, 1976; and HMIS, 1994). In rats, the maximum average daily concentration of isopropyl alcohol that caused no adverse effects was 0.6 mg/m^3 (0.24 ppm) (NIOSH, 1976). Rats that inhaled more than 1 ppm continuously for 86 days exhibited slowed reaction times, significant changes in blood chemistry and cellular damage of the spleen, liver and cerebral motor neurons (NIOSH, 1976). Exposure limits established by OSHA and NIOSH are 400 ppm (980 mg/m^3) and 500 ppm for short-term exposure. The immediately dangerous to life and health (IDLH) level is 2,000 mg/m^3 (USDHHS, 1994).

- Carcinogenicity/Teratogenicity: There is no evidence isopropyl alcohol is carcinogenic (HMIS, 1994; NIOSH, 1976; and Lewis, 1992). Currently, no data concerning teratogenicity of ingested or inhaled isopropyl alcohol are available.

- Metabolism: Ingested isopropyl alcohol is oxidized to acetone and excreted in urine and exhaled air. A secondary metabolic route is conjugation with glucuronic acid followed by excretion. Absorption primarily occurs in the intestines and secondarily in the stomach. Rabbits given 6 mg/kg excreted acetone in the urine after 24 hour (NIOSH, 1976).

B.2.12.2.4 Cyclohexanone

B.2.12.2.4.1 Usage. Cyclohexanone is used as a simulant in the FOX Simulator. Cyclohexanone will be used inside at the FOX simulation area only.

B.2.12.2.4.2 Quantity. Approximately .15 ounce (5 milliliters) are used in each training event. The estimated yearly requirement is approximately 1 ounce (30 milliliters). The total on-hand quantity is approximately 2 pints (1 liter).

B.2.12.2.4.3 Safety Information.

- Oral Ingestion: Cyclohexanone is moderately toxic by ingestion. The oral LD_{50} for rats and mice is 1,535 mg/kg and 1,400 mg/kg, respectively (Lewis, 1992; and Lijinsky, 1986). Other studies report oral LD_{50} for mice as 2.1 g/kg (Gupta, 1979; and Lijinsky, 1986). Symptoms from ingestion of 1.13 - 2.11 g/kg included acute hypnosis and labored respiration, followed by death (Gupta, 1979). Chronic (two-year) ingestion of 3,300-6,500 ppm cyclohexanone caused considerably reduced weight gain in rats. This effect was observed in mice exposed to 13,000 - 25,000 ppm cyclohexanone (Lijinsky, 1986). Considering this study, oral no observable adverse effect level (NOAEL) and LOAEL of 462 mg/kg/day and 910 mg/kg/day were established, and the oral RfD is 5 mg/kg/day (IRIS, 1995). Survival of rats ingesting 25,000 and 13,000 ppm cyclohexane was 50 percent after one year (Lijinski, 1986). In a National Cancer Institute study of subchronic (95-175 day) effects, depression of body weight was the only effect observed in rats from ingestion of 7,000 ppm cyclohexanone, although increased mortality and body weight depression were observed in mice that ingested 50,000 ppm (IRIS, 1995).

- Dermal Absorption: Cyclohexanone is readily absorbed through skin (Aldrich, 1996). Dermal contact produces skin irritation and can be destructive to mucous membranes. In rabbits, 500 mg applied to open skin produced mild redness and edema. However, dermal LD_{50} was 948 mg/kg (Lewis, 1992). The 8-hour TWA for skin exposure to cyclohexanone, as well as the NIOSH exposure limit is 25 ppm (100 mg/m^3) (ACGIH, 1986; and USDHHS, 1994). Limit for occupational contact established by OSHA is 50 ppm. The IDLH for cyclohexanone is 700 ppm (USDHHS, 1994). Eye contact causes severe irritation. In rabbits, 4,740 mg applied to the eye produced severe redness and edema.

- Inhalation: Cyclohexanone is moderately toxic when inhaled. Inhaled vapors cause respiratory irritation, headache, shortness of breath and changes in sense of smell (Aldrich, 1996; HMIS, 1994; Lewis, 1992; and USDHHS, 1994). After inhalation of high doses, lungs of mice showed congestion, edema and hemorrhage (Gupta, 1979). In humans, the lowest concentration to cause a toxic effect (TCLo) was 75 ppm, which irritated eyes, nose and pulmonary system. In rats, LC_{50} was 8,000 ppm (Aldrich, 1996; and Lewis, 1992). Cyclohexanone may have slight narcotic properties and extreme doses may cause coma (USDHHS, 1994). In extreme cases, death may result from spasm, inflammation and edema of the larynx and bronchi (Aldrich, 1996).

- Carcinogenicity/Teratogenicity: Currently, cyclohexanone is not classifiable as a human carcinogen (ACGIH, 1986). There is no evidence of teratogenic activity of cyclohexanone (IRIS, 1995). In rats, 1,430 ppm cyclohexanone ingested during gestation days 9 - 16 caused significant depression of maternal and fetal body weight (IRIS, 1995). Cyclohexanone was cytotoxic to cultured mouse cells (Gupta, 1979) and human mutation data has been reported (Lewis, 1992).

- Metabolism: No information was available about the metabolism of cyclohexane.

- Wildlife Exposure: No information was available about wildlife exposures to cyclohexane.

B.2.12.2.5 Diethyl phthalate

B.2.12.2.5.1 Usage. Diethyl phthalate is used as a simulant in the FOX Simulator. Diethyl phthalate will be used inside at the FOX simulation area only.

B.2.12.2.5.2 Quantity. Approximately 6 ounces (200 milliliters) are used in each training event. The estimated yearly requirement is approximately 2.5 pints (1.2 liters). The total on-hand quantity is approximately 2 pints (1 liter).

B.2.12.2.5.3 Safety Information.

- Oral Ingestion: Diethyl phthalate is moderately toxic by ingestion. Rats fed diets containing 5 percent diethyl phthalate (approx. 3,160 mg/kg/day in males and 3,710 mg/kg/day in females) had significantly lower weight gain, and lower absolute weight of heart, brain, liver, spleen and kidneys (IRIS, 1995). However, relative weights of these and other organs were significantly greater in test animals than control animals (Brown, 1978). Females fed diets with 1 percent diethyl phthalate (750 mg/kg/day) also had significantly less weight gain (IRIS, 1995). These results were repeated in other studies.

  Chronic intake may cause sluggishness, loss of strength, weight loss and paralysis of hind quarters (HMIS, 1994; and Baker, 1989a). Ingestion of 3,250 mg/kg/day of diethyl phthalate by parent rats produced physiological effects in pups and significantly decreased number of pups in second-generation litters. Physiological effects included a significant decrease in body weight and increased weight of prostate, liver, and pituitary. The significance of organ weight differences is not fully understood (USDHHS, 1994).

  The oral NOAEL and LOAEL were established at 750 mg/kg/day and 3,160 mg/kg/day, respectively. The lowest reported NOAEL value for diethyl phthalate, 1,000 mg/kg/day (USDHHS, 1994). The oral RfD is 0.8 mg/kg/day (IRIS, 1995). The oral LD_{50} in rats and guinea pigs is 8600 mg/kg, while the LD_{50} in mice is 6,172 mg/kg (HMIS, 1994; Baker, 1989a; and Lewis, 1992).

- Dermal Absorption: Diethyl phthalate is only slightly irritating when applied to intact or abraded skin. Mild irritation occurred when diethyl phthalate was applied to the eyes of rabbits (USDHHS, 1994). A NOAEL of 0.1 ml was established (USDHHS, 1994). Tests of diethyl phthalate in vitro show the chemical is absorbed more quickly through rat skin than human skin.

- Inhalation: Diethyl phthalate causes irritation when inhaled. Few studies regarding effects from inhalation exposure to humans or animals have been located. The lowest dose of diethyl phthalate vapor to cause an effect in humans was 1,000 mg/m^3, which caused lachrymation, respiratory obstruction and other pulmonary effects (Lewis, 1992). Other symptoms include CNS depression, coughing and difficulty breathing (HMIS, 1994). The OSHA permissible exposure limit (PEL) value and the ACGIH threshold limit value (TLV) is a TWA of 5 mg/m^3. NOAEL values for inhalation were not reported in the Toxicological Profile of Diethyl phthalate.

- Carcinogenicity/Teratogenicity: No information was available about the carcinogenicity/teratogenicity.

- Metabolism: Diethyl phthalate is metabolized in the liver and small intestine of animals by enzymatic hydrolysis to a monoester derivative. In other phthalic acid esters, the monoester derivative is further hydrolyzed to phthalic acid and excreted or the monoester is oxidized and excreted (Pierce, 1980; and USDHHS, 1994). In vitro studies show diethyl phthalate may inhibit a liver enzyme involved in detoxification of other substances. After dermal application of diethyl phthalate in rats, 50 percent was excreted in the urine. The short side chain of diethyl phthalate facilitates dermal uptake (USDHHS, 1994; and Woodward, 1986).

- Wildlife Exposure: Fish, algae, fungi and bacteria and other microorganisms are able to degrade phthalates to more simple molecules (Woodward, 1986). Phthalate esters concentrate in fish tissues, but concentrations decline rapidly when the chemical is removed from water. In two species of minnows under static conditions, there was no observable effect after 96 hours with a concentration of 22-30 mg/L diethyl phthalate (Woodward, 1986). The LC_{50} for these minnows was 17-30 mg/L. It is unlikely that levels of diethyl phthalate normally present in the environment will have direct adverse effect on mammals (Woodward, 1986). Accumulation in biota is not a likely hazard to predatory birds (Woodward, 1986).

B.2.12.2.6 Diethyl malonate (DEM)

B.2.12.2.6.1 Usage. Diethyl malonate is used as a simulant in the FOX Simulator. It will be used inside at the FOX simulation area and the MM1 simulation classrooms only.

B.2.12.2.6.2 Quantity. Approximately 1 ounce (30 milliliters) are used in each training event. The estimated yearly requirement is approximately 5 gallons (19.03 liters). The total on-hand quantity is approximately 2 pints (1 liter).

B.2.12.2.6.3 Safety Information.

- Oral Ingestion: Diethyl malonate is mildly toxic by ingestion. Oral LD_{50} for rats and mice is 15 g /kg and 6,400 mg/kg, respectively (Lewis, 1992).

- Dermal Absorption: Dermal contact causes skin irritation. Mild irritation resulted when 500 mg diethyl malonate was applied to skin of rabbit (Lewis, 1992).

- Inhalation: No information was found on inhalation.

- Carcinogenicity/Teratogenicity: No information was found on carcinogenicity.

- Metabolism: No information was found on metabolism.

B.2.12.2.7 Dimethyl phthalate

B.2.12.2.7.1 Usage. Dimethyl phthalate is used as a simulant in the FOX Simulator, in the motorpool and on the Field Training Exercise, with approximately 80 percent of the use in the simulator and 20 percent distributed between the motor pool and field training locations.

B.2.12.2.7.2 Quantity. Approximately .2 ounce (10 milliliters) are used in each training event. The estimated yearly requirement is approximately 2 ounces (60 milliliters). The total on-hand quantity is approximately 8 pints (4 liters).

B.2.12.2.7.3 Safety Information.

- Oral Ingestion: Dimethyl phthalate is moderately toxic by ingestion. Oral LD_{50} for rats and mice is 6,800 mg/kg, for rabbits 4,400 mg/kg, for guinea pigs 2,400 mg/kg and for chickens 8,500 mg/kg (Aldrich, 1995c; and Lewis, 1992). The oral NOEL reported by IRIS was 1,000 mg/kg/day based upon chronic study of rats showing effects to kidneys. Symptoms of exposure may include burning sensation, coughing, wheezing, laryngitis, headache, nausea and vomiting (Aldrich, 1995c). Intake of dimethyl phthalate may cause CNS depression (Aldrich, 1995c; and Baker, 1989b). The subchronic RfD is 100 mg/kg/day (USEPA, 1993). Ambient water criteria for dimethyl phthalate limit intake through contaminated water and organisms to 313 mg/L and through organisms alone to 2.9 g/L (USEPA, 1986).

- Dermal Absorption: Dimethyl phthalate causes irritation when applied to eyes (Lewis, 1992; and USDHHS, 1994). The LD_{50} for dermal exposure to dimethyl phthalate in rats, rabbits and guinea pigs is > 4,800 mg/kg, > 20 ml/kg, and > 10 ml/kg, respectively (Aldrich, 1995c).

- Inhalation: Dimethyl phthalate is mildly toxic by inhalation. The lower control limit (oral) (LCLo), established in cats, was 9.30 mg/m^3/6 hour (Lewis, 1992). Symptoms may include irritation of upper respiratory system and mucous membranes (Aldrich, 1995c; Baker, 1989b; and USDHHS, 1994). Occupational exposure limits reported by OSHA (PEL) and ACGIH (TLV) are TWA of 5 mg/m^3. The IDLH is 2,000 mg/m^3 (USDHHS, 1994). No information regarding inhalation of dimethyl phthalate was available from IRIS.

- Carcinogenicity/Teratogenicity: Dimethyl phthalate caused mutagenic effects in in vitro bioassays (IRIS, 1995). It may be toxic to embryos and affect development of fetal eye, ear and musculoskeletal tissues (Aldrich, 1995c).

- Metabolism: Dimethyl phthalate is metabolized in the liver and small intestine of animals by enzymatic hydrolysis to a monoester derivative and methanol (IRIS, 1995; and Pierce, 1980). In other phthalic acid esters, the monoester derivative is further hydrolyzed to phthalic acid and excreted or the monoester is oxidized and excreted (Pierce, 1980; and USDHHS, 1994). After dermal application of diethyl phthalate in rats, 50 percent was excreted in the urine. The short side chain of dimethyl phthalate facilitates dermal uptake (Woodward, 1986).

- Wildlife Exposure: No information was available about wildlife exposures to dimethyl phthalate.

B.2.12.2.8 Ethyl phthalate

B.2.12.2.8.1 Usage. Ethyl phthalate is used as a simulant in the FOX Simulator, in the motorpool and on the Field Training Exercise, with approximately 80 percent of the use in the simulator and 20 percent distributed between the motor pool and field training locations.

B.2.12.2.8.2 Quantity. Approximately .15 ounce (5 milliliters) are used in each training event. The estimated yearly requirement is approximately 1 ounce (30 milliliters). The total on-hand quantity is approximately 8 pints (4 liters).

B.2.12.2.8.3 Safety Information. Ethyl phthalate is also called diethyl phthalate. Please refer to the discussion of that chemical for safety information.

B.2.12.2.9 Eucalyptol

B.2.12.2.9.1 Usage. Eucalyptol is used as a simulant in the FOX Simulator. Eucalyptol will be used inside at the FOX simulation area only.

B.2.12.2.9.2 Quantity. Approximately 2 pints (1 liter) is used in each training event. The estimated yearly requirement is approximately 13 pints (6 liters). The total on-hand quantity is approximately 13 pints (6 liters).

B.2.12.2.9.3 Safety Information.

- Oral Ingestion: Eucalyptus oil, containing chiefly eucalyptol, is a human poison when ingested in large amounts. In a human child, 218 mg/kg caused ciliary eye spasms, respiratory depression and somnolence. In an adult human, 375 mg/kg was lethal. The LD_{50} in rats is 2480 mg/kg (Lewis, 1992). Ingestion of non-toxic amounts of eucalyptol, along with other terpenes, has been shown to reduce activity of hepatic coenzymes, which may inhibit formation of gallstones (Clegg, 1980)
- Dermal Absorption: Eucalyptus oil caused moderate skin irritation when applied to rabbits (Lewis, 1992).
- Inhalation: Information on inhalation was not available.
- Carcinogenicity/Teratogenicity: No information was available regarding the carcinogenicity of eucalyptol. Eucalyptol is able to pass through the placenta; in the fetus, eucalyptol may stimulate liver microsomal activity (Jori, 1973). Eucalyptol is not able to cross the blood-milk barrier from mother to suckling young (Jori, 1973).
- Metabolism: No information was available about metabolism.
- Wildlife Exposure: No information was available about wildlife exposures to eucalyptol.

B.2.12.2.10 Isopropyl Alcohol.

B.2.12.2.10.1 Usage. Isopropyl alcohol is a cleaner and it is used as an unknown for training with the MM1.

B.2.12.2.10.2 Quantity. Approximately 3 ounces (90 milliliters) are used in each training event, and approximately 36 ounces (1,080 milliliters) of isopropyl alcohol are used annually.

B.2.12.2.10.3 Safety Information. Isopropyl alcohol will be used inside at the FOX simulation area only.

B.2.12.2.11 Methyl salicylate.

B.2.12.2.11.1 Usage. Methyl salicylate (MES) is a simulant used in FOX simulation. It will be used inside at the FOX simulation area only.

B.2.12.2.11.2 Quantity. Approximately 1 ounce (30 milliliters) are used in each training event. The estimated yearly requirement is approximately 4 gallons (15.03 liters). The total on-hand quantity is approximately 2 pints (1 liter).

B.2.12.2.11.3 Safety Information.

- Oral Ingestion: Methyl salicylate is recognized as a safe food additive by the FDA (Bennett, 1984). Chemical exposure via ingestion poses the biggest threat to both humans and animals. Effects include dyspnea, nausea, vomiting and excitation of the CNS (Baker, 1989c; Lewis, 1992; and Opdyke, 1979). Oral administration of 700 mg/kg in dogs decreased cardiac output and increased heart rate (Opdyke, 1979). Large doses (> 600 mg/kg) affected the CNS and respiratory function. In rats, the oral LD_{50} is 887 mg/kg and the oral TDLo is 36,450 mg/kg (Lewis, 1992). Human ingestion of small doses (30 ml for adults) may cause death (Bennett, 1984; Lewis, 1992; and Opdyke, 1979). Chronic intake of methyl salicylate may cause damage to liver, kidneys and blood (Baker, 1989c). One study showed ingestion of methyl salicylate as 1 percent - 2 percent of the diet for two years caused significant decrease in body weight and may change bone composition. The highest dose caused death in 50 days (Opdyke, 1979). Dogs receiving > 500 mg/kg/day decreased in body weight and died by day 59. In rats, two years' consumption of 0.21 percent methyl salicylate in the diet caused no adverse effects (Opdyke, 1979).

- Dermal Absorption: Dermal application of methyl salicylate can cause skin and eye irritation and repeated application has been known to cause kidney damage among laboratory animals (HMIS, 1994). The acute dermal LD_{50} in rabbits exceeds 5 g/kg (Opdyke, 1979). In rabbits, 500 mg applied to skin caused moderate redness and edema and the same amount applied to eyes caused mild to severe redness (Lewis, 1992).

- Inhalation: Rats exposed 20 times to 700 mg/m^3 methyl salicylate for 7 hour caused no toxic symptoms or pathologic abnormalities (Opdyke, 1979).

- Carcinogenicity/Teratogenicity: Methyl salicylate is not listed as having any evidence of being carcinogenic (Opdyke, 1979; and Quest, 1994). Injection of 0.1 ml methyl salicylate to female rats in day 10 and 11 of pregnancy decreased weight gain of the mother, decreased number and weight of young, increased number of malformed young and resorptions, and retarded renal development in rat fetuses (Opdyke, 1979). Up to 5,000 ppm methyl salicylate administered to rats for three generations did not decrease fertility, but 3,000 - 5,000 ppm doses decreased litter size, survival and numbers of live-born progeny (Opdyke, 1979). In a separate study, effects to offspring were observed in rats ingesting of 36,540 mg/kg methyl salicylate (Bennett, 1984).

- Metabolism: Methyl salicylate is hydrolyzed to salicylic acid in the body. The primary site of hydrolysis is the liver (in rat, rabbit, dog and monkey). After ingestion, 700 mg/kg administered to dogs was completely hydrolyzed after 1.5 hours. Hydrolysis is slower in humans. Higher body fat content may decrease the dose that is lethal (in dogs).

B.2.12.2.12 Mustard-Lewisite simulant. Mustard-Lewisite (HL) is a persistent chemical agent simulant (PCAS). Mustard-Lewisite simulant constituent composition by weight is ferrous ammonium sulphate 2 percent, polyethylene oxide 0.3 percent, hydroxyethyl cellulose 0.4 percent, glycerol 10 percent, methyl salicylate 13 percent and water 75 percent.

B.2.12.2.12.1 Usage. HL is used as a chemical agent simulant.

B.2.12.2.12.2 Quantity. Training will use 19 pints (9 liters) per training event and has an estimated yearly requirement for 475 gallons (3,800 pints) (1,800 liters). The on-hand quantity is approximately 1,260 pints (600 liters).

B.2.12.2.12.3 Safety Information. Per the Chem School, PCAS should not have an adverse effect on plant life if training release results in the desired concentration of less than 0.10 percent. A study showed the HL simulant is toxic to earthworms at 0.10 percent, which is near the expected training release concentration.

- Oral Ingestion: Ferrous ammonium sulfate is poorly absorbed from the gastrointestinal tract. Ingestion causes irritation of the mouth and stomach (HSDB, 1987). Ingestion of large amounts of ammonium salts is toxic and may cause abdominal pain, diarrhea, vomiting, lassitude, hyperventilation, corrosion of the stomach and cardiovascular collapse (HSDB, 1987). The lethal dose is related to iron content; as little as 1 - 2 g of iron may cause death. In rats, LD_{50} is 0.5 - 5 g/kg (HSDB, 1987).

- Dermal Absorption: Dust can irritate skin and eyes with prolonged contact (HSDB, 1987).

- Inhalation: Inhalation of dust irritates the nose and throat. The exposure standard recommended by OSHA is an 8 hour TWA of 1 mg/m^3 (HSDB, 1987).

- Carcinogenicity/Teratogenicity: No information was found about carcinogenicity or teratogenicity. Iron is known to cross the placenta and may concentrate in the fetus (HSDB, 1987).

- Metabolism: Toxic doses of iron overwhelm the gastrointestinal regulatory mechanism resulting in massive iron absorption. Intestinal mucosa is the principal limiting site of iron absorption. The body store of iron is divided between essential iron-containing compounds and those in which excess iron is stored. Hemoglobin acts as the essential fraction. Two thirds of stored iron is eliminated from the GI tract as extravasated red cells, iron in bile and iron in exfoliated mucosal cells. Removal of the other third is through desquamated cells (small amounts) and excretion through urine. Normal absorption of iron is about 1 mg/day in adult males and 1.4 mg/day in adult females. Many metals, including iron, are substantially excreted in sweat. This could result in substantial losses of iron (HSDB, 1987).

- Wildlife Exposure: No information was found about wildlife exposure to ferrous ammonium sulfate.

Polyethylene oxide.

- Oral Ingestion: Ethylene oxide is a poison by ingestion (Lewis, 1992).

- Dermal Absorption: Ethylene oxide is an irritant to skin and eyes as well as mucous membranes of the respiratory tract.

- Inhalation: Moderately toxic by inhalation with rat LC_{50} of 800 ppm/4 hours. Human systemic effects by inhalation include convulsions, nausea, vomiting, and olfactory and pulmonary changes (Lewis, 1992). High concentrations can cause pulmonary edema (Lewis, 1992).

- Carcinogenicity/Teratogenicity: Ethylene oxide is a confirmed human carcinogen with experimental carcinogenic, tumorigenic, neoplastigenic and teratogenic data (Lewis, 1992).

- Metabolism: Information on metabolism of ethylene oxide was not available.

- Wildlife Exposure: Information on wildlife exposures to ethylene oxide was not available.

Hydroxyethylcellulose.

- Oral Ingestion: The greatest danger from ingestion of large quantities is intestinal obstruction. Toxic doses by ingestion would have to be in excess of 2 g/kg. Groups of rats maintained for two years on diets containing 5 percent, 1 percent and 0.2 percent hydroxyethylcellulose did not exhibit adverse effects to growth, food intake, lifespan, frequency of extraneous infections, body measurements, kidney and liver weights, hematologic exam, occurrence of neoplasms or histologic exams of organs. It has been administered to rats in single oral doses as high as 23,000 mg/kg with no toxic effects (HSDB, 1987).

- Dermal Absorption: Skin sensitization is unusual (HSDB, 1987).

- Inhalation: Inhalation could cause a chemical pneumonitis.

- Carcinogenicity/Teratogenicity: Hydroxyethylcellulose is not a risk to human or animal health. It is not toxic or carcinogenic (Scientific, 1994).

- Metabolism: No information was found about metabolism of hydroxyethylcellulose.

Glycerol.

- Oral Ingestion: Glycerol has low oral toxicity in humans (IRIS, 1995). Very high concentrations may cause damage to kidneys and red blood cells (IRIS, 1995). Toxic effects including headache, nausea and vomiting occurred in an adult human after ingestion of 1,428 mg/kg glycerol (Lewis, 1992; and HMIS, 1994). The oral LD_{50} in mice and guinea pigs is 4,090 mg/kg and 7,750 mg/kg, respectively (Lewis, 1992). The oral LD_{50} in rats is 12,600 mg/kg (HMIS, 1994). Chronic ingestion may cause damage to kidneys (HMIS, 1994)

- Dermal Absorption: Glycerol has a low irritant potential to human skin and eyes (IRIS). Glycerol application caused sensitization in a few individuals (IRIS, 1995 and HMIS, 1994). Application of 500 mg/24 hour caused mild redness and edema in rabbits (Lewis, 1992). Contact of 500 mg/24 hour with rabbit eyes caused mild symptoms of irritation (Lewis, 1992).

- Inhalation: In humans, glycerol is a nuisance particle and an inhalation irritant (Lewis, 1992). Occupational exposure limits established for glycerol mist by OSHA (PEL) and ACGIH (TLV) are TWA 10 mg/m^3 (Lewis, 1992).

- Carcinogenicity/Teratogenicity: Human mutation data have been reported (Lewis, 1992). However, there was no evidence of carcinogenicity in long-term oral and dermal absorption studies of rats (IRIS, 1995). Most tests for mutagenicity were negative (IRIS, 1995).

- Metabolism: No information was found on metabolism.

- Wildlife Exposure: No information was found on exposure to wildlife.

Methyl salicylate.

- Oral Ingestion: Methyl salicylate is recognized as a safe food additive by the FDA (Bennett, 1984). Chemical exposure via ingestion poses the biggest threat to both humans and animals. Effects include dyspnea, nausea, vomiting and excitation of the CNS (Lewis, 1992; and Opdyke, 1979). Oral administration of 700 mg/kg in dogs decreased cardiac output and increased heart rate (Opdyke, 1979). Large doses (> 600 mg/kg) affected the

CNS and respiratory function. In rats the oral LD_{50} is 887 mg/kg and the oral TDLo is 36,450 mg/kg (Lewis, 1992). Human ingestion of small doses (30 ml for adults) may cause death (Bennett, 1984; Lewis, 1992; and Opdyke, 1979). Chronic intake of methyl salicylate may cause damage to liver, kidneys and blood (Baker, 1989). One study showed ingestion of methyl salicylate as 1 percent - 2 percent of the diet for two years caused significant decrease in body weight and may change bone composition. The highest dose caused death in 50 days (Opdyke, 1979). Dogs receiving > 500 mg/kg/day decreased in body weight and died by day 59. In rats, two years' consumption of 0.21 percent methyl salicylate in the diet caused no adverse effects (Opdyke, 1979).

- Dermal Absorption: Dermal application of methyl salicylate can cause skin and eye irritation and repeated application has been known to cause kidney damage among laboratory animals (Methyl salicylate). The acute dermal LD_{50} in rabbits exceeds 5 g/kg (Opdyke, 1979). In rabbits, 500 mg applied to skin caused moderate redness and edema and the same amount applied to eyes caused mild to severe redness (Lewis, 1992).

- Inhalation: Rats exposed 20 times to 700 mg/m^3 methyl salicylate for 7 hours caused no toxic symptoms or pathologic abnormalities (Opdyke, 1979).

- Carcinogenicity/Teratogenicity: Methyl salicylate is not listed as having any evidence of being carcinogenic (Opdyke, 1979; and HMIS, 1994). Injection of 0.1 ml methyl salicylate into female rats in day 10 and 11 of pregnancy decreased weight gain of the mother, decreased number and weight of young, increased number of malformed young and resorptions, and retarded renal development in rat fetuses (Opdyke, 1979). Up to 5,000 ppm methyl salicylate administered to rats for three generations did not decrease fertility, but 3,000 - 5,000 ppm doses decreased litter size, survival and numbers of live-born progeny (Opdyke, 1979). In a separate study, effects to offspring were observed in rats ingesting of 36,540 mg/kg methyl salicylate (Bennett, 1984).

- Metabolism: Methyl salicylate is hydrolyzed to salicylic acid in the body. The primary site of hydrolysis is the liver (in rat, rabbit, dog and monkey). After ingestion, 700 mg/kg administered to dogs was completely hydrolyzed after 1.5 hours. Hydrolysis is slower in humans. Higher body fat content may decrease the dose that is lethal (in dogs).

B.2.12.2.13 n-Amyl Acetate (Banana Oil).

B.2.12.2.13.1 Usage. N-Amyl acetate is used in the CDTF. It is used as a test for mask fit and integrity.

B.2.12.2.13.2 Quantity. The Chemical School uses approximately 9.9 pints (4.7 liters) annually.

B.2.12.2.13.3 Safety information.

- Oral Ingestion: N-Amyl acetate is slightly toxic to humans. Chronic toxicity is of a low order (Lewis, 1992). Ingestion may cause nausea, vomiting and GI disturbance (HMIS, 1994). In rats the oral LD_{50} is 6,500 mg/kg (Lewis, 1992; and HMIS, 1994).

- Inhalation: Inhalation may irritate nose and throat and may have a narcotic effect. Respiration of 4,000 ppm is immediately dangerous to life or health (HMIS, 1994). Symptoms include headache, chest pain, dizziness, nausea, vomiting, CNS depression and anorexia. The LCLo for rats is 5,200 ppm (8 hours; Lewis, 1992). NIOSH and OSHA limit exposure to TWA of 100 ppm (525 mg/m^3) and the IDLH is 1,000 ppm (USDHHS, 1994).

- Dermal absorption: Application to the skin causes irritation, drying and dermatitis (HMIS, 1994). Contact of n-Amyl acetate with eyes may cause irritation, photophobia and weakened vision.

- Carcinogenicity/Teratogenicity: N-Amyl acetate is not listed as having any evidence of being carcinogenic (HMIS, 1994). Currently, no data concerning teratogenicity of ingested, inhaled or dermal n-Amyl acetate are available.

B.2.12.2.14 PEG-200

B.2.12.2.14.1 Usage. PEG-200 (polyethylene glycol with a molecular weight of 200) is used as a chemical agent simulant. It is used to simulate contamination of vehicles and personnel and provides decontamination practice.

B.2.12.2.14.2 Quantity. The Chemical School uses approximately 1,134 pints (540 liters) annually.

B.2.12.2.14.3 Safety information.

- Mutagenicity: PEG is not mutagenic to bacteria in Ames tests or to fruit flies (*Drosophila melanogaster*) when fed at concentrations of 0.01 - 1.0 percent (ES, 1996c).

- Tumorigenicity: PEG is not considered to be a potential carcinogen by a chemical selection working group of the National Cancer Institute. The compound is not listed as a candidate for testing in the National Cancer Institute (NCI) Carcinogenesis Bioassay Program (ES, 1996c).

- Human Exposure Criteria: No TLV-TWA values have been established for PEG 200. Reportedly, inhalation of this compound does not present a significant exposure hazard because of its extremely low vapor pressures (ES, 1996c). In 21 CFR 172.820, the FDA classifies PEG 200 safe to use in food.

- Toxic Hazard Rating: 1 and 2. 1 = practically non-toxic: Probable oral lethal dose (human) above 15 g/kg, more than one quart (2.2 lbs) for 70 kg person (150 lbs). 2 = slightly toxic: Probable oral lethal dose (human) 5-15 g/kg, between one pint and one quart for 70 kg person (150 lbs) (ES, 1996c).

B.2.12.2.15 Soman (GD) Simulant. Soman simulant is a persistent chemical agent simulant (PCAS). Soman simulant composition by weight is sodium carbonate 2 percent, polyethylene oxide 1 percent, hydroxy ethyl cellulose 0.4 percent, glycerol 10 percent, diethyl malonate 13 percent and water 74 percent.

B.2.12.2.15.1 Usage. Soman is used as a chemical agent simulant.

B.2.12.2.15.2 Quantity. The PCAS is projected to be used in 14 chemical training courses with a total of 90 classes per year. Estimated chemical usage for these classes is approximately 42 pints (20 liters) each of GD simulant per class. The total estimated average annual training usage is approximately 475 gallons (3,800 pints) (1,800 liters).

B.2.12.2.15.3 Safety Information. Per the Chem School, PCAS should not have an adverse effect on plant life if training release results in the desired concentration of less than 0.10 percent. The GD simulant should not affect soil organisms at these same levels. Hydroxyethyl cellulose - A cellulose ether that is water soluble and non-ionic.

Sodium carbonate.

- Oral Ingestion: Sodium carbonate is moderately toxic by ingestion with an oral LD_{50} for rats of 4,090 mg/kg (Lewis, 1992). Ingestion of large quantities may cause corrosion of the GI tract, vomiting and diarrhea (HSDB, 1987).

- Dermal Absorption: Sodium carbonate is a mild skin and eye irritant (HSDB, 1987; and Lewis, 1992). An aqueous solution of 50 percent weight/volume sodium carbonate applied to abraded and intact skins of rabbits and guinea pigs caused little or no redness or swelling after 48 hours (HSDB, 1987).

- Inhalation: Sodium carbonate is moderately toxic with a LC_{50} of 2300 mg/m^3/2 hour (Lewis, 1992). Rats exposed to an aerosol of 2 percent aqueous solution of sodium carbonate for 4 hours/day, 5 days/week for 3.5 months had reduced weight gain and lung damage (HSDB, 1987).

- Carcinogenicity/Teratogenicity: No information was available regarding carcinogenic or teratogenic effects.

- Metabolism: Information on metabolism of sodium carbonate was not available.

Polyethylene oxide.

- Oral Ingestion: Ethylene oxide is a poison when ingested (Lewis, 1992).

- Dermal Absorption: Ethylene oxide is an irritant to skin and eyes as well as mucous membranes of the respiratory tract.

- Inhalation: Ethylene oxide is moderately toxic by inhalation with a rat LC_{50} of 800 ppm/4 hours. Human systemic effects by inhalation include convulsions, nausea, vomiting, and olfactory and pulmonary changes (Lewis, 1992). High concentrations can cause pulmonary edema (Lewis, 1992).

- Carcinogenicity/Teratogenicity: Ethylene oxide is a confirmed human carcinogen with experimental carcinogenic, tumorigenic, neoplastigenic and teratogenic data (Lewis, 1992).

- Metabolism: Information on metabolism of ethylene oxide was not available.

- Wildlife Exposure: Information on wildlife exposures to ethylene oxide was not available

Hydroxyethylcellulose. See previous discussion of this material.

Glycerol. See previous discussion of this material.

Diethyl Malonate.

- Oral Ingestion: Diethyl malonate is mildly toxic when ingested. Oral LD_{50} for rats and mice is 15 g /kg and 6400 mg/kg, respectively (Lewis, 1992).

- Dermal Absorption: Dermal contact causes skin irritation. Mild irritation resulted when 500 mg diethyl malonate was applied to skin of rabbit (Lewis, 1992).

- Inhalation: No information was found on inhalation.

- Carcinogenicity/Teratogenicity: No information was found on carcinogenicity.

- Metabolism: No information was found on metabolism.

B.2.12.3 Toxic Agent Chemical Training

B.2.12.3.1 Agent - GB (Sarin)

B.2.12.3.1.1 Usage. GB (Sarin) is a toxic agent used in chemical agent training in the controlled portion of the CDTF.

B.2.12.3.1.2 Quantity. Up to 7.5 ounces (250 milliliters) of GB will be mixed at one time with a maximum of 9 ounces (300 milliliters) of GB stored at the CDTF Lab, and an additional 2,900 milliliters of the binary compounds will be stored at the Ammunition Supply Point. The total estimated average training usage is approximately 9 ounces (300 milliliters) per year.

B.2.12.3.1.3 Safety Information. GB (Sarin) is an anticholinergic nerve gas used in chemical warfare. Phosphorus in the compound binds with and inactivates cholinesterase (enzyme) in the brain. Inactivation of the enzyme allows acetylcholine to persist in nerve synapses, causing paralysis of systems including respiratory system (Bennett, et al, 1984).

GB can enter the body by ingestion, inhalation and dermal absorption. All routes of entry can be fatal with small concentrations of exposure. Studies which are designed to acquire toxicological data for GB gas use organophosphate insecticides, for safety purposes, as means of estimating exposure concentrations and toxicological effects. Some exposure symptoms include miosis, runny nose, nausea, anxiety, muscle twitches, convulsions, respiratory failure and death (DA, 1993c).

B.2.12.3.2 Agent - VX

B.2.12.3.2.1 Usage. VX is a toxic agent used in chemical agent training in the controlled portion of the CDTF.

B.2.12.3.2.2 Quantity. Up to 7.5 ounces (250 milliliters) of VX will be mixed at one time and up to 300 milliliters of mixed VX will be stored at the CDTF Lab at any given time. A total of approximately 76 ounces (2,160 grams) of the binary compound will be stored at the Ammunition Supply Point. The total estimated average annual training usage is approximately 18 fluid ounces (600 milliliters) per year.

B.2.12.3.2.3 Safety Information. Military studies have shown that VX gas is extremely dangerous to human health.

VX gas can enter the body by ingestion, inhalation and dermal absorption. All routes of entry can be fatal with small concentrations of exposure. Studies which are designed to acquire toxicological data for VX gas use organophosphate insecticides, for safety purposes, as a means of estimating exposure concentrations and toxicological effects. Mammalian studies have shown that VX gas is 10^3 to 10^4 times more toxic than commercial insecticides (Watson, 1992). Some exposure symptoms include miosis, runny nose, nausea, anxiety, muscle twitches, convulsions, respiratory failure and death (DA, 1993).

VX gas is not listed as a carcinogenic by The International Agency for Research on Cancer and The National Toxicology Program (DA, 1993). Teratogenic effects of VX gas exposure were not discussed in the literature reviewed.

B.2.12.3.3 Decontaminant - DS-2

B.2.12.3.3.1 Usage. DS-2 is a decontaminant used in the CDTF.

B.2.12.3.3.2 Quantity. The Chemical School uses approximately 2,670 gallons (10,146 liters) annually.

B.2.12.3.3.3 Safety information. DS-2 is made of two major components (EGME and DETA) with different toxicities and physical properties. The TLV of the mixture (calculated) is 5.2 mg/m^3 as an 8 hour time weighted average. To date the Occupational Safety and Health Administration has not promulgated a permissible exposure limit for DS-2, nor has the value proposed been officially adopted as a part of a special occupational safety and health standard for DS-2 in accordance with DOD 6055.1.

No toxicity data are available on DS-2; however, the toxicity of each of the components has been partially determined.

DS-2 is an alkali and with direct contact will corrode tissue (skin, eye respiratory mucosa or gastric mucosa). The effects exhibited depend on route of exposure, amount of substance present and duration of exposure. Health effects can range from mild burns and primary irritation to corneal opacification, severe burns and esophageal stricture.

Sufficient exposure to EGME, a major component of DS-2, may cause central nervous system depression and liver damage. Although not definitely established in humans, reproductive effects (including teratogenesis) are also a major concern with this substance. The National Institute for Occupational Safety and Health recommends that EGME be regarded in the workplace as having the potential to cause adverse reproductive effects in male and female workers. Appropriate controls must be installed to minimize worker exposure to EGME.

Exposure to high vapor concentrations of DS-2 can cause nausea, vomiting and respiratory irritation as acute effects.

Repeated skin and respiratory exposures to DETA can cause skin sensitization and asthma.

B.2.12.4 Flame Field Expedient Deterrent Training Materials and Explosive Hand Grenades

B.2.12.4.1 Charge Demolition C4 1¼ LB (M023)

B.2.12.4.1.1 Usage. These charges are used primarily as cutting explosives.

B.2.12.4.1.2 Quantity. Approximately 353 charges are used annually by the incoming activities and 12,361 by FLW. The total estimated average annual training usage is approximately 12,714 charges.

B.2.12.4.1.3 Safety Information. Munitions and explosives are encased in protective packaging. When discharged the component materials are consumed in the process. The ordnance is a serious physical threat to human health if not properly handled.

B.2.12.4.2 Grenade, Hand M67 (G881)

B.2.12.4.2.1 Usage. Grenades are used in training to provide familiarization and proficiency in their offensive and defensive use. These grenades are high explosive, fragmentation grenades and are used only at Range 31.

B.2.12.4.2.2 Quantity. Approximately 7,743 grenades are used annually by the incoming activities and 36,531 by FLW. The total estimated average annual training usage is approximately 44,274 grenades.

B.2.12.4.2.3 Safety Information. Munitions and explosives are encased in protective packaging. When discharged the component materials are consumed in the process. The ordnance is a serious physical threat to human health if not properly handled.

B.2.12.4.3 Thickening Compound, M4 (K917)

B.2.12.4.3.1 Usage. This compound is used to thicken the fuel used as explosive in flame field expedient deterrents.

B.2.12.4.3.2 Quantity. Approximately 354 cans of 40 ounces each are used annually by the incoming activities and 111 by the Engineer School. The total estimated average annual training usage is approximately 18,600 ounces.

B.2.12.4.3.3 Safety Information. This compound can cause possible redness, pain and irritation to eyes. Prolonged exposure may cause skin irritation. If the product comes in contact with the eyes, flush with water a minimum of fifteen minutes and seek medical attention. Emergency procedures for skin contact include flushing the area with warm water and removing contaminated clothing. If irritation develops, seek medical attention. If ingested, drink large amounts of water/milk and seek medical attention.

B.2.12.4.4 Motor Gasoline

B.2.12.4.4.1 Usage. Motor gasoline is used as the explosive in flame field expedient deterrents.

B.2.12.4.4.2 Quantity. Approximately 1,000 gallons are used annually at FLW. With the implementation of the OPTM Alternative, approximately 22,550 gallons would be used annually.

B.2.12.4.4.3 Safety Information. Motor gasoline can enter the body through inhalation, ingestion and dermal absorption. Inhalation can cause irritation of the upper respiratory tract and depression of the central nervous system. It can be irritating to the eyes and skin. Ingestion can cause gastrointestinal disturbances and central nervous system depression. Chronic health hazards include: dermatitis, pneumonitis, polyneuropathy, pulmonary edema and kidney damage. Overexposure will result in coughing, difficulty in breathing, nausea, vomiting, fatigue, dizziness, headaches, unconsciousness and eye irritation. Motor gasoline contains benzene which is listed by the International Agency for Research on Cancer and The National Toxicology Program as a carcinogenic. It is also regulated by the Occupational Safety and Health Administration as a carcinogenic.

B.2.12.5 CS (Tear) Gas, Obscurant (Smoke) Grenades, Obscurant Fog Oil (Smoke) and other Obscurants

B.2.12.5.1 CS (Tear) Gas

B.2.12.5.1.1 Usage. CS (Tear) gas is used for GMT and NBC equipment training at the gas chamber. The capsules are stored at the installation Ammunition Supply Point.

B.2.12.5.1.2 Quantity. Approximately 15 capsules are use in each training event. Approximately 883 capsules are used annually by the incoming activities and 2,650 by FLW.

B.2.12.5.1.3 Safety Information. CS gas can enter the body through ingestion, inhalation and dermal absorption. Unreacted material may be irritating to eyes, skin and respiratory tract. Overexposure may result in skin blisters, coughing and vomiting. CS gas is not known to be a chronic health hazard. CS gas is not listed as a carcinogenic by The International Agency for Research on Cancer, The National Toxicology Program or by the Occupational Safety and Health Administration.

B.2.12.5.2 Grenade, Hand, CS (Tear) Gas

B.2.12.5.2.1 Usage. CS grenades are used to dispense CS gas. Grenades are used in training to provide familiarization and proficiency in their use.

B.2.12.5.2.2 Quantity. Approximately 1,396 grenades are used annually by the incoming activities and 730 by FLW. Minimum used per day as currently scheduled is eight grenades, although the minimum number used per training event is three grenades. The total estimated average annual training usage is approximately 2,126 grenades.

B.2.12.5.2.3 Safety Information. See previous discussion at subsection B.2.12.5.1.

B.2.12.5.3 Grenade, Hand, Smoke - Green, Red, Violet, Yellow

B.2.12.5.3.1 Usage. Smoke grenades are typically used as signals and beacons. Grenades are used in training to provide familiarization and proficiency in their use.

B.2.12.5.3.2 Quantity. Approximately 5,428 grenades are used annually by the incoming activities and 1,986 by FLW.

B.2.12.5.3.3 Safety Information. Munitions and explosives are encased in protective packaging. When discharged the component materials are consumed in the process. The ordnance is a serious physical threat to human health if not properly handled.

B.2.12.5.4 Smoke Grenade, M8 and M82

B.2.12.5.4.1 Usage. Smoke grenades are used to conceal troop and equipment movement and activity.

B.2.12.5.4.2 Quantity. Approximately 888 grenades are used annually by the incoming activities and 110 by FLW.

B.2.12.5.4.3 Safety Information. Munitions and explosives are encased in protective packaging. When discharged the component materials are consumed in the process. The ordnance is a serious physical threat to human health if not properly handled.

B.2.12.5.5 Obscurant, Fog Oil

B.2.12.5.5.1 Usage. Fog oil is used to conceal troop and equipment movement and activity.

B.2.12.5.5.2 Quantity. The Chemical School currently uses up to 125,500 gallons (476,900 liters) annually, which includes up to 12,425 gallons (47,215 liters) which are used at night. Up to 20,000 gallons (76,000 liters) are used for Static training, 64,000 gallons (243,200 liters) are used for Field Exercises and 41,500 gallons (157,700 liters) are used for Mobile training. This amount includes up to 1,260 gallons (4,788 liters) per year used by the U.S. Air Force. With implementation of the Army's Proposed Action Alternative up to 84,500 gallons (321,100 liters) would be used annually. Up to 8,500 gallons (32,300 liters) would be for used for Static training, 20,000 gallons (76,000 liters) would be used for Mobile training and 56,000 gallons (212,800 liters) for Field training. With implementation of the EPTM up to 49,500 gallons (188,100 liters) would be used annually. Up to 1,000 gallons (3,800 liters) would be for used for Static training, 20,000 gallons would be used for Field Exercises and 28,500 gallons (108,300 liters) for Mobile training.

Reserve Component training uses 11,464 gallons (43,563 liters) annually for Static training.

B.2.12.5.5.3 Safety Information.

- Oral Ingestion: Acute toxicity of fog oil is low in animals (Palmer, 1990). A similar petroleum product, white mineral oil, is lethal to mice in doses of 5-20 ml/kg (Driver, 1992). Daily ingestion of 5 or 20 ml/kg white mineral oil caused weight loss, degeneration of liver and kidney, restlessness, and epidermal damage; animals died within 7-10 days (Muhly, 1983). However, the Muhly results are based on oil manufactured prior to the current specification, Mil Spec C, amendment 2. Unlike the fog oil currently used, the oil used in the Muhly study contained approximately half aromatics since it did not undergo special refining. In rats and rabbits, ingestion of fog oil is rarely acutely toxic (Palmer, 1990). Aspiration of oil products (i.e. inhaling the liquid instead of swallowing it) during or following ingestion may be more harmful than ingestion itself. Mortality was caused by aspiration of fog oil at doses several times smaller than doses that were lethal by ingestion (Driver, 1992). Aspiration of oil products may cause edema, pulmonary lesions, pneumonia, visceral congestion, central nervous disorders and anorexia (Driver, 1992).

- Dermal Absorption: Fog oil used for obscuration is not considered a skin sensitizer or eye irritant. In humans, short-term dermal exposure to petroleum oils may cause redness (Palmer, 1990). Dermal application of 0.6 ml yellow or white lubricating oil on guinea pigs for 2 days caused redness, hyperkeratosis and desquamation (Mulhy, 1983). Prolonged or repeated skin exposure to petroleum products can cause reversible inflammation, acanthosis and eczema (Palmer, 1990; and Smith, 1987). The refining process of "new" fog oil removes a significant proportion of PAHs and few chronic skin problems, including tumorigenesis, are expected (Palmer, 1990).

- Inhalation: The minute size of fog oil droplets (0.5-1 mm) facilitates respiratory exposure (Palmer, 1990). Viscosity of fog oil is low and respiratory toxicity is lower than thicker oil mists (Driver, 1992). After inhalation of high doses (4,330-4,500 mg/m^3) for 2-92 h, mice retained significant amounts of oil in the bronchioles and alveoli and a few deaths occurred (Mulhy, 1983). The short-term exposure limit for mineral oil (chemically and toxicologically similar to fog oil) is 10 mg/m^3 for 15 minute (Driver, 1992). Adverse pulmonary and systemic effects may occur from prolonged or repeated exposure to fog oil. In humans, exposure to refined oils may cause respiratory granulomas and pneumonia (Palmer, 1990). An 8-hour time weighted average exposure limit of 5 mg/m^3 is advised for humans (Palmer, 1990).

- Carcinogenicity/Teratogenicity: The International Agency for Research of Cancer lists some napthenic and paraffinic-based mineral oils as carcinogens or probable carcinogens. However, several human studies have found no association between inhalation of oil mist and lung cancer (Shinn, 1987). Chronic ingestion of highly refined mineral oils is not known to cause cancer in animals (Palmer, 1990; and Oser, 1965). No carcinogenic effects were observed in rats fed 2 percent liquid paraffin for 500 days or rats fed 5 percent petrolatum for two years (Palmer, 1990). Liquid paraffin and petrolatum are similar to mineral oil. Oser (1965) conducted a study that found no oil-related tumors observed in rats fed 5 percent diets of three grades of petrolatum for two years. Inhalation of 5 and 100 mg/m^3 of mineral oil for 13 months caused no difference in the incidence of tumors in mice (Palmer, 1990). Studies of the carcinogenicity of "old" fog oil by dermal absorption are inconclusive (Palmer, 1990). Solvent refining processes are known to remove many cancer-causing factors, including PAHs, from fog oil (Gehrart, 1988). However, Palmer (1990) found that stockpiles of fog oil may be carcinogenic, especially if producers only use OSHA specifications as a guideline.

- Metabolism: Information on metabolism was not available.
- Wildlife Exposure: Little data exist describing the toxicity of fog oil to wildlife. Small animals breathe a larger volume of air per unit body weight than humans, therefore, wildlife may be more susceptible to effects of inhalation of fog oil (Driver, 1992). Herbivores may ingest oils from plants because petroleum oils are known to penetrate leaves, fruit and tubers of some species (Mulhy, 1983). However, fog oil deposition is so slight that it is immeasurable. Fog oil can accumulate in food chains, especially in aquatic situations (Shinn, 1987). Tests indicate fog oil has limited potential to reduce dissolved oxygen (Driver, 1992). Studies have shown effects of exposure to fog oil in waterfowl, aquatic organisms and invertebrates. In ducks, ingestion of 20 ml/kg lubricating oil or 24 ml/kg diesel oil caused no mortality. Other studies revealed systemic damage from doses as low as 1 ml/kg lubricating oil or 3 ml/kg diesel oil (Mulhy, 1983). Toxicity of petroleum products to eggs may be related to PAH content of the oil. Most species of fish tolerate 24 hour exposure to 28-52.5 mg/L of No. 2 fuel oil added to water, although some minnows tolerate up to 260 mg/L (Mulhy, 1983). The fathead minnow (*Pimephales promelas*) was not adversely affected by 0.16-2.37 mg/L fog oil (Driver, 1992). Marine annelids tolerated 24 hour exposure to 8.7 mg/L No. 2 fuel oil dissolved in water (Mulhy, 1983). Fog oil residues of 285 mg/g (3600 mg/cm^3) in soil had no apparent effect on survival of adult or larval earthworms (Driver, 1992). For the freshwater invertebrate, *Daphnia magna*, exposure to 8.96 mg/l of fog oil was lethal (Driver, 1992). Shinn (1987) predicted that toxic effects of fog oil clouds on terrestrial species will be minimal if exposure is limited to short periods of time. Impact areas for obscurant training are typically small and no wildlife population or community structure changes can be anticipated due to military training (Driver, 1993).

B.2.12.5.6 Signal Illumination - Green Star, Parachute Green, Parachute Red Star, White Star Cluster, Red Star, Illuminated Projectile (G307)

B.2.12.5.6.1 Usage. Illumination signals are typically used for communication, as beacons and as temporary light sources. Signals are used in training to provide familiarization and proficiency in their use.

B.2.12.5.6.2 Quantity. Approximately 5,042 illumination signals are used annually by the incoming activities and 7,850 by FLW.

B.2.12.5.6.3 Safety Information. Munitions and explosives are encased in protective packaging. When discharged the component materials are consumed in the process. The ordnance is a serious physical threat to human health if not properly handled.

B.2.12.5.7 Simulated Ordnance - Projectile Bursts, Hand Grenades, Booby Traps

B.2.12.5.7.1 Usage. Simulated ordnance projectile bursts, hand grenades and booby traps are used in training to familiarize students with conditions encountered under battlefield situations.

B.2.12.5.7.2 Quantity. Approximately 2,565 units are used annually by the incoming activities and 4,569 by FLW.

B.2.12.5.7.3 Safety Information. Munitions and explosives are encased in protective packaging. When discharged the component materials are consumed in the process. The ordnance is a serious physical threat to human health if not properly handled.

B.2.12.5.8 Smoke Pot, M8 TA

B.2.12.5.8.1 Usage. Smoke pots are used to generate smoke to obscure troop and equipment movement or activity.

B.2.12.5.8.2 Quantity. Approximately 840 smoke pots are used annually by the incoming activities and 110 by FLW.

B.2.12.5.8.3 Safety Information. The smoke pot, M8 TA is comprised of terephthalic acid (TA). Terephthalic acid can enter the body through ingestion. Acute health hazards include irritation to the eyes and mild irritation to skin. Repeated exposure will cause drying of the skin. Overexposure may cause retardation of urinary excretion of medicines. This could result in greater than expected effects or prolonged effects from the medicine. Terephthalic acid is not listed as carcinogenic by The International Agency for Research on Cancer, The National Toxicology Program or by the Occupational Safety and Health Administration.

Repeated overexposure may increase activity of microsomal enzymes that could decrease effectiveness of other medicines. Terephthalic acid has caused kidney damage in chickens and has caused bladder/kidney stones and cancer in rats.

B.2.12.6 Military Police Chemicals

B.2.12.6.1 Ethyl 2-cyanoacrylate

B.2.12.6.1.1 Usage. Ethyl 2-cyanoacrylate is used by the Military Police School to enhance fingerprints.

B.2.12.6.1.2 Quantity. The total estimated average annual training usage is approximately 200 ounces (6,000 milliliters) per year.

B.2.12.6.1.3 Safety Information. Ethyl 2-cyanoacrylate can enter the body through inhalation. This substance will bond eyelids together and the vapors can cause irritation and tearing. The cured adhesive (cyanoacrylates) will not bond well to the surface of the eye, but corneal damage from abrasion may result. Ethyl 2-cyanoacrylate will bond immediately to the skin. Frequent and prolonged exposure may cause irritation. Vapors are irritating to mucous membrane and eyes. Overexposure to vapors can produce lacrimation, rhinorrhea and blurred vision. Ethyl 2-cyanoacrylate is not listed as a carcinogenic by The International Agency for Research on Cancer, The National Toxicology Program or by the Occupational Safety and Health Administration.

B.2.12.7 Training Support Materials - Interior Use Only. FLW currently uses a number of hazardous materials as described in subsection 4.8 of Volume I that require special management procedures for safe handling, transportation, storage and disposal. Spill response plans and contingency plans are in place to guide an effective response to incidents involving hazardous materials and assure that impacts on health and the environment are minimized. Implementation of the BRAC action will result in the use of additional hazardous material usage at FLW. Most of the chemicals are already in use in non-training applications at the post.

B.2.12.7.1 Usage. The hazardous materials that will be used to support the new training functions at FLW are listed in Table B.7. These materials will be utilized in the classroom, shop and laboratory settings. Some chemicals identified are used in interior decontamination and wash water treatment.

B.2.12.7.2 Quantity. The chemicals and quantities listed in Table B.7 are for interior use only. Approximate annual quantity estimates for interior training and training support are provided in Table B.7. The post is preparing a pollution prevention plan which addresses reduction of waste volumes and toxicity.

B.2.12.7.3 Safety Information. The chance of exposure of the listed chemicals to the environment is negligible due to the standard operating procedures and safety precautions utilized. The training and use of the chemicals is done under the control of experienced, trained staff. Chemical training programs such as Hazard Communication and Worker Right-to-Know assist in providing safety information to the individuals working with the chemicals.

B.2.12.8 Radiation Safety. In conjunction with training activities, additional types and quantities of low-level radiological isotopes will be used at FLW. The usage, estimated quantity and safety information for each hazardous material to be used are described in the following subsections. A list of the radiological isotopes used in association with these training activities is contained in Table B.8. FLW currently uses a number of low-level radioactive materials associated with equipment calibration and hospital procedures. Special management procedures are in place for the safe handling, transportation, storage and disposal of the material as well as spill contingency planning as described in subsection 4.8.8 of Volume I. The focus of all radiological training at the Chemical School is radiation protection and safety. Much of the training parallels that done at colleges and universities across the country but with the focus on military equipment and procedures.

B.2.12.8.1 Usage. Some small quantities of unsealed radioactive material will be used in the laboratories to train students how to handle unsealed sources and how to control contamination. These sources will be used in very small quantities (microcurie range) and under very stringent control. Most of the radioactive material will be small sealed sources used in the laboratory as check sources for radiation meters or laboratory measuring equipment. Some larger sealed sources will be used for radiation instrument calibration.

The larger sources of radioactive material (millicurie range) all remain sealed. The primary isotopes are Cobalt 60, Cesium 137 and Strontium 90. These are all commercially produced sources. They are primarily used in standard commercial equipment as calibration sources. Some of them are the same as the sources already being used at FLW to train soil testers. Others are the same as the sources used by commercial construction companies to X-ray load bearing structures. These larger sources of radioactive material will be used to train students in the safe use of such devices and how to handle accidents involving similar materials. The largest source of radioactive material used at the Chemical School is 120 Curies of Cesium 137. This sealed source will be housed within a specially designed container located within a specially designed laboratory. This is a commercially available calibration standard used by the training staff to calibrate health and safety meters.

The probability of a release into the environment from radiologic training activities is very low. All sources will be stored in containers specially designed to contain radioactive contamination even in the event of a fire. Most of the sources will be stored in a specially designed vault to restrict access. Sources will be used in the smallest quantities possible for effective training and then returned to their storage location. At all times, radiological isotopes will be used under the supervision of school staff trained in radiation protection and safety and in the proper use of the source or device.

Chemical School information identifies whether the isotope is used for student training and/or equipment calibration. The majority of the isotopes are used for the calibration of equipment at the RADLAB which is operated under an NRC license in accordance with standard operating procedures and safety precautions which protect human health and the environment. The use of all isotopes is under the control of trained professionals who have extensive experience in handling and management of radioactive materials. The chance of exposure of the calibration isotopes to the environment is negligible due to the standard operating procedures and safety precautions utilized.

B.2.12.8.2 Quantity. The isotopes proposed for use in activities associated with the Chemical School are listed in Table B.8. The maximum source size and quantities of radiological materials that can be kept at the facility are specified in the NRC license. For example the NRC license for the Chemical School allows the school to maintain any by-product material with atomic number 3 - 83 (inclusive). A maximum of 100 millicuries of each of these radionuclides may be held with a maximum of 3 curies total for these materials. Other NRC license requirements specify other limits for specific sources. The majority of the isotopes have a half-life of longer than 10 years. The training use of the radiological materials is generally non-consumptive and they are reused for subsequent training or calibration. Radiological materials which have a short half-life are replaced through commercial suppliers on an as needed basis.

B.12.8.3 Safety Information. All but about 20 of the known elements exist in nature in two or more isotopic forms. Most of these natural isotopes are stable; that is, the nuclei do not change in any way over long periods of time. Some isotopes have nuclei that are not stable; they continuously undergo changes by emitting radiations. These unstable isotopes are said to be radioactive. The process of radioactive change is commonly referred to as radioactive decay. Radioactive isotopes (or radioisotopes) occur naturally on earth or can be produced artificially by various nuclear reactions.

Four kinds of radiation are associated with the more common types of radioactive decay. They are the following:

<u>Alpha Particles</u> - Alpha particles consist of two protons and two neutrons and are identical to the nucleus of a helium atom. When emitted by a radionuclide, alpha particles have a high velocity and travel two to three inches in air before they are brought virtually to rest. They then pick up two electrons and thus become ordinary atoms of helium. In materials denser than air, alpha particles are stopped within much shorter distances. For example, alpha particles are unable to get through the outer layers of the human skin. Because of this, alpha particles are considered to be an "internal" hazard. The main human concern associated with alpha radiation is in the ingestion, inhalation or injection of the alpha particle producing radioisotope.

<u>Beta Particles</u> - A charged particle emitted from the nucleus during the process of radioactive decay. A negatively charged beta particle is identical to an electron. A positively charged beta particle is called a positron. Beta particles can travel several feet through air before they are absorbed; they can penetrate the human skin to a depth of a very small fraction of an inch. Large amounts of beta radiation can cause skin burns, and beta emitters are harmful if they enter the body. Because of this, beta particles are considered to be both an internal and an external hazard. Beta particles are easily stopped by a thin sheet of metal or plastic.

<u>Gamma Rays</u> - Gamma rays (high-energy, short wavelength electromagnetic radiation emitted from the nucleus) are basically the same as x-rays, with the exception that they generally have more energy. Gamma rays can travel great distances through the air and they can pass through appreciable thicknesses of denser material. Thus, gamma rays are sometimes able to penetrate completely through the body. Because of this, gamma rays

are considered to be both an internal and an external hazard. Gamma rays are best stopped or shielded by dense materials, such as lead or uranium.

Electrons - An electron is identical to a negatively charged beta particle. Betas/electrons can travel several feet through air before they are absorbed; they can penetrate the human skin to a depth of a very small fraction of an inch. Large amounts of beta/electron radiation can cause skin burns, and beta/electron emitters are harmful if they enter the body. Because of this, beta/electron particles are considered to be both an internal and an external hazard. Beta/electron particles are easily stopped by a thin sheet of metal or plastic.

In their passage through matter, alpha and beta particles and gamma rays are able to remove one or more (negatively charged) electrons from atoms they encounter, thereby leaving positively charged residues called ions. Alpha, beta, gamma and certain other radiations are thus said to be capable of causing ionization, and hence they are referred to as ionizing radiation. Exposure of living organisms to sufficiently large quantities of ionizing radiations can cause harmful effects. For example, it is not the gamma rays themselves that cause the damage to the living tissue, it is the high energy electrons produced when the gamma ray energy is absorbed in the body. The potential injury depends upon the amount of energy absorbed in this manner. The extent of the potential hazard depends on many factors, including the following: the known tendency of the isotopes of a few elements to concentrate in specific tissues (e.g., iodine in the thyroid gland); the amount of radioactive material taken into the body; the rate in which it is removed by natural elimination processes and radioactive decay; and the nature and energy of the radiations emitted. It should be noted that the body can repair some damage from radiation, much as it can repair other types of damage (i.e., cut, bruise, alcohol/smoking-related damage, etc.).

The types of emissions from the radiological isotopes anticipated for use at the Chemical School and the RADLAB are specified in Table B.8. The safety information as provided under each of the four kinds of radiation would be applicable as appropriate.

Uranium is a heavy metal. Typically, uranium found in the environment or utilized in sources is highly insoluble. It is collected in the lungs and cleared through the body. The target organs for uranium are the skin, kidneys, bone marrow and the lymphatic system. It can cause dermatitis and blood changes. Additionally, kidney disfunction may be caused, as the uranium is filtered through and collects in the kidneys. The potential for cancer is a result of alpha emitting properties and radioactive decay products (e.g. radon). The NIOSH Pocket Guide to Chemical Hazards (June) indicates that the OSHA TWA for insoluble uranium is 0.25 mg/m^3; the NIOSH recommended exposure limit (REL) is 0.2 mg/m^3; the short-term exposure limit (STEL) is 0.6 mg/m^3; and the IDLH is 10 mg/m^3.

Table B.8:
Radioisotopes Used in Training

Radioisotope	Half-Life[1]	Emissions	Use	NRC Licensed Quantity per Source
Americium 241 (Am-241)	432.2 y	alpha, gamma, electron	T/C	Plated Sources - Not to exceed 1 microcurie/source and 10 microcuries total Unsealed Sources - Quantities less than 1E5 times the applicable limits in 10 CFR 20, Appendix C (100 microcuries) Sealed Sources - Quantities less than 1E10 times the applicable limits in 10 CFR 20, Appendix C (10 Curies)
Calcium 45 (Ca-45)	165 d	beta	T/C	Any Form - Not to exceed 100 millicuries per radionuclide and 3 Curies total (by-product materials with atomic numbers 3-83) Unsealed Sources - Quantities less than 1E5 times the applicable limits in 10 CFR 20, Appendix C (10 Curies) Sealed Sources - Quantities less than 1E10 times the applicable limits in 10 CFR 20, Appendix C (1E6 Curies)

Table B.8:
Radioisotopes Used in Training

Radioisotope	Half-Life[1]	Emissions	Use	NRC Licensed Quantity per Source
Cesium 137 (Cs-137)	30.0 y	beta, electron, gamma	T/C	Sealed Source (UDM-1A) - 120 Curies Sealed Source (3M Model 4F6S) - Not to exceed 500 millicuries per source and 2 Curies total Any Form - Not to exceed 100 millicuries per radionuclide and 3 Curies total (by-product materials with atomic numbers 3-83) Unsealed Sources - Quantities less than 1E5 times the applicable limits in 10 CFR 20, Appendix C (1 Curie) Sealed Sources - Quantities less than 1E10 times the applicable limits in 10 CFR 20, Appendix C (1E5 curies)
Cobalt 60 (Co-60)	5.271 y	beta, gamma	T/C	Any Form - Not to exceed 100 millicuries per radionuclide and 3 Curies total (by-product materials with atomic numbers 3-83) Unsealed Sources - Quantities less than 1E5 times the applicable limits in 10 CFR 20, Appendix C (100 Curies) Sealed Sources - Quantities less than 1E10 times the applicable limits in 10 CFR 20, Appendix C (1E7 Curies)
Gold 198 (Au-198)	2.696 d	beta, electron, gamma	T	Any Form - Not to exceed 100 millicuries per radionuclide and 3 Curies total (by-product materials with atomic numbers 3-83) Unsealed Sources - Quantities less than 1E5 times the applicable limits in 10 CFR 20, Appendix C (10 Curies) Sealed Sources - Quantities less than 1E10 times the applicable limits in 10 CFR 20, Appendix C (1E6 Curies)
Hydrogen 3/Tritium (H-3)	12.35 y	beta	T/C	Any Form - 1 Curie Unsealed Sources - Quantities less than 1E5 times the applicable limits in 10 CFR 20, Appendix C (100 Curies) Sealed Sources - Quantities less than 1E10 times the applicable limits in 10 CFR 20, Appendix C (1E7 Curies)
Krypton 85 (Kr-85)	10.72 y	beta, gamma	T/C	Any Form - Not to exceed 100 millicuries per radionuclide and 3 Curies total (by-product materials with atomic numbers 3-83) Unsealed Sources - Quantities less than 1E5 times the applicable limits in 10 CFR 20, Appendix C (100 Curies) Sealed Sources - Quantities less than 1E10 times the applicable limits in 10 CFR 20, Appendix C (1E7 Curies)
Nickel 63 (Ni-63)	96 y	beta	T	Any Form - Not to exceed 100 millicuries per radionuclide and 3 Curies total (by-product materials with atomic numbers 3-83) Unsealed Sources - Quantities less than 1E5 times the applicable limits in 10 CFR 20, Appendix C (10 Curies) Sealed Sources - Quantities less than 1E10 times the applicable limits in 10 CFR 20, Appendix C (1E6 Curies)
Plutonium 239 (Pu-239)	24,065 y	alpha, gamma, electron	T/C	Unsealed Sources - Quantities less than 1E5 times the applicable limits in 10 CFR 20, Appendix C (100 microcuries) Sealed Sources - Quantities less than 1E10 times the applicable limits in 10 CFR 20, Appendix C (10 Curies)
Strontium 90 (Sr-90)	29.12 y	beta	T/C	Any Form - Not to exceed 100 millicuries per radionuclide and 3 Curies total (by-product materials with atomic numbers 3-83) Unsealed Sources - Quantities less than 1E5 times the applicable limits in 10 CFR 20, Appendix C (10 millicuries) Sealed Sources - Quantities less than 1E10 times the applicable limits in 10 CFR 20, Appendix C (1000 Curies)
Yttrium 90 (Y-90)	64.0 h	beta	T	Any Form - Not to exceed 100 millicuries per radionuclide and 3 Curies total (by-product materials with atomic numbers 3-83) Unsealed Sources - Quantities less than 1E5 times the applicable limits in 10 CFR 20, Appendix C (1 Curies) Sealed Sources - Quantities less than 1E10 times the applicable limits in 10 CFR 20, Appendix C (1E5 Curies)
Thorium 232 (Th-232)	1.405E10 y	alpha, gamma, electron	T	Unsealed Sources - Quantities less than 1E5 times the applicable limits in 10 CFR 20, Appendix C (10 Curies) Sealed Sources - Quantities less than 1E10 times the applicable limits in 10 CFR 20, Appendix C (1E6 Curies)

Table B.8: Radioisotopes Used in Training

Radioisotope	Half-Life[1]	Emissions	Use	NRC Licensed Quantity per Source
Uranium 233 (U-233)	1.585E5 y	alpha, gamma, electron	T/C	Unsealed Sources - Quantities less than 1E5 times the applicable limits in 10 CFR 20, Appendix C (100 microcuries) Sealed Sources - Quantities less than 1E10 times the applicable limits in 10 CFR 20, Appendix C (10 Curies)
Barium 133 (Ba-133)	7.2 y	gamma, electron	C	Any Form - Not to exceed 100 millicuries per radionuclide and 3 Curies total (by-product materials with atomic numbers 3-83) Unsealed Sources - Quantities less than 1E5 times the applicable limits in 10 CFR 20, Appendix C (10 Curies) Sealed Sources - Quantities less than 1E10 times the applicable limits in 10 CFR 20, Appendix C (1E6 Curies)
Cadmium 109 (Cd-109)	453 d	gamma, electron	C	Any Form - Not to exceed 100 millicuries per radionuclide and 3 Curies total (by-product materials with atomic numbers 3-83) Unsealed Sources - Quantities less than 1E5 times the applicable limits in 10 CFR 20, Appendix C (100 millicuries) Sealed Sources - Quantities less than 1E10 times the applicable limits in 10 CFR 20, Appendix C (1E4 Curies)
Carbon 14 (C-14)	5730 y	beta	C	Any Form - Not to exceed 100 millicuries per radionuclide and 3 Curies total (by-product materials with atomic numbers 3-83) Unsealed Sources - Quantities less than 1E5 times the applicable limits in 10 CFR 20, Appendix C (10 Curies) Sealed Sources - Quantities less than 1E10 times the applicable limits in 10 CFR 20, Appendix C (1E6 Curies)
Chlorine 36 (Cl-36)	3.08E5 y	beta, gamma	C	Any Form - Not to exceed 100 millicuries per radionuclide and 3 Curies total (by-product materials with atomic numbers 3-83) Unsealed Sources - Quantities less than 1E5 times the applicable limits in 10 CFR 20, Appendix C (1 Curie) Sealed Sources - Quantities less than 1E10 times the applicable limits in 10 CFR 20, Appendix C (1E5 Curies)
Cobalt 57 (Co-57)	270.9 d	gamma, electron	C	Any Form - Not to exceed 100 millicuries per radionuclide and 3 Curies total (by-product materials with atomic numbers 3-83) Unsealed Sources - Quantities less than 1E5 times the applicable limits in 10 CFR 20, Appendix C (1 Curie) Sealed Sources - Quantities less than 1E10 times the applicable limits in 10 CFR 20, Appendix C (1E5 Curies)
Iron 55 (Fe-55)	2.7 y	gamma	C	Any Form - Not to exceed 100 millicuries per radionuclide and 3 Curies total (by-product materials with atomic numbers 3-83) Unsealed Sources - Quantities less than 1E5 times the applicable limits in 10 CFR 20, Appendix C (10 Curies) Sealed Sources - Quantities less than 1E10 times the applicable limits in 10 CFR 20, Appendix C (1E6 Curies)
Lead 210 (Pb-210)	22.3 y	beta, electron, gamma, alpha	C	Any Form - Not to exceed 100 millicuries per radionuclide and 3 Curies total (by-product materials with atomic numbers 3-83) Unsealed Sources - Quantities less than 1E5 times the applicable limits in 10 CFR 20, Appendix C (1 millicurie) Sealed Sources - Quantities less than 1E10 times the applicable limits in 10 CFR 20, Appendix C (100 Curies)
Manganese 54 (Mn-54)	312.5 d	gamma, electron	C	Any Form - Not to exceed 100 millicuries per radionuclide and 3 Curies total (by-product materials with atomic numbers 3-83) Unsealed Sources - Quantities less than 1E5 times the applicable limits in 10 CFR 20, Appendix C (10 Curies) Sealed Sources - Quantities less than 1E10 times the applicable limits in 10 CFR 20, Appendix C (1E6 Curies)
Polonium 210 (Po-210)	3.05 m	alpha	C	Unsealed Sources - Quantities less than 1E5 times the applicable limits in 10 CFR 20, Appendix C Sealed Sources - Quantities less than 1E10 times the applicable limits in 10 CFR 20, Appendix C

Table B.8: Radioisotopes Used in Training				
Radioisotope	**Half-Life[1]**	**Emissions**	**Use**	**NRC Licensed Quantity per Source**
Promethium 147 (Pm-147)	2.6234 y	beta	C	Any Form - Not to exceed 100 millicuries per radionuclide and 3 Curies total (by-product materials with atomic numbers 3-83) Unsealed Sources - Quantities less than 1E5 times the applicable limits in 10 CFR 20, Appendix C (10 Curies) Sealed Sources - Quantities less than 1E10 times the applicable limits in 10 CFR 20, Appendix C (1E6 Curies)
Radium 226 (Ra-226)	1600 y	alpha, gamma, electron	C	Unsealed Sources - Quantities less than 1E5 times the applicable limits in 10 CFR 20, Appendix C (10 millicuries) Sealed Sources - Quantities less than 1E10 times the applicable limits in 10 CFR 20, Appendix C (1E3 Curies)
Scandium 46 (Sc-46)	83.83 d	beta, gamma	C	Any Form - Not to exceed 100 millicuries per radionuclide and 3 Curies total (by-product materials with atomic numbers 3-83) Unsealed Sources - Quantities less than 1E5 times the applicable limits in 10 CFR 20, Appendix C (1 Curie) Sealed Sources - Quantities less than 1E10 times the applicable limits in 10 CFR 20, Appendix C (1E5 Curies)
Silver 110m (Ag-110m)	249.9 d	beta, electron, gamma	C	Any Form - Not to exceed 100 millicuries per radionuclide and 3 Curies total (by-product materials with atomic numbers 3-83) Unsealed Sources - Quantities less than 1E5 times the applicable limits in 10 CFR 20, Appendix C (1 Curie) Sealed Sources - Quantities less than 1E10 times the applicable limits in 10 CFR 20, Appendix C (1E5 Curies)
Sodium 22 (Na-22)	2.602 y	beta, gamma	C	Any Form - Not to exceed 100 millicuries per radionuclide and 3 Curies total (by-product materials with atomic numbers 3-83) Unsealed Sources - Quantities less than 1E5 times the applicable limits in 10 CFR 20, Appendix C (1 Curie) Sealed Sources - Quantities less than 1E10 times the applicable limits in 10 CFR 20, Appendix C (1E5 Curies)
Technetium 99 (Tc-99)	2.13E5 y	beta	C	Any Form - Not to exceed 100 millicuries per radionuclide and 3 Curies total (by-product materials with atomic numbers 3-83) Unsealed Sources - Quantities less than 1E5 times the applicable limits in 10 CFR 20, Appendix C (10 Curies) Sealed Sources - Quantities less than 1E10 times the applicable limits in 10 CFR 20, Appendix C (1E6 Curies)
Thorium 230 (Th-230)	7.7E4 y	alpha, gamma, electron	C	Unsealed Sources - Quantities less than 1E5 times the applicable limits in 10 CFR 20, Appendix C (100 microcuries) Sealed Sources - Quantities less than 1E10 times the applicable limits in 10 CFR 20, Appendix C (10 Curies)
Uranium 235 (U-235)	703.8E6 y	alpha, gamma	C	Unsealed Sources - Quantities less than 1E5 times the applicable limits in 10 CFR 20, Appendix C (100 microcuries) Sealed Sources - Quantities less than 1E10 times the applicable limits in 10 CFR 20, Appendix C (10 Curies)
[1] years (y), days (d), hours (h), minutes (m)				
Source: Harland Bartholomew and Associates, Inc.				

B.2.13 Utility Systems

Implementation of the proposed action will include the construction of stormwater retention ponds, expansion of existing utility service and collection lines, and modification of existing energy management and conservation policies and goals. Although new facilities at FLW will be designed and constructed to current U.S. Army Energy Programs, AR 11-27 and U.S. Army Engineer Center's *Energy Conservation Plan* (FLW, 1992a) energy conservation standards, they will increase the demand placed on the existing systems.

B.2.14 Warehousing and Supply Storage

Relocation of the Chemical School and Military Police School to FLW will result in several changes in the types and quantities of weapons ammunition that will be stored at the Ammunition Supply Point and a need to store small quantities of binary components (approximately 2,160 grams of VX and 2,900 milliliters of GB) used in chemical training. Management changes will also be required in the quantities and types of small arms ammunition, classroom support items such as paper, ink pens, pencils, computer paper and expendable training aids including, but not limited to, those items listed on Table B.5.

B.2.15 Vehicle and Equipment Maintenance and Repair

Movement of the FOX and BIDS vehicle systems and the various vehicles associated with other aspects of training at the Chemical School and Military Police School will increase the number of vehicles at FLW by approximately 910 vehicles. Note that the number of vehicles and pieces of equipment that will be relocated to FLW, as part of the proposed action, may be affected by other current force modernization and restructuring initiatives resulting in minor changes in the currently identified numbers.

Table B.9 is a listing of the equipment and vehicles (allowance) for the Chemical School while Table B.10 is a listing of the equipment and vehicles (allowance) for the Military Police School. Also provided are a listing of equipment (allowance) for the 20th Chemical Detachment (Biological Detection) on Table B.11 and a listing of the vehicle and equipment (allowance) for the 11th Chemical Detachment (Decontamination) on Table B.12. The 20th Chemical Detachment (Biological Detection) and 11th Chemical Company (Decontamination) will also be relocated as a part of the proposed action. Table B.13 is a listing of the vehicles currently used by the Training Brigade at Fort McClellan which will be relocated to FLW that will be used to augment the vehicles currently used by the Training Brigade at FLW.

Table B.9: Equipment Assigned to the U.S. Army Chemical School

Item	Quantity
Carrier Smoke Generator (M1059)	22
Reconnaissance System (M93 FOX)	11
Trailer Water: M149A2	1
Truck Cargo: 1¼ Ton, M1028	1
Truck Cargo: 2½ Ton, M35A2	13
Truck Cargo: D/S W/W M813A1	1
Truck Cargo: D/S M813A1	9
Truck Cargo: D/S M923	1
Truck Cargo: D/S M35A2C	2
Truck Cargo: LWB W/W M54A2	8
Truck Cargo: LWB W/W M813	1
Truck: LF CBD 4000 lbs	4
Truck: LF CBD 6000 lbs	1
Truck: LF EL E40EV36V	1
Truck Pumper: UN 13217E7130	12
Truck Utility: Shelter, M1037	30
Truck Utility: ¾ Ton, M1009	1
Truck Utility: 1¾ Ton, M998	68
Total	**187**

Source: TDA TCW4K9AA, CCNUM TC0296, EDATE 951101

Table B.10: Equipment Assigned to the U.S. Army Military Police School

Item	Quantity
Automobile Sedan: Class II Compact	5
Automobile Sedan: Class II Compact	61
Automobile Sedan: Class II Large	2
Trailer Water: M149A2	1
Trailer Water: M149	1
Truck Cargo: D/D M35A2C	1
Truck Cargo: LWB W/W, M54A2	1
Truck Cargo: 1¼ Ton, M1028A1	2
Truck Cargo: 2½ Ton, M35A2	7
Truck: LF, MDL, MLT6, ROPS	1
Truck Utility: 1¼ Ton, M1026	26
Truck Utility: 1¼ Ton, M1025	94
Truck Utility: ¾ Ton, M1009	45
Total	**247**

Source: TDA TCW4K8AA, CCNUM TC0296, EDATE 951101

Table B.11:
Equipment Assigned to the 20th Chemical Detachment (Biological Detection)

Item	Quantity
Generator Set: DSL Eng Drum, TM 15 KW, 50/60 HZ, MTD ONM116A3, PU801	7
Power Supply Vehicle: HYP-57/TSEC	15
Trailer Cargo: High Mobility, ¾ Ton	7
Truck Utility: Cargo/Troop Carrier, 1¼ Ton, W/E (HMMWV)	8
Truck Utility: Heavy Variant, 4X4, 10,000 GVW, W/E (HMMWV)	7
Total	**44**
Source: TOE 03477A000, EDATE 951101	

Table B.12:
Equipment Assigned to the 11th Chemical Company (Decontamination)

Item	Quantity
Decontamination Apparatus	8
Generator Set: Diesel Engine, 5 KW	2
Generator Set: DED, Skid Mounted, 3 KW, 60 HZ	1
Generator Smoke Mechanical Pulse Jet	48
Tank Unit Liquid Dispensing Trailer Mounting	2
Tank & Pump Unit, Liquid Dispensing Truck Mounting	10
Tank Fabric Collapsible: W/ staves stake guy wires & cover	8
Tank Assembly: Fabric Collapsible, 3,000 gallon water	8
Trailer Cargo: High Mobility, 1¼ Ton	30
Trailer Cargo: LMTV, W/Dropsides	66
Trailer Cargo: ¾ Ton, 2 wheel, W/E	2
Trailer Cargo: 1½ Ton, 2 wheel, W/E	18
Trailer: Flatbed, 5 Ton, 4 wheel general purpose	2
Trailer Tank: Water 400 gallons, 8 wheel, track capable XM1112	1
Truck CGO: ½ Ton, 6X6, W/E	2
Truck CGO: 2½ Ton, 6X6, W/Winch, W/E	1
Truck CGO: Drop Slide, 5 Ton, 6X6, W/E	14
Truck CGO: Drop Slide, 5 T, 6X6, W/Winch, W/E	12
Truck Cargo: 4X4, LMTV, W/E	34
Truck Cargo: 4X4, LMTV, W/W, W/E	2
Truck Cargo: MTV, W/E	32
Truck Utility Cargo	30
Truck Utility: Cargo/Troop Carrier, 1¼ Ton, 4X4, W/E (HMMWV)	14
Truck Utility: Heavy Variant, 4X4, 10,000 GVW, W/E (HMMWV)	60
Truck Wrecker: MTV, W/W, W/E	1
Truck Wrecker: 5 Ton, 6X6, W/Winch, W/E	1
Total	**409**
Source: TOE 03417L00, EDATE 951101	

Table B.13: Training Brigade Vehicles	
Item	**Quantity**
Trailer Water: M149A2	3
Truck Cargo: 1¼ Ton, M1028A1	12
Truck Cargo: 2½ Ton, M35A2	4
Truck Utility: 1¼ Ton, M988	2
Truck Utility: ¾ Ton, M1009	2
Total	**23**
Source: Harland Bartholomew & Associates, Inc,	

Table B.14 is a summary of the total number of vehicles and equipment which will be relocated to FLW.

Table B.14: Summary of Additional Vehicles and Equipment	
Item	**Quantity**
U.S. Army Chemical School	187
U.S. Army Military Police School	247
20th Chemical Detachment (Biological Detection)	44
11th Chemical Company (Decontamination)	409
Training Brigade Vehicles	23
Total	**910**
Source: Harland Bartholomew & Associates, Inc,	

Most vehicle and equipment types are similar to the types of equipment currently maintained and operated at FLW, although several types of equipment will be new to FLW. The new types of vehicles and equipment include:

- Carrier Smoke Generator: Full Tracked Armored;
- Power Supply Vehicle: HYP-57/TSEC;
- Tank Assembly: Fabric Collapsible, 3,000 gallon water;
- Truck Cargo: 4X4, LMTV;
- Truck Cargo: Tactical, 1¼ Ton, 4X4, Shelter Carrier, M028;
- Truck Utility: ARMT Carrier ARMD, 1¼ Ton, 4X4 (HMMWV); and
- Reconnaissance System (M93 FOX).

Appendix C
IDENTIFICATION AND SCREENING OF SUPPORT FACILITY ALTERNATIVES

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APPENDIX C: IDENTIFICATION AND SCREENING OF SUPPORT FACILITIES ALTERNATIVES

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Appendix C: Identification and Screening of Support Facilities Alternatives

C.1 INTRODUCTION

This appendix describes the process used to define alternative methods for providing the facilities required to support the training and operational requirements associated with the planned relocation of the Military Police School, the Chemical School and the other associated personnel that will relocate from FMC to FLW as a result of the BRAC action. The analysis includes:

- a review of alternate methods that could be used to provide required facilities (i.e. facility reuse, leasing, new construction);
- grouping of identified facility requirements into three BRAC 1995 land use plans with associated facilities construction project packages, which will be evaluated in Section 5, Environmental Consequences; and
- the selection of the Army's Proposed Land Use and associated facility construction project package.

C.2 ALTERNATIVE FACILITY UTILIZATION CONCEPTS

The EIS study team considered the ability of several construction and non-construction options to meet additional facility requirements associated with the planned BRAC action. Options that were considered include:

- reuse of existing facilities at FLW, including:
  - changes in existing management practices and facility assignment guidelines,
  - consolidation of similar or compatible uses in existing structures by increasing the use density, and
  - rehabilitation or adaptive reuse of existing space;
- a review of facilities potentially available for lease in the local civilian community;
- new construction; and
- a combination of reuse of existing facilities and new construction on-post coupled with the leasing of available off-post facilities.

The viability of each of these concepts is discussed below.

C.2.1 Reuse of Existing, Available Facilities at FLW

The ability to use existing, available facilities at FLW to support relocated functions is limited by the number, size and location of the available facilities. Consequently this analysis started with the development of a listing of facilities available for conversion, diversion or alteration to meet identified requirements, and the identification of management practices that could be changed to increase the use of existing facilities. Facilities that were identified as being available to support relocated missions are summarized below.

- A total of 11 "Rolling Pin" barracks in the 600, 700, 800 and 1000-areas (which do not meet current U.S. Army Unaccompanied Enlisted Personnel Housing (UEPH) standards for permanent party military personnel) could be available if the existing functions in those facilities were realigned and collocated to ensure more efficient use of the facilities. A rolling pin barracks is a standard design Army barracks with an exterior shape that resembles a rolling pin when viewed from above. The center section of the building, which contains open-bay barracks areas and latrine facilities, is longer and wider than the ends, which contain private rooms for the Drill Sergeants/Enlisted cadre. The 600, 700 and 800-areas of the installation are bounded by Fourth Street (on the north), Iowa Avenue (on the east), South Dakota Avenue (on the south), and Buckeye Avenue (on the west); with the 600-area occupying the northern one-third of this area, the 700-area in the middle third and the 800-area in the southern third of the area. The 1000-area is southeast of the 800-area and is bounded by Nineteenth Street, Battery Street, Nebraska Avenue and Arkansas Avenue. These areas are illustrated on Figure 4.6 in Section 4, Affected Environment. These facilities could be used for the following types of functions.

    - Chemical School and Military Police School OSUT open-bay barracks requirements.
    - Military Police School, Rehabilitation Instructor Training Course (RITC) barracks and classroom requirements. The RITC course (which is designed to teach civilian law enforcement personnel to operate "bootcamp-like" drug and first time offender rehabilitation courses) will use the relatively austere environment provided by the barracks to augment classroom instruction. Minor renovation of the facility will be required to facilitate classroom instruction and these costs have been included in the construction cost for construction project 46091, Applied Instruction Facility.
    - Museum storage and display requirements.

- Additional barracks rooms at Specker Barracks could be made available thorough changes in existing management practices. These changes would include:

    - The dedication of the southern half of Specker Barracks to ITRO use. By dedicating the area to only ITRO use, three personnel could be assigned to each room (versus two as currently assigned), thereby increasing the number of personnel housed in the southern half of Specker Barracks by one-third.
    - The reallocation of the northern half of Specker Barracks to only permanently assigned unaccompanied junior enlisted personnel. This would allow the assignment of two personnel to each room, thereby increasing the number of personnel that will be housed in the northern half of Specker Barracks.

- A currently deactivated 1,000 person dining facility at Specker Barracks is available to support increased dining requirements. However, this facility will require extensive renovation in order to be reactivated.

- A total of approximately 664 existing family housing quarters were identified as available to support anticipated family housing requirements following implementation of the proposed action. Family housing quarters not required to support family housing requirements could be used to support UPH requirements.

- A total of approximately 190 existing, available unaccompanied transient officer rooms at Sturgis Heights were identified as excess to transient officer requirements following implementation of the proposed action.

- Approximately 8,900 square feet at the present Engineer Center Museum was identified as available, however the security requirements associated with the remainder of the existing Museum limit the potential reuse options for this area.

- Shelf-space for approximately 42,000 volumes was identified as being available at Clarke Library, the present Engineer Center and FLW Community Library.

- Temporary warehouse buildings 2310 and 2311 were identified as excess to current Directorate of Logistics warehouse requirements.

- Approximately 3,000 square feet at Building 5265, the Directorate of Logistics (DOL) Vehicle Maintenance Facility, was identified as excess to anticipated vehicle maintenance requirements.

- Approximately 13,750 square feet of general instruction classrooms within Lincoln Hall was identified as excess to anticipated Engineer School training requirements.

- Approximately 58,600 square feet of available administrative space within Lincoln and Hoge halls was identified as excess to anticipated Engineer School and Engineer Center requirements.

- Approximately 9,400 square feet of unit vehicle maintenance facilities at Buildings 3010 and 3011 which could be used to support vehicle and equipment maintenance requirements.

- Reallocation of the approximately 8,900 square feet at the present Engineer Center Museum, which could be altered to support Chemical and Military Police museum requirements, has been included as part of Project 46091, Applied Instruction Facility for the Combined Headquarters and Combined Headquarters and Instruction land use plans.

Together these facilities are able to accommodate over 800,000 square feet of the identified 1,500,000 square feet of BRAC related support facility requirements. The estimated cost to replicate these existing, available facilities with new facilities would be over $200 million.

Following development of this listing of available facilities it was determined that this alternative was non-viable. This reuse of existing facilities alone would not provide adequately sized areas to support the facility requirements of the relocated operational and training missions.

C.2.2 Leasing Facilities in the Surrounding Civilian Community

The lease of off-post facilities in the surrounding civilian community was considered to support BRAC training requirements. Available options included:

- the lease of general and applied instruction classrooms, and administrative facilities;

- the lease of general and applied instruction classrooms, administrative areas, and UPH facilities from the University of Missouri, Rolla;

- the lease of hotel/motel space in the Waynesville/St. Robert area for use as UPH; and

- the leasing of local live-fire weapons ranges to support weapons familiarization and qualification requirements.

The review also considered the potential for individual service members to either rent or purchase housing in the civilian community as compared to the U.S. Army leasing the housing.

C.2.2.1 Leasing General and Applied Instruction Classroom, and Administrative Facilities. Operational concerns dictate that the general and applied instruction classrooms, and administrative facilities for specific segments of the training missions be collocated. This allows the instructors to receive the proper level of administrative support. Remotely located administrative areas would not provide the desired level of interaction and support. Furthermore, the unique training programs associated with the Military Police School and the Chemical School dictate that specifically designed applied instruction facilities be provided, although these could be constructed at a site that would provide the other training requirements. Sites for off-post leasing that were considered included the following.

- The Waynesville School District has numerous facilities that could easily provide the general instruction and administrative areas required, however the school district does not have the excess capacity to allow it to enter into a short- or long-term lease of facilities.

- A large retail store is located on the eastern side of the Interstate 44 Spur north of the installation. At the time of the analysis, the store was available, but has since been leased. This retail shopping facility is located in a shopping center, and provides adequate parking and a relatively large indoor area with minimal interior divisions. The facility could be renovated to provide general administrative areas (much like the recently renovated old commissary at FLW provides a general administrative area), general instruction or applied instruction areas. However, the store is not large enough to provide the desired level of collocation of functions.

  Fragmentation of functions (particularly at remotely located sites) would increase concerns about administrative command and control of training efforts and limit the potential to obtain the positive synergistic effects desired by the relocation of the Military Police School and Chemical School to FLW. Consequently, further consideration of this alternative was terminated.

There were no other reasonable options for the leasing of instruction or administrative facilities in the surrounding civilian community.

C.2.2.2 Lease from the University of Missouri, Rolla. The University of Missouri, Rolla is a State of Missouri operated university that specializes in Engineering and Computer Science related fields of study. The university offers excellent facilities that could support many of the general and applied instruction classrooms, administrative areas, and unaccompanied personnel housing facilities required for all training programs from basic Enlisted indoctrination to advanced Officer training. However, the long-term use of University of Missouri, Rolla facilities would not provide the positive synergistic effects desired by the relocation of the schools.

C.2.2.3 Lease Unaccompanied Personnel Housing in Waynesville/St. Robert. Based on initial planning calculations (FLW, 1996c) FLW will have a deficit in adequate, UEPH of approximately 2,175 spaces. Changes in current FLW management practices can reduce the number of additional UEPH spaces required to approximately 1,662 spaces.

There are several hotels and motels in the Waynesville/St. Robert area which could be used to provide these additional UEPH spaces. Use of these facilities was considered as part of the economic analysis performed during the development of UEPH requirements. Two different alternate plans were developed that would have included leasing of UEPH spaces in the surrounding community. These included:

- the lease of hotels/motels in the Waynesville/St. Robert area to provide the total additional requirement of approximately 1,662 spaces; and

- the conversion, renovation and reallocation of existing UEPH facilities at FLW, followed by leasing approximately 888 spaces in the local community.

The net present values for these two options, along with two other options available for meeting the additional housing requirement are contained in Table C.1.

Table C.1:
Net Present Value of Various Unaccompanied Personnel Housing Alternatives

Alternatives		Net Present Value
1	Lease approximately 1,662 UPH spaces in local hotels/motels	$261,338,000
2	Conversion, renovation and reallocation of existing UPH facilities, followed by leasing approximately 888 UPH spaces in the local community	$138,991,000
3	New construction approximately 1,662 new UPH spaces	$106,325,000
4	Conversion, renovation and reallocation of existing UPH facilities, followed by new construction of approximately 888 additional UPH spaces	$70,251,000

Source: DD Form 1391, Military Construction, Project 46092, Unaccompanied Personnel Housing

Based on the relative net present value of the long-term lease of UPH spaces (alternative 1) in the surrounding community, this option has been eliminated from further consideration.

C.2.2.4 Leasing of Local Live-Fire Weapons Ranges. There are no existing local off-post live-fire weapons ranges that could adequately support the training requirements of the Military Police School and the Chemical School.

C.2.2.5 Renting Family Housing Facilities. An analysis of the housing market in the local community, completed by FLW, Directorate of Public Works, Housing Division, indicated that it is more desirable for the civilian community to support the additional family housing requirements associated with the personnel that would be relocated to FLW than for the government to provide this service. The only exception to this general rule would be family housing for "Key and Essential" personnel that must reside on-post.

Renting or purchasing of family housing facilities will be left to individual service members. Service members will be provided a "non-availability" stamp that will allow them to be reimbursed at an established monthly rate. The service member is then able to select either the purchase of a home or the leasing/rental of housing from available units in the civilian housing market. This implementation method is preferred to alternatives in which the Housing Division would pre-lease housing units in the civilian community for assignment to service members as they arrive.

In addition, the analysis performed by the Housing Division indicated that a total of 364 existing family housing quarters currently located at FLW could be made available for conversion to other uses.

C.2.3 New Construction

This alternative would construct new facilities to support the total facility requirements associated with the relocated missions. This option would not, however, take advantage of the existing available facilities at FLW, as listed in subsection C.2.2 earlier. Implementation of this alternative would result in both increased construction costs, and long-term maintenance and repair costs associated with the use of the new facilities and the existing, available facilities. Failure to use the existing, available facilities would require the construction of approximately $400 million in new facilities. This total cost would represent an increase of approximately $200 million of over the estimated cost of any development plan that used the existing, available facilities. Consequently, this alternative, which would rely solely on the construction of new facilities, is considered viable, but not reasonable, due to additional short- and long-term costs that would be associated with the implementation alternative.

C.2.4 Combination of Reuse, New Construction and Leasing

Based on this screening of alternatives for meeting facilities requirements (through the leasing of facilities in the surrounding community, including the rental or lease of family housing by individual service members or the construction of new facilities) it is was determined that a "combination" alternative was the only alternative that would be both viable and reasonable. This alternative would include a combination of:

- reuse of identified existing, available facilities at FLW, including areas that would be made available through changes in existing management practices and facility assignments;
- new construction, including the renovation, modernization and expansion of existing facilities identified for reuse; and
- rental or purchase of family housing in the local community by individual service members.

Determination of how individual existing, available facilities would be used to support identified BRAC facilities requirements resulted in the development of multiple implementation plans. Three of these implementation plans are discussed in Section C.3 below.

C.3 FACILITY ALTERATION AND NEW CONSTRUCTION PROJECT PACKAGE ALTERNATIVES

Once the proposed methods for accomplishing required training missions (as discussed in Volume IV, *Identification and Screening of Alternatives to Accomplish Training Goals at FLW*) were identified, additional fine tuning of the construction and renovation requirements (as stated in Section 2 of the EIS) was required to identify the proposed implementation plans that would be analyzed in the EIS. As discussed in subsection C.2.4, the Army's proposed action will include a combination of:

- adaptive reuse of existing, available facilities;
- modification of facility requirements based on the ability to reduce new construction requirements through reuse of existing, available facilities or other non-construction alternatives;
- identification of the new construction requirements, including the renovation, modernization and expansion of existing facilities identified for reuse; and
- rental, lease or purchase of off-post family housing by individual service members.

C.3.1 Available Facilities

Facilities which were identified for potential conversion, diversion or alteration to help meet identified requirements, and the identified requirement that they would be used to support are listed in Table C.2. As illustrated on Table C.2, the different land use plans specify different uses for many of the facilities. Where a facility is **"not specified for use"** it will remain in use supporting existing ongoing USAEC and FLW mission requirements.

Table C.2: Reuse of Available Facilities by Land Use Plan			
Available Facilities	**Combined Headquarters**	**Separate Headquarters**	**Combined Headquarters and Instruction**
Nine Rolling Pin Barracks	OSUT Barracks	OSUT Barracks	OSUT Barracks
One Rolling Pin Barracks	MP School RITC Training	MP School RITC Training	MP School RITC Training
One Rolling Pin Barracks	not specified for use [1]	Museum	not specified for use [1]
Specker Barracks, southern half	reallocation to ITRO training	reallocation to ITRO training	reallocation to ITRO training
Specker Barracks, northern half	reallocation for junior enlisted personnel	reallocation for junior enlisted personnel	reallocation for junior enlisted personnel
Dining Facility at Specker	Dining Facility	Dining Facility	Dining Facility
300 available Family Housing Units	Family Housing	Family Housing	Family Housing
190 available Family Housing Units	not specified for use [1]	not specified for use [1]	UPH, Enlisted and Officer housing
154 available Family Housing Units	not specified for use [1]	not specified for use [1]	not specified for use [1]
190 UPH Transient Officer Rooms	not specified for use [1]	not specified for use [1]	UPH, Officer
8,900 square feet at Walker Museum	Museum	not specified for use [1]	Museum
Shelf area at Clarke Hall	Library	not specified for use [1]	Library
Building 2310	not specified for use [1]	not specified for use [1]	warehouse
Building 2311	not specified for use [1]	not specified for use [1]	warehouse
3,000 square feet at Building 5265	not specified for use [1]	not specified for use [1]	FOX vehicle maintenance training
13,750 square feet at Hoge Hall	administration	administration	administration and classrooms
58,600 square feet at Lincoln Hall	administration	administration	administration and classrooms
Building 3010	not specified for use [1]	vehicle maintenance	vehicle maintenance
Building 3011	not specified for use [1]	vehicle maintenance	vehicle maintenance
Note: 1 Where a facility is "not specified for use" it will remain in use supporting existing ongoing USAEC and FLW mission requirements.			
Source: FLW, BRAC 95 Land Use Plan			

C.3.2 Formulation of Construction/Non-Construction Alternatives

This section reviews the construction and non-construction alternatives considered for meeting identified facility requirements. The information presented in this analysis is based on providing the facilities required to accomplish the missions identified in Volume III, Appendix B, *Analysis of New Missions*, and Volume IV *Identification and Screening of Alternatives to Accomplish Training Goals at FLW.*

Formulation of the construction alternatives was based on the following assumptions:

- That OSUT (junior enlisted indoctrination) training will be segregated by school.
- Non-Commissioned Officer and Advanced Individual Training (both attended by Enlisted Personnel), Officer Indoctrination, Junior Officer and Officer Advanced classroom training for the Chemical School, Engineer School and Military Police School would be consolidated where possible or collocated to allow for joint-use of facilities. This collocation would be possible because the core of the instruction would involve the use of general instruction classrooms.
- That relocated live-fire weapons familiarization and qualification ranges, training areas and maneuver areas would be located outside of the currently established FLW cantonment (built-up

area). It has also been assumed that relocated live-fire weapons range safety zones will be overlaid on existing ranges (to the maximum extent possible) in order to reduce the total amount of land required for the safety zones associated with the live-fire weapons ranges.

C.3.2.1 Formulation of Project Packages. During the review of construction alternatives, installation planners organized the support facility requirements into eight construction project packages based on functional relationships. The construction project packages include:

- General Officer Quarters, Project 38174;
- Sixteen-Building Military Operations in Urbanized Terrain Facility, Project 45892;
- Chemical Defense Training Facility, Project 45893;
- General Instruction Facility, Project 46090;
- Applied Instruction Facility, Project 46091;
- Unaccompanied Enlisted Personnel Housing, Project 46092;
- Range Modifications, Project 46094; and
- Convert Housing Project 46640.

C.3.2.2 Formulation of Land Use Plans. Alternative siting plans were developed for each of the functional requirements included in the construction projects, based on various concepts for the long-term operation and management of the installation. Three concepts for the long-term operation and management of the installation initially emerged as the prevailing alternatives for the development of the installation.

a) The **Separate Headquarters** Land Use and Facility Plan, which would provide for the operation of the schools at FLW in much the same manner as they are operated now, with each of the schools retaining a separate headquarters, separate instructional areas, and separate branch identities. This land use plan was developed first, since it requires the least amount of change in the management philosophy at the school.

b) The **Combined Headquarters** Land Use and Facility Plan, which would provide for separate instruction areas for the schools but would combine the headquarters staffs which would allow the schools to maintain separate instructional areas and therefore maintain part of the branch identity enjoyed by the schools presently.

c) The **Combined Headquarters and Instruction** Land Use and Facility Plan, which would collocate and combine the schools to the maximum extent possible, while retaining a relatively small number of personnel in the administrative staffs of the individual schools. This alternative would require the largest physical and organizational changes in the internal structure of the schools.

The relative advantages and disadvantages of the three Land Use and Facility Plans are discussed in subsection C.4.2.2. The nature of these three land use plans in part dictated the location of sites that could be used within the cantonment area. Information concerning the selection of alternate sites in the cantonment area for each land use plan are included in the discussion of each construction project.

Site locations for the non-cantonment projects were not tied directly to the land use and facility plans, consequently the alternate, reasonable sites were assigned to a land use plan based on an initial analysis completed by the FLW DPW Master Planner, in coordination with representatives of the FLW DPW

Environment, Energy and Natural Resources Division and the user activities. Alternative acceptable sites (consistent with the installation Master Plan (FLW, 1991c) and the Training Area Master Plan (FLW, 1990a)) were selected following a screening process that defined locations that could reasonably satisfy the demands of the user and meet the safety requirements for separation from population areas and adjacent ranges. Alternative sites were assigned to one of the three land use plans, in order to develop a meaningful choice of alternative sites, for analysis during the environmental review process. Non-cantonment construction projects include the: 16-Building Military Operations in Urbanized Terrain Facility (Project 45892); Chemical Defense Training Facility (Project 45893); and Range Modifications (Project 46094).

C.3.2.3 Site Screening Process. Individual sites were evaluated using a multi-phased screening process. This screening process attempted to avoid, where possible, impacts to sensitive natural and cultural resources. Installation maps, the Master Plan (FLW, 1991c), Training Area Master Plan (FLW, 1990a), Historic Preservation Plan (FLW 1992c), aerial photographs of the installation, and numerous other studies were consulted, as well as site visits being performed to identify and select sites. Where possible, construction and training sites were selected to avoid negative impacts and emphasize positive impacts. The same sixteen categories used in the Volume I, Section 5 analysis of impacts were used for the site screening process. The categories are:

- Other land uses in the surrounding military and civilian community;
- Air Quality and Climate;
- Noise in the surrounding military and civilian community;
- Water Resources (including Floodplains, Surface Water and Hydrogeology/Groundwater);
- Geology and Soils;
- Infrastructure;
- Hazardous and Toxic Materials;
- Munitions;
- Permits and Regulatory Authorizations;
- Biological Resources (including Federal T & E Species, Other Protected Species, Wetlands, Aquatic Resources, and Terrestrial Resources);
- Cultural Resources;
- Sociological Environment in the surrounding military and civilian community;
- Economic Development in the surrounding military and civilian community;
- Quality of Life (including Human Health and Safety) in the surrounding military and civilian community;
- Installation Agreements; and
- Operational Efficiency.

Of the sixteen categories, several do not apply to the analysis of comparative differences between locations for individual projects. These include: **Hazardous and Toxic Materials, Munitions, Cultural Resources, Sociological Environment**, **Economic Development**, and **Installation Agreements.**

- Two of the criteria required specific clearance as part of the siting process. For each of the sites being specified for each of the alternative land use plans, site-specific surveys for **Cultural Resources** and **Hazardous and Toxic Materials** have been conducted to reduce the potential for adverse environmental impacts. These surveys included:

  - **Phase 1, Archaeological Surveys.** As a result of these recent surveys, a "no effect" determination was established by the Missouri State Historic Preservation Officer for all sites, as discussed in Appendix G, Section G.3 of the EIS.

  - **Phase 1, Hazardous Materials Site Surveys.** In April 1996, FLW Environment, Energy, and Natural Resources Division completed a Preliminary Assessment Screening (PAS) of all sites as a final clearance check. The PAS did not identify any sites included in the Installation Action Plan or which require remediation through the Installation Restoration Plan. At some sites, the PAS indicates the existence or potential for hazardous substances, or facilities which may have asbestos or underground storage tanks. At this time, no further investigation of these sites is required due to a low potential for contamination and the fact that the proposed uses for the sites are similar to the current use.

- **Munitions** are used as a portion of training, and the impacts and issues associated with their use, with respect to this category are captured in the Range Modifications (Project 46094) construction project. Consequently, the category Munitions will only be discussed under the Range Modifications project.

- The **Sociological Environment** criterion does not apply directly to this project since the construction effort is limited to on-post and the impacts of the proposed action on the surrounding sociological environment are more appropriately discussed based on the impact of the entire action (not the single project level). However, the overall impact of this construction project, in conjunction with the other elements of the proposed action, will be evaluated with respect to sociological environment issues in subsection 5.4.2.13.

- Likewise, the **Economic Development** and **Installation Agreements** criteria do not apply directly to the impact of this single project. The impacts of the proposed action on economic development are evaluated in subsection 5.4.2.14, while the impacts of the proposed action on installation agreements are discussed in subsection 5.4.2.16.

C.3.3 Review of Construction Projects

Additional information on the alternatives considered as part of the development of each of the individual construction projects packages is presented in subsections C.3.3.1 through C.3.3.8 below. The review of each construction project is presented in the following format:

- **Goal** of the project;

- **Construction/Non-Construction Alternatives Considered**;

- **Selection of the Proposed Construction/Non-Construction Alternative**;

- **Rationale for Selection of Proposed Site Alternatives**; and

- **Analysis Criteria for Implementing the Proposed Alternatives.**

In addition to the discussion of Analysis Criteria for Implementing the Proposed Alternatives that is contained in this Appendix, the reader should refer to Section 5, Environmental Consequences, of the EIS for additional information. The discussion of the Analysis Criteria for Implementing the Proposed Alternatives (for each construction project) includes a summary table of the natural, cultural, sociological and economic resource categories (as presented in subsections 4.1 and 5.1.1) and the operational efficiency category (as discussed in subsection 5.1.1) which were used to screen alternative sites. These categories are evaluated in Section 5, Environmental Consequences.

Subsection C.4 (below) contains a summary of the selection process used to identify which of these three land use and facility siting plans would become the Army's Proposed Action. Based on the analysis contained in subsection C.4, the Combined Headquarters and Instruction concept was selected as the Army's Proposed Land Use and Facility Plan (Combined Headquarters and Instruction) for development of the installation. The Combined Headquarters concept was designated as Alternative 1 Land Use and Facility Plan (Combined Headquarters) and the Separate Headquarters concept was designated as Alternative 2 Land Use and Facility Plan (Separate Headquarters). Each of these different alternatives are capable of being selected to meet the BRAC action requirements and each of the alternatives will be evaluated in for environmental consequences in Section 5 of the EIS.

C.3.3.1 General Officers Quarters, Project 38174

C.3.3.1.1 Goal. The goal of the general officers quarters construction project package is to provide housing for two general officers and their families who will be relocated to FLW as part of the proposed action. The two general officers will be the Commandants of the Military Police School and the Chemical School. These two positions have been designated by the installation to be "Key and Essential." As discussed in subsection C.2.4, the remaining family housing requirements will be met through the use of existing family housing at FLW, and the rental or purchase of homes in the surrounding community by individual service members.

The Army Criteria Tracking System (ACTS) and Department of the Army, Architectural and Engineering Instructions state that General Officers are authorized family housing units that contain approximately 2,100 net square feet of living area. The homes will also include driveway and utility runs into the site; both public entertainment areas and private family areas; garage; utility room; patio; screened-in porch; and bulk storage areas.

C.3.3.1.2 Construction/Non-Construction Alternatives Considered. In addition to the non-construction alternatives previously discussed (in subsection C.2.2), the following alternatives were developed for this identified BRAC support facilities requirement.

C.3.3.1.2.1 Convert Available Facilities at FLW. There are no facilities available at FLW for conversion; therefore, this option is considered non-viable.

C.3.3.1.2.2 New Construction. Construct two new general officer quarters in one of the FLW family housing areas.

C.3.3.1.2.3 Renovate Existing Quarters at FLW. There are currently four general officer quarters available on FLW.

- Two were constructed in 1994 and are assigned to the Commandant and Deputy Commandant of the Engineer Center and Fort Leonard. These positions will require similar general officers quarters following completion of the proposed BRAC action. Consequently these two sets of quarters are not available for use by the additional general officers.

- The two remaining general officer quarters were constructed in 1957. Quarters 4000 has 2,116 gross square feet of space while Quarters 4002 has only 1,838 square feet of living space, less than the authorized 2,100 net square feet or 2,310 gross square feet per quarters. Extensive remodeling, repair, modernization and expansion of these quarters will be required for them to meet current occupancy standards for general officers. The economic analysis completed prior to the construction of two new general officers quarters in 1994 determined that the construction of new quarters was economically preferred to the renovation and modernization of these two sets of quarters.

C.3.3.1.2.4 Lease Quarters Off-Post. Lease appropriate housing off-post and provide the quarters for the incoming general officers.

C.3.3.1.2.5 Provide a Non-Availability Status. Provide incoming generals with a quarters non-availability status and allow them to locate, and lease or buy the home of their choice in the local civilian community.

C.3.3.1.3 Selection of the Proposed Construction/Non-Construction Alternative. The construction of two new general officer quarters was selected as the Army's proposed action based on:

- the elimination of the Leasing Off-Post and Provide a Non-Availability Status as viable alternatives for the two school Commandants, since their positions have been designated as "Key and Essential" requiring them to live on-post; and

- the non-quantifiable benefits associated with improved quality-of-life consistent with Army policy for these housing facilities.

The construction of two additional general officers quarters is reflected as the Army's proposed action in Section 2, Overview of the Proposed Action, subsection 2.4.2.6 of the EIS.

C.3.3.1.4 Rationale for Selection of Proposed General Officer Quarters Construction Site Alternatives. The proposed construction site for this project is located along the north side of Piney Hills Drive, north of the recently completed quarters occupied by the Fort Leonard Wood Commanding General and Deputy Command General, and east of Building 4115. This site is illustrated as site P-45 on Figure 3.3 (Army's Proposed BRAC Facility Siting Plan (Combined Headquarters & Instruction)), site 1-45 on Figure 3.5 (Alternative 1 BRAC Facility Siting Plan (Combined Headquarters)), and site 2-45 on Figure 3.7 (Alternative 2 BRAC Facility Siting Plan (Separate Headquarters)). All of these figures are located in Section 3, Description of Alternatives - Including the Proposed Action, of the EIS. Alternative sites considered for the construction of the two new general officer quarters included:

1) an area south of Piney Hills Drive, between Mackenzie Drive and Thayer Street;

2) the location of existing quarters 4000 and 4002 (requiring that these units be demolished prior to construction of the new quarters);

3) a site directly east of Mackenzie Drive and across the street from quarters 4002;

4) a site south of East Fifth Street, midway between Michigan and Oklahoma avenues; and

5) the proposed site north of Piney Hills Drive.

During an initial review of these alternative sites it was determined that three of the sites should be eliminated as less favorable when compared to the remaining sites.

- The demolition of quarters 4000 and 4002 (alternative 2 above) followed by the reuse of that site for the construction of two new general officer family housing quarters would have the least environmental impact of the four alternative sites. Utility and other infrastructure support services are adequate at the location, and construction at this site would not require any additional tree clearing, thereby reducing impacts on vegetation and wildlife. However, this alternative was eliminated from further consideration based on operational considerations. Construction at this site would have a higher short-term cost (when compared to the other alternative sites) due to the cost of demolishing the existing quarters. Demolishing existing quarters 4000 and 4002 would result in the loss of two houses that are fully adequate for field grade officers, as field grade officers are not authorized areas of "official entertainment" and therefore do not need the building additions that would be required for the quarters to meet general officer housing standards. Changes to the post population in the recent past, as well as the BRAC 95 move, have resulted in an increased need for field grade officer housing. In addition, placing the general officer quarters at the end of a dead-end street (at the location of quarters 4000 and 4002) would recreate the traffic congestion that was one of the reasons the generals quarters were relocated.

- The site directly east of Mackenzie Drive and across the street from quarters 4002 would require an extensive amount of tree clearing in an area of relatively steep slopes. The site would involve construction of the homes in an area that would have an elevation grade change in excess of 30 feet from the western (front) side of the quarters and the eastern (back) side of the quarters. Construction on this type of slope would increase initial construction costs and require removal of a larger number of trees than the other project locations. Additionally, following stabilization of the area around and at the rear of the quarters it was feared that traffic on Water Intake Road (FLW 24) would create undesirable visual and noise impacts on the private/entertainment areas of the quarters. Consequently, this site was eliminated from further consideration.

- The site south of East Fifth Street, midway between Michigan and Oklahoma Avenues, offers an advantage of placing the general officer quarters on a hill overlooking the central part of the post. Using this location for houses would result in the diversion of an approximately twenty-five acre site that could be better used for other purposes. Additionally, separating the general officers from the other senior officer housing area would create social problems and make security more difficult. Consequently, this site was eliminated from further consideration.

Advantages of the Proposed Site. The site along the northern side of Piney Hills Drive (alternative 5) was selected as the preferred site, when compared against the site along the southern side of Piney Hills Drive, between Mackenzie Drive and Thayer Street. Considerations included in the selection of the site north of Piney Hills Drive as the preferred alternative included:

- this site's proximate location across the street from the quarters occupied by the Fort Leonard Wood Commanding General and Deputy Command General, thereby increasing operational efficiency during official entertainment functions and furthering informal communication between the senior staff;

- the site being located within an area of housing slated for Senior Officers allowing it to be more compatible with surrounding uses;

- the added quality of life that would be provided to the occupants based on the more private location which would offer a buffer between the quarters and other structures;

- the reduced traffic noise anticipated at the site due to it's location on a cul-de-sac; and

- placing the Military Police Commandant and the Chemical School Commandant in a location other than near the two current FLW generals might create significant problems, leaving the impression that the relocated generals were either inferior or superior to the current FLW generals.

Construction at this site would result in increased levels of site grading and increased levels of tree clearing; however given the benefits offered by the site, the FLW Master Planner recommended that the site north of Piney Hills Drive be selected as the preferred location. Following a review of potential sites, the Commandants of the three schools also selected the location as the most preferred, and determined that the site south of Piney Hills Drive would degrade their quality of life when compared to the preferred location. Consequently, only the site north of Piney Hills Drive will be reviewed for environmental impact in Section 5 of the EIS.

Subsection C.3.3.1.5 below contains criteria for analyzing the implementation of the proposed action at this site.

C.3.3.1.5 Analysis Criteria for Implementing the Proposed Alternatives. The basis and framework for analyzing the potential impacts of implementing each of the construction alternatives are summarized on Table C.3 below. As discussed in subsection C.3.3.1.4 above, the initial analysis of this project determined that one site was clearly more reasonable and preferred than the other sites. Consequently the same site will be used for each of the three land use plans.

Table C.3: Analysis Criteria for Implementing Proposed General Officer Quarters Construction Alternatives	
Resource Category	**Summary of Potential Impacts and Issues**
Land Use and Training Areas	Located in an area classified for (Senior Officer) Family Housing
Air Quality and Climate	Particulate matter (such as dust from construction) is regulated.
Noise	Construction will generate noise levels above the baseline conditions, construction noise will be transient and generally limited to daylight hours.
Water Resources, Including, Floodplains, Surface Water and Hydrogeology/Groundwater	Located in the Eastgate Road watershed; not within .25 miles of a perennial stream or stormwater drainageway
Geology and Soils	The construction site is situated on approximately 2 acres of soils with high erosion potential.
Infrastructure	Existing utilities and roadways are adequate to support the anticipated additional demand generated by the construction of these quarters.
Permits and Regulatory Authority	No permits will be required.
Biological Resources (including Federal T & E Species, Other Protected Species, Wetlands, Aquatic Resources, and Terrestrial Resources)	Project site consists of approximately 2 acres of grassland/old field, with approximately 1.4 acres of medium quality Indiana bat habitat potentially impacted by the construction effort.
Cultural Resources	Archaeological surveys of the proposed construction site have been conducted and "no effect" is anticipated on archaeological or historic properties.
Quality of Life (including Human Health and Safety)	No impacts on the installation's quality of life are expected to occur.
Operational Efficiency	Location of the quarters at this site will facilitate "official" entertainment responsibilities and minimize additional security issues.
Source: Harland Bartholomew & Associates, Inc.	

Discussion of the combined impacts of the project packages comprising the land use and facility plans are discussed in Volume I, subsections 5.3.2, 5.3.3 and 5.3.4. As discussed in subsection C.3.3.1.4 above, the review of alternative construction sites for this project resulted in the selection of a single site along the northeast side of Piney Hills Drive as the proposed development site for this project under each of the land use and facility plans.

C.3.3.2 Sixteen-Building Military Operations in Urbanized Terrain Facility, Project 45892

C.3.3.2.1 Goal. The goal of the 16-Building MOUT construction project package is to provide a facility that will be used to train soldiers from the Military Police School in the tactics and techniques of Military Operations in Urbanized Terrain. Based on the number of students that will be trained and the type of training that they will receive at the facility, the Military Police School is authorized a 16-building MOUT training facility.

The Engineer School has an authorized requirement for a 32-building MOUT, and although a project has been identified to construct a 32-building MOUT, funding for the construction of this facility has not been available.

C.3.3.2.2 Construction/Non-Construction Alternatives Considered. In addition to the non-construction alternatives discussed in subsection C.2.2, the following alternatives were developed for this identified requirement.

C.3.3.2.2.1 Convert Available Facilities at FLW. FLW currently uses several temporary "World War II era" wooden facilities located near the southwest corner of the cantonment. These facilities would require expansion, modernization and modification to meet the full training intent of Military Police School requirements.

C.3.3.2.2.2 New Construction, Construct a 16-Building MOUT. This alternative would construct a 16-Building MOUT designed to support the training requirements of the Military Police School.

C.3.3.2.2.3 New Construction, Construct a 32-Building MOUT. This alternative would construct a 32-Building MOUT designed to support the training requirements of the Military Police School which would also meet the training requirements of the Engineer School for a larger facility. The basis for this alternative would be a 35 percent design that has already been completed, but is no longer included in the funded military construction program for FLW. This alternative was determined to be non-viable based on mandated policy that BRAC construction projects may not be used to correct existing facilities deficiencies at receiving installations. This alternative would construct a larger facility than is needed by the Military Police in order to correct an existing facilities shortfall at the Engineer School.

C.3.3.2.2.4 New Construction, Construct 16 buildings from the 32-Building MOUT. This alternative would construct only 16 buildings (of the 32-Building MOUT project discussed in subsection C.3.3.2.2.3) to meet the training requirements of the Military Police. The remaining 16 buildings would be constructed at a later date when funding was available. This alternative was determined to be non-viable based on a review of the ability of the partial facility with only 16 buildings to meet the intent of Military Police training. Following this review it was determined that the effectiveness of Military Police training would be reduced in the interim period when only 16 of the 32 buildings were available. Consequently this alternative was determined to be non-viable.

C.3.3.2.2.5 Leasing of Facilities in the Surrounding Community. Appropriate facilities are not available for lease in the surrounding community.

C.3.3.2.3 Selection of the Army's Proposed Construction/Non-Construction Alternative. Construction of a 16-Building MOUT tailored to meet the training requirements of the Military Police School was selected as the proposed alternative. Mission training requirements completed by the Military Police School can only justify a 16-Building MOUT; therefore, the added cost of constructing a 32-Building MOUT (to meet the training requirements of the Engineer School) would be a violation of BRAC funding policy. Review of the alternative of constructing only 16 buildings of the proposed 32-Building MOUT, so that the remaining buildings would be constructed later, revealed that the training environment created by the 16 building partial facility would not be conducive to Military Police School requirements.

Consequently, two construction/non-construction alternatives were determined to be viable:

- the conversion and expansion of the existing WW II era facilities near the 800-area; and
- the construction of a 16-Building MOUT.

Implementation of either construction/non-construction alternative will provide a 16-building MOUT training facility. This facility is to be used to train soldiers in the Military Police School (and the Engineer School) in tactics and techniques for MOUT operations under simulated combat conditions.

The MOUT complex will be a non-live fire company collective training facility. The MOUT will include 16 buildings (9 intact and 7 partially reduced to rubble) with streets, parking, underground sewer network, information systems and other features required to simulate an urban setting. This alternative is reflected as the Army's Proposed Action in Section 2, subsection 2.4.2.7 of the EIS.

C.3.3.2.4 Rationale for Selection of the Army's Proposed Construction Site Alternatives. Sites that were initially considered for the construction of the 16-Building MOUT facility included the following:

1) the site originally proposed for the 32-Building MOUT (which has been designed to the 35 percent level) along the western side of Training Area 238;

2) a site at Training Area 70, which is located along the eastern side of the installation near the Big Piney River;

3) a site southwest of the 800-area near the southern end of the cantonment (defined by Indiana Avenue (closed) on the west, South Dakota Avenue on the North, Alabama Avenue on the east, and Artillery Circle on the south);

4) a site at the northeast end of Babb Airfield; and

5) a site near Firing Point 10 which is slightly more than three miles west of Range Control.

Each of these areas provide a location that would be near existing training and maneuver areas, near an existing all-weather road, and that is outside of range safety zones and safety fans. Although a location near other training areas and near an existing all-weather road was desired; only sites that are located outside of existing and proposed range safety zones and safety fans were considered reasonable.

During a secondary screening of these five alternative sites, it was determined that three of the sites were clearly less favorable than the two remaining sites. Consequently, three sites were eliminated from further consideration.

- The site at Training Area 70 was eliminated from further consideration as construction of the facility and the types of training which would be conducted at the training area could result in unacceptable impacts on bald eagles (Federally threatened), cerulean warblers (Federal species of concern) and red-shouldered hawks (State protected) which are known to occasionally be present near the area. Additionally, training at the MOUT will include the use of obscurant grenades, which emit small quantities of smoke. Given the proximity of Training Area 70 to the installation boundary it was feared that, depending upon wind direction and air stability class, the obscurant cloud from the facility would drift across the installation boundary.

- The site at Babb Airfield was eliminated from further consideration, as construction of the MOUT would severely limit the use of the area as an expedient airfield, and as discussed in subsection C.3.3.7.4 below, this particular area was also considered as a potential training area for multiple training requirements. Construction of the MOUT would prohibit the area from supporting the types of training that are currently performed in the area and the other new training requirements that may be placed there. Additionally, construction of the MOUT near the northeast end of Babb Airfield could have adverse impacts on Indiana bats (Federally endangered) which have been known to use Wolf Den Cave that is located near the site.

- The site near Firing Point 10 was not preferred because it would result in: increased travel times for Military Police OSUT, NCO and Officer students who will be the primary users of the MOUT; extensive tree clearing requirements and the associated impact on vegetation and wildlife; extensive surface preparation and surface grading requirements which would increase the construction expense and the potential for soil erosion; and construction expense associated with a requirement to upgrade and extend approximately 3.3 miles of electrical service from the Range Control area to the proposed training site.

Advantages of the Proposed Sites. The two remaining sites each offered distinct advantages and were carried forwarded for complete environmental analysis in Section 5.

Advantages of using the renovated WW II era wood facilities site near the intersection of South Dakota and Indiana/Alabama avenues, and southwest of the 800-area include the following:

- reduced travel time between the proposed billeting locations for Military Police students and the training area, including the potential for Military Police One Station Unit Training students to march from their other training areas to the MOUT;

- adequacy of existing roadways and utility infrastructure systems to support construction and ongoing training requirements;

- minimal tree clearing (when compared to the sites eliminated from consideration), as the site is mostly grassland;

- minimal site grading requirements, as the site is relatively level, thereby reducing construction requirements and the potential for soil erosion during construction; and

- reduced initial construction costs.

Continued use of this site would, however, reduce training efficiency and realism when compared to the other site (the site originally proposed for the 32-Building MOUT), as the use of obscurant systems in this area is restricted. The use of obscurant systems during MOUT training adds realism to the training scenarios, thereby increasing the effectiveness of the training.

Advantages of using the site originally proposed for the 32-Building MOUT include the following:

- minimal tree clearing, as the site includes mostly grassland coverage;

- minimal potential for noise or drifting obscurant clouds from the facility to affect surrounding land uses and functions, as the site is relatively isolated;

- minimal site grading requirements, as the site is relatively level, thereby reducing construction requirements and the potential for soil erosion during construction; and

- location relative to Babb Airfield, allowing training associated with both facilities and wooded areas.

After reviewing the advantages and disadvantages of the two remaining sites the FLW DPW Master Planner, in coordination with representatives of the FLW DPW Environment, Energy and Natural Resources Division and the using activities, determined that either of the remaining sites would be able to support minimum training requirements. Consequently:

- the site originally proposed for the 32-Building MOUT was included in the Combined Headquarters and Instruction Land Use Plan as that is the preferred land use and facility plan (as discussed in subsection C.4.2 below);

- the site south of the 800-area will be evaluated for environmental impacts as part of the Combined Headquarters Land Use Plan; and

- the site originally proposed for the 32-Building MOUT will also be included in the analysis of the Separate Headquarters Land Use Plan.

Development of the Separate Headquarters Land Use Plan for several other construction projects will concentrate development near the 800-area site, making that site less desirable as an element of that plan. Table C.4 provides a summary of the potential MOUT sites.

Table C.4: Alternative Sites for the 16-Building MOUT Construction Project Package			
Project Requirements	**Combined Headquarters**	**Separate Headquarters**	**Combined Headquarters and Instruction**
	(shown on Figure 3.5)	(shown on Figure 3.7)	(shown on Figure 3.3)
16 Building MOUT	Renovation of existing WW II era wood facilities and the construction of approximately 78,500 square feet of new facilities near the intersection of South Dakota and Indiana/Alabama avenues, and southwest of the 800-area (site-7)	New Construction, North of Babb Airfield (site-7)	New Construction, North of Babb Airfield (site-7)
Source: Harland Bartholomew & Associates, Inc.			

The BRAC facility locator numbers relate each support project to Figures 3.2 through 3.7 and Table 3.2 (which are located in Section 3, Description of Alternatives - Including the Proposed Action) which have been included to illustrate the general location of all projects under each development alternative.

Subsection C.3.3.2.5 below contains criteria for analyzing the implementation of the proposed action at these alternative sites.

C.3.3.2.5 Analysis Criteria for Implementing the Proposed 16-Building MOUT Alternatives. The basis and framework for analyzing the potential impacts of implementing each of the construction alternatives are summarized on Table C.5 below.

Table C.5: Analysis Criteria for Implementing Proposed 16-Building MOUT Alternatives			
Resource Category	**Combined Headquarters Land Use and Facility Plan**	**Separate Headquarters Land Use and Facility Plan**	**Combined Headquarters and Instruction Land Use and Facility Plan**
	(shown on Figure 3.5)	(shown on Figure 3.7)	(shown on Figure 3.3)
Land Use and Training Areas	reclassification of approximately 27 acres of industrial land use to Training	located in an area classified for this land use	same as the SH LU & FP
Air Quality and Climate	Particulate matter (such as dust from construction) is regulated.	same as the CH LU & FP	same as the CH LU & FP
Noise	Construction will generate noise levels above the baseline conditions - noise will be transient and generally limited to daylight hours. Training area will be located at the southern end of the cantonment.	Construction will generate noise levels above the baseline conditions - noise will be transient and generally limited to daylight hours. Training area will be isolated from the cantonment and other non-range/training area activities.	same as the SH LU & FP
Water Resources (including, Floodplains, Surface Water and Hydrogeology/Groundwater)	located in the Pond/Ballard Hollow watershed, near the intersection of South Dakota and Indiana/Alabama avenues, involves use of existing buildings	located in the Smith Branch watershed, north of Babb Airfield; located within .25 mile of a stormwater drainageway	same as the SH LU & FP
Geology and Soils	renovation of WW II-era wooden facilities - no soils affected	site of approximately 9 acres situated on soils of low erosion potential	site of approximately 9 acres situated on soils of low erosion potential

Table C.5: Analysis Criteria for Implementing Proposed 16-Building MOUT Alternatives			
Resource Category	**Combined Headquarters Land Use and Facility Plan**	**Separate Headquarters Land Use and Facility Plan**	**Combined Headquarters and Instruction Land Use and Facility Plan**
	(shown on Figure 3.5)	(shown on Figure 3.7)	(shown on Figure 3.3)
Infrastructure	existing utilities and roadways adequate to support the anticipated additional demand generated	Electrical service will be extended approximately 1.2 miles to MOUT site.	same as the SH LU & FP
Permits and Regulatory Authority	may require permit for construction over 5 acres	same as the CH LU & FP	same as the CH LU & FP
Biological Resources (including Federal T & E Species, Other Protected Species, Wetlands, Aquatic Resources, and Terrestrial Resources)	renovation of WW II-era wooden facilities and the construction of new facilities nearby	situated on approximately 9 acres of grassland/old field	situated on approximately 3 acres of developed land, 4 acres of shrub/forest and 2 acres of grassland/old field
	situated on approximately 7.5 acres of Indiana bat habitat and 22.6 acres of Gray bat habitat.	situated on approximately 4 acres of Indiana bat habitat.	same as the SH LU & FP
Cultural Resources	surveys conducted and "no effect" established	same as the CH LU & FP	same as the CH LU & FP
	New construction of approximately 78,500 gross square feet will be required.	same as the CH LU & FP	same as the CH LU & FP
Quality of Life (including Human Health and Safety)	Training area will be located at the southern end of the cantonment, resulting in potential impacts on nearby building occupants.	Training area will be isolated from the cantonment and other non-range/training area activities eliminating potential impacts on nearby building occupants.	same as the SH LU & FP
Operational Efficiency	Reduced travel time between billeting and general instruction areas and the training facility.	Increased travel time between billeting and general instruction areas and the training facility. Provides increased training realism, efficiency when compared to the CH LU & FP.	same as the SH LU & FP
Source: Harland Bartholomew & Associates, Inc.			

C.3.3.3 Chemical Defense Training Facility, Project 45893

C.3.3.3.1 Goal. The CDTF construction project package is needed to construct a toxic-agent applied instruction facility which will allow realistic training of military personnel on the detection and identification of toxic agents, and decontamination of personnel, personal equipment and unit equipment. Training alternatives that would attempt to accomplish that training goal without the use of toxic chemicals were determined to be non-viable, as was the use of only one agent, such as GB (as discussed in Volume IV). The unique training environment offered by toxic agent training is critical in building confidence in Chemical specialists in both their skills and their personal protective procedures and equipment.

C.3.3.3.2 Construction/Non-Construction Alternatives for Providing Facilities. In addition to the non-construction alternatives discussed in Section C.2, the following alternatives were developed for this identified requirement.

- **Convert Existing FLW Facilities.** There are no existing facilities available at FLW suitable for conversion into a chemical defense training facility. Due to the unique nature of the mission and the requirement for a 985 feet (300 meters) radius security zone around the facility, use of existing facilities is considered non-viable.

- **Lease Existing Facility near FLW.** There are no existing facilities available for lease near FLW suitable for conversion into a chemical defense training facility.

- **New Construction.** Construct a new CDTF to fulfill the unique mission requirement of training U.S. and foreign military and civilian personnel in chemical decontamination.

- **Exterior Training.** The use of exterior training for this type of activity would result in unacceptable environmental and human health risks. Consequently, this alternative is considered non-viable.

C.3.3.3.3 Selection of the Army's Proposed Construction/Non-Construction Alternative. Due to the unique and environmentally sensitive nature of the mission and the requirement for a 985 feet (300 meters) radius security zone around the facility, new construction outside the cantonment area was determined to be the only viable option. During a review of potential construction sites, a total of 17 locations were reviewed. This review included a screening of all 17 sites, which led to the selection of three alternative site locations which are included as part of the three composite land use and facility siting plans to be further evaluated in the EIS.

C.3.3.3.4 Rationale for Selection of the Army's Proposed Construction Site Alternatives. Alternative sites considered for the construction of the CDTF, as illustrated on Figure C.1, included the following, designated by their center-of-grid coordinates in the military grid system:

1) W743N770
2) W792N755
3) W742N824
4) W734N794
5) W819N795
6) W726N711
7) W735N730
8) W746N742
9) W824N780
10) W735N774
11) W682N690
12) W783N725
13) W751N770
14) W728N741
15) W741N652
16) W666N639
17) W687N674

Each site is numbered to match the listing in Figure C.1. The square in the center of each site is the approximate size (322 yards by 322 yards (268 meters by 268 meters)) of the fenced area of the CDTF while the circular shape around each site marks the approximately location of the 985-foot (300-meter) radius security zone which will be placed around the selected site.

The CDTF is a training area comprised of an administrative area, a training operations area, exhaust filtering equipment area and waste disposal area. Access into the training area is severely restricted due to the nature of the materials used in the training operations. Desirable features for selection of the preferred site include:

- relative flat terrain within the immediate training site to simplify construction;

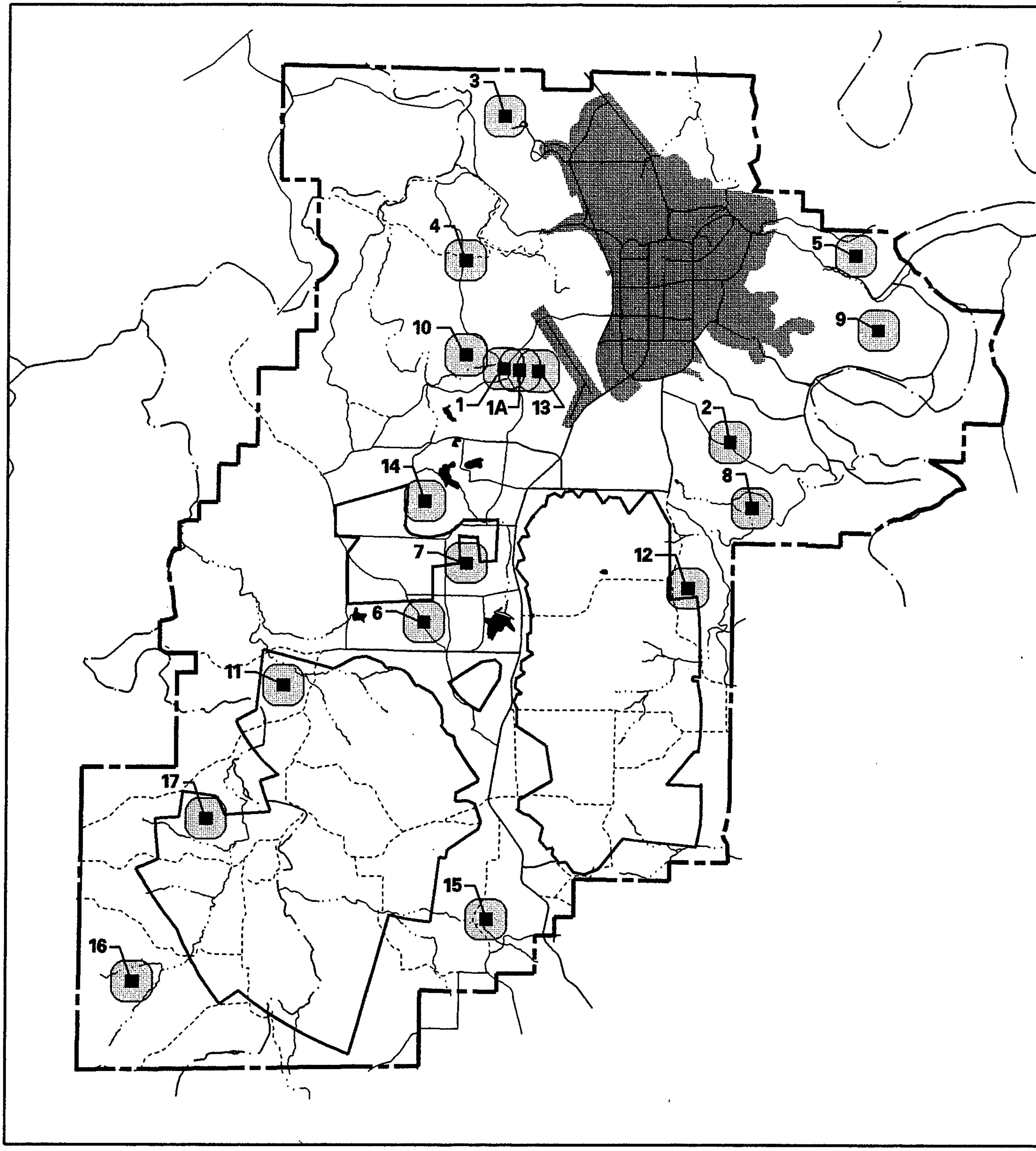
- relative accessibility to utilities;
- ease of control of the restricted access area; and
- minimal conflict in land use both within the restricted area and in close proximity.

During a secondary screening of the 17 sites (based on the criteria listed above) most of the sites were eliminated from further consideration for various reasons, including proximity to the installation boundaries, excessive difficulty in obtaining utilities given the desire for a relatively isolated training site, or conflict with other land uses. Other considerations for the CDTF site included: the direction of the prevailing wind and the avoidance of high accident potential areas (such as being in line with the approach and departure lanes of the airfield).

Advantages of the Proposed Sites. Following completion of the secondary screening of sites, three sites were determined as preferred to the remaining 14 sites based on constructibility; anticipated, relative environmental impacts of construction and operation at each of the sites; and the operationally efficiency of each of the sites. The three preferred sites include CDTF Site 1A, CDTF Site 7, and CDTF Site 15.

CDTF Site 1A, as illustrated on Figure C.1, was developed during the review of potential sites and as part of the selection process. The site located between original sites 1 and 13 eliminates the negatives associated with each of those individual sites and reinforces the positive features of each site. This new site is:

- close to a good road system;
- only lightly used to support other training activities (which can easily be supported by other training areas);
- proximate to utilities (when compared to alternative sites), thereby reducing the length and cost of extending utility systems into the site;
- located so that sanitary sewage from the area could be fed back to the FLW sanitary sewage system, thereby eliminating the need for an additional discharge permit (A sanitary sewage connection is only necessary for routine waste. It will not be possible to feed special waste from the CDTF into the sanitary sewer system.);
- approximately 1.2 miles (2 kilometers) from the nearest permanent housing and over 2.4 miles (4 kilometers) from the installation boundary;
- 1,980 feet (600 meters) to the side of the airfield approach and departure lanes; and
- near the existing fenced airfield, which will make access control relatively easy.



LEGEND:

- Cantonment Area
- Installation Boundary
- All Weather Road
- Seasonal Road
- Creek /River
- Intermittent Stream
- Range Boundary
- Chemical Defense Training Facility

N

0 10000 20000

Scale in Feet

HARLAND BARTHOLOMEW & ASSOCIATES, INC
ST LOUIS, MISSOURI

KANSAS CITY DISTRICT
US ARMY CORPS OF ENGINEERS
KANSAS CITY, MISSOURI

ENVIRONMENTAL IMPACT STATEMENT

RELOCATION OF U.S. ARMY CHEMICAL SCHOOL AND U.S. ARMY MILITARY POLICE SCHOOL TO FORT LEONARD WOOD, MISSOURI

POSSIBLE CHEMICAL DEFENSE TRAINING FACILITY CONSTRUCTION SITES

DATE: **MARCH, 1997** FIGURE NO. **C.1**

CDTF Site 7, as illustrated on Figure C.1, offers the following advantages:

- easy routine and emergency egress; and
- ease in restricting access around the site due to its location near blast zones and dud areas, where access is already restricted, simplifies access control.

Disadvantages of CDTF Site 7 include: the lack of utilities in the general area; and need for an additional discharge permit for a sanitary sewage outfall, or an excessively expensive connection of the sanitary sewage to the existing FLW system. The site will work well for the training requirements, but the increased distance to required utility infrastructure will increase initial construction costs relative to Site 1A above. This site will be evaluated for impacts as part of Alternative 1 Land Use and Facility Plan (Combined Headquarters).

CDTF Site 15, as illustrated on Figure C.1, offers the following advantages:

- easy routine and emergency egress; and
- ease in restricting access around the site (when compared to the other 14 sites, but not when compared to Site 1A or Site 7).

The biggest disadvantages of this site include the lack of utilities in the general area and the resulting requirement for extensive utility extensions, and the need for an additional discharge permit for a sanitary sewage outfall, or an excessively expensive connection of the sanitary sewage to the existing FLW system. The site will work well for the training requirements, but the greater distance to required utility infrastructure will increase initial construction costs relative to Sites 1A and 7 above. This site is approximately only ¼ the distance from the installation boundary as Site 1A and one fifth the distance as Site 7 .

Based on the review of the advantages and disadvantages associated with each of the three CDTF sites the FLW DPW Master Planner, in coordination with representatives of the FLW DPW Environment, Energy and Natural Resources Division and the using activities, determined that each of the three remaining sites were acceptable, would meet minimum training requirements and were consistent with the installation Master Plan (FLW, 1991c) and Training Area Master Plan (FLW, 1991c). Each of the sites will be analyzed in order to afford the decision maker a meaningful choice of sites and range of environmental impacts, consequently:

- Site 1A will be evaluated for environmental impacts in Section 5 as part the Army's Proposed Action Land Use and Facility Plan (Combined Headquarters and Instruction);

- Site 7 will be evaluated as part of Alternative 1 Land Use and Facility Plan (Combined Headquarters); and

- Site 15 will be evaluated as part of Alternative 2 Land Use and Facility Plan (Separate Headquarters).

The three sites are listed on Table C.6. The BRAC facility locator number that has been assigned to this project is site 10. The BRAC facility locator will allow the location of this project on Figures 3.2 through 3.7 and Table 3.2 (which are located in Section 3, Description of Alternatives - Including the Proposed Action) which have been included to illustrate the general location of all projects under each development alternative.

Table C.6: Alternative Sites for the Chemical Defense Training Facility Construction Project Package			
Project Requirements	**Combined Headquarters**	**Separate Headquarters**	**Combined Headquarters and Instruction**
	(shown on Figure 3.5)	(shown on Figure 3.7)	(shown on Figure 3.3)
Chemical Defense Training Facility	New Construction near Range 33 and north of TA 236 (CDTF site 7 during this analysis of CDTF sites but referred to as BRAC facility locator site 10 in other sections of this document)	New Construction near TA 234 (CDTF site 15 during this analysis of CDTF sites but referred to as BRAC facility locator site 10 in other sections of this document)	New Construction, near TA 246, southwest of the Airfield and northeast of Normandy Training Area (CDTF site 1A during this analysis of CDTF sites but referred to as BRAC facility locator site 10 in other sections of this document)
Source: Harland Bartholomew & Associates, Inc.			

Subsection C.3.3.3.5 below contains criteria for analyzing the implementation of the proposed action at these alternative sites.

C.3.3.3.5 Analysis Criteria for Implementing Proposed CDTF Alternatives. The basis and framework for analyzing the potential impacts of implementing each of the construction alternatives are summarized on Table C.7 below.

Table C.7: Analysis Criteria for Implementing Proposed CDTF Alternatives			
Resource Category	**Combined Headquarters Land Use and Facility Plan**	**Separate Headquarters Land Use and Facility Plan**	**Combined Headquarters and Instruction Land Use and Facility Plan**
	(shown on Figure 3.5)	(shown on Figure 3.7)	(shown on Figure 3.3)
Land Use and Training Areas	located in an area classified for this land use - will require establishment of 300-meter radius security buffer	same as the CH LU & FP	same as the CH LU & FP
Air Quality and Climate	Particulate matter (such as dust from construction) is regulated.	same as the CH LU & FP	same as the CH LU & FP
Noise	construction will generate noise levels above baseline conditions - noise will be transient and generally limited to daylight hours	same as the CH LU & FP	same as the CH LU & FP
Water Resources (including, Floodplains, Surface Water and Hydrogeology/Groundwater)	located in the Smith Branch watershed, near Range 33 and north of TA 236; not within .25 mile of perennial stream or stormwater drainageway	located in the Turnbull/Musgrave Hollow watershed, near TA 234; located within .25 mile of a stormwater drainageway	located in the Smith/Ballard Hollow watershed, near TA 246, southwest of the airfield and northeast of Normandy Training Area; not within .25 mile of a perennial stream or stormwater drainageway
Geology and Soils	situated on approximately 27 acres of soil with low erosion potential	situated on approximately 26 acres of soil with high erosion potential	situated on approximately 23 acres of soil with low erosion potential
Infrastructure	new groundwater well and two water storage tanks required - approximately 1.5 miles of new sewer lines, 1.5 miles of new natural gas lines and 0.7 mile of new electrical line required - approximately 1.5 miles of existing electrical lines to be upgraded	new groundwater well and two water storage tanks required - approximately 8 miles of new sewer lines, 8 miles of new natural gas lines and 7 mile of new electrical line - approximately 1 mile of existing electrical lines to be upgraded	approximately 2.4 miles of new water distribution lines, 2.5 miles of new sewer lines 2.2 miles of new natural gas lines and 0.7 mile of new electrical line required - approximately 1.5 miles of existing electrical lines to be upgraded

Table C.7:
Analysis Criteria for Implementing Proposed CDTF Alternatives

Resource Category	Combined Headquarters Land Use and Facility Plan	Separate Headquarters Land Use and Facility Plan	Combined Headquarters and Instruction Land Use and Facility Plan
	(shown on Figure 3.5)	(shown on Figure 3.7)	(shown on Figure 3.3)
Permits and Regulatory Authority	may require permit for construction over 5 acres	same as the CH LU & FP	same as the CH LU & FP
Biological Resources (including Federal T & E Species, Other Protected Species, Wetlands, Aquatic Resources, and Terrestrial Resources)	situated on approximately 2 acres of developed land, 20 acres of shrub/forest and 5 acres of grassland/old field	situated on approximately 26 acres of shrub/forest	situated on approximately 2 acres of developed land, 19 acres of shrub/forest and 2 acres of grassland/old field
	situated on approximately 2.3 acres of Indiana bat habitat	situated on approximately 21 acres of Indiana bat and 3.8 acres of Gray bay habitat	situated on approximately 23.2 acres of Indiana bat habitat
Cultural Resources	surveys conducted and "no effect" established	same as the CH LU & FP	same as the CH LU & FP
Quality of Life (including Human Health and Safety)	approximately 3.4 miles from installation boundary	approximately .6 mile from installation boundary	approximately 2.6 miles from installation boundary
Operational Efficiency	location is easily secured due to minimizing security concerns	location does not offer the same degree of ease in being secured as the CH LU & FP	same as the CH LU & FP

Source: Harland Bartholomew & Associates, Inc.

C.3.3.4 General Instruction Facility, Project 46090

C.3.3.4.1 Goal. The goal of the General Instruction Facility construction project package is to provide both general instruction and applied instruction facilities that will be required to meet the officer and senior enlisted training requirements of the Military Police School and Chemical School. A total of approximately 395,000 square feet will be required to support these requirements. Unique facility requirements that must be provided include: both the community and technical library facilities; general instruction classrooms, instructor preparation and general administration areas; secure administration areas; FOX vehicle simulator bays; FOX VOS-25 trainer and FOX MM1 trainer areas; BIDS simulator bays and Component laboratories; a radiological laboratory; computer labs; a vulnerability assessment lab; crime scene rooms; a Contingency Support Mobile Training Facility; and a Dragon Warfighter simulator center.

C.3.3.4.2 Construction/Non-Construction Alternatives Considered. In addition to the non-construction alternatives discussed in Section C.2, the following alternatives were developed for this identified requirement.

C.3.3.4.2.1 Conversion of Existing Available Facilities at FLW. There is no excess capacity in existing permanent facilities available for conversion to general instruction and administrative use which could fully support the additional requirements identified in this project. There are several relatively small facilities available which could be used to offset part of the overall construction requirement. However, these facilities are relatively isolated and would significantly increase logistic support requirements. Conversion of all of the facilities that have been identified as available, as discussed in Table C.2, would not provide an adequate amount of area to support all identified requirements; therefore, this alternative is considered non-viable.

C.3.3.4.2.2 Renovation of Existing Facilities at FLW. Existing permanent general instruction and administrative facilities are available for use to offset part of the identified requirements included in this project. The capacity of the existing facilities cannot satisfy the entire general instruction and administrative requirements. Therefore, this alternative is considered non-viable by itself. Minor interior alterations associated with renovating existing available spaces are included in Alternative C.3.3.4.2.3.

C.3.3.4.2.3 Reuse Existing followed by Construction of New Facilities at FLW. Depending on the BRAC land use plan being considered, a total of approximately 95,000 square feet of available area in Lincoln and Hoge halls, and the library shelf space available in Clarke Hall would be used to offset part of the total BRAC construction effort identified for this project. Consequently a minimum total of approximately 300,000 square feet of additional area would be needed to support identified requirements. The "Separate Headquarters" land use plan will establish new libraries for the Chemical and Military Police schools, increasing this total construction requirement by approximately 18,000 square feet.

C.3.3.4.2.4 New Construction. This alternative includes the construction of new facilities to support identified Chemical and Military Police school requirements. This alternative will include the construction of an estimated 395,000 square feet of new general instruction classrooms and support facilities.

C.3.3.4.3 Selection of the Army's Proposed Construction/Non-Construction Alternative. Alternative C.3.3.5.2.3, Reuse of Existing Facilities followed by New Construction and Alternative C.3.3.5.2.4, New Construction were determined to be the only viable alternatives. The added implementation of costs associated with the construction of all new facilities, when there are existing, available facilities at FLW that may be used to offset part of the construction requirement resulted in the selection of Alternative C.3.3.5.2.3 as the proposed alternative. Additionally, the use of existing, available areas in Hoge, Lincoln and Clarke halls increases potential for positive synergistic impacts as a result of increased interaction between the schools. This alternative is reflected as the Army's Proposed Action in Section 2, subsection 2.4.2.1 of the EIS.

C.3.3.4.4 Rationale for Selection of the Army's Proposed Construction Site Alternatives.

This project consists of six functional requirements, including:

- Headquarters (administrative areas) for the Chemical School and Military Police School;
- Officer general and applied instruction classrooms;
- Non-Commissioned Officer general and applied instruction classrooms;
- Base Support administrative areas;
- Unit administrative areas for the 11th Chemical Corps and the 20th Chemical Detachment; and
- Research Support/Library facilities.

The process delineated below was used to develop criteria that would be used in identifying facility size and location requirements.

1) Existing facilities used at Fort McClellan were reviewed to assist in the determination of facilities requirements for specific training elements. The existing facilities at FMC provide the specialized learning environments to conduct the unique applied instruction courses for the Military Police School and Chemical School. The amount of area provided at FMC was also compared against standard Army allowances for similar facilities to develop a summary Tabulation of Existing and Required Facilities for the proposed action (FLW, 1995d).

2) Existing, available facilities at FLW were assessed for their ability to offset part of the construction requirement. With minor exceptions, it was determined that most existing permanent training facilities at FLW are fully utilized and other on-post structures are unsuitable or uneconomical for renovation and conversion. However, areas within Hoge Hall (the Engineer Center Headquarters), Lincoln Hall (which contains Engineer School classrooms and administrative support areas) and Clarke Hall (which houses the FLW community library and the Engineer School library) were identified as being able to offset some of the identified requirements.

3) Alternative siting plans for each of the functional requirements were developed, based on various concepts for the long-term operation and management of the installation. Three alternatives for the long-term operation and management of the installation initially emerged as the prevailing concepts for the development of the installation. As discussed in subsection C.3.3 (above) these three plans included:

   a) The **Separate Headquarters** Land Use and Facility Plan;

   b) The **Combined Headquarters** Land Use and Facility Plan; and

   c) The **Combined Headquarters and Instruction** Land Use and Facility Plan.

   Section C.4 (below) contains a summary of the selection process used to identify which of the three land use and facility siting plans would become the Army's Proposed Action.

Advantages of the Proposed Sites. The alternative sites that were reviewed for meeting the six functional operational requirements (Headquarters, Officer Classrooms, Non-Commissioned Officer Academy Classrooms, Base Support Administrative, Unit Administrative, and Research Support/Library areas) identified above included those summarized below. The summary captures the relative advantages and disadvantages of the sites that were reviewed. These differences were used by the FLW DPW Master Planner, in coordination with the FLW DPW Environment, Energy and Natural Resources Division and the using activities, to determine the preferred sites that would be included in each of the land use and facility plans for each of the functional requirements.

Headquarters. Sites considered for the construction of the Headquarters for the Chemical and Military Police School included the following.

1) An area near the intersection of Artillery Circle and Iowa Avenue for the Chemical School Headquarters and an area near the intersection of South Dakota Avenue and West Nineteenth Street for the Military Police School Headquarters. This site was selected as the most desirable location for construction of the Separate Headquarters (if the Separate Headquarters LU & FP is implemented) as it contains adequate utility connections, relatively good access to installation roadways, and provides adequate area for the construction of the required facilities.

2) The reallocation of areas within Hoge Hall and Lincoln Hall, with the construction of additional facilities as required to augment those available was selected as the preferred location for the headquarters if either the Combined Headquarters or the Combined Headquarters and Instruction LU & FP were implemented. This location would place the three headquarters in one complex; most effectively use the existing, available space in Hoge, Lincoln and Clarke halls identified on Table C.2 (located on page C-7) above; and provide direct access for off-post and on-post traffic.

3) The construction of a new consolidated headquarters for all three schools was also considered. Although viable, this alternative is not reasonable given the amount of area that would be required, the condition of Hoge and Lincoln halls, and the added cost to construct a new headquarters for the Engineer functions. Consequently this alternative, regardless of location, was eliminated from further consideration.

4) The renovation and expansion of Building 315, which was eliminated from further consideration since this alternative would require the relocation of the current occupants into other new facilities that would need to be constructed, at additional cost.

5) The construction of two new headquarters in the area east of the Exchange near Engineer Circle. This alternative was eliminated from further consideration as the area is zoned for community activities; the increased traffic flow in the area would be detrimental to through traffic; and the traffic generated by the new facility would degrade the quality of the recently completed Guest Quarters on Engineer Circle.

6) The construction of new Chemical School and Military Police School headquarters in the currently open area near the intersection of South Dakota Avenue and Big Piney Road. This alternative was eliminated following the initial review of alternative sites as it would infringe on the open and recreational area at the heart of the cantonment. One of the key elements included in the Master Plan of the U.S. Army Engineer Center and Fort Leonard Wood (FLW, 1991c) was maintaining this open/recreational area in the heart of the installation.

Officer Classrooms. Sites considered for the construction of the Officers general and applied instruction areas for the Chemical School and Military Police School included the following.

1) An area near the intersection of Artillery Circle and Iowa Avenue for the Chemical School Headquarters and an area near the intersection of South Dakota Avenue and West Nineteenth Street for the Military Police School Headquarters. These sites are located in an area that would complement the site selected for the headquarters (as discussed above). The sites contain adequate utility connections, relatively good access to installation roadways, and provide adequate area for the construction of the required facilities. Consequently this site was selected for inclusion in the Separate Headquarters LU & FP.

2) The reallocation of areas within Hoge Hall and Lincoln Hall, with the construction of additional facilities as required to augment the available area, which was selected as the action if either the Combined Headquarters or the Combined Headquarters and Instruction LU & FP are implemented. This alternative provides the highest potential for positive synergistic effects; most effectively use the existing, available space in Hoge, Lincoln and Clarke halls identified on Table C.2 (located on page C-7) above; and provides direct access for off-post and on-post traffic.

3) The construction of a new consolidated Officer classroom facility for all three schools was also considered. Although viable, this alternative is not reasonable given the amount of area that would be required, the condition of Hoge and Lincoln halls, and the added cost to construct a new headquarters for the Engineer functions. Additionally, the construction of new Officer classrooms at a location other than near the existing Engineer campus would reduce the effectiveness of having Clarke Library proximate to the Officer classrooms. Consequently, this alternative, regardless of location, was eliminated from further consideration.

4) The renovation of two available rolling pin barracks to provide classrooms and support areas, along with the construction of additional facilities west of the 600-area barracks (in the area currently occupied by Training Area 93) was considered. This alternative was eliminated, however, after an initial cost estimate to convert a typical rolling pin barracks in the 600-area to classrooms indicated that the cost of renovation would exceed the cost to construct a new facility. Additionally, this alternative would have eliminated the Basic Training physical training area and placed Officer training in an area proximate to Basic Training, thereby resulting in adverse disruptive impacts on the Basic Training.

5) The construction of new facilities for Officer training in the area north of First Street and east of the intersection of First Street and Nebraska Avenue. This area was eliminated from further consideration as it would separate officer training from the existing facilities without providing a truly separate headquarters, thereby not meeting the objective of either the Combined Headquarters/Combined Headquarters and Instruction Land Use and Facility Plan or the Separate Headquarters Land Use and Facility Plan.

Non-Commissioned Officers Academy. Sites considered for the construction of the Non-Commissioned Officers Academy general and applied instruction areas for the Chemical School and Military Police School included the following.

1) The reallocation of existing rolling pin barracks in the 1000-area (near the existing Engineer Non-Commissioned Officers Academy. This was selected as the preferred action if the Separate

Headquarters or Combined Headquarters LU & FP is implemented. This alternative would result in the least amount of initial construction costs and environmental impact, and the least amount of disruption in the ongoing operation of the Engineer NCO Academy. Collocation of the NCO academies in the 1000-area would also separate these functions from the Basic Training and One Station Unit Training functions in the 600- to 800-area barracks.

2) The reallocation of areas within Hoge Hall and Lincoln Hall, with the construction of additional facilities as required to augment the available area was selected as the preferred action if the Combined Headquarters and Instruction LU & FP are implemented. This alternative provides the highest potential for positive synergistic effects; most effectively uses the existing, available space in Hoge, Lincoln and Clarke halls identified on Table C.2 (located on page C-7) above; allows additional elements of NCO training to be combined thereby reducing long-term staff requirements; and provides direct access for off-post and on-post traffic.

3) The renovation of two available rolling pin barracks to provide classrooms and support areas, along with the construction of additional facilities west of the 600-area barracks (in the area currently occupied by Training Area 93) was considered. This alternative was eliminated, however, after an initial cost estimate to convert a typical rolling pin barracks in the 600-area to classrooms indicated that the cost of renovation would exceed the cost to construct a new facility. Additionally this alternative would have eliminated the Basic Training physical training area and placed Officer training in an area proximate to Basic Training, thereby resulting in adverse disruptive impacts on the Basic Training.

4) The construction of new facilities for Non-Commissioned Officer training in the area west of the Specker Barracks administrative facilities and east of Nebraska Avenue. This site would be directly south of the new UEPH barracks, if the site in the 1900-area was selected for the construction of the facilities. This site was determined to be less desirable than the collocation of facilities near Lincoln Hall as it would require the duplication of several computer and simulation systems. This location would also make the existing resources in Clarke Hall library less accessible to personnel than the location specified in alternative 2 above. Consequently, this alternative was eliminated from further consideration.

Base Support. Sites considered for the construction of the Base Support administrative areas included the following.

1) The reallocation of areas within Hoge Hall and Lincoln Hall, with the construction of additional facilities as required to augment the available area, was selected as the preferred alternative under each of the alternative land use and facility plans that will be evaluated in the EIS. This alternative allows for the maximum flexibility in the future use of areas; provides the highest potential for positive synergistic effects; most effectively uses the existing, available space in Hoge, Lincoln and Clarke halls identified on Table C.2 (located on page C-7) above; and provides direct access for off-post and on-post traffic.

2) The renovation of an available rolling pin barracks to provide administrative areas. This alternative was eliminated, however, after an initial cost estimate to convert a typical rolling pin barracks in the 600-area to provide administrative area that would be in compliance with current safety and occupancy standards indicated that the cost of renovation would exceed the cost to construct a new facility.

3) The construction of new Base Operations administrative facilities south of First Street and east of Illinois Avenue. This site would allow for the relocation of personnel displaced in the reallocation of area at Hoge and Lincoln halls, and the additional staff that would be relocated from FMC. This alternative was eliminated since the constant foot traffic across First Street would be disruptive to traffic flow, inconvenient during inclement weather, and would result in lost productive time as personnel walked back and forth between the facilities. Additionally, this alternative would have

resulted in the provision of a separate facility that could not be easily reconfigured and reallocated to meet changing personnel levels and mission requirements.

Unit Administration. Sites considered for the unit administrative areas for the 11th Chemical Company and the 20th Chemical Detachment included the following.

1) The reallocation of existing, available areas within the Specker Barracks administrative area. This alternative was determined to be the most effective alternative for all three land use plans, as the space was available and adequate to meet anticipated requirements without modification, and as the most junior personnel attached to these units would be billeted in Specker Barracks.

2) The reallocation of existing, available rolling pin barracks to provide the unit administrative areas. This alternative was eliminated, however, as it would place the unit administrative areas in an area proximate to either Basic Training or One Station Unit Training, thereby resulting in disruptive adverse impacts on these programs.

3) The reallocation of existing, available rolling pin barracks in the 1000-area to provide the unit administrative areas. This alternative was eliminated, however, as it would place the unit administrative areas in the 1000-area while junior personnel would be billeted in the 1700-area. This would require personnel to commute over one mile each way to and from work, a distance that it was anticipated would result in many personnel driving versus walking. The increase in traffic would result in unnecessary congestion on installation roadways, as opposed to no increase in traffic were Specker Barracks to be used.

Research Support/Library. Sites considered for the construction of the Research Support/Library areas for the Chemical School and Military Police School included the following.

1) An area near the intersection of Twentieth Avenue and Caisson Drive that would be used for a collocated Chemical School and Military Police School Library if the Separate Headquarters LU & FP is implemented. This site is located in an area that would complement the sites selected for the headquarters (as discussed above), the site contains adequate utility connections, relatively good access to installation roadways; and provide adequate area for the construction of the required support facilities.

2) The reallocation of areas within Hoge Hall and Clarke Hall, to allow the collocation of the Military Police School Library and the Chemical School Library with the existing FLW community library and the Engineer School Library, would be the preferred alternative if either the Combined Headquarters or the Combined Headquarters and Instruction LU & FP are implemented. This location would require minimal additional construction, thereby reducing initial costs and environmental impacts associated with the construction; would allow for the use of a smaller library staff to be used to support all of the library requirements; thereby reducing long-term operations costs; and allow for the elimination of duplicated volumes currently maintained at the three existing libraries; thereby reducing total storage requirements and the costs associated with procurement of replacement and new editions.

As discussed in the introduction to the Advantages of the Proposed Sites section above, the FLW DPW Master Planner, in coordination with the FLW DPW Environment, Energy and Natural Resources Division and the using activities, reviewed the functional requirements associated with the General Instruction Facility project with respect to six functional operational requirements (Headquarters, Officer Classrooms, Non-Commissioned Officer Academy Classrooms, Base Support Administrative, Unit Administrative, and Research Support/Library areas). Based on a review of the various sites available for meeting each of these six functional requirements the FLW Master Planner selected a preferred site for each of the requirements that would be evaluated for environmental consequences in Section 5. Table C.8 provides a summary of the sites that were selected for each of the functional requirements for each of the land use and facility plans.

Table C.8: Alternative Sites for the General Instruction Facility Construction Project Package			
Project Requirements	**Combined Headquarters**	**Separate Headquarters**	**Combined Headquarters and Instruction**
	(shown on Figure 3.5)	(shown on Figure 3.7)	(shown on Figure 3.3)
Headquarters, Chemical Administration	Located in Lincoln and Hoge halls, and augmented by additional construction north of Lincoln Hall (site-41)	New Construction near the intersection of Artillery Circle and Iowa Ave (site-41)	Located in Lincoln and Hoge halls, and augmented by additional construction north of Lincoln Hall (site-41)
Headquarters, Military Police Administration	Located in Lincoln and Hoge halls, and augmented by additional construction north of Lincoln Hall (site-42)	New Construction, Located near the intersection of South Dakota Ave and West Nineteenth Street (south of the 800-area) (site-42)	Located in Lincoln and Hoge halls, and augmented by additional construction north of Lincoln Hall (site-42)
Officer Instruction, Chemical, General Instruction	Located in Lincoln and Hoge halls, and augmented by additional construction north of Lincoln Hall (site-1)	New Construction, Located near the intersection of Artillery Circle and Iowa Ave (site-1, 2-1A)	Located in Lincoln and Hoge halls, and augmented by additional construction north of Lincoln Hall (site-1)
Officer Instruction, Military Police	Located in Lincoln and Hoge halls, and augmented by additional construction north of Lincoln Hall (site-1)	New Construction, Located near the intersection of South Iowa Ave and West Nineteenth Street (site-1, 2-1A)	Located in Lincoln and Hoge halls, and augmented by additional construction north of Lincoln Hall (site-1)
Non-Commissioned Officer Instruction, Chemical, NCO General Instruction	Convert buildings in the 1000-area for an NCOA (site-2)	Convert building in the 1000-area for an NCOA (site-2)	New Construction, NCOA included in General Instruction Facility north of Lincoln Hall (site-2)
Non-Commissioned Officer Instruction, Military Police	Convert building in the 1000-area for an NCOA (site-2)	Convert building in the 1000-area for an NCOA (site-2)	Located in Lincoln and Hoge halls, and augmented by additional construction north of Lincoln Hall
Base Support, Administrative Area	Located in Lincoln and Hoge halls, and augmented by additional construction north of Lincoln Hall (site-1)	Located in Lincoln and Hoge halls, and augmented by additional construction north of Lincoln Hall (site-1)	Located in Lincoln and Hoge halls, and augmented by additional construction north of Lincoln Hall (site-1)
Unit Administration, 11th Chemical Company	Reallocation of existing, available areas at Specker Barracks administrative area (site-39)	Reallocation of existing, available areas at Specker Barracks administrative area (site-39)	Reallocation of existing, available areas at Specker Barracks administrative area (site-39)
Unit Administration, 20th Chemical Detachment	Reallocation of existing, available areas at Specker Barracks administrative area (site-40)	Reallocation of existing, available areas at Specker Barracks administrative area (site-40)	Reallocation of existing, available areas at Specker Barracks administrative area (site-40)
Research Support/Library, Chemical	Located at Clarke Hall (site-18)	New Construction, Collocated with MP Library near the intersection of Twentieth Avenue and Caisson Drive (site-18)	Located at Clarke Hall (site-18)
Research Support/Library, Chemical, Secure Storage	Located at Hoge Hall (site-1)	New Construction, Collocated with MP Library near the intersection of Twentieth Avenue and Caisson Drive (site-1A)	Located at Hoge Hall (site-1)
Research Support/Library, Military Police	Located at Clarke Hall (site-18)	New Construction, Collocated with Chemical Library near the intersection of Twentieth Avenue and Caisson Drive (site-18)	Located at Clarke Hall (site-18)
Source: Harland Bartholomew & Associates, Inc.			

The BRAC facility locator numbers relate each support project to Figures 3.2 through 3.7 and Table 3.2 (which are located in Section 3, Description of Alternatives - Including the Proposed Action) which have been included to illustrate the general location of all projects under each development alternative.

Subsection C.3.3.4.5 below contains criteria for analyzing the implementation of the proposed action at these alternative sites.

C.3.3.4.5 Analysis Criteria for Implementing Proposed General Instruction Facility Alternatives. The basis and framework for analyzing the potential impacts of implementing each of the construction alternatives are summarized on Table C.9 below.

Table C.9: Analysis Criteria for Implementing Proposed General Instruction Facility Alternatives

Resource Category		Combined Headquarters Land Use and Facility Plan	Separate Headquarters Land Use and Facility Plan	Combined Headquarters and Instruction Land Use and Facility Plan
		(shown on Figure 3.5)	(shown on Figure 3.7)	(shown on Figure 3.3)
Land Use and Training Areas		located in an area classified for this land use	reclassification of approximately 215 acres of Industrial and Troop Housing land use to approximately 64 acres of Administration and 151 acres of Training	same as the CH LU & FP
Air Quality and Climate		Particulate matter (such as dust from construction) is regulated.	same as the CH LU & FP	same as the CH LU & FP
Noise		construction will generate noise levels above baseline conditions - noise will be transient and generally limited to daylight hours	same as the CH LU & FP	same as the CH LU & FP
Water Resources (including, Floodplains, Surface Water and Hydrogeology/ Groundwater)		Chemical Administration and Military Police Administration projects located in Lincoln Hall and Hoge Hall; not within .25 mile of perennial stream or stormwater drainageway	Chemical Administration located in Pond Hollow watershed, near intersection of Artillery Circle and Iowa Avenue - Military Police Administration building located in Dry Creek watershed, near intersection of South Dakota Avenue and West Nineteenth Street; not within .25 mile of perennial stream or stormwater drainageway	Chemical and Military Police Administration building located in Dry Creek watershed, north of Lincoln Hall; not within .25 miles of a perennial stream or stormwater drainageway
Geology and Soils	Headquarters, Chemical Administration	Located in Lincoln Hall and Hoge Hall and in an addition located north of Lincoln Hall. Construction north of Lincoln Hall is situated on approximately 10 acres of soils with high erosion potential and 45 acres of soils with low erosion potential.	situated on approximately 2 acres of soils with high erosion potential and 43 acres of soils with low erosion potential.	Located in Lincoln Hall and Hoge Hall and in an addition located north of Lincoln Hall. Construction north of Lincoln Hall is situated on approximately 10 acres of soils with high erosion potential and 45 acres of soils with low erosion potential
	Headquarters, Military Police Administration	located in Lincoln Hall and Hoge Hall, and in an addition located north of Lincoln Hall (see discussion under **Headquarters,** Chemical Administration)	situated on no soils with high erosion potential and approximately 45 acres of soils with low erosion potential	located in Lincoln Hall and Hoge Hall, and in an addition located north of Lincoln Hall (see discussion under **Headquarters,** Chemical Administration)
	Research Support/Library, Chemical	located in Clarke Hall	situated on no soils with high erosion potential	located in Clarke Hall

Table C.9:
Analysis Criteria for Implementing Proposed General Instruction Facility Alternatives

Resource Category		**Combined Headquarters Land Use and Facility Plan**	**Separate Headquarters Land Use and Facility Plan**	**Combined Headquarters and Instruction Land Use and Facility Plan**
		(shown on Figure 3.5)	(shown on Figure 3.7)	(shown on Figure 3.3)
	Officer Instruction, Chemical, General Instruction	located in Lincoln Hall and Hoge, and in an addition located north of Lincoln Hall (see discussion under **Headquarters**, Chemical Administration)	included Chemical Administration building	located in Lincoln Hall and Hoge, and in an addition located north of Lincoln Hall (see discussion under **Headquarters**, Chemical Administration)
Infrastructure		existing utilities and roadways adequate to support the anticipated additional demand	upgrade of electrical substation No. 1 required	upgrade of electrical substation No. 1 required
		No important changes in traffic volume are anticipated.	No important changes in traffic volume are anticipated.	Missouri Avenue weekday traffic will increase in volume from approximately 24,000 to 31,600 vehicles per day by the year 2000.
Permits and Regulatory Authority	**Headquarters**, Chemical Administration	may require permit for construction over 5 acres	may require permit for construction over 5 acres	may require permit for construction over 5 acres
	Research Support/Library, Chemical	located in Clarke Hall, no permit required	may require permit for construction over 5 acres	same as the CH LU & FP
	Research Support/Library, Chemical, Secure Storage	located at Hoge Hall	collocated with **Research Support/Library**, Chemical	same as the CH LU & FP
	Officer Instruction, Chemical, General Instruction	collocated with **Headquarters**, Chemical Administration	may require permit for construction over 5 acres	same as the CH LU & FP
	Non-Commissioned Officer Instruction, Chemical, NCO General Instruction	involves conversion of buildings in the 1000-Area	involves conversion of buildings in the 1000-Area	collocated with **Headquarters**, Chemical Administration
	Headquarters, Military Police Administration	collocated with **Headquarters**, Chemical Administration	may require permit for construction over 5 acres	collocated with **Headquarters**, Chemical Administration
	Research Support/Library, Military Police	located in Clarke Hall	collocated with **Research Support/Library**, Chemical	same as the CH LU & FP
	Officer Instruction, Military Police	collocated with **Headquarters**, Military Police Administration	collocated, in part, **Officer Instruction**, Chemical, General Instruction	same as the CH LU & FP

Table C.9:
Analysis Criteria for Implementing Proposed General Instruction Facility Alternatives

Resource Category		**Combined Headquarters Land Use and Facility Plan**	**Separate Headquarters Land Use and Facility Plan**	**Combined Headquarters and Instruction Land Use and Facility Plan**
		(shown on Figure 3.5)	(shown on Figure 3.7)	(shown on Figure 3.3)
Biological Resources (including Federal T & E Species, Other Protected Species, Wetlands, Aquatic Resources, and Terrestrial Resources)	**Headquarters,** Chemical Administration	located in Lincoln Hall and Hoge Hall, and in an addition located north of Lincoln Hall (see discussion under Headquarters, Chemical Administration); situated on approximately 27 acres of developed land, 13 acres of shrub/forest, 15 acres of grassland/old field	situated on approximately 17 acres of developed land, 11 acres of shrub/forest, 17 acres of grassland/old field	situated on approximately 27 acres of developed land, 13 acres of shrub/forest, 15 acres of grassland/old field
		no T & E species habitat affected	situated on approximately 1.3 acres of Indiana bat habitat	same as the CH LU & FP
	Research Support/Library, Chemical	located in Clarke Hall	situated on approximately 1 acre of developed land, 1 acre of shrub/forest, 3 acres of grassland/old field	same as the CH LU & FP
	Research Support/Library, Chemical, Secure Storage	located at Hoge Hall	collocated with **Research Support/Library**, Chemical	same as the CH LU & FP
	Officer Instruction, Chemical, General Instruction	collocated with **Headquarters**, Chemical Administration	situated on approximately 27 acres of developed land, 13 acres of shrub/forest, 15 acres of grassland/old field	same as the CH LU & FP
	Non-Commissioned Officer Instruction, Chemical, NCO General Instruction	involves conversion of buildings in the 1000-Area	involves conversion of buildings in the 1000-Area	collocated with **Headquarters**, Chemical Administration
	Headquarters, Military Police Administration	collocated with **Headquarters**, Chemical Administration	situated on approximately 3 acres of developed land, 3 acres of shrub/forest, 39 acres of grassland/old field	collocated with **Headquarters**, Chemical Administration
		No T & E species habitat affected	situated on approximately 2.8 acres of Indiana bat habitat	same as the CH LU & FP
	Research Support/Library, Military Police	located in Clarke Hall	collocated with **Research Support/Library**, Chemical	same as the CH LU & FP
	Officer Instruction, Military Police	collocated with **Headquarters,** Military Police Administration	collocated, in part, **Officer Instruction**, Chemical, General Instruction	same as the CH LU & FP
Cultural Resources		surveys conducted and "no effect" established	same as the CH LU & FP	same as the CH LU & FP

Table C.9: Analysis Criteria for Implementing Proposed General Instruction Facility Alternatives				
Resource Category		**Combined Headquarters Land Use and Facility Plan**	**Separate Headquarters Land Use and Facility Plan**	**Combined Headquarters and Instruction Land Use and Facility Plan**
		(shown on Figure 3.5)	(shown on Figure 3.7)	(shown on Figure 3.3)
Quality of Life (including Human Health and Safety)		No impacts are expected to occur to the installation's quality of life.	same as the CH LU & FP	same as the CH LU & FP
Operational Efficiency		Received the second highest relative score in the analysis contained in subsection C.4.2, provides potential for synergistic effects from officer training.	Received the lowest relative score in the analysis contained in subsection C.4.2, limits the potential for synergistic effects, and fails to capture many long-term costs savings obtained by the other alternatives.	Provides greatest potential for synergistic effects, lowest long-term operations costs, and received highest relative score in the analysis contained in subsection C.4.2
Source: Harland Bartholomew & Associates, Inc.				

C.3.3.5 Applied Instruction Facility, Project 46091

C.3.3.5.1 Goal. The Applied Instruction Facility construction project package has been developed to provide:

- a training district that will be used to teach Military Police the proper methods to be used when patrolling and responding to incidents;
- facilities that will be used to instruct students on the proper use of decontamination equipment and on proper decontamination procedures;
- a humidity controlled facility to house the artifacts of the Chemical and Military Police museums;
- general warehouse facilities to store unique training materials associated with the Military Police School and Chemical School;
- facilities that will be used to instruct students on the proper operation and maintenance of vehicles and equipment assigned to the Military Police School, Chemical School, or operational units that the students may be assigned to after graduation; and
- facilities that will be used to maintain the vehicles and equipment relocated from FMC to FLW as part of the proposed action.

Together the BRAC requirements associated with this project total approximately 345,000 square feet.

C.3.3.5.2 Construction/Non-Construction Alternatives Considered. In addition to the non-construction alternatives discussed in Section C.2, the following alternatives were developed for this identified requirement.

C.3.3.5.2.1 Use of Available Facilities at FLW. There is no excess capacity in existing permanent facilities available for applied instruction use which could fully support the additional BRAC requirements identified in this project. Additionally, the unique applied instruction facility requirements of chemical decontamination training and applied military police training can not be satisfied by existing facilities at FLW. Therefore, this alternative is considered to be non-viable.

C.3.3.5.2.2 Conversion of Existing Available Facilities at FLW. There is no excess capacity in existing permanent facilities available for conversion to applied instruction which could fully support the BRAC related chemical decontamination and military police training requirements identified in this project. There are several relatively small facilities available which could be used to offset part of the overall construction requirement. Depending upon the land use plan that is implemented, many of the identified functions might be housed in existing, available facilities (for example: Building 829 will be converted for use as part of the applied instruction project requirements; an area in the DOL Maintenance Facility (Building 5265) might be used for FOX maintenance and maintenance instruction; buildings 2310 and 2311 might be renovated to provide dedicated storage to units attached to the schools, or part of Walker Museum might be used to support storage and display of Chemical and Military Police artifacts. Table C.2 (located on page C-7) contains a listing of the facilities that have been identified as available at FLW and the intended use for the facilities. The table has been developed to illustrate the different uses for the existing, available facilities based on the land use plan (as discussed in Section C.4) that will be implemented. The remaining available facilities are relatively isolated and would significantly increase logistical requirements. Therefore, the conversion of additional existing available permanent facilities to support identified applied instruction requirements is considered non-viable.

C.3.3.5.2.3 Reuse of Existing Facilities followed by New Construction. This alternative includes the construction of new facilities to support identified Chemical and Military Police unique applied instruction requirements, only after existing available facilities as identified on Table C.2 (located on page C-7) and in Section C.2 are used to the maximum extent possible. The complete support facility requirements associated with this project are delineated in subsection C.3.2.5. This alternative will include the diversion of Building 829 to support Military Police Applied Instruction requirements; and depending upon the land use plan selected:

- the renovation and reallocation of an area in the DOL Maintenance facility (Building 5265) to support Chemical School FOX maintenance, FOX storage, and FOX maintenance instruction;
- the renovation of buildings 2310 and 2311 to provide dedicated storage to units attached to the schools; and
- use of available area at Walker Museum to store and display part of the artifacts from the Chemical and Military Police museums.

In addition to the reuse of the facilities identified, this alternative will include the construction of a minimum of approximately 129,300 square feet of new applied instruction and support facilities. These unique applied instruction facilities will include:

- a decontamination apparatus training facility which will allow Chemical School students hands-on training opportunities with the equipment that they will use in the field (in a non-toxic environment); and
- a Patrol Incident area for use by Military Police students which will include specifically designed crime scenes and support facilities that will assist in the training of Military Police personnel in the proper methods of patrol and investigation.

C.3.3.5.2.4 New Construction. This alternative includes the construction of approximately 345,000 square feet of new facilities to support all identified Chemical and Military Police unique applied instruction requirements as delineated in subsection C.3.2.5. Because this alternative will provide all new facilities, and not reuse existing, available facilities it will inflate initial construction and long-term maintenance costs. It is therefore considered to be non-viable.

C.3.3.5.3 Selection of the Army's Proposed Construction/Non-Construction Alternative. Alternative C.3.3.5.2.3, Reuse of Existing Facilities followed by New Construction and Alternative C.3.3.5.2.4, New Construction were determined to be the only viable alternatives. The added implementation of costs associated with the construction of all new facilities, when there are existing, available facilities at FLW that may be used to offset part of the construction requirement resulted in the selection of Alternative C.3.3.5.2.3 as the proposed alternative. This alternative is reflected as the Army's Proposed Action in Section 2, subsection 2.4.2.2 of the EIS.

C.3.3.5.4 Rationale for Selection of the Army's Proposed Construction Site Alternatives. This project consists of five functional requirements, including:

- Military Police (MP) Village;
- Chemical Decontamination Apparatus Training Facility (DATF);
- an area to house the artifacts of the Military Police Corps Museum and Chemical Corps Museum;
- BIDS and FOX maintenance and instruction area; and
- warehouse storage area for unique instructional materials of the Military Police School and the Chemical School.

The process delineated below was used to develop criteria that would be used in identifying facility size and location requirements.

1) Existing facilities used at Fort McClellan were reviewed to assist in the determination of facilities requirements for specific training elements. The existing facilities at FMC provide the specialized learning environments to conduct the unique applied instruction courses for the Military Police School and Chemical School. The amount of area provided at FMC was also compared against standard Army allowances for similar facilities to develop a summary Tabulation of Existing and Required Facilities for the proposed action (FLW, 1995d).

2) Existing, available facilities at FLW were assessed for their ability to offset part of the construction requirement. With minor exceptions, it was determined that existing permanent training facilities at FLW are fully utilized and other on-post structures are unsuitable or uneconomical for renovation and conversion.

3) Alternative siting plans for each of the functional requirements were developed.

Formulation of the construction alternatives was based on the following assumptions:

- That OSUT (junior enlisted training and indoctrination) activities will be segregated by school.

- Non-Commissioned Officer and Advanced Individual Training (both attended by enlisted personnel), Officer Indoctrination, Junior Officer and Officer Advanced classroom training for the Chemical School, Engineer School and Military Police School would be consolidated where possible or collocated to allow for joint use of facilities. This collocation would be possible because the core of the instruction would involve the use of general instruction classrooms.

In addition to the existing available facilities identified for reuse, listed in Table C.2 (located on page C-7) above, alternative sites for construction were considered.

MP Village. The Military Police training area will consist of a mock Military Police station with crime scenes, a mock confinement facility, a communications lab, a Special Physical Security compound and a Patrolling Incident area.

Sites considered for the construction of the Military Police One Station Unit Training, Patrol Incident Training and applied instruction area (referred to as the MP Village) Applied Instruction Facility included the following:

1) An area near the intersection of Artillery Circle and West Twentieth Street was eventually chosen as the Combined Headquarters site. This choice was based on the complementary functional relationships between the components of this project package. This site contains adequate utility

connections, relatively good access to installation roadways, and provides adequate area for the construction of the required facilities.

2) The 1000-area at the southern end of the cantonment was eventually chosen as the Separate Headquarters site. This choice was based on the complementary functional relationships between the components of this project package. This site contains adequate utility connections, relatively good access to installation roadways, and provides adequate area for the construction of the required facilities.

3) An area southwest of the 800-area was eventually chosen as the Combined Headquarters and Instruction site. This choice was based on the complementary functional relationships between the components of this project package. This site contains adequate utility connections, relatively good access to installation roadways, and provides adequate area for the construction of the required facilities.

4) Training Area 200 at the southern end of the cantonment was eliminated from further consideration based on the construction cost of a required utility-sewage lift station, excessive marching distance to available MP OSUT barracks, a potential lack of area to expand into due to conflicts with airfield safety zones, and possible conflicts with noise from future airfield operations.;

5) Training Area 192 at the southern end of the cantonment was eliminated from further consideration based on the construction cost of a required utility-sewage lift station, marching distance to available MP OSUT barracks (although a shorter distance than to TA 200) is excessive, potential lack of area to expand into due to steep slopes on the site, and conflicting training requirements at the Training Area. Any construction in areas of steep slopes would require extensive earthmoving and the associated cost and the potential for erosion and its related problems.

6) An unnamed cleared area southwest of the intersection of Nebraska Avenue and Artillery Circle was eliminated from further consideration based on potential lack of area to expand into due to steep slopes on the site and clearing requirements. Any construction in areas of steep slopes would require extensive earthmoving and the associated cost and the potential for erosion and its related problems.

7) An area west of the 700-area was eliminated from further consideration based on potential lack of area to expand into due to conflicting training requirements currently being carried out in the area. A determination was also made that Engineer OSUT would remain in the 700-area barracks and the Military Police OSUT would be initially assigned to the 800-area.

Chemical DATF. The Chemical School training area includes construction of applied instruction classrooms and a Decontamination Apparatus Training Facility (DATF). A vehicle maintenance/training building and a vehicle wash rack will be made available in existing facilities for FOX equipment training, but minor modifications to these spaces will be required.

Sites considered for the construction of the Chemical One Station Unit Training, DATF and applied instruction area Applied Instruction Facility included the following:

1) An unnamed cleared area south of the 1000-area barracks and east of Artillery Circle was eventually chosen as the Combined Headquarters site. (This is the same site as number 6 listed under the MP OSUT Village site choices.) This site provides excellent access to an existing range road that could be used for the decontamination line. Use of this range road would allow tracked vehicles to obtain access to the site without crossing installation cantonment area paved roadways.

2) A location near the intersection of Alabama Ave and West Nineteenth Street was eventually chosen as the Separate Headquarters site.

3) A location north of South Dakota Avenue and west of Alabama Avenue and west of the 800-area barracks was eventually chosen as the Combined Headquarters and Instruction site. The site is close to the 800-area, which is where Chemical OSUT soldiers will be housed under this land use plan. The site is directly north of the MP Village, allowing for the sharing of facilities during peak loads. Site development costs are less for this site than for others.

4) Training Area 200 at the southern end of the cantonment was eliminated from further consideration based on the construction cost of a required utility-sewage lift station, marching distance to available Chemical OSUT barracks, a potential lack of area to expand into due to conflicts with airfield safety zones, and possible conflicts with noise from future airfield operations.

5) Training Area 192 at the southern end of the cantonment was eliminated from further consideration based on the construction cost of a required utility-sewage lift station, marching distance to available MP OSUT barracks (although a shorter distance than to TA 200) is excessive, potential lack of area to expand into due to steep slopes on the site, and conflicting training requirements at the Training Area. Any construction in areas of steep slopes would require extensive earthmoving and the associated cost and the potential for erosion and its related problems.

6) An area west of the 700-area was eliminated from further consideration based on potential lack of area to expand into due to conflicting training requirements currently being carried out in the area. A determination was also made that Engineer OSUT would remain in the 700-area barracks and the Military Police OSUT would be initially assigned to the 800-area.

Museums. This project will construct a controlled humidity area to house the artifacts of the Chemical and Military Police museums. Alternative areas to house the artifacts of the Military Police Corps Museum and Chemical Corps Museum included the following:

1) Construction of a new addition to Walker Museum was eventually chosen as the Combined Headquarters option and Combined Headquarters and Instruction option. This location will allow for collocation of the collections, reduce long-term costs for staff support, and provide synergistic effects associated with the collocation of the collections. This site contains adequate utility connections, relatively good access to installation roadways, and provides adequate area for the construction of the required facilities.

2) Conversion of barracks in the 1000-area was eventually chosen as the Separate Headquarters option, as the facilities would be proximate to the new headquarters, this site contains adequate utility connections, relatively good access to installation roadways, and provides adequate area for the construction of the required facilities.

3) Conversion of barracks in the 800-area was eliminated from further consideration since the barracks would be fully utilized under the CH & I and CH plan. The 1000-area is also a more favorable location based on the walking distance from Headquarters sites used in the land use plan.

4) Conversion of barracks in the 600-area was eliminated from further consideration due to conflicts with use of the area for Basic Training. The 1000-area is also a more favorable location based on the walking distance from Headquarters sites used in the land use plan.

5) Conversion and retention of Nutter Field House (temporary building 1067) (versus demolition) was eliminated from further consideration due to the high cost of converting the facility to provide climate control adequate to protect the collections of the museums, as well as the high cost of maintenance of this WW II temporary facility. In addition, due the age of this building, costly lead and asbestos abatement would likely be required with any conversion project.

6) Construction of a new facility south of Walker Museum near the WW II static displays was eliminated from further consideration due to the duplication of facilities which would occur.

Vehicle (BIDS and FOX) Maintenance. This element incorporates two different training requirements, one by the Chemical School and one by the units that will be transferred. Alternative options that were reviewed to facilitate vehicle (BIDS and FOX) maintenance and instruction for BIDS and FOX vehicles and organizational equipment maintenance and instruction included the following.

1) Conversion of an area at the DOL maintenance facility (Building 5265) was eventually selected as the schoolhouse site for the CH & I and SH land use plans. This site meets the criterion of being within walking distance for OSUT students from all sites proposed for billeting and classrooms. This conversion would also be less expensive than new construction and the site also provides the benefits of collocating similar activities. This site contains adequate utility connections, relatively good access to installation roadways, and provides adequate area for the construction of the required facilities.

2) Construction of a BIDS and FOX maintenance training area was incorporated with the Chemical OSUT training facility (No. 1 in the Chemical (OSUT) DATF list above) south of the 1000-area and east of Artillery Circle. This site provides the benefit of collocating functionally similar activities.

3) Reassignment of an area near Buildings 882 and 3000 (west of the 800-area barracks) for organizational maintenance was the option eventually selected for all three land use plans. This reassignment would also be less expensive than new construction and the site also provides the benefits of collocating similar activities. This site contains adequate utility connections, relatively good access to installation roadways, and provides adequate area for the construction of the required facilities.

4) Construction of a new maintenance facility for organizational maintenance west of the 700-area was eliminated from further consideration because existing facilities were determined to be adequate and the extra cost of new construction could not be justified. New construction would be much more expensive than reassignment of existing facilities.

5) Construction of a new maintenance facility for organizational maintenance west of the 800-area. This option was eliminated from further consideration because existing facilities were determined to be adequate and the extra cost of new construction could not be justified.

6) Construction of a new maintenance facility for organizational maintenance southwest of the 800-area. This option was eliminated from further consideration because existing facilities were determined to be adequate and the extra cost of new construction could not be justified.

Warehouse. This project requires warehouse buildings to house the unique instructional materials of the Military Police School and the Chemical School. Alternative storage areas for unique instructional materials of the Military Police School and the Chemical School that were reviewed included the following.

1) An area near the intersection of East Fourth Street and Louisiana Avenue was eventually chosen for new construction as the Combined Headquarters site. This site is in a compatible land use area, would be proximate to other warehouse facilities, and contains adequate utility connections, relatively good access to installation roadways, and provides adequate area for the construction of the required facilities.

2) The 2300-area south of First Street and North of East Second Street, between the railroad tracks was eventually chosen for new construction as the Separate Headquarters site. This site is in a compatible land use area, would be proximate to other warehouse facilities, and contains adequate utility connections, relatively good access to installation roadways, and provides adequate area for the construction of the required facilities.

3) The new construction requirement would be temporarily deferred due to the ability to renovate Buildings 2310 and 2311 for the Combined Headquarters and Instruction site. This site is in a compatible land use area, would be proximate to other warehouse facilities, and contains adequate utility connections, relatively good access to installation roadways, and provides adequate area for the construction of the required facilities. Plus the renovation of existing, available facilities would have lower construction costs from new construction.

4) The new construction requirement would be temporarily deferred due to the ability to renovate Buildings 2563 and 2565. This option was eliminated from further consideration due to conflicts with current usage of those facilities, potential traffic problems near the area and potential lack of area to expand into due to steep slopes on the site.

5) New construction near the site of Building 2563 was eliminated from further consideration due to restricted access, potential traffic problems near the area and potential lack of area to expand into due to steep slopes on the site.

6) Renovation in the basement of Lincoln Hall would collocate instructional material used by the Military Police School and the Chemical School with similar material used by the Engineer School. However, this option was eliminated from further consideration due to insufficient room for all material storage requirements.

7) Renovation in the basement of Hoge Hall was eliminated from further consideration due to the incompatibility of the organization of the space and limited access for moving large items. Large items to be moved include loads of books and educational materials on pallets.

8) New construction south of East Fourth Street and northwest of Minnesota Avenue was eliminated from further consideration due to the amount of earthwork required. The considerable earthwork would elevate the initial construction cost. Extensive earthmoving would also increase the potential for erosion and its related problems.

As described above, implementation of the Applied Instruction Facility project package includes construction and/or renovation at multiple sites. The various functions, and the alternative sites, that are included in this project package are listed on Table C.10.

Table C.10:
Alternative Sites for the Applied Instruction Facility Construction Project Package

Project Requirements	**Combined Headquarters**	**Separate Headquarters**	**Combined Headquarters and Instruction**
	(shown on Figure 3.5)	(shown on Figure 3.7)	(shown on Figure 3.3)
MP Village, Military Police, OSUT	New Construction, MP OSUT located near the intersection of Artillery Circle and West Twentieth Street (site-4)	New Construction, MP OSUT located south of the 1000-area, and east of Artillery Circle (site-4)	New Construction, MP OSUT located southwest of the 800-area (site-4)
Chemical DATF, Chemical OSUT	New Construction, Chemical DATF located south of the 1000 Area, and east of Artillery Circle, to include FOX Maintenance and Maintenance Training area (site-3)	New Construction, Located near the intersection of Alabama Ave and West Nineteenth Street (site-3)	New Construction, Chemical DATF located north of South Dakota Avenue, west of Alabama Avenue, and west of the 800 Area barracks (site-3)
Museum, Chemical	New Construction, addition to Walker Museum (site-19)	Converted 1000-area barracks (site-19)	New Construction, addition to Walker Museum (site-19)
Museum, Military Police	New Construction, addition to Walker Museum (site-19)	Converted 1000 Area barracks (site-19)	New Construction, addition to Walker Museum (site-19)

Table C.10: Alternative Sites for the Applied Instruction Facility Construction Project Package			
Project Requirements	**Combined Headquarters**	**Separate Headquarters**	**Combined Headquarters and Instruction**
	(shown on Figure 3.5)	(shown on Figure 3.7)	(shown on Figure 3.3)
Vehicle (BIDS and FOX) Maintenance, Maintenance and Maintenance Training	New Construction, Chemical DATF located south of the 1000-area, and east of Artillery Circle, to include FOX Maintenance and Maintenance Training area (site-8)	Renovation of Building 5265 for FOX Maintenance and Maintenance Training (site-8)	Renovation of Building 5265 for FOX Maintenance and Maintenance Training (site-8)
Vehicle (BIDS and FOX) Maintenance, Vehicle and Equipment (Organizational), Maintenance in the Cantonment	Maintain the remaining vehicles at existing Directorate of Logistics Maintenance facilities. (site-56)	Maintain the remaining vehicles at existing Directorate of Logistics Maintenance facilities. (site-56)	Maintain the remaining vehicles at existing Directorate of Logistics Maintenance facilities. (site-56)
Vehicle (BIDS and FOX) Maintenance, Vehicle and Equipment (Organizational), Maintenance in the Cantonment	Construct a new organizational vehicle maintenance facility for the 11th Chemical Company near the 800 Area barracks, west of Alabama Avenue in an area near buildings 882 and 3000. (site-57)	Assign an existing unit maintenance facility to the 11th Chemical Company (site-57) Construct additional maintenance (site-57A)	Assign an existing unit maintenance facility (with parking area) to the 11th Chemical Company (site-57)
Vehicle (BIDS and FOX) Maintenance, Vehicle and Equipment (Organizational), Parking/Storage in the Cantonment	Construct a new organizational vehicle maintenance facility (with parking area) for the 11th Chemical Company near the 800-area barracks, west of Alabama Avenue in an area near buildings 882 and 3000. (site-57) Store the remaining vehicles and equipment at existing Directorate of Logistics Maintenance facilities. (site-56)	Assign an existing unit maintenance facility (with parking area) to the 11th Chemical Company (site-57) Maintain and store the remaining vehicles at existing Directorate of Logistics Maintenance facilities. (site-56)	Assign an existing unit maintenance facility (with parking area) to the 11th Chemical Company (site-57) Maintain the remaining vehicles at existing Directorate of Logistics Maintenance facilities. (site-56)
Warehouse/Storage	New Construction, new warehouse near the intersection of East Fourth Street and Louisiana Avenue (site-58)	New Construction, new warehouse constructed in the 2300 Area; south of First Street, north of East Second Street and between the railroad tracks (site-58)	New Construction requirement temporarily deferred through the renovation of buildings 2310 and 2311 (site-58)
Source: Harland Bartholomew & Associates, Inc.			

The BRAC facility locator numbers relate each support project to Figures 3.2 through 3.7 and Table 3.2 (which are located in Section 3, Description of Alternatives - Including the Proposed Action) which have been included to illustrate the general location of all projects under each development alternative.

Subsection C.3.3.5.5 below contains criteria for analyzing the implementation of the proposed action at these alternative sites.

C.3.3.5.5 Analysis Criteria for Implementing Proposed Applied Instruction Facility Alternatives. The basis and framework for analyzing the potential impacts of implementing each of the construction alternatives are summarized on Table C.11 below.

Table C.11:
Analysis Criteria for Implementing Proposed Applied Instruction Facility Alternatives

Resource Category		Combined Headquarters Land Use and Facility Plan	Separate Headquarters Land Use and Facility Plan	Combined Headquarters and Instruction Land Use and Facility Plan
		(shown on Figure 3.5)	(shown on Figure 3.7)	(shown on Figure 3.3)
Land Use and Training Areas		located in an area classified for this land use	same as the CH LU & FP	conversion of approximately 3 acres of Recreation land use to Community Facilities land use - conversion of approximately 53 acres of Industrial land use to Training
Air Quality and Climate		Particulate matter (such as dust from construction) is regulated.	same as the CH LU & FP	same as the CH LU & FP
Noise		construction will generate noise levels above the baseline conditions - noise will be transient and generally limited to daylight hours	same as the CH LU & FP	same as the CH LU & FP
Water Resources (including, Floodplains, Surface Water and Hydrogeology/ Groundwater)	**Museum**, Chemical	located in Dry Creek watershed, as an addition to Walker Museum; not within .25 miles of a perennial stream or stormwater drainageway	involves converting 1000-Area barracks; not within .25 mile of perennial stream or stormwater drainageway	same as the CH LU & FP
	Vehicle (BIDS and FOX) Maintenance, Maintenance and Maintenance Training	incorporated in the DATF; located within .25 mile of a stormwater drainageway	located in the Pond Hollow watershed; not within .25 mile of perennial stream or stormwater drainageway	renovation of an existing DOL building
	Chemical DATF, Chemical OSUT	located in an unnamed watershed draining to the Big Piney River; located within .25 mile of a stormwater drainageway	located in the Pond Hollow watershed; not within .25 mile of perennial stream or stormwater drainageway	located in the Pond Hollow watershed; not within .25 miles of a perennial stream or stormwater drainageway
	MP Village, Military Police, OSUT	located in the Pond Hollow watershed; not within .25 mile of perennial stream or stormwater drainageway	located in an unnamed watershed draining to the Big Piney River; not within .25 mile of perennial stream or stormwater drainageway	located in the Pond Hollow watershed; not within .25 miles of a perennial stream or stormwater drainageway
	Vehicle (BIDS and FOX) Maintenance, Maintenance and Maintenance Training Cantonment	located in the Pond Hollow watershed; not within .25 mile of perennial stream or stormwater drainageway	located in an unnamed watershed draining to the Big Piney River; not within .25 mile of perennial stream or stormwater drainageway	involves assigning an existing unit maintenance facility to the 11th Chemical Company
	Warehouse/Storage	located in the Dry Creek watershed; not within .25 mile of perennial stream or stormwater drainageway	located in Dry Creek watershed; not within .25 mile of perennial stream or stormwater drainageway	construction will take place in the warehouse district, but is deferred
Geology and Soils	**Vehicle (BIDS and FOX) Maintenance**, Maintenance and Maintenance Training	incorporated in the DATF project	situated on approximately 21 acres of soils with low erosion potential	renovation of Building 5265

Table C.11: Analysis Criteria for Implementing Proposed Applied Instruction Facility Alternatives				
Resource Category		**Combined Headquarters Land Use and Facility Plan**	**Separate Headquarters Land Use and Facility Plan**	**Combined Headquarters and Instruction Land Use and Facility Plan**
		(shown on Figure 3.5)	(shown on Figure 3.7)	(shown on Figure 3.3)
	Chemical DATF, Chemical OSUT	situated on approximately 21 acres of soils with low erosion potential and 7 acres of soils with high erosion potential	situated on approximately 30 acres of soils with low erosion potential and no soils with high erosion potential	situated on approximately 21 acres of soils with low erosion potential and 7 acres of soils with high erosion potential; not within .25 miles of a perennial stream or stormwater drainageway
	MP Village, Military Police, OSUT	situated on approximately 30 acres of soils with low erosion potential	situated on approximately 16 acres of soils with low erosion potential and 3 acres of soils with high erosion potential	situated on approximately 19 acres of soils with low erosion potential and no soils with high erosion potential; not within .25 miles of a perennial stream or stormwater drainageway
	Vehicle (BIDS and FOX) Maintenance, Maintenance and Maintenance Training Cantonment	situated on approximately 9 acres of soils with low erosion potential and 2 acres of soils with high erosion potential	involves use of an existing DOL building	involves use of an existing DOL building
	Warehouse/Storage	situated on approximately 3 acres of soils with low erosion potential	situated on approximately 2 acres of soils with low erosion potential	construction will be located in the warehouse district, but is deferred.
Infrastructure		existing utilities and roadways adequate to support the anticipated additional demand generated	same as the CH LU & FP	same as the CH LU & FP
Permits and Regulatory Authority	**Vehicle (BIDS and FOX) Maintenance**, Maintenance and Maintenance Training	incorporated in the DATF project	may require permit for construction over 5 acres	renovation of Building 5265
	Chemical DATF, Chemical OSUT	may require permit for construction over 5 acres	may require permit for construction over 5 acres	may require permit for construction over 5 acres
	MP Village, Military Police, OSUT	may require permit for construction over 5 acres	may require permit for construction over 5 acres	may require permit for construction over 5 acres
	Vehicle (BIDS and FOX) Maintenance, Maintenance and Maintenance Training Cantonment	may require permit for construction over 5 acres	involves use of an existing DOL building	involves use of an existing DOL building
	Warehouse/Storage	no permit required	no permit required	located in the warehouse district, but construction is deferred
Biological Resources (including Federal T & E Species, Other Protected Species, Wetlands, Aquatic Resources, and Terrestrial Resources)	**Vehicle (BIDS and FOX) Maintenance**, Maintenance and Maintenance Training	incorporated in the DATF project	situated on approximately 11 acres of developed land, 3 acres of shrub/forest, 7 acres of grassland/old field	renovation of Building 5265

Table C.11: Analysis Criteria for Implementing Proposed Applied Instruction Facility Alternatives				
Resource Category		**Combined Headquarters Land Use and Facility Plan**	**Separate Headquarters Land Use and Facility Plan**	**Combined Headquarters and Instruction Land Use and Facility Plan**
		(shown on Figure 3.5)	(shown on Figure 3.7)	(shown on Figure 3.3)
	Chemical DATF, Chemical OSUT	situated on approximately 12 acres of developed land, 15 acres of shrub/forest, 1 acre of grassland/old field	situated on approximately 5 acres of developed land, 7 acres of shrub/forest, 18 acres of grassland/old field	situated on approximately 11 acres of developed land, 3 acres of shrub/forest, 7 acres of grassland/old field
		situated on approximately 6.9 acres of Indiana bat habitat	no T & E species habitat affected	situated on approximately 3.0 acres of Indiana bat habitat
	MP Village, Military Police, OSUT	situated on approximately 5 acres of developed land, 7 acres of shrub/forest, 18 acres of grassland/old field	situated on approximately 2 acres of developed land, 17 acres of shrub/forest, 1 acre of grassland/old field.	situated on approximately 10 acres of developed land, 7 acres of shrub/forest, 2 acres of grassland/old field
		no T & E species habitat affected	situated on approximately 13.5 acres of Indiana bat habitat	situated on approximately 7.5 acres of Indiana bat, 2.3 acres of Gray bay habitat
	Vehicle (BIDS and FOX) Maintenance, Maintenance and Maintenance Training Cantonment	situated on approximately 2 acres of developed land, 3 acres of shrub/forest, 6 acres of grassland/old field	involves use of an existing DOL building	involves use of an existing DOL building
	Warehouse/Storage	situated on approximately 2 acres of developed land, 1 acre of shrub/forest , no acres of grassland/old field	situated on approximately 2 acres of developed land, no acres of shrub/forest, no acres of grassland/old field	located in the warehouse district, but construction is deferred
		situated on approximately 4.5 acres of Indiana bat habitat	No T & E species habitat affected	same as the CH LU & FP
Cultural Resources		surveys conducted and "no effect" established	same as the CH LU & FP	same as the CH LU & FP
Quality of Life (including Human Health and Safety)		No impacts are expected to occur to the installation's quality of life.	same as the CH LU & FP	same as the CH LU & FP
Operational Efficiency		Received the second highest relative score in the analysis contained in subsection C.4.2, provides potential for synergistic effects from officer training.	Received the lowest relative score in the analysis contained in subsection C.4.2, limits the potential for synergistic effects, and fails to capture many long-term costs savings obtained by the other alternatives.	Provides greatest potential for synergistic effects, lowest long-term operations costs, and received highest relative score in the analysis contained in subsection C.4.2
Source: Harland Bartholomew & Associates, Inc.				

C.3.3.6 Unaccompanied Enlisted Personnel Housing, Project 46092

C.3.3.6.1 Goal. This project is the first of two construction project packages which have been identified that will specifically address the support requirements associated with troop housing and dining facilities. The second project package, discussed in subsection C.2.3.8, will (depending upon the land use plan selected for implementation) convert existing, available family housing and unaccompanied officer housing to new uses. A total of 1,662 additional enlisted barracks spaces will be required.

This project package will consider only the alternatives associated with the construction of new barracks and the reallocation of existing facilities. The consideration of alternatives involving the alteration, conversion or diversion of existing facilities are considered as part of Project 46540, Convert Housing.

New Unaccompanied Enlisted Personnel Housing (UEPH) spaces will be based on the U.S. Army standard "1 +1" living/sleeping (private and semi-private) room module and will include new recreational facilities.

C.3.3.6.2 Construction/Non-Construction Alternatives Considered. In addition to the non-construction alternatives discussed in Section C.2, the following alternatives were developed for this identified requirement.

C.3.3.6.2.1 New Construction. This alternative would fulfill the billeting needs of the Military Police School and the Chemical School through the construction of new barracks facilities. A total of approximately 1,662 additional UEPH spaces would be required under this alternative. These new spaces would be provided in six separate barracks buildings and would consist of a total of approximately 510,000 square feet. Each barracks building would include a Soldier Community Building with approximately 14,618 square feet, resulting in an additional 87,708 square feet of new construction.

C.3.3.6.2.2 New Construction Augmented by Reallocation and Reassignment of Existing Facilities. This alternative would fulfill the billeting needs of the Military Police School and Chemical School through the reallocation of existing assets followed by the construction of new barracks facilities to support their additional housing requirements. This would reduce the total number of new barracks spaces that would need to be constructed. A total of approximately 888 additional spaces would be required under this alternative. These new spaces would be provided in three separate barracks buildings and would consist of a total of approximately 270,000 square feet. Each barracks building would include a Soldier Community Building with approximately 14,618 square feet, resulting in an additional 43,854 square feet of new construction.

C.3.3.6.2.3 Lease of UEPH Spaces. As discussed in Section C.2, this alternative was eliminated from further consideration due to the high cost associated with the lease of UEPH spaces.

C.3.3.6.3 Selection of the Army's Proposed Construction/Non-Construction Alternative. The selection of the proposed alternative for this project was limited to the review of Alternative C.3.3.6.2.1, New Construction, and Alternative C.3.3.6.2.2, Reallocation and Reassignment of Existing Facilities Augmented by New Construction. The selection of Alternative C.3.3.6.2.2 as the proposed alternative was based on the availability of existing barracks to support additional personnel if reallocated to different uses, and the reduced construction and maintenance costs that would be associated with this alternative. This alternative is reflected as the Army's Proposed Action in Section 2, subsection 2.4.2.4 of the EIS.

C.3.3.6.4 Rationale for Selection of the Army's Proposed Construction Site Alternatives. The scope of this project will be dependent upon the land use plan implemented. If the Combined Headquarters and Instruction Land Use and Facility Plan is implemented, then the number of additional quarters that will be required will be approximately 888 spaces. If either Alternative 1 Land Use and Facility Plan (Combined Headquarters) or Alternative 2 Land Use and Facility Plan (Separate Headquarters) are implemented, the project will include the construction of approximately 1,662 UEPH barracks spaces as part of this project. The disparity of these two plans is tied to implementation of Convert Housing (Project 46640) which will only be implemented if the Army's Proposed Land Use and Facility Plan (Combined Headquarters and Instruction) is implemented. Additional discussion of this issue is contained in subsections 2.4.2.6 and 2.4.2.8.

The process delineated below was used to identify UPH options that would be evaluated in the Land Use and Facility Plan alternatives.

1) Housing requirements, by pay-grade and status of personnel were developed. Under the "1 + 1" barracks living/sleeping (private and semi-private) room module standard, no more than two junior enlisted personnel (authorized one barracks space each) or one senior enlisted person (authorized two barracks spaces) will be assigned to a bathroom.

2) Existing Unaccompanied Enlisted and Officer Personnel Housing assets which could be used to offset identified housing requirements were identified. However, since the Army had recently upgraded the definition of the minimally acceptable housing standard for permanent party personnel to the "1 + 1" barracks living/sleeping (private and semi-private) room module, only the Specker Barracks (1700-area) met the minimum standard. The barracks in the 600-, 700- 800- and 1000-areas were available to be used for Basic Training and One Station Unit Training personnel, but these barracks would require extensive modernization to meet the current standard.

3) An initial cost estimate to convert one of the typical "rolling pin" barracks in the 600-area for use by permanent party personnel was prepared. The initial cost estimate indicated that it would be more expensive to modify the facility to the new housing standard than it would be to construct a new facility. This finding was consistent with other initial cost estimates at other Army installations. Consequently, a decision was made that the 600-, 700-, 800- and 1000-area facilities would be used to house personnel in basic training and one station unit training. Minimal (if any) interior modification and maintenance would be required to allow the facilities to be used for this function.

4) Specker Barracks would be retained for use by more junior personnel. Interservice Training Resources Organization (ITRO) personnel would be housed in the southern half of Specker Barracks. ITRO personnel (from the Air Force, Marines and Navy) attend classes on equipment maintenance and operations at FLW along with Army personnel. The northern half of Specker Barracks would be used to house junior enlisted personnel assigned to units at FLW. This modification in housing would increase the number of personnel that would be housed at Specker Barracks.

5) Following completion of items 1 through 4 above, the UEPH analysis indicated that there would be a deficiency of approximately 1,662 UEPH spaces.

Alternative methods for meeting the UEPH barracks space deficiency were identified. These methods included:

1) New construction south of Specker Barracks was included in the Combined Headquarters and Separate Headquarters land use and facility plans. This choice was based on the complementary functional relationships between this project and the other project packages, particularly the General Instruction Facility and the Applied Instruction Facility. This site contains adequate utility connections, relatively good access to installation roadways, and provides adequate area for the construction of the required facilities.

2) New construction south of the 800-area barracks in an area that would be bounded by West Nineteenth Street, Iowa Avenue, and Cedar Avenue was included in the Combined Headquarters Land Use and Facility Plan. This choice was based on the complementary functional relationships between this project and the other project packages, particularly the General Instruction Facility and the Applied Instruction Facility. This site contains adequate utility connections, relatively good access to installation roadways, and provides adequate area for the construction of the required facilities.

3) New construction in the old 1900-area, north of Specker Barracks, was included in the Separate Headquarters Land Use and Facility Plan. This choice was based on the complementary functional relationships between this project and the other project packages, particularly the General Instruction Facility and the Applied Instruction Facility. This site contains adequate utility

connections, relatively good access to installation roadways, and provides adequate area for the construction of the required facilities.

4) New construction on the area currently occupied by the soccer and softball field, north of Lincoln Hall and along Gate Street was included in the Combined Headquarters and Instruction Land Use and Facility Plan. This choice was based on the complementary functional relationships between this project and the other project packages, particularly the General Instruction Facility and the Applied Instruction Facility. This site contains adequate utility connections, relatively good access to installation roadways, and provides adequate area for the construction of the required facilities.

5) New construction in the area bounded on the east by Nebraska Avenue, on the north by First Street, on the west by Illinois Avenue, and on the south by Headquarters Avenue was eliminated from further consideration. This was based on through traffic conflicts, a limited area for expansion, and inadequate exterior physical training and recreational areas around the facilities.

6) New construction in the area north of Lincoln Hall, along Gate Street and east of the area occupied by existing soccer field and softball fields was eliminated based on the high cost of earthwork that would be required, the amount of tree clearing that would be required, and the time required to construct the site.

7) New construction in the area northeast of the intersection of First Street and Nebraska Avenue was eliminated from further consideration based on limited area for expansion, and inadequate exterior physical training and recreational areas around the facilities.

8) New construction on the site of the 600-area barracks was eliminated due to the requirement to replace the basic training barracks spaces currently located in the 600-area. Extra cost would have been incurred in replacing the 600-area barracks that are adequate to support Basic Training housing requirements.

This is the first of two project packages that will provide required Unaccompanied Personnel Housing. A total of 1,662 UPH spaces are required to support the unaccompanied personnel that will be relocated to FLW as part of the proposed BRAC action. This project package also includes several other items associated with the barracks. These items, and the alternative sites considered for the functions, are listed on Table 3.12.

Table C.12:
Alternative Sites for the Unaccompanied Personnel Housing Construction Project Package

Project Requirements	**Combined Headquarters**	**Separate Headquarters**	**Combined Headquarters and Instruction**
	(shown on Figure 3.5)	(shown on Figure 3.7)	(shown on Figure 3.3)
Housing, Enlisted Barracks (new construction)	New Construction, New Perm Party UEPH south of Specker Barracks (site-46)	New Construction, New Perm Party UEPH south of Specker Barracks (site-46)	New Construction, New barracks north of the General Instruction Facility addition to Lincoln Hall (site-46)
	New Construction, New IET Barracks south of 800 Area (west of Iowa Ave and south of South Dakota Ave) (site-46A)	New Construction, New Perm Party UEPH north of Specker Barracks (site-46A)	
Housing, Enlisted Dining (new)	none	none	New Construction, Construction of Dining Facility at barracks north of Lincoln Hall (site-43)

Table C.12: Alternative Sites for the Unaccompanied Personnel Housing Construction Project Package			
Project Requirements	**Combined Headquarters**	**Separate Headquarters**	**Combined Headquarters and Instruction**
	(shown on Figure 3.5)	(shown on Figure 3.7)	(shown on Figure 3.3)
Housing, Enlisted Barracks (reallocation)	Reallocation of existing barracks: 600-700 Engineer OSUT; 800 MP OSUT; 1000 Chem OSUT, and south Specker to ITRO; north Specker to junior Perm Party. (site-47, 1-48, 1-48, 1-50, 1-51)	Reallocation of existing barracks: 600-700 Engineer OSUT; 800 MP OSUT; 1000 Chem OSUT; south Specker to ITRO; north Specker to junior Perm Party (site-47, 2-48, 2-49, 2-50, 2-51)	Reallocation of existing barracks: 600-700 Engineer OSUT; 800 MP OSUT; 700 Chem OSUT; south Specker to ITRO; north Specker to junior Perm Party (site-47, P-48, P-49, P-50, P-51)
Housing, Enlisted Dining (reactivation)	Reactivation of dining facility at Specker Barracks(site-44)	Construction of new dining facility at Specker Barracks(site-44)	Construction of new dining facility at Specker Barracks (site-44)
Source: Harland Bartholomew & Associates, Inc.			

The BRAC facility locator numbers relate each support project to Figures 3.2 through 3.7 and Table 3.2 (which are located in Section 3, Description of Alternatives - Including the Proposed Action) which have been included to illustrate the general location of all projects under each development alternative.

As discussed in Volume I, subsection 5.2.2.2.1, construction of this project at the site specified in the Combined Headquarters and Instruction Land Use and Facility Plan proposed site will require the relocation of an existing recreational area which contains two soccer fields and two softball fields. The two soccer fields will be replaced with new fields constructed at the site currently occupied by buildings 2510 and 2516. These buildings are located north of First Street, east of the intersection of Nebraska Avenue and First Street. Both buildings are currently scheduled for demolition under separate actions planned by the installation. The two lost softball fields will be replaced through the modification and upgrade of Hilltopper Baseball Field and the construction of a new ball field to the north of that field. Modifications and upgrades to the Hilltopper Baseball Field will include the installation of irrigation and new fencing.

Subsection C.3.3.6.5 below contains criteria for analyzing the implementation of the proposed action at these alternative sites.

C.3.3.6.5 Analysis Criteria for Implementing Proposed UEPH Alternatives. The basis and framework for analyzing the potential impacts of implementing each of the construction alternatives are summarized on Table C.13 below.

Table C.13: Analysis Criteria for Implementing Proposed UEPH Alternatives			
Resource Category	**Combined Headquarters Land Use and Facility Plan**	**Separate Headquarters Land Use and Facility Plan**	**Combined Headquarters and Instruction Land Use and Facility Plan**
	(shown on Figure 3.5)	(shown on Figure 3.7)	(shown on Figure 3.3)
Land Use and Training Areas	located in an area classified for this land use	same as the CH LU & FP	conversion of approximately 22 acres of Recreation land use to Troop Housing
Air Quality and Climate	Particulate matter (such as dust from construction) is regulated.	same as the CH LU & FP	same as the CH LU & FP
Noise	construction will generate noise levels above the baseline conditions - noise will be transient and generally limited to daylight hours	same as the CH LU & FP	same as the CH LU & FP

Table C.13: Analysis Criteria for Implementing Proposed UEPH Alternatives			
Resource Category	**Combined Headquarters Land Use and Facility Plan**	**Separate Headquarters Land Use and Facility Plan**	**Combined Headquarters and Instruction Land Use and Facility Plan**
	(shown on Figure 3.5)	(shown on Figure 3.7)	(shown on Figure 3.3)
Water Resources (including, Floodplains, Surface Water and Hydrogeology/Groundwater)	located in Dry Creek watershed, south of Specker Barracks and new IET barracks south of the 800-Area; located within .25 mile of a stormwater drainageway	located in Dry Creek watershed; not within .25 mile of perennial stream or stormwater drainageway	located in Dry Creek watershed, north of the General Instruction Facility addition to Lincoln Hall; not within .25 mile of a perennial stream or stormwater drainageway
	other site located in Dry Creek watershed, new IET barracks south of the 800-Area; located within .25 mile of a stormwater drainageway	other site located in Dry Creek watershed, north of Specker Barracks; located within .25 mile of a stormwater drainageway	n/a
Geology and Soils	situated on approximately 8 acres of soils with high erosion potential and approximately 59 acres of soils with low erosion potential	situated on approximately 10 acres of soils with high erosion potential and approximately 122 acres of soils with low erosion potential	situated on approximately 26 acres of soils with high erosion potential and approximately 52 acres of soils with low erosion potential
Infrastructure	existing utilities and roadways adequate to support the anticipated additional demand generated from this project	same as the CH LU & FP	same as the CH LU & FP
Permits and Regulatory Authority	may require permit for construction over 5 acres	may require permit for construction over 5 acres	may require permit for construction over 5 acres
Biological Resources (including Federal T & E Species, Other Protected Species, Wetlands, Aquatic Resources, and Terrestrial Resources)	situated on approximately 16 acres of developed land, 38 acres of shrub/forest, 77 acres of grassland/old field	situated on approximately 56 acres of developed land, 41 acres of shrub/forest, 35 acres of grassland/old field	situated on approximately 39 acres of developed land, 24 acres of shrub/forest, 16 acres of grassland/old field
	situated on approximately 4.2 acres of Indiana bat habitat	situated on approximately 1.4 acres of Indiana bat habitat	situated on approximately 2.4 acres of Indiana bat habitat
Cultural Resources	surveys conducted and "no effect" established	same as the CH LU & FP	same as the CH LU & FP
Quality of Life (including Human Health and Safety)	No impacts are expected to occur to the installation's quality of life.	same as the CH LU & FP	same as the CH LU & FP
Operational Efficiency			
Source: Harland Bartholomew & Associates, Inc.			

C.3.3.7 Range Modifications, Project 46094

C.3.3.7.1 Goal. This construction project package was developed to identify the most effective methods for providing required weapons familiarization and qualification ranges, training, and maneuver areas needed to support relocated training missions.

C.3.3.7.2 Construction/Non-Construction Alternative Considered. In addition to the non-construction alternatives discussed in Section C.2, the following alternatives were developed for this identified requirement.

C.3.3.7.2.1 Construct New Ranges. This alternative would construct new ranges and establish new range safety zones to support the training requirements of the Chemical School and Military Police School. Existing ranges would remain unchanged by the new construction.

C.3.3.7.2.2 New Construction at Existing Ranges. This alternative would construct new ranges as overlays to existing ranges, using the established safety zones to the maximum extent possible. Existing ranges would be modified as part of this project in order to minimize costs, and maximize use of existing range and range safety buffer areas.

C.3.3.7.2.3 Use Civilian Ranges. There are no civilian ranges in the area suitable for the training required by the incoming activities. Therefore this alternative was eliminated from additional consideration.

C.3.3.7.3 Selection of the Army's Proposed Construction/Non-Construction Alternative. The New Construction at Existing Ranges alternative was selected as the proposed alternative and is reflected as the Army's Proposed Action in Section 2, subsection 2.4.2.8 of the EIS. This selection was based on:

- the elimination of a requirement to obtain additional training lands that would be necessary under the Construct New Ranges alternative;
- the availability of existing ranges to support the additional time requirements; and
- the reduced construction and maintenance costs that would be associated with this alternative as compared to the Construct New Ranges.

C.3.3.7.4 Rationale for Selection of the Army's Proposed Construction Site Alternatives. The analysis consisted of three interrelated elements, including the screening of:

1) alternative locations for field and mobile obscurant (smoke) training;

2) alternative locations for live-fire weapons ranges; and

3) alternative locations for other training and field maneuver areas, and support functions.

The first two elements are distinct due to the unique operational and safety concerns involved in these activities.

- Training locations for obscurant training needed to be located so that the training could be conducted safely and in compliance with restrictions developed by the State of Missouri, Department of Natural Resources in the air quality permit that they have granted to allow this training to be conducted.
- The location of live-fire ranges requires an analysis to develop safety zones based on training methods, activities, weapons that would be used, and the impact area associated with each range. For safety reasons, personnel are not permitted to be within the impact zone associated with live-fire ranges during weapons firing and personnel not directly involved in training are not permitted near the firing line. The general locations of the existing range impact/safety zones at FLW are illustrated on Figure 4.2 in Section 4.

The alternative locations for other training and field maneuver areas, and support functions are sited based on operational considerations and the availability of other existing facilities.

C.3.3.7.4.1 Alternate Locations for Field and Mobile Obscurant (Smoke) Training. As part of the analysis of alternative range and training area configurations, the following analysis of alternative obscurant training areas was conducted in 1993. To analyze the various location alternatives, multiple sites were evaluated based on both environmental and operational training criteria.

The nature of obscurant training dictates that, when possible, the training be conducted in riparian corridors or valleys. The use of corridors and valleys adds realism to the training and assists in control of the obscurant cloud. During the smoke mission planning, eleven valleys were initially identified as potential sites. Of the eleven riparian corridors and valleys reviewed, six preferred valleys were selected for potential smoke training. Evaluation criteria were identified based on the key environmental issues related specifically to smoke training.

The criteria used included the following:

1) Access to roads, fire breaks etc.;
2) Wind direction;
3) Proximity to endangered species caves and/or foraging areas;
4) Proximity to and potential for disturbance to archaeological and historic sites;
5) Proximity to wetlands;
6) Proximity to the FLW boundary;
7) Proximity to or on U.S. Forest Service land; and
8) Size as compared to FMC ranges.

A matrix was then established that identified both the location and the criteria. Each site was given a relative ranking of between 1 (least preferred) to 11 (most preferred) with regard to the eight factors and the sites were then provided a relative ranking based on their total relative scores. Where one or more of the areas were determined to have similar relative rankings for a criteria the scores were then averaged. The total relative score for each site (based on the eight criteria) was then calculated (the higher the better) to determine an overall ranking of locations. The results of the analysis completed in 1993 are located on Table C.14.

Table C.14:
Smoke Training Location Evaluation Matrix

Location	Access	Wind Direction	Endangered Species	Arch/ Historic Sites	Wetlands	Boundary	USFS	Size	Total	Final Rank	
Ballard Hollow	10.5	8.5	9.5	9	6	9.5	7.5	9	69.5	1	Most Suitable
Bailey Hollow	7	8.5	6	10.5	10	9.5	7.5	9	59	2	
Smith Branch	8.5	8.5	9.5	1	6	6	1.5	11	52	3	
Wolf Hollow	10.5	8.5	9.5	5	6	3	1.5	6	50	4	
Musgrave Hollow	8.5	8.5	3	3	2	9.5	7.5	7	49	5	
McCann Hollow	6	8.5	6	10.5	6	9.5	7.5	9	48	6	
Training Area 125	4.5	1	9.5	7	10	3	7.5	2	44.5	7	
Hurd Hollow	3	5	6	7	6	7	3	5	42	8	
Turnbull Hollow	4.5	3	3	7	2	3	7.5	4	34	9	
The Sapper Range	2	3	1	3	10	3	7.5	2	31.5	10	
Mush Paddle Hollow	1	3	3	3	2	3	7.5	2	24.5	11	Least Suitable

Source: Fort Leonard Wood, Directorate of Public Works

As part of the initial analysis of fog oil obscurant training sites during the BRAC 1995 review, the Army reviewed and validated the information obtained during the 1993 review. During the 1995 review the following modifications were made in the sites that were considered during 1993:

1) Bailey Hollow and McCann Hollow training areas were combined into one obscurant training area (Bailey/McCann Hollow) for the purposes of this analysis. By combining the two areas into one training area, a total of approximately 111 acres are available, allowing the training area to more effectively support training requirements. The increased size of the training area would also result in an increase in the relative score that would be assigned to this training area.

2) Smith Branch was eliminated from additional consideration. The area which is located along the boundary between FLW and the Forest Service lands, located in the northwest corner of the installation, is not large enough to support training if the assumption is made that obscurant training operations could not use Forest Service lands.

3) Further evaluation concerning the use of Training Area 125, Hurd Hollow, Turnbull Hollow, the Sapper Range and Mush Paddle Hollow determined that the use of these areas for Mobile and Field Obscurant training was not preferred. These five sites received the lowest relative scores during the 1993 analysis, and it was determined that these sites were still not preferred during this analysis. Consequently these site were eliminated from further review.

4) A new site at Cannon Range (Mush Paddle Hollow) was added to the analysis. This site, which is located in the northeast portion of Mush Paddle Hollow, provides an excellent training area and eliminates many of the negative evaluation factors that resulted from the analysis that included the use of all of Mush Paddle Hollow. The new site does not contain any known archaeological sites, historic sites or wetlands, and is located further away from the installation boundary. The area is located near the southwestern part of the installation allowing it to be used much of the year during which prevailing winds are from the south. Access to the area is still limited, but improved from Mush Paddle Hollow, and roadways that would be used during training are available (although maintenance of the roads would need to be improved and performed more frequently than currently accomplished). The existing roadways also clearly define an area in which off-road obscurant operations could be performed without adversely impacting surface or ground waters. The Cannon Range (Mush Paddle Hollow) area also offers a unique potential for obscurant training to be conducted along with Air Force aerial bombardment practice range. Consequently, this redefined training area was included in the analysis.

5) An additional potential obscurant training site at Babb Airfield was also identified. This site is located southwest of the cantonment and provides a level area which has already been cleared of tree cover. Consequently, initial construction costs would be minimized. The use of Babb Airfield also provides the potential for combining this portion of obscurant training with other training activities currently conducted in the area and with other BRAC training objectives that may be relocated there as part of this project.

Following this secondary screening of alternative obscurant smoke training areas a total of six viable and reasonable training areas remained in consideration. These six training areas are:

1) Ballard Hollow;

2) the combination of Bailey/McCann Hollow;

3) Wolf Hollow;

4) Musgrave Hollow;

5) Cannon Range (Mush Paddle Hollow); and

6) Babb Airfield.

For operational and flexibility reasons, the Army desires a minimum of four training areas be established for mobile and field obscurant training. The availability of four established areas allows for the rotation between the sites to respond to changing meteorological conditions (wind direction and speed, and well as atmospheric stability class) as required on a day-to-day basis. Additionally, the availability of multiple training areas provides areas in which students can practice driving the vehicles (without generating smoke) while other students are performing smoke generating exercises. Each of these sites will be evaluated for environmental impact in the EIS. Grouping of the six remaining sites into packages of four is provided in subsection C.3.3.7.4.4 Summary of Alternative Range Modifications Sites, below.

C.3.3.7.4.2 Alternative Locations for Live-Fire Weapons Ranges. Selection of alternative live-fire weapons ranges, as stated above, requires analysis to develop safety zones based on training methods, activities, weapons that would be used, and the impact area associated with each range. For safety reasons personnel are not permitted to be within the impact zone associated with live-fire ranges during weapons firing and personnel not directly involved in training are not permitted near the firing line. The general locations of the existing range impact/safety zones at FLW are illustrated on Figure 4.2 in Volume 1, Section 4 of the EIS. Selection of alternative live-fire range locations included the following elements:

1) The identification of existing safety zones, and the size and shape of proposed safety zones, as the establishment and enforcement of these safety zones are critical to ensuring that range training is accomplished in a safe manner.

2) A review of existing and estimated future range utilization information to determine which, if any, of the existing ranges at FLW would be used to fully or partially offset new range requirements.

Based on this initial analysis, it was determined that several existing range areas could be relocated or modified to accommodate the new range requirements, and that in some cases the additional range training requirements could be collocated with the existing range requirements. Collocation of new and existing range requirements was desired to minimize the amount of land area that would be required for the safety zones. Table C.15 below provides a listing of ranges that were identified as being capable of supporting various range requirements. A total of approximately 38 different ranges and training areas were identified as available to support part (or available for modification to support part) of the identified BRAC training and range requirements. Depending upon which ranges and training areas were selected to support one or more of the BRAC requirements, installation planners at Range Control were required to consider the ripple effects of the BRAC action on other training requirements. Due to the complexity of this process, installation planners organized the potential range modifications into three packages. Criteria used by representatives of Range Control; FLW DPW Environment, Energy and Natural Resources Division; the using activities; and the FLW DPW Master Planner during their review of potential range package combinations included:

- the existing natural and man-made features on the range (including existing targets and firing lanes);
- range safety fans/considerations associated with existing and proposed uses;
- range safety fans/considerations associated with proximate range and training areas;
- range scheduling requirements (e.g. length of training, time of day or night of training);
- training scheduling which may result in synergistic effects of having one or more training areas or ranges proximate to each other;
- potential for noise from training to impact on the surrounding civilian and military community, and known T & E species locations;
- location of existing dud areas; and
- availability of support facilities (behind the firing line such as latrines, range support administrative and classroom areas, and bleachers)

The BRAC facility locator numbers relate each support project to Figures 3.2 through 3.7 and Table 3.2 (which are located in Volume 1, Section 3, Description of Alternatives - Including the Proposed Action), which have been included to illustrate the general location of all projects under each development alternative. Where a range or training area is **"not specified for use"** it will remain in use supporting existing ongoing USAEC and FLW mission requirements.

Table C.15:
Ranges Available for Reuse

Range	Package 1	Package 2	Package 3
Area North of Range 1	not specified for use [1]	Marine NBC Training Area (site 21)	not specified for use [1]
Babb Airfield	Mobile Smoke Training Area (site 15)	Air Force Air Base Recovery (site 11) and Mobile Smoke Training Area (site 14)	Air Force Air Base Recovery Training Area (site 11)
Bailey/McCann Hollow	not specified for use [1]	Mobile Smoke Training Area (site 15)	Mobile Smoke Training Area (site 14)
Ballard Hollow	Mobile Smoke Training Area (site 13), with obscurant storage/transfer point (site 17A)	not specified for use [1]	Mobile Smoke Training Area (site 13), with obscurant storage/transfer point (site 17A)
Bloodland Lake	not specified for use [1]	FOX vehicle swim (site 9), BIDS and FOX Organizational Vehicle Parking	not specified for use [1]
East of Cannon Range	Mark 19 Familiarization and Qualification Range (site 23)	not specified for use [1]	not specified for use [1]
Cannon Range (Mush Paddle Hollow)	not specified for use [1]	not specified for use [1]	Mobile Smoke Training Area (site 15)
Musgrave Hollow	Mobile Smoke Training Area (site 16)	Mobile Smoke Training Area (site 16)	Mobile Smoke Training Area (site 16)
Penn's Pond	FOX vehicle swim (site 9), BIDS and FOX Organizational Vehicle Parking	not specified for use [1]	not specified for use [1]
Range 1	Relocate Range 30 Day/Night (site 30)	Special Reaction Team Range Marksman/Observer (site 25)	not specified for use [1]
Range 3	Relocate Zero Fire (M16) Range (site 33)	Relocate Zero Fire (M16) Range (site 33)	Relocate Zero Fire (M16) Range (site 33)
Range 4	Relocate 29 (site 29)	not specified for use [1]	Relocate 29 (site 29)
Range 6	not specified for use [1]	Relocate Range 30 Day/Night (site 30)	Relocate Range 30 F (site 31)
Range 10	Relocate US Weapons Range (site 32)	Relocate US Weapons Range (site 32)	Relocate US Weapons Range (site 32)
Range 11	Special Reaction Team Range (site 26)	9 mm Pistol (FATS Simulator) (site 34) Range	Relocate Range 30 Day/Night (site 30)
Range 12	not specified for use [1]	9 mm Pistol (Marine) (site 35), Shotgun (Marine) (site 22) and Combat Pistol (Marine) (site 36) Range	not specified for use [1]
Range 13	9 mm Pistol (Marine) (site 35), Shotgun (Marine) (site 22) and Combat Pistol (Marine) (site 36) Range	not specified for use [1]	Special Reaction Team Range Marksmanship Observer (site 25)
Range 14	Special Reaction Team Marksmanship Observer (site 25)	M60/M240 Range (site 20)	Special Reaction Team Range Marksmanship Observer (site 25)
Range 15	Mark 19 Familiarization and Qualification Range (site 23)	not specified for use [1]	Special Reaction Team Marksmanship Observer (site 25) and Special Reaction Team Range (site 26)

Table C.15: Ranges Available for Reuse			
Range	**Package 1**	**Package 2**	**Package 3**
Range 17	9 mm Pistol (FATS Simulator) (site 34)	not specified for use [1]	9 mm Pistol (Marine) (site 35), Shotgun (Marine) (site 22) and Combat Pistol (Marine) (site 36) Range
Range 18	not specified for use [1]	not specified for use [1]	M60/M240 (site 20) and FOX Vehicle Familiarization (site 24) Range
Range 19	not specified for use [1]	Mark 19 Familiarization and Qualification (site 23)	Mark 19 Familiarization and Qualification Range (site 23)
Range 21	not specified for use [1]	not specified for use [1]	9 mm Pistol (FATS Simulator) (site 34)
Range 24	not specified for use [1]	Flame Field Expedient Deterrent Range (site 5)	not specified for use [1]
Range 27	Flame Field Expedient Deterrents Range (site 5)	not specified for use [1]	not specified for use [1]
Range 27A	M60/M240 Range (site 20)	not specified for use [1]	Flame Field Expedient Deterrent Range (site 5)
Range 28	not specified for use [1]	Fox Vehicle Familiarization (site 24)	not specified for use [1]
Range 29	Static Smoke Training Area (site 12)	not specified for use [1]	not specified for use [1]
Range 30	not specified for use [1]	not specified for use [1]	Static Smoke Training Area (site 5)
Range 30 Day/night	not specified for use [1]	Static Smoke Training Area (site 5)	not specified for use [1]
Training Area 100	Air Force Gas (CS-Tear) Chamber (site 6) and Marine NBC Training Area (site 21)	not specified for use [1]	not specified for use [1]
Training Area 101	not specified for use [1]	not specified for use [1]	Air Force Gas (CS-Tear) Chamber (site 6) and Marine NBC Training Area (site 21)
Training Area 109A	Air Force Air Base Recovery (site 11)	not specified for use [1]	Evasive (site 38) and HMMWV Driving (site 37) courses, and organizational vehicle parking
Training Area 132	not specified for use [1]	Air Force Gas (CS-Tear) Chamber (site 6)	not specified for use [1]
Training Area 228	not specified for use [1]	Evasive (site 38) and HMMWV Driving (site 37) courses, and organizational vehicle parking	not specified for use [1]
Training Area 236	Evasive (site 38) and HMMWV Driving (site 37) courses	not specified for use [1]	not specified for use [1]
Training Area 250	not specified for use [1]	not specified for use [1]	FOX vehicle swim (site 9), BIDS and FOX Organizational Vehicle Parking
Wolf Hollow	Mobile Smoke Training Area (site 14)	Mobile Smoke Training Area (site 13), with obscurant storage/transfer point (site 17A)	not specified for use [1]
Note: 1 Where a range or training area is "not specified for use" it will remain in use supporting existing ongoing USAEC and FLW mission requirements.			
Source: Harland Bartholomew & Associates, Inc.			

Following a review of the three Range project packages, the FLW DPW Master Planner, in coordination with representatives of the FLW DPW Environment, Energy and Natural Resources Division; the Range Control Officer; and the using activities, determined that each of the three packages were acceptable, would meet training requirements, and were consistent with the FLW Master Plan (FLW, 1991c) and Training Area Master Plan (FLW, 1990a); consequently:

- Range Package 3 will be evaluated for environmental impacts in Volume 1, Section 5 as part the Army's Proposed Action Land Use and Facility Plan (Combined Headquarters and Instruction);
- Range Package 1 will be evaluated as part of Alternative 1 Land Use and Facility Plan (Combined Headquarters); and
- Range Package 2 will be evaluated as part of Alternative 2 Land Use and Facility Plan (Separate Headquarters).

Criteria used by the FLW Master Planner included those listed on page C-57 above.

C.3.3.7.4.3 Alternative Locations for Other Training and Maneuver Areas, and Support Functions.

Support functions to be located are the Range Control addition, Range Control classroom and fog oil storage area. Collocating the Range Control addition with the existing Range Control administration facility is desirable for efficiency and cost savings. A proximate location for the additional administrative area would allow for the most efficient use of existing and proposed staff. Although there area advantages offered by having the Range Control classroom and fog oil storage facilities located near Range Control, a location proximate the proposed fog oil (static, mobile and field) training areas is more preferred. A location near the training areas would ensure access is maximized, and travel times and transportation costs are minimized. Potential sites that were considered for these Range Support Facilities area listed on Table C.16. The sites were organized by the FLW DPW Master Planner and the Range Control Officer into three project packages.

Table C.16:
Areas Available for Range Support Facilities

Area	Package 1	Package 2	Package 3
Area North of Range Control	Range Control Addition for Administration and Classroom (sites 27 and 28), with obscurant storage/transfer point (site 17)	Range Control Addition for Administration and Classroom (sites 27 and 28), with obscurant storage/transfer point (site 17)	Range Control Addition for Administration (site 27)
Area North of Range 30	not specified for use [1]	not specified for use [1]	Range Control Classroom (site 28) with obscurant storage/transfer point (site 17)

Note: 1 Where a range or training area is "not specified for use" it will remain in use supporting existing ongoing USAEC and FLW mission requirements.

Source: Harland Bartholomew & Associates, Inc.

Following a review of the three Range support facilities project packages the FLW DPW Master Planner, in coordination with representatives of the FLW DPW Environment, Energy and Natural Resources Division; the Range Control Officer; and the using activities, determined that Package 3 was the most preferred, Package 1 was the second most preferred, and Package 2 was the least preferred of the three; consequently:

- Package 3 will be evaluated for environmental impacts in Section 5 as part the Army's Proposed Action Land Use and Facility Plan (Combined Headquarters and Instruction);
- Package 1 will be evaluated as part of Alternative 1 Land Use and Facility Plan (Combined Headquarters); and
- Package 2 will be evaluated as part of Alternative 2 Land Use and Facility Plan (Separate Headquarters).

Criteria used by the FLW Master Planner included those listed on page C-57 above.

C.3.3.7.4.4 Summary of Alternative Range Sites. The range construction project package includes the construction, alteration and modification of various range and training areas. Training requirements and the alternative sites and utilization options considered for each of these requirements are listed on Table C.17. It should be noted that some range modification activities require new construction, while others require minimal to no new construction. To assist the reader in understanding the potential variations in the amount of work required, several terms have been used in this discussion.

- New Construction, which involves providing new facilities that will replace existing features at the range or training area, requiring relocation of the current (pre-BRAC) use.
- New Construction/Overlay, which involves new construction that will modify the existing range or training area, but will allow the current (pre-BRAC) use to continue.
- Overlay, which involves minimal modification of the existing facilities, normally limited to the addition of new targets, allowing both current (pre-BRAC) and new, BRAC-related activities to be conducted in the area.

Table C.17: Alternative Sites for the Range Modifications Construction Project Package

Project Requirements	Combined Headquarters	Separate Headquarters	Combined Headquarters and Instruction
	(shown on Figure 3.5)	(shown on Figure 3.7)	(shown on Figure 3.3)
9 mm Pistol (FATS Simulator) Training Area	New Construction at Range 17 (site-34)	New Construction at Range 11 (site-34)	New Construction at Range 21 (site-34)
Air Force Base Recovery Training Area	New Construction TA 109A (site-11)	New Construction/Overlay Babb Airfield (site-11)	New Construction/Overlay Babb Airfield (site-11)
Air Force Gas Chamber Training Area	New Construction/Overlay at TA 100 (site-6)	New Construction/Overlay at TA 132 (site-6)	New Construction/Overlay at TA 101 (site-6)
Chemical, BIDS and FOX Organizational Vehicle Parking	New Construction/Overlay fenced parking area near Penn's Pond (site-9)	New Construction/Overlay fenced parking area near Bloodland Lake (site-9)	New Construction/Overlay fenced parking area near Training Area 250 (site-9)
Evasive Driving Training Area	New Construction at TA 236 (site-38)	TA 228, south of Range Control (site-38)	New Construction at TA 109A (site-38)
Flame Field Expedient Deterrent Range	New Construction/Overlay at Range 27 (site-5)	New Construction/Overlay at Range 24 (site-5)	New Construction at Range 27A (site-5)
FOX Vehicle Swim Training Area	New Construction/Overlay at Penn's Pond (site-9)	New Construction/Overlay at Bloodland Lake (site-9)	New Construction/Overlay at TA 250 (site-9)
HMMWV Driving Training Area	New Construction/Overlay at TA 236 (site-37)	New Construction/Overlay at TA 228 (site-37)	New Construction at TA 109A (site-37)
M60/M240 Machinegun and Squad Automatic Weapon Range	New Construction/Overlay at Range 27A (site-20)	New Construction/Overlay at Range 14 (site-20)	New Construction/Overlay at Range 18 (site-20)
Marine 9 mm Pistol Range	New Construction/Overlay at Range 13 (site-35)	New Construction/Overlay at Range 12 (site-35)	New Construction/Overlay at Range 17 (site-35)
Marine Combat Pistol Range	New Construction/Overlay at Range 13 (site-36)	New Construction/Overlay at Range 12 (site-36)	New Construction/Overlay at Range 17 (site-36)
Marine NBC Training Area	New Construction/Overlay at TA 100 (site-21)	New Construction North of Range 1 (site-21)	New Construction/Overlay at TA 101 (site-21)
Marine Shotgun Range	New Construction/Overlay at Range 13 (site-22)	New Construction/Overlay at Range 12 (site-22)	New Construction/Overlay at Range 17 (site-22)

Table C.17: Alternative Sites for the Range Modifications Construction Project Package

Project Requirements	Combined Headquarters	Separate Headquarters	Combined Headquarters and Instruction
	(shown on Figure 3.5)	(shown on Figure 3.7)	(shown on Figure 3.3)
Mark 19 Familiarization and Qualification Range	New Construction/Overlay at Cannon Range (Mush Paddle Hollow) (site-23)	New Construction/Overlay at Range 19 (site-23)	New Construction/Overlay at Range 19 (site-23)
FOX Vehicle Familiarization Range	New Construction/Overlay at Range 15 (site-24)	New Construction/Overlay at Range 28 (site-24)	New Construction/Overlay at Range 18 (site-24)
Mobile Smoke Training Areas	New Construction/Overlay Wolf Hollow (site-13) Babb Airfield (site-14) Ballard Hollow (site-15) Musgrave Hollow (site-16)	New Construction/Overlay Wolf Hollow (site-13) Babb Airfield (site-14) Musgrave Hollow (site-16) Bailey/McCann Hollow (site-15)	New Construction/Overlay Cannon Range (Mush Paddle Hollow) (site-15) Ballard Hollow (site-13) Musgrave Hollow (site-16) Bailey/McCann Hollow (site-14)
Obscurant Storage	New Construction northwest of Range 30 and at Ballard Hollow (site-17, 1-17A)	New Construction northwest of Range 30 and at Wolf Hollow (site-17, 1-17A)	New Construction northwest of Range 30 and at Ballard Hollow (site-17, P-17A)
Range Control Addition	New Construction north of Range Control (site-27)	New Construction north of Range Control (site-27)	New Construction north of Range Control (site-27)
Range Control Classroom	New Construction north of Range Control (site-28)	New Construction north of Range Control (site-28)	New Construction east of the Obscurant Storage area near Range 30 (site-28)
Relocate M16 Zero Fire Range	Overlay at Range 3 (site-33)	Overlay at Range 3 (site-33)	Overlay at Range 3 (site-33)
Relocate US Weapons Range	Overlay at Range 10 (site-32)	Overlay at Range 10 (site-32)	Overlay at Range 10 (site-32)
Special Reaction Team Marksman/Observer Range	New Construction at Range 14 (site-25)	New Construction at Range 1 (site-25)	New Construction at Range 15 (site-25)
Special Reaction Team Range	New Construction at Range 11 (site-26)	New Construction at Range 13 (site-26)	New Construction at Range 15 (site-26)
Static Smoke Training Area	New Construction at Range 29 (site-12)	New Construction at Range 30 Day/Night (site-12)	New Construction at Range 30 (site-12)
Relocate Range 30 Day/Night	New Construction at Range 1 (site-30)	New Construction at Range 6 (site-30)	New Construction/Overlay at Range 11 (site-30)
Relocate Range 29	New Construction/Overlay at Range 4 (site-29)	no requirement to move Range 29	New Construction/Overlay at Range 4 (site-29)
Relocate Range 30F	no requirement to move Range 30F	no requirement to move Range 30F	New Construction/Overlay at Range 6 (site-31)
Vehicle and Equipment (Organizational), Maintenance outside of the cantonment	none	Construct a new maintenance facility for the Military Police vehicles used in Evasive Driving Training near the training area (site-37) Construct a Directorate of Logistics satellite maintenance facility north of the FLW Route 28 (the road into the Normandy Training Area) west of FLW Route 1	Construct a new maintenance facility for the Military Police vehicles used in Evasive Driving Training near the training area (site-37)

Table C.17: Alternative Sites for the Range Modifications Construction Project Package			
Project Requirements	**Combined Headquarters**	**Separate Headquarters**	**Combined Headquarters and Instruction**
	(shown on Figure 3.5)	(shown on Figure 3.7)	(shown on Figure 3.3)
Vehicle and Equipment (Organizational), Parking/Storage outside of the Cantonment	none	Construct a new maintenance facility (with parking area) for the Military Police vehicles used in Evasive Driving Training near the training area (site-37) Construct a Directorate of Logistics satellite maintenance facility (with parking area) north of the FLW Route 28 (the road into the Normandy Training Area) west of FLW Route 1	Construct a new maintenance facility (with parking area) for the Military Police vehicles used in Evasive Driving Training near the training area (site-37)
Source: Harland Bartholomew & Associates, Inc.			

The BRAC facility locator numbers relate each support project to Figures 3.2 through 3.7 and Table 3.2 (which are located in Section 3, Description of Alternatives - Including the Proposed Action) which have been included to illustrate the general location of all projects under each development alternative.

Subsection C.3.3.7.5 below contains criteria for analyzing the implementation of the proposed action at these alternative sites.

C.3.3.7.5 Analysis Criteria for Implementing Proposed Range Modifications Alternatives. The basis and framework for analyzing the potential impacts of implementing each of the construction alternatives are summarized on Table C.18 below.

Table C.18: Analysis Criteria for Implementing Proposed Range Modifications Alternatives				
Resource Category		**Combined Headquarters Land Use and Facility Plan**	**Separate Headquarters Land Use and Facility Plan**	**Combined Headquarters and Instruction Land Use and Facility Plan**
		(shown on Figure 3.5)	(shown on Figure 3.7)	(shown on Figure 3.3)
Land Use and Training Areas		Project sites are located in areas classified for Training land use.	same as the CH LU & FP	same as the CH LU & FP
Air Quality and Climate		Particulate matter (such as dust from construction) is regulated.	same as the CH LU & FP	same as the CH LU & FP
Noise		construction will generate noise levels above the baseline conditions - noise will be transient and generally limited to daylight hours; weapons noise will not significantly change the noise contours	construction will generate noise levels above the baseline conditions - noise will be transient and generally limited to daylight hours; weapons noise will not significantly change the noise contours	construction will generate noise levels above the baseline conditions - noise will be transient and generally limited to daylight hours; weapons noise will not significantly change the noise contours

Table C.18: Analysis Criteria for Implementing Proposed Range Modifications Alternatives				
Resource Category		**Combined Headquarters Land Use and Facility Plan**	**Separate Headquarters Land Use and Facility Plan**	**Combined Headquarters and Instruction Land Use and Facility Plan**
Water Resources (Including, Floodplains, Surface Water and Hydrogeology/ Groundwater)	9 mm Pistol (FATS)	located in McCourtney Hollow watershed at Range 17; located within .25 mile of a stormwater drainageway	located in Smith Branch watershed at Range 11; located within .25 mile of a perennial stream	located in Falls Hollow watershed at Range 21; located within .25 mile of a perennial stream
	Air Force Base Recovery	located in Smith Branch watershed at TA 109A; not within .25 mile of perennial stream or stormwater drainageway	located in Smith Branch watershed at Babb Airfield; located within .25 mile of a stormwater drainageway	Same as the SH LU & FP; located within .25 mile of a stormwater drainageway
	Air Force Gas Chamber	located in Pond Hollow/Ballard Hollow watershed at TA 100; located within .25 mile of a stormwater drainageway	located in Pond Hollow/Ballard Hollow watershed at TA 132; not within .25 mile of a perennial stream or stormwater drainageway	located in Pond Hollow/Ballard Hollow watershed at TA 101; located within .25 mile of a stormwater drainageway
	Chemical, BIDS and FOX Organizational Vehicle Parking	located in Hurd Hollow watershed near Penn's Pond; located within .25 mile of a perennial stream	located in Smith Branch watershed near Bloodland Lake; located within .25 mile of a perennial stream	located near TA 250 in an unnamed watershed which drains into the Big Piney River; located within .25 mile of a perennial stream
	Evasive Driving	located in Smith Branch watershed at TA 236; located within .25 mile of a perennial stream	located in Smith Branch watershed at TA 228, south of Range Control; located within .25 mile of a perennial stream	located in Smith Branch watershed at TA 109A; not within .25 miles of a perennial stream or stormwater drainageway
	Flame Field Expedient Range	located in McCann Hollow watershed at Range 27; located within .25 mile of a perennial stream	located in McCann Hollow watershed at Range 24; not within .25 mile of a perennial stream or stormwater drainageway	located in McCann Hollow watershed at Range 27A; located within .25 mile of a perennial stream
	FOX Vehicle Swim	located in Hurd Hollow watershed, in Penn's Pond; located within .25 mile of a perennial stream	located in Smith Branch watershed, in Bloodland Lake; located within .25 mile of a perennial stream	located at TA 250 in an unnamed watershed which drains into the Big Piney River, across; located within .25 mile of a perennial stream
	HMMWV Driving	incorporated into the Evasive Driving site	incorporated into the Evasive Driving site	incorporated into the Evasive Driving site
	M60/M240 Range	located in Bailey Hollow watershed at Range 27A; not within .25 mile of perennial stream or stormwater drainageway	located in McCourtney Hollow watershed at Range 14; located within .25 mile of a stormwater drainageway	located in McCourtney Hollow watershed at Range 18; located within .25 mile of a stormwater drainageway
	Marine 9 mm Pistol	located in McCourtney Hollow watershed at Range 13; located within .25 mile of a perennial stream	located in Smith Branch watershed at Range 12; located within .25 mile of a perennial stream	located in Smith Branch watershed at Range 17; located within .25 mile of a stormwater drainageway
	Marine Combat Pistol	incorporated at the Marine 9 mm Pistol site	incorporated at the Marine 9 mm Pistol site	incorporated at the Marine 9 mm Pistol site

Table C.18: Analysis Criteria for Implementing Proposed Range Modifications Alternatives				
Resource Category		**Combined Headquarters Land Use and Facility Plan**	**Separate Headquarters Land Use and Facility Plan**	**Combined Headquarters and Instruction Land Use and Facility Plan**
	Marine NBC Training	located in Pond Hollow/Ballard Hollow watershed at TA 100; located within .25 mile of a stormwater drainageway	located in Quarry Hollow watershed north of Range 1; located within .25 mile of a perennial stream	located in Pond Hollow/Ballard Hollow watershed at TA 101; located within .25 mile of a stormwater drainageway
	Marine Shotgun	incorporated at the Marine 9 mm Pistol site	incorporated at the Marine 9 mm Pistol site	incorporated at the Marine 9 mm Pistol site
	Mark 19 Familiarization Range	located in Mush Paddle Hollow watershed at Cannon Range (Mush Paddle Hollow); located within .25 mile of a perennial stream	located in McCourtney Hollow watershed at Range 19; located within .25 mile of a stormwater drainageway	same as the SH LU & FP
	Mark 19 Qualification Range	located in McCourtney Hollow watershed at Range 15; not within .25 mile of perennial stream or stormwater drainageway	located in Bailey Hollow watershed at Range 28; located within .25 mile of a stormwater drainageway	located in McCourtney Hollow watershed at Range 18; not within .25 mile of a perennial stream or stormwater drainageway
	Mobile Smoke Ranges	located in Wolf Hollow, Smith Branch, Ballard Hollow and Musgrave Hollow watersheds; all areas within .25 mile of a perennial stream	located in Wolf Hollow, Smith Branch, Musgrave Hollow and Bailey/McCann Hollow watersheds; all areas located within .25 mile of a perennial stream	located in Ballard Hollow, Musgrave Hollow, Bailey/McCann Hollow and Caby Hollow watersheds; all areas within .25 mile of a perennial stream or stormwater drainageway
	Obscurant Storage	located in Bailey Hollow watershed (northwest of Range 30) and Ballard Hollow watersheds; Bailey Hollow site within .25 mile of perennial stream, Ballard Hollow site not within .25 mile of a perennial stream or stormwater drainageway	located in Bailey Hollow watershed (northwest of Range 30); within .25 mile of a perennial stream	same as the CH LU & FP
	Range Control Addition	located in Smith Branch watershed, north of Range Control; not within .25 mile of a perennial stream or stormwater drainageway	same as the CH LU & FP	same as the CH LU & FP
	Range Control Classroom	located in Smith Branch watershed, north of Range Control; located within .25 mile of a perennial stream	same as the CH LU & FP	located in Smith Branch watershed, east of the obscurant storage area near Range 30; located within .25 mile of a perennial stream
	Relocate M16 Zero Fire Range	would overlay existing Range 3; located within .25 mile of a stormwater drainageway	same as the CH LU & FP	same as the CH LU & FP
	Relocate US Weapons	would overlay existing Range 10; not within .25 mile of a perennial stream or stormwater drainageway	same as the CH LU & FP	same as the CH LU & FP
	Special Reaction Team Marksman/Observer	located in Smith Branch watershed at Range 14; located within .25 mile of a perennial stream	located in Quarry Hollow watershed at Range 1; located within .25 mile of a perennial stream	located in Smith Branch watershed at Range 15; located within .25 mile of a perennial stream

Table C.18: Analysis Criteria for Implementing Proposed Range Modifications Alternatives

Resource Category		Combined Headquarters Land Use and Facility Plan	Separate Headquarters Land Use and Facility Plan	Combined Headquarters and Instruction Land Use and Facility Plan
	Special Reaction Team Range	located in McCourtney Hollow watershed at Range 11; located within .25 mile of a stormwater drainageway	located in McCourtney Hollow watershed at Range 1; located within .25 mile of a stormwater drainageway	incorporated with Special Reaction Team Marksman/ Observer Range; located within .25 mile of a perennial stream
	Static Smoke Range	located in Bailey Hollow watershed at Range 29; located within .25 mile of a perennial stream	located in Bailey Hollow watershed at Range 30 Day/Night; located within .25 mile of a perennial stream	located in Bailey Hollow watershed at Range 30; located within .25 mile of a perennial stream
	Static Smoke Relocate Range 30 Day/Night	would overlay existing Range 1; located within .25 mile of a perennial stream	would overlay existing Range 6; located within .25 mile of a perennial stream	would overlay existing Range 11; located within .25 mile of a perennial stream
	Static Smoke Relocate Range 29	would overlay existing Range 4; located within .25 mile of a stormwater drainageway	no requirement to relocate range	same as the CH LU & FP
	Static Smoke Relocate Range 30F	no requirement to relocate range	same as the CH LU & FP	would overlay existing Range 6; located within .25 mile of a perennial stream
	Vehicle and Equipment (Organizational), Maintenance outside of the cantonment	incorporated with BIDS and FOX Organizational Vehicle Parking	incorporated in the Evasive Driving project - in addition, a DOL maintenance facility would be constructed in the Smith Branch watershed; not within .25 mile of a perennial stream or stormwater drainageway	incorporated in the Evasive Driving project
	Vehicle and Equipment (Organizational), Parking/Storage outside of the cantonment	incorporated with BIDS and FOX Organizational Vehicle Parking	incorporated in the Evasive Driving project - in addition, a DOL maintenance facility would be constructed in the Smith Branch watershed; not within .25 mile of a perennial stream or stormwater drainageway	incorporated in the Evasive Driving project
Geology and Soils	9 mm Pistol (FATS)	situated on approximately 0.3 acres of soils with low erosion potential	situated on approximately 0.3 acres of soils with low erosion potential	situated on approximately 0.3 acres of soils with low erosion potential
	Air Force Base Recovery	situated on approximately 6 acres of soils with low erosion potential	situated on approximately 6 acres of soils with low erosion potential	Same as the SH LU & FP.
	Air Force Gas Chamber	situated on approximately 1 acre of soils with low erosion potential	situated on approximately 1 acre of soils with low erosion potential	situated on approximately 1 acre of soils with low erosion potential
	Chemical, BIDS and FOX Organizational Vehicle Parking	situated on approximately 4 acres of soils with low erosion potential	situated on approximately 4 acres of soils with low erosion potential	situated on approximately 4 acres of soils with low erosion potential
	Evasive Driving	situated on approximately 5 acres of soils with low erosion potential and 73 acres with high erosion potential	situated on approximately 53 acres of soils with low erosion potential and 26 acres with high erosion potential	situated on approximately 73 acres of soils with low erosion potential

Table C.18:
Analysis Criteria for Implementing Proposed Range Modifications Alternatives

Resource Category		Combined Headquarters Land Use and Facility Plan	Separate Headquarters Land Use and Facility Plan	Combined Headquarters and Instruction Land Use and Facility Plan
	Flame Field Expedient Range	Situated on approximately 57 acres of soils with low erosion potential and 28 acres with high erosion potential.	Situated on approximately 53 acres of soils with low erosion potential and 26 acres with high erosion potential.	same as the CH LU & FP
	FOX Vehicle Swim	Incorporated in BIDS and FOX Organizational Vehicle Parking project.	Incorporated in BIDS and FOX Organizational Vehicle Parking project.	Incorporated in BIDS and FOX Organizational Vehicle Parking project.
	HMMWV Driving	Incorporated in Evasive Driving project.	Incorporated in Evasive Driving project.	Incorporated in Evasive Driving project.
	M60/M240 Range	Situated on approximately 21 acres of soils with low erosion potential and 24 acres with high erosion potential.	Situated on approximately 45 acres of soils with low erosion potential.	Situated on approximately 45 acres of soils with low erosion potential.
	Marine 9 mm Pistol	Situated on approximately 3 acres of soils with low erosion potential.	Situated on approximately 3 acres of soils with low erosion potential.	Situated on approximately 3 acres of soils with low erosion potential.
	Marine Combat Pistol	Incorporated with Marine 9 mm Pistol.	Incorporated with Marine 9 mm Pistol.	Incorporated with Marine 9 mm Pistol.
	Marine NBC Training	Situated on approximately 1 acre of soils with low erosion potential.	Situated on approximately 1 acre of soils with low erosion potential.	Situated on approximately 1 acre of soils with low erosion potential.
	Marine Shotgun	Incorporated with Marine 9 mm Pistol.	Incorporated with Marine 9 mm Pistol.	Incorporated with Marine 9 mm Pistol.
	Mark 19 Familiarization Range	Situated on approximately 200 acres of soils with low erosion potential and 122 acres with high erosion potential.	Situated on approximately 322 acres of soils with low erosion potential.	same as the SH LU & FP
	Mark 19 Qualification Range	Situated on approximately 45 acres of soils with low erosion potential.	Situated on approximately 39 acres of soils with low erosion potential and 6 acres with high erosion potential.	Incorporated with M60/M240 Range.
	Mobile Smoke Ranges	Situated on approximately 11 acres of soils with low erosion potential and 19 acres with high erosion potential.	Situated on approximately 43 acres of soils with low erosion potential and 78 acres with high erosion potential.	Situated on approximately 51 acres of soils with low erosion potential and 78 acres with high erosion potential.
	Obscurant Storage	Incorporated in Static Smoke Range.	Incorporated in Static Smoke Range.	Incorporated in Static Smoke Range.
	Range Control Addition	Project site is situated on 2.6 acres of soils with low erosion potential.	same as the CH LU & FP	same as the CH LU & FP
	Range Control Classroom	Incorporated in Range Control Addition.	same as the CH LU & FP	Incorporated with Obscurant Storage project.
	Relocate M16 Zero Fire Range	Would overlay existing Range 3.	same as the CH LU & FP	same as the CH LU & FP
	Relocate US Weapons	Would overlay existing Range 10.	same as the CH LU & FP	same as the CH LU & FP
	Special Reaction Team Marksman/ Observer	Situated on approximately 44 acres of soils with low erosion potential.	same as the CH LU & FP	same as the CH LU & FP

Table C.18: Analysis Criteria for Implementing Proposed Range Modifications Alternatives				
Resource Category		**Combined Headquarters Land Use and Facility Plan**	**Separate Headquarters Land Use and Facility Plan**	**Combined Headquarters and Instruction Land Use and Facility Plan**
	Special Reaction Team Range	Situated on approximately 44 acres of soils with low erosion potential.	same as the CH LU & FP	Incorporated in Special Reaction Team Marksman/ Observer project
	Static Smoke Range	Situated on approximately 2 acres of soils with low erosion potential and 10 acres with high erosion potential.	Situated on approximately 4 acres of soils with low erosion potential and 8 acres with high erosion potential.	same as the SH LU & FP
	Static Smoke Relocate Range 30 Day/Night	Would overlay existing Range 1.	Would overlay existing Range 6.	Would overlay existing Range 11.
	Static Smoke Relocate Range 29	Would overlay existing Range 4.	No requirement to relocate range.	same as the CH LU & FP
	Static Smoke Relocate Range 30F	No requirement to relocate range.	same as the CH LU & FP	Would overlay existing Range 6.
	Vehicle and Equipment (Organizational), Maintenance outside of the cantonment	Incorporated with BIDS and FOX Organizational Vehicle Parking.	The Vehicle and Equipment (Organizational), Maintenance project is incorporated in the Evasive Driving project.	The Vehicle and Equipment (Organizational), Maintenance project is incorporated in the Evasive Driving project.
	Vehicle and Equipment (Organizational), Parking/Storage outside of the cantonment	Incorporated with BIDS and FOX Organizational Vehicle Parking.	Vehicle and Equipment (Organizational), Parking/Storage project is incorporated in the Evasive Driving project.	Vehicle and Equipment (Organizational), Parking/Storage project is incorporated in the Evasive Driving project.
Infrastructure		Evasive Driving would require approximately 1.5 miles of new sewer and natural gas lines. Approximately 0.8 mile of new electrical line would be required and 0.7 mile would be upgraded.	Evasive Driving would utilize improvements made for the CDTF.	Existing utilities and roadways adequate to support the anticipated additional demand generated from this project.
Munitions		Munitions will be discharged on ranges designated for their use.	same as the CH LU & FP	same as the CH LU & FP
	Mark 19 Familiarization Range	Construction of a new Range (west of Cannon Range (Mush Paddle Hollow)) would require the establishment of new dud area (which is no longer authorized), a requirement to have an Explosive Ordnance Disposal team available at the range, or a modification of training methods to allow training on the range with only "practice" rounds (no high explosives)	Construction site specified, would allow the use of an existing dud area for many of the targets, training on other targets could be limited to modified training rounds.	Construction site specified, would allow the use of an existing dud area for many of the targets, training on other targets could be limited to modified training rounds.
		The conditions and limits of permits and licenses will be defined in accordance with the application process and applicable regulations.	same as the CH LU & FP	same as the CH LU & FP

Table C.18:
Analysis Criteria for Implementing Proposed Range Modifications Alternatives

Resource Category		Combined Headquarters Land Use and Facility Plan	Separate Headquarters Land Use and Facility Plan	Combined Headquarters and Instruction Land Use and Facility Plan
Permits and Regulatory Authority	9 mm Pistol (FATS)	will not require permit for construction over 5 acres	will not require permit for construction over 5 acres	will not require permit for construction over 5 acres
	Air Force Base Recovery	may require permit for construction over 5 acres	may require permit for construction over 5 acres	may require permit for construction over 5 acres
	Air Force Gas Chamber	will not require permit for construction over 5 acres	will not require permit for construction over 5 acres	will not require permit for construction over 5 acres
	Chemical, BIDS and FOX Organizational Vehicle Parking	may require permit for construction over 5 acres	may require permit for construction over 5 acres	may require permit for construction over 5 acres
	Evasive Driving	may require permit for construction over 5 acres	may require permit for construction over 5 acres	may require permit for construction over 5 acres
	Flame Field Expedient Range	may require permit for construction over 5 acres	may require permit for construction over 5 acres	same as the CH LU & FP
	FOX Vehicle Swim	Incorporated in BIDS and FOX Organizational Vehicle Parking project.	Incorporated in BIDS and FOX Organizational Vehicle Parking project.	Incorporated in BIDS and FOX Organizational Vehicle Parking project.
	HMMWV Driving	Incorporated in Evasive Driving project.	Incorporated in Evasive Driving project.	Incorporated in Evasive Driving project.
	M60/M240 Range	may require permit for construction over 5 acres	may require permit for construction over 5 acres	may require permit for construction over 5 acres
	Marine 9 mm Pistol	will not require permit for construction over 5 acres	will not require permit for construction over 5 acres	will not require permit for construction over 5 acres
	Marine Combat Pistol	Incorporated with Marine 9 mm Pistol.	Incorporated with Marine 9 mm Pistol.	Incorporated with Marine 9 mm Pistol.
	Marine NBC Training	will not require permit for construction over 5 acres	will not require permit for construction over 5 acres	will not require permit for construction over 5 acres
	Marine Shotgun	Incorporated in Marine 9 mm Pistol.	Incorporated in Marine 9 mm Pistol.	Incorporated in Marine 9 mm Pistol.
	Mark 19 Familiarization Range	may require permit for construction over 5 acres	may require permit for construction over 5 acres	same as the SH LU & FP
	Mark 19 Qualification Range	may require permit for construction over 5 acres	may require permit for construction over 5 acres	Incorporated with M60/M240 Range.
	Mobile Smoke Ranges	may require permit for construction over 5 acres	may require permit for construction over 5 acres	may require permit for construction over 5 acres
	Obscurant Storage	Incorporated in Static Smoke Range.	Incorporated in Static Smoke Range.	Incorporated in Static Smoke Range.
	Range Control Addition	will not require permit for construction over 5 acres	same as the CH LU & FP	same as the CH LU & FP
	Range Control Classroom	Incorporated in Range Control Addition.	same as the CH LU & FP	Incorporated with Obscurant Storage project.
	Relocate M16 Zero Fire Range	Would overlay existing Range 3.	same as the CH LU & FP	same as the CH LU & FP
	Relocate US Weapons	Would overlay existing Range 10.	same as the CH LU & FP	same as the CH LU & FP
	Special Reaction Team Marksman/ Observer	may require permit for construction over 5 acres	may require permit for construction over 5 acres	same as the CH LU & FP

Table C.18:
Analysis Criteria for Implementing Proposed Range Modifications Alternatives

Resource Category		Combined Headquarters Land Use and Facility Plan	Separate Headquarters Land Use and Facility Plan	Combined Headquarters and Instruction Land Use and Facility Plan
	Special Reaction Team Range	may require permit for construction over 5 acres	same as the CH LU & FP	Incorporated in Special Reaction Team Marksman/ Observer project.
	Static Smoke Range	may require permit for construction over 5 acres	may require permit for construction over 5 acres	same as the SH LU & FP
	Static Smoke Relocate Range 30 Day/Night	Would overlay existing Range 1.	Would overlay existing Range 6.	Would overlay existing Range 11.
	Static Smoke Relocate Range 29	Would overlay existing Range 4.	No requirement to relocate range.	same as the CH LU & FP
	Static Smoke Relocate Range 30F	No requirement to relocate range.	same as the CH LU & FP	Would overlay existing Range 6.
	Vehicle and Equipment (Organizational), Maintenance outside of the cantonment	Incorporated with BIDS and FOX Organizational Vehicle Parking.	Incorporated in the Evasive Driving project. In addition, a DOL maintenance facility would be constructed north of FLW Route 28 and west of FLW Route 1.	Incorporated in the Evasive Driving project.
	Vehicle and Equipment (Organizational), Parking/Storage outside of the cantonment	Incorporated with BIDS and FOX Organizational Vehicle Parking.	Incorporated in the Evasive Driving project. In addition, a DOL maintenance facility would be constructed north of FLW Route 28 and west of FLW Route 1.	Incorporated in the Evasive Driving project.
Biological Resources (including Federal T & E Species, Other Protected Species, Wetlands, Aquatic Resources, and Terrestrial Resources)	9 mm Pistol (FATS)	Project site is situated on approximately 0.3 acre of developed land.	Project site is situated on approximately 0.3 acre of developed land.	Project site is situated on approximately 0.3 acre of developed land.
		Project site is situated on approximately 0.1 acre of Indiana bat habitat.	No T & E species habitat would be affected.	No T & E species habitat would be affected.
	Air Force Base Recovery	Project site is situated on 6 acres of developed land.	Project site is situated on approximately 1 acre of developed land and 5 acres of grassland/ old field.	Project site is situated on approximately 1 acre of developed land and 5 acres of grassland/ old field.
	Air Force Gas Chamber	Project site is situated on approximately 1 acre of developed land.	Project site is situated on approximately 1 acre of developed land.	Project site is situated on approximately 1 acre of developed land.
	Chemical, BIDS and FOX Organizational Vehicle Parking	Project site is situated on approximately 1 acre of developed land, 3 acres of shrub/forest and 1 acre of grassland/old field.	Project site is situated on approximately 1 acre of developed land, 2 acres of shrub/forest and 1 acre of grassland/old field.	Project site is situated on 4 acres of developed land.

Table C.18:
Analysis Criteria for Implementing Proposed Range Modifications Alternatives

Resource Category		Combined Headquarters Land Use and Facility Plan	Separate Headquarters Land Use and Facility Plan	Combined Headquarters and Instruction Land Use and Facility Plan
	Evasive Driving	Project site is situated on approximately 32 acres of developed land, 16 acres of shrub/forest and 30 acres of grassland/old field.	Project site is situated on approximately 7 acres of developed land, 26 acres of shrub/forest and 46 acres of grassland/old field.	Project site is situated on approximately 63 acres of developed land, 6 acres of shrub/forest and 4 acres of grassland/old field.
		Project site is situated on approximately 6 acres of Indiana bat habitat.	Project site is situated on approximately 6 acres of Indiana bat habitat.	Project site is situated on approximately 5 acres of Indiana bat habitat.
	Flame Field Expedient Range	Project site is situated on approximately 22 acres of developed land, 12 acres of shrub/forest and 51 acres of grassland/old field.	Project site is situated on approximately 10 acres of developed land, 62 acres of shrub/forest and 20 acres of grassland/old field.	same as the CH LU & FP
		Project site is situated on approximately 8.1 acres of Indiana bat habitat.	Project site is situated on approximately 23 acres of Indiana bat habitat.	Project site is situated on approximately 4.3 acres of Indiana bat habitat.
	FOX Vehicle Swim	Incorporated in BIDS and FOX Organizational Vehicle Parking project.	Incorporated in BIDS and FOX Organizational Vehicle Parking project.	Incorporated in BIDS and FOX Organizational Vehicle Parking project.
	HMMWV Driving	Incorporated in Evasive Driving project.	Incorporated in Evasive Driving project.	Incorporated in Evasive Driving project.
		Project site is situated on approximately 5 acres of Indiana bat habitat.	Project site is situated on approximately 5 acres of Indiana bat habitat.	No T & E species habitat would be affected.
	M60/M240 Range	Project site is situated on approximately 8 acres of developed land, 8 acres of shrub/forest and 29 acres of grassland/old field.	Project site is situated on approximately 7 acres of developed land, 10 acres of shrub/forest and 28 acres of grassland/old field.	Project site is situated on approximately 7 acres of developed land, 10 acres of shrub/forest and 28 acres of grassland/old field.
		No T & E species habitat would be affected.	Project site is situated on approximately 0.2 acres of Indiana bat habitat.	No T & E species habitat would be affected.
	Marine 9 mm Pistol	Project site is situated on approximately 1 acre of developed land and 2 acres of grassland/old field.	Project site is situated on approximately 1 acre of developed land and 2 acres of grassland/old field.	Project site is situated on approximately 1 acre of developed land and 2 acres of grassland/old field.
		No T & E species habitat would be affected.	No T & E species habitat would be affected.	Project site is situated on approximately 0.1 acre of Indiana bat habitat.
	Marine Combat Pistol	Incorporated with Marine 9 mm Pistol.	Incorporated with Marine 9 mm Pistol.	Incorporated with Marine 9 mm Pistol.
	Marine NBC Training	Project site is situated on approximately 1 acre of developed land.	Project site is situated on approximately 1 acre of shrub/forest.	Project site is situated on approximately 1 acre of shrub/forest.
		Project site is situated on approximately 0.5 acre of Indiana bat habitat and 0.25 acres of Gray bat habitat.	Project site is situated on approximately 1.2 acres of Indiana bat habitat.	Project site is situated on approximately 0.5 acre of Indiana bat habitat.
	Marine Shotgun	Incorporated in Marine 9 mm Pistol.	Incorporated in Marine 9 mm Pistol.	Incorporated in Marine 9 mm Pistol.

Table C.18:
Analysis Criteria for Implementing Proposed Range Modifications Alternatives

Resource Category		Combined Headquarters Land Use and Facility Plan	Separate Headquarters Land Use and Facility Plan	Combined Headquarters and Instruction Land Use and Facility Plan
	Mark 19 Familiarization Range	Project site is situated on approximately 6 acres of developed land, 310 acres of shrub/forest and 6 acres of grassland/old field.	Project site is situated on approximately 25 acres of developed land, 257 acres of shrub/forest and 40 acres of grassland/old field.	same as the SH LU & FP
		Project site is situated on approximately 116 acres of Indiana bat habitat.	Project site is situated on approximately 77 acres of Indiana bat habitat.	Project site is situated on approximately 77 acres of Indiana bat habitat.
	Mark 19 Qualification Range	Project site is situated on approximately 5 acres of developed land, 2 acres of shrub/forest and 38 acres of grassland/old field	Project site is situated on approximately 8 acres of developed land, 14 acres of shrub/forest and 23 acres of grassland/old field	Incorporated with M60/M240 Range.
	Mobile Smoke Ranges	Project site is situated on approximately 1 acre of developed land, 13 acres of shrub/forest and 15 acres of grassland/old field.	Project site is situated on approximately 47 acres of developed land, 34 acres of shrub/forest and 41 acres of grassland/old field.	Project site is situated on approximately 48 acres of developed land, 46 acres of shrub/forest and 36 acres of grassland/old field.
		Project site is situated on the following approximate acreage of Indiana bat habitat: 1.4 acres in Ballard Hollow, 0.4 acre in Musgrave Hollow, and 2.5 acres in Wolf Hollow.	Project site is situated on the following approximate acreage of Indiana bat habitat: 2.5 acres in Wolf Hollow, 0.4 acre in Musgrave Hollow, and 6.3 acres in Bailey/McCann Hollow, and approximately 0.4 acres of Gray bat habitat in Bailey/McCann Hollow.	Project site is situated on the following approximate acreage of Indiana bat habitat: 1.4 acres of in Ballard Hollow, 0.4 acres in Musgrave Hollow, and 6.3 acres in Bailey/McCann Hollow, and approximately 0.4 acres of Gray bat habitat in Bailey/McCann Hollow.
	Obscurant Storage	Incorporated in Static Smoke Range.	Incorporated in Static Smoke Range.	Incorporated in Static Smoke Range.
	Range Control Addition	Project site is situated on 2.6 acres of grassland/old field.	same as the CH LU & FP	same as the CH LU & FP
	Range Control Classroom	Incorporated in Range Control Addition.	same as the CH LU & FP	Incorporated with Obscurant Storage project.
	Relocate M16 Zero Fire Range	Would overlay existing Range 3.	same as the CH LU & FP	same as the CH LU & FP
	Relocate US Weapons	Would overlay existing Range 10.	same as the CH LU & FP	same as the CH LU & FP
	Special Reaction Team Marksman/ Observer	Project site is situated on approximately 8 acres of developed land, 5 acres of shrub/forest and 31 acres of grassland/old field	Project site is situated on approximately 7 acres of developed land, 27 acres of shrub/forest and 10 acres of grassland/old field	same as the CH LU & FP
	Special Reaction Team Range	Project site is situated on approximately 2 acres of developed land, 41 acres of shrub/forest and 1 acre of grassland/old field.	same as the CH LU & FP	Incorporated in Special Reaction Team Marksman/ Observer project.
		Project site is situated on approximately 31 acres of Indiana bat habitat.	same as the CH LU & FP	No T & E species habitat would be affected.

Table C.18:
Analysis Criteria for Implementing Proposed Range Modifications Alternatives

Resource Category		Combined Headquarters Land Use and Facility Plan	Separate Headquarters Land Use and Facility Plan	Combined Headquarters and Instruction Land Use and Facility Plan
	Static Smoke Range	Project site is situated on approximately 1 acre of developed land, 4 acres of shrub/forest and 7 acres of grassland/old field.	Project site is situated on approximately 3 acres of developed land, 4 acres of shrub/forest and 6 acres of grassland/old field.	same as the SH LU & FP
		No T & E species habitat would be affected.	No T & E species habitat would be affected.	Project site is situated on approximately 0.25 acre of Indiana bat habitat.
	Static Smoke Relocate Range 30 Day/Night	Would overlay existing Range 1.	Would overlay existing Range 6.	Would overlay existing Range 11.
	Static Smoke Relocate Range 29	Would overlay existing Range 4.	No requirement to relocate range.	same as the CH LU & FP
	Static Smoke Relocate Range 30F	No requirement to relocate range.	same as the CH LU & FP	Would overlay existing Range 6.
	Vehicle and Equipment (Organizational), Maintenance outside of the cantonment	Incorporated with BIDS and FOX Organizational Vehicle Parking.	Incorporated in the Evasive Driving project. In addition, a DOL maintenance facility would be constructed north of FLW Route 28 and west of FLW Route 1.	Incorporated in the Evasive Driving project.
	Vehicle and Equipment (Organizational), Parking/Storage outside of the cantonment	Incorporated with BIDS and FOX Organizational Vehicle Parking.	Incorporated in the Evasive Driving project. In addition, a DOL maintenance facility would be constructed north of FLW Route 28 and west of FLW Route 1.	Incorporated in the Evasive Driving project.
Cultural Resources		surveys conducted and "no effect" established	same as the CH LU & FP	same as the CH LU & FP
Quality of Life (including Human Health and Safety)		use of Penn's Pond for FOX amphibious training could result in negative impacts on recreational fishing	use of Bloodland Lake for FOX amphibious training could result in negative impacts on recreational fishing	use of TA 250 for FOX amphibious training will eliminate potential negative impacts on recreational fishing as occurs with the other alternatives
Operational Efficiency		will require the establishment of a new range impact dud area, or require EOD personnel to be present at the new Mark 19 range during all training. This will result in increased long-term operations costs.	will allow the reuse of an existing dud area for Mark 19 training reducing costs associated with removing dud rounds	will allow the reuse of an existing dud area for Mark 19 training reducing the cost of removing dud rounds. arrangement of Special Reaction team ranges (13-15) also results in improved synergism effects associated with this training

Source: Harland Bartholomew & Associates, Inc.

C.3.3.8 Convert Housing, Project 46540

C.3.3.8.1 Goal. The goal of this construction project package is to renovate and convert existing, available family housing and unaccompanied personnel housing (enlisted and officer) into facilities that can be used to support the additional barracks space requirements that are anticipated following the relocation of the Chemical and Military Police schools. Although the concept of new construction will be considered as an alternative in the following analysis, new barracks construction requirements have been separated into a dedicated construction project discussed in Project 46092, Unaccompanied Personnel Housing.

C.3.3.8.2 Construction/Non-Construction Alternatives Considered. In addition to the non-construction alternatives discussed in Section C.2, the following alternatives were developed for this identified requirement.

C.3.3.8.2.1 New Construction. As discussed in Alternative C.3.3.6, Project 46092, Unaccompanied Personnel Housing, the alternative of constructing new barracks is included in this analysis only as an alternative for discussion. If the construction of new barracks was selected, the construction requirements are consolidated under subsection C.3.3.6.

C.3.3.8.2.2 Lease of UPH Spaces. As discussed in Section C.2, this alternative was eliminated from further consideration due to the high cost associated with the lease of UPH spaces. The short-term lease/rental of UPH spaces in the surrounding community during peak occupancy periods on-post will continue.

C.3.3.8.2.3 Conversion and Renovation of Existing Facilities. This alternative includes the renovation and conversion of 194 existing, available family housing quarters and the renovation and modernization of 168 available unaccompanied junior officer quarters, in order to provide approximately 944 of the additional enlisted and officer barracks requirements associated with the relocation of the Chemical and Military Police schools.

C.3.3.8.3 Selection of the Army's Proposed Construction/Non-Construction Alternative. The Conversion and Renovation of Existing Facilities was selected as the proposed alternative. This selection was based on a determination by the FLW, Directorate of Public Works, Housing Division that unless renovated, the units would be excess to their requirements. In addition:

- renovation of the units would be far less costly than the construction of new units;
- renovated units would provide at least the same level of occupancy standards as would be provided in new construction; and
- renovation of the units would require less site clearing than the alternative of new construction thereby resulting in a lower level of potential environmental concern.

The renovation of approximately 168 unaccompanied junior officer quarters at Sturgis Heights (to meet current occupancy standards) will include interior renovation and modernization of the plumbing and heating, cooling and air conditioning systems.

C.3.3.8.4 Rationale for Selection of the Army's Proposed Construction Site Alternatives. This project will only be implemented if the Army's Proposed Land Use and Facility Plan (Combined Headquarters and Instruction) (as described in Section 3) is selected as the proposed action. If the Army's Proposed Land Use and Facility Plan (Combined Headquarters and Instruction) is not selected as the proposed action, the UEPH project discussed in subsections C.3.3.6, 2.4.2.6 and 2.4.2.8 will increase in scope to construct approximately 1,662 UEPH barracks spaces.

This project will convert available family housing to UPH use, but will not require extensive modifications to the family housing units. The project will renovate and convert 194 excess family housing quarters and renovate 168 Junior Officer quarters. The renovation and conversion of the excess family housing quarters will be limited to dewinterization of the units and minor interior repairs including: miscellaneous painting and floor refinishing; waxing of existing hardwood floors; replacing approximately 100 square feet of deteriorated hardwood flooring at each unit; replacing deteriorated window sills, window trim, door trim, baseboard and base shoe; servicing existing plumbing fixtures by replacing faucet washers, flush valves, seals and gaskets and shutoff valves; replacing storm doors; replacing exterior entrance doors; replacing broken windows; and cleaning and grooming the exterior grounds at the units. The renovation of 188 unaccompanied officer rooms at Sturgis Heights to meet current occupancy standards will include interior renovation and modernization of the plumbing and heating, cooling and air conditioning systems. Existing utilities and infrastructure support systems are adequate to support the intended use of the facilities following conversion and renovation. Design and construction will be in accordance with the Fort Leonard Wood Installation Design Guide.

The process delineated below was used to identify family housing units to be converted that would be evaluated in the Land Use and Facility Plan alternatives.

1) Family housing requirements based on the projected incoming population were developed by FLW DPW.

2) Existing family housing units that were available and could be converted to UEPH and UOPH were identified.

3) Selection of units that would be converted was conducted.

The following criteria were used for selection of family housing units to be converted:

- All existing family housing units at FLW were reviewed.

- Housing units least capable of supporting Quality-of-Life initiatives for families were identified.

- The fourplex and row house housing styles were identified as least desirable for family housing. Desirability for family housing was based on:
  - room size,
  - room arrangement,
  - yard space, and
  - relatively high density of 4- and 8-unit buildings versus the majority of other housing unit styles at FLW which are single family and duplex styles.

Converted family housing units will be assigned to senior enlisted personnel so that each soldier has a private bedroom and no more than two soldiers share one bath.

Final selection of the housing units that would be converted was based on the desire to separate UPH from family housing to provide a distinct quality of life appropriate to each of those groups. In this way, no families would housed next to unaccompanied personnel. As a result of this identification and selection process, family housing units along Indiana Avenue were selected for the conversion project.

This is second of two construction project packages that were developed to provide the required UPH spaces to house unaccompanied personnel that will be relocated for FMC to FLW. Elements included in this construction project package (by land use plan) are listed on Table C.19.

Table C.19:
Alternative Sites for the Convert Housing Construction Project Package

Project Requirements	Combined Headquarters	Separate Headquarters	Combined Headquarters and Instruction
	(shown on Figure 3.5)	(shown on Figure 3.7)	(shown on Figure 3.3)
Housing, Enlisted Unaccompanied (convert Family Housing)	none	none	Diversion of Indiana Street Housing (site-55)
Housing, Officer Unaccompanied (new construction)	New Construction, UOPHs constructed next to Morelli Heights UOPHs (site-53)	New Construction, Near the Sturgis Heights UOPHs (site-53)	none

Table C.19: **Alternative Sites for the Convert Housing Construction Project Package**			
Project Requirements	**Combined Headquarters**	**Separate Headquarters**	**Combined Headquarters and Instruction**
Housing, Officer Unaccompanied (convert Family Housing)	none	none	Diversion of Indiana Street Housing (site-55)
Housing, Officer Unaccompanied (convert existing)	Renovation of Sturgis Heights UOPHs (site-54)	none	Renovation of Sturgis Heights UOPHs (site-54)
Source: Harland Bartholomew & Associates, Inc.			

The BRAC facility locator number that has been assigned to this project is site 10. The BRAC facility locator will allow the location of this project on Figures 3.2 through 3.7 and Table 3.2 (which are located in Section 3, Description of Alternatives - Including the Proposed Action) which have been included to illustrate the general location of all projects under each development alternative.

Subsection C.3.3.8.5 below contains criteria for analyzing the implementation of the proposed action at these alternative sites.

C.3.3.8.5 Analysis Criteria for Implementing Proposed Convert Housing Alternatives. The basis and framework for analyzing the potential impacts of implementing each of the construction alternatives are summarized on Table C.20.

Table C.20: **Analysis Criteria for Implementing Proposed Convert Housing Alternatives**			
Resource Category	**Combined Headquarters Land Use and Facility Plan**	**Separate Headquarters Land Use and Facility Plan**	**Combined Headquarters and Instruction Land Use and Facility Plan**
	(shown on Figure 3.5)	(shown on Figure 3.7)	(shown on Figure 3.3)
Land Use and Training Areas	Project site located in an area classified for this land use.	same as the CH LU & FP	same as the CH LU & FP
Air Quality and Climate	Particulate matter (such as dust from construction) is regulated by 10 CSR 10-6.170 which restricts particulate matter beyond the premises of origin.	same as the CH LU & FP	same as the CH LU & FP
	Realignment of activities and personnel will result in an increased square footage required. Increased square footage will result in increased fuel consumption and an associated increase in air emissions. These increases correlate to the increase in square footage required.	same as the CH LU & FP	same as the CH LU & FP
Noise	Project construction will generate noise levels above the baseline conditions. Construction noise will be transient and, for the most part, limited to daylight hours.	same as the CH LU & FP	same as the CH LU & FP

Table C.20: Analysis Criteria for Implementing Proposed Convert Housing Alternatives			
Resource Category	**Combined Headquarters Land Use and Facility Plan**	**Separate Headquarters Land Use and Facility Plan**	**Combined Headquarters and Instruction Land Use and Facility Plan**
Water Resources (including, Floodplains, Surface Water and Hydrogeology/Groundwater)	UOPH project site located in the Dry Creek watershed; not within .25 mile of a perennial stream or stormwater drainageway	UOPH project site located in the Eastgate Road watershed; not within .25 mile of a stormwater drainageway	Project component not required in this land use plan.
Geology and Soils	UOPH project site is situated on approximately 6 acres of soils with low erosion potential and 3 acres of soils with high erosion potential.	same as the CH LU & FP	Project component not required in this land use plan.
Infrastructure	Existing utilities and roadways adequate to support the anticipated additional demand generated from this project.	same as the CH LU & FP	same as the CH LU & FP
Permits and Regulatory Authority	The conditions and limits of permits and licenses will be defined in accordance with the application process and applicable regulations.	same as the CH LU & FP	same as the CH LU & FP
Biological Resources (including Federal T & E Species, Other Protected Species, Wetlands, Aquatic Resources, and Terrestrial Resources)	UOPH project site is situated on approximately 2 acres of developed land, 5 acres of shrub/forest and 2 acres of grassland/old field.	UOPH project site is situated on approximately 9 acres of shrub/forest.	Project component not required in this land use plan.
Cultural Resources	surveys conducted and "no effect" established	same as the CH LU & FP	same as the CH LU & FP
Quality of Life (including Human Health and Safety)	No impacts are expected to occur to the installation's quality of life.	same as the CH LU & FP	same as the CH LU & FP
Operational Efficiency			
Source: Harland Bartholomew & Associates, Inc.			

C.3.4 Anticipated Cost of New Construction

As illustrated on Table C.2 the three BRAC land use plans, as discussed in subsection C.3.1, will have different impacts on the number, type and extent of utilization of existing, available facilities that will be reused to support identified BRAC related construction requirements. Table C.21 provides a summary of the construction requirements that will be associated with each of the land use and facility siting alternatives and the estimated total construction cost of the identified facilities.

Table C.21
FLW BRAC 1995 Construction Projects [1]

		Land Use Plan			
Project Number	**Title**	**Combined Headquarters**	**Separate Headquarters**	**Combined Headquarters and Instruction**	**Unit**
38174	General Officer Quarters	4,200	4,200	4,200	SF
45892	Sixteen-Building Military Operations in Urbanized Terrain (MOUT) Facility	78,500	78,500	78,500	SF
45893	Chemical Defense Training Facility	68,500	68,500	68,500	SF
46090	General Instruction Facility	375,000	395,000	300,000	SF
46091	Applied Instruction Facility	345,000	345,000	198,000	SF
46092	Unaccompanied Personnel Housing	1,662	1,662	888	PN
46094	Range Modifications	16	16	16	EA
46640	Convert Housing	0	0	1,130	PN
	Estimated Construction Cost ($ millions)	**255**	**260**	**205**	**million**

Notes: 1 All areas and estimated costs are approximate.
2 SF = Square Feet, PN = Persons, EA = Each

Source: DD Form 1391s for the projects

Based upon the analysis completed in Section C.4 below, the Combined Headquarters and Instruction Land Use and Facility Plan was selected as the Army's Proposed Land Use and Facility Plan. The Combined Headquarters Land Use Plan was selected as Alternative 1, and the Separate Headquarters Land Use Plan was selected as Alternative 2. Additional information concerning the Army's Proposed Action is located in subsection 2.4.2 of Section 2, *Overview of the Proposed Action*. Subsection 3.4 in Section 3, *Description of Alternatives - Including the Proposed Action* provides additional descriptions of all three alternatives. The anticipated environmental impact of implementing these three land use plan alternatives are discussed in Section 5, *Environmental Consequences*.

C.4 SELECTION OF THE ARMY'S PROPOSED LAND USE AND FACILITY SITING PLAN

This section documents the initial review of land use related to the development and selection of the proposed BRAC 1995 land use alternative, and provides a discussion of the rationale which led to the selection of the Army's Proposed Land Use and Facility Plan. Section 5 (Environmental Consequences) of the EIS will evaluate the impacts of implementing this Army's Proposed Land Use and Facility Plan compared to those associated with two alternative plans.

C.4.1 Land Use Concept Development

C.4.1.1 Background

Existing land use patterns at FLW have established a series of functional and aesthetic relationships that are based on the original 1940 design of the installation. This design provided for a large, centrally located parade ground with troop housing arrayed along all four sides. To a remarkable degree, this pattern has been preserved for the intervening fifty years, even though most of the temporary barracks have been replaced with permanent structures. Minor encroachment into the central open area has occurred at the northern, southern and western boundaries. The installation community center has been located along the northern edge of the open area. At the southern end, encroachment has occurred through the construction of service clubs, the temporary home of the Training and Audiovisual Support Center, a bowling alley, and a theater. Minor encroachment along the western side has occurred along Iowa Avenue in the form of a theater and headquarters support facilities. The various recreational and training facilities which have been built in the open area add to its usefulness without detracting from the sense of openness.

The continuation and reinforcement of the original installation design, along with the land use patterns it established, was a primary consideration in the development of the current *Master Plan for the U.S. Army Engineer Center and FLW* (FLW, 1991d). The plan established the current land use program for the installation and included areas for administrative, airfield, community support, family housing, industrial, maintenance, medical, supply/storage, unaccompanied personnel housing, outdoor recreational facilities, ranges, training areas and open space. The environmental impacts of implementing this plan were evaluated in the *Environmental Assessment of the Master Plan and Ongoing Mission* (FLW, 1995c).

Independent from, yet related to, the existing Master Plan, FLW has developed a master plan for development of range and training areas. The environmental effects of implementing this plan are evaluated in *Environmental Assessment of the Training Area Master Plan* (FLW, 1994e).

Together these two plans, and their related environmental reviews, document the baseline conditions which BRAC related development will augment.

C.4.1.2 Assumptions

The Master Plan, Training Area Master Plan and the following general assumptions were used as guidance in the selection of sites for new facilities required by the relocation of the Military Police School and Chemical School. These assumptions were provided by FLW planners, and reflect guidance from the FLW command group and headquarters U.S. Army Training and Doctrine Command.

- Each of the service schools will retain their branch identity.
- To the maximum extent possible, existing permanent facilities will be used to meet the additional mission requirements.
- Where cost-effective, renovation of available existing facilities will be considered in order to minimize new construction.
- Relocated missions will be provided with facilities that meet their current and future requirements.
- Sites for required projects will be selected to provide sufficient area for additional construction at a later date.
- Renovated buildings must provide the proper dimensions for use and be complete and usable. In classrooms this is particularly important. Facilities renovated for classroom use must provide proper visual contact between instructors, students and the material being presented. Spaces with columns or other building systems in the interior of classrooms should be avoided.
- Conversion of existing facilities will include modification and modernization of existing electrical and mechanical systems.

C.4.2 Alternative BRAC 1995 Land Use Plans

The analysis for the proposed land use plan for BRAC 1995 actions started with a review of the existing land use plans on the installation that were established by the Master Plan and Training Area Master Plan. These plans were used as the environmental baseline for proposed BRAC actions since the plans had been recently updated and both plans had been evaluated for environmental impacts as required by NEPA and AR 200-2.

Figures 4.1 and 4.2 (located in Volume 1, Section 4) provide illustrations of the training area and cantonment area land use patterns that were established by these plans. Review of these land use patterns determined that sufficient areas had not been included within the existing land use patterns of the cantonment to support the unique training requirements associated with the Military Police School and the Chemical School. Consequently, it was determined that modification of the established land use patterns would be required in order to fully and efficiently support identified BRAC related training and support requirements. This process led to the development of three alternative land use plans, entitled:

- Combined Headquarters;
- Separate Headquarters; and
- Combined Headquarters and Instruction.

Following identification and development of the land use plans, a review was performed to identify the optimum land use plan. Volume I, Section 5, Environmental Consequences, includes an analysis of the anticipated environmental impacts associated with implementing each of the land use plans. The analysis located in Section 5 is based on the following resource categories:

- Land Use and Training Areas;
- Air Quality and Climate;
- Noise;
- Water Resources (including, Floodplains, Surface Water and Hydrogeology/Groundwater);
- Geology and Soils;
- Infrastructure;
- Hazardous and Toxic Materials;
- Munitions
- Permits and Regulatory Authority;
- Biological Resources (including Federal T & E Species, Other Protected Species, Wetlands, Aquatic Resources, and Terrestrial Resources);
- Cultural Resources;
- Sociological Environment;
- Economic Development;
- Quality of Life (including Human Health and Safety);
- Installation Agreements; and
- Operational Efficiency.

These categories were developed based on a review of installation resources, applicable resource protection laws and regulations, and comments received from the public and resource agencies during the EIS scoping process.

The analysis contained in subsection C.4.2.2 will provide input into the selection of the Operational Efficiency criteria only. The criteria used during this analysis included:

- Equality of facilities provided to the Engineer School, Chemical School and the Military Police School;
- Effectiveness in the use of existing, available facilities for the functions that they were originally designed to support;
- Effectiveness in the conversion of existing, available facilities for other than their design use;
- On- and off-post traffic flow;
- Flexibility in the future use of facilities;
- Proximity of OSUT billets to their associated general and applied instruction facilities;
- Proximity of NCOA billets to their associated general and applied instruction facilities;
- Proximity of Officer billets to their associated applied instruction facilities;
- Proximity of Officer billets to their associated general instruction facilities;
- Lowest overall construction cost;
- Lowest overall site development cost; and
- Lowest overall utility system construction cost.

Subsection C.4.2.1 provides additional information concerning the differences between the three land use development plans. The subsection also identifies the alternative sites that will be used for planned BRAC actions if that land use plan is selected for implementation. Subsection C.4.2.2 documents the review process that resulted in the selection of the Combined Headquarters and Instruction Land Use Plan as the Army's Proposed Action. The differences between the existing, approved Land Use Plan for the FLW cantonment (which is illustrated on Figure 4.1) and the three alternative land use plans are illustrated on figures 3.2, 3.4 and 3.6. The Army's Proposed BRAC Land Use Plan (Combined Headquarters and Instruction) is presented on Figure 3.2, while Figure 3.4 provides an illustration of the Alternative 1 BRAC Land Use Plan (Combined Headquarters) and Figure 3.6 provides an illustration of the Alternative 2 BRAC Land Use Plan (Separate Headquarters).

C.4.2.1 Identification of the Land Use Plans

This section provides a summary of the three alternative land use plans (in subsections C.4.2.1.1, C.4.2.1.2, and C.4.2.1.3) and a summary of key facilities locations that will be used if the land use plan is selected for implementation (in subsection C.4.2.1.4). Section C.5 provides additional information on the selection and review of individual construction sites.

C.4.2.1.1 Combined Headquarters Land Use and Facility Plan. This concept will locate the headquarters for the Chemical School, Engineer School and Military Police School in Hoge and Lincoln halls. Figure 3.4 located in Volume I, Section 3 of the EIS provides an illustration of the proposed cantonment area land use plan for this alternative. The background on this figure illustrates the existing approved and evaluated land use patterns, while proposed changes are illustrated in darker line weights and area fills. Figure 3.5 (located in Volume 1, Section 3) provides an illustration of the proposed construction sites that would be used if this land use plan is implemented. Table 3.3 (located in Volume 1, Section 3) provides a cross reference that associates proposed training activities required to accomplish each of the training goals with a proposed site. Section C.5 provides additional information on the selection and review of individual construction sites. Significant elements included in this concept include the following.

- The general instruction classroom requirements for all three service schools will be met through the reallocation of existing classrooms and the construction of new consolidated classrooms.

- Engineer Center base operations personnel currently located in Hoge and Lincoln halls (the Directorate of Resources Management, Directorate of Plans, Training and Mobilization, etc) will be relocated to converted rolling-pin barracks in the 600-area.

- A new IET barracks will be constructed at the southern end of the 800-area (west of Iowa Avenue and south of South Dakota Avenue) to replace barracks converted into base operations administrative areas.

- The existing Engineer Center Museum, located in Walker Museum, will be modified and expanded to provide a consolidated museum facility for all three schools. The regimental room and some current Engineer Center Museum spaces will be renovated into additional storage areas and addition will be constructed to house the remainder of the collections.

- The 1000-area will be converted into NCOA general instruction and general purpose administrative areas for the three NCO academies.

- New 1 + 1 (private and semi-private) permanent party barracks will be constructed south of Specker Barracks to provide for flexible assignment of existing and new barracks as the training loads shift between the various service schools.

- Applied instruction areas for the Chemical School will be constructed southeast of the DOL Transportation Maintenance complex.

- Applied instruction areas for the Military Police School will be constructed west of Alabama Avenue on the site of the 1200-area temporary buildings.

- A general purpose warehouse required to store training materials for the Chemical and Military Police schools near the existing warehouse district west of Louisiana Avenue and north of East Fourth Street.

- Unaccompanied officer quarters, if required, will be constructed near the existing Morelli Heights officers quarters, northeast of the Engineer School complex.

- General Officer Quarters for the commandants of the Chemical and Military Police schools will be constructed along the northeast side of Piney Hills Drive. This site will place the new GOQs across the street from the recently completed GOQs quarters for FLW requirements.

C.4.2.1.2 Separate Headquarters Land Use and Facility Plan. This concept will locate the headquarters for Military Police School and the Chemical School in separate headquarters, but with consolidated general instruction and library facilities in the 800-area. The Engineer School will remain in Hoge, Lincoln and Clarke halls. An illustration of the proposed Separate Headquarters land use plan is provided on Figure 3.6 located in Volume I, Section 3 of the EIS provides an illustration of the proposed cantonment area land use plan for this alternative. The background on this figure illustrates the existing approved and evaluated land use patterns, while proposed changes are illustrated in darker line weights and area fills. Figure 3.7 (located in Volume 1, Section 3) provides an illustration of the proposed construction sites that would be used if this land use plan is implemented. Table 3.3 (located in Volume 1, Section 3) provides a cross reference that associates proposed training activities required to accomplish each of the training goals with a proposed site. Section C.5 provides additional information on the selection and review of individual construction sites. Significant elements included in this concept are outlined below.

- Existing rolling-pin barracks in the 1000-area will be converted into the Chemical Museum and Military Police Museum artifact storage areas.

- The remaining 1000-area buildings will be converted into NCOA general instruction and general purpose administrative areas for the three NCO academies.

- Permanent party barracks will be constructed south of Specker Barracks to provide for flexible assignment of existing and new barracks as the training loads shift between the various service schools.

- Applied instruction areas for the Chemical School will be constructed northwest of the DOL Transportation Maintenance complex.

- Applied instruction areas for the Military Police School will be constructed southwest of the DOL Transportation Maintenance complex and south of the 800-area barracks.

- A general purpose warehouse required to store training materials for the Military Police School and Chemical School will be built in the 2300-area, replacing temporary facilities on that site.

- If required, unaccompanied officer quarters will be constructed near the existing 4100-area Officers Quarters northeast of the Engineer Center Open Mess.

- GOQs for the commandants of the Chemical and Military Police schools will be constructed along the northeast side of Piney Hills Drive. This site will place the new GOQs across the street from the recently constructed GOQs at FLW.

C.4.2.1.3 Combined Headquarters and Instruction Land Use Plan. This concept will locate the headquarters for the Chemical, Engineer and Military Police schools in Hoge, Lincoln and Clarke halls.

This land use concept is illustrated on Figure 3.2 which is located in Volume I, Section 3 of the EIS. The background on this figure illustrates the existing approved and evaluated land use patterns, while proposed changes are illustrated in darker line weights and area fills. Figure 3.3 (located in Volume 1, Section 3) provides an illustration of the proposed construction sites that would be used if this land use plan is implemented. Table 3.3 (located in Volume 1, Section 3) provides a cross reference that associates proposed training activities required to accomplish each of the training goals with a proposed site. Significant elements included in this concept include the following.

- Existing offices in Hoge and Lincoln halls will be reassigned to ensure maximum use of available space.
- Additional general and applied instruction classrooms, and general purpose administrative facilities will be constructed north of Lincoln Hall.
- The existing Engineer Center Museum, located in Walker Museum, will be modified and expanded to provide a consolidated museum facility for all three schools. The regimental room and some current Engineer Center Museum spaces will be renovated into additional storage areas and addition will be constructed to house the remainder of the collections.
- Permanent party barracks will be constructed north of Lincoln Hall.
- Applied instruction areas for the Chemical School will be constructed west of the 800-area.
- Applied instruction areas for the Military Police School will be constructed southwest of the 800-area.
- General purpose storage for the Chemical and Military Police schools will be obtained through the use of existing temporary WW II-era facilities.
- Unaccompanied officer quarters, if required, will be provided by converting existing, available military family housing into unaccompanied officer quarters, and by renovation of the existing available Sturgis Heights quarters.
- GOQs for the commandants of the new service schools will be constructed along the northeast side of Piney Hills Drive. This site will place the new GOQs across the street from the recently constructed GOQs at FLW.

C.4.2.1.4 Alternative Construction Sites for the Construction Project Packages. This section summarizes the anticipated alternative locations that will be used to implement BRAC actions. The analysis contained in this appendix has been organized into eight different sections, one for each of the proposed construction projects. Table 3.3, which is located in Volume I, Section 3, includes a listing of alternative training locations and support facility locations in association with alternative land use plans. The proposed sites are illustrated on Figures 3.3, 3.5 and 3.7 (all located in Volume 1, Section 3):

- Figure 3.5 illustrates the sites that will be used if the Combined Headquarters Land Use Plan (Alternative 1) is implemented;
- Figure 3.7 illustrates the locations that will be used if the Separate Headquarters Land Use Plan (Alternative 2) is implemented; and
- Figure 3.3 illustrates the sites that will be used if the Combined Headquarters and Instruction Land Use Plan (Alternative 3) is implemented.

Each of these illustrations includes site references which correlate the anticipated function to the training goals listed on Table 3.3.

C.4.2.2 Selection of the Army's Proposed Land Use and Facility Plan Alternative

The relocation of the Military Police School and the Chemical School to FLW can be accomplished in a number of ways. To analyze the various alternatives, the three independent land use and construction project package alternatives were evaluated based on the twelve criteria listed in subsection C.4.2.

During the evaluation, a score of between 1 and 3 was assigned to each alternative for each criterion. A score of 3 was assigned to the alternative that best meets the selected criterion, and a score of 1 to the alternative that least meets the selected criterion. When two or more alternatives were rated as being equal in their ability to meet the criterion, the scores were averaged. A description of the individual evaluation criteria is provided below, along with a discussion of each option's ability to meet that criterion. Subsection C.4.3, which includes Table C.22, includes a summary of the individual scores given to each land use and associated construction project package plan.

C.4.2.2.1 Equality of Facilities. Facilities should be provided that treat all three service schools as equals and that meet mission requirements.

- **Combined Headquarters.** This concept places each of the headquarters and general instruction facilities in the same (and therefore equal) facilities. The museums are collocated in an existing facility which may result in inequalities in space and accessibility. This concept earned a score of 2 for this criterion.

- **Separate Headquarters.** Construction of new headquarters and general instruction facilities for the Chemical and Military Police schools will ensure that they have facilities that are consistent with their requirements. This option would result in the duplication of facilities at all three headquarters that are only needed occasionally and could be shared under a combined headquarters scenario. In addition, this concept provides a separate museum of approximately equal size for each school. Conversion of barracks to museums will be expensive and may raise an equality issue. The use of barracks in this manner should only be temporary pending the construction of permanent additions to Walker Museum. This concept earned a score of 2 for this criterion.

- **Combined Headquarters and Instruction.** As with the Combined Headquarters concept, the headquarters and general instruction facilities for the three service schools will be collocated, ensuring equality by definition. This option calls for the expansion of Walker Museum to support the collocated museum requirements which will make the museums more accessible to soldiers in training and their visitors. This concept received the highest score, of 3, for this criterion.

C.4.2.2.2 Use of Existing, Available Facilities for Their Originally Designed Use. Existing, available permanent facilities will be used to offset new Base Realignment and Closure requirements. The highest score for this criterion is given to the alternative that makes the greatest use of existing available space as it was originally designed. If existing, available facilities can be used as originally designed, then renovation costs will be minimized.

- **Combined Headquarters.** This concept makes good use of existing, available space in Hoge and Lincoln halls. The only factor pulling its score down is the extensive cost to convert existing rolling-pin barracks into administrative use. Consequently this concept earns the score of 2.

- **Separate Headquarters.** In this concept a minimal number of existing facilities are used as originally designed. Consequently this concept received the minimum score of 1.

- **Combined Headquarters and Instruction.** This concept is similar to the Combined Headquarters concept in the proposed use of existing facilities except for the accommodation of additional administrative requirements in converted, existing, available barracks. Consequently this concept earns the highest score of 3.

C.4.2.2.3 Conversion of Existing, Available Facilities for Other Than Their Designed Use. The renovation and conversion of existing facilities to a use other than their originally designed purpose can be costly. Concepts scored low if the facility being renovated was adequate for its intended purpose and construction of replacement facilities is required.

- **Combined Headquarters.** Construction of new initial entry training barracks is required to replace barracks converted to administrative functions. The smaller quantity of barracks being converted earns this concept a score of 1.

- **Separate Headquarters.** The proposed modifications are close to the original design, but with enough changes to keep it from receiving the highest score. Consequently this concept earns the score of 2.

- **Combined Headquarters and Instruction.** This concept matches the proposed use of the original design best, while still making good use of existing, available facilities. In those cases where barracks are proposed for renovation the proposed conversion seems to fit the land use and conversion should not be too costly. Consequently this concept earns the highest score of 3.

C.4.2.2.4 On- and Off-Post Traffic Flow. Since many of the staff and faculty will live off-post, and since most residential areas are located north of the installation, it is desirable to keep largely administrative functions close to the north end of the cantonment.

- **Combined Headquarters.** The bulk of the administrative positions in this concept are located at the northern end of the cantonment. This concept loses some strength because of the difficulties in getting from Hoge and Lincoln halls to the applied instruction areas at the southern end of the cantonment. Consequently this concept earns the score of 2.

- **Separate Headquarters.** This concept locates a large administrative area at the southern end of the cantonment, increasing the existing on- and off-post traffic flow problems. Therefore, this concept earns the lowest score for this criterion. Consequently this concept earns the score of 1.

- **Combined Headquarters and Instruction.** This concept places all of the administrative functions and personnel at the northern end of the cantonment, presenting the least amount of on- and off-post traffic flow problems. This option will concentrate additional traffic at the northern end of the cantonment where it can be easily eliminated through a minor road realignment. The realignment includes the relocation of Nebraska Avenue between First and Third streets, and providing a fully articulated intersection at First Street. This would provide a continuous flow of traffic on Nebraska Avenue from the Morelli Heights to the southern end of the cantonment. Consequently this concept earns the highest score of 3.

C.4.2.2.5 Future Use of Facilities. Although the basis of this study is the relocation of personnel and missions associated with the Chemical and Military Police schools, flexibility must be provided to meet the changing demands of these missions plus yet undefined missions.

- **Combined Headquarters.** This concept provides some flexibility by consolidating the school administrative and general instruction facilities into a single complex. The noncommissioned officers academies are still isolated, making joint-use of these facilities more difficult. Consequently this concept earns the score of 2.

- **Separate Headquarters.** Construction of completely new facilities across the cantonment from the other large administrative and general instruction areas limits flexibility to meet peak loads. In addition, completely new facilities encourage tailoring of the buildings to meet today's mission, possibly at the expense of meeting tomorrow's needs. Consequently this alternative earns the lowest score of 1.

- **Combined Headquarters and Instruction.** This concept creates a highly flexible administrative and instructional complex, adaptable to changing loads in the future. Siting of unaccompanied enlisted personnel housing north of the administrative and instruction complex increases the potential future use of this area. These factors combine to make this the most desirable alternative under this criterion which earns the highest score of 3.

C.4.2.2.6 Proximity of OSUT Billets to Their Associated General and Applied Instruction Facilities. It is desirable to billet OSUT soldiers close to both their general and applied instruction areas to minimize time and money spent transporting soldiers between their billeting and classroom facilities.

- **Combined Headquarters.** Moving base operations functions into the northern barracks and relocating OSUT billets south reduces the distance between billeting and the applied instruction area. This concept, however, places all of the general instruction facilities at the northern end of the cantonment, maximizing travel between billets and the general instruction area. This increased travel time is considered undesirable and earns this concept the lowest score of 1.

- **Separate Headquarters.** This concept earned an excellent score for reducing travel time and costs by placing both general and applied instruction areas at the southern end of the cantonment. This not only puts the general instruction area near the applied instruction area, but also minimizes the distance between billets and training areas earning this concept the highest score of 3 for this criterion.

- **Combined Headquarters and Instruction.** Although northern barracks are not converted to administrative use in this concept (as they are in Combined Headquarters concept), the general and applied instruction facilities that will be used most often by OSUT students are concentrated in the southern end of the cantonment. As such, the travel time between billets, general and applied instruction facilities, and support services are minimized, decreasing the cost and time required to transport students. Consequently this concept earns the score of 2.

C.4.2.2.7 Proximity of Noncommissioned Officer Academy Billets to Their Associated General and Applied Instruction Facilities. As discussed above with regard to OSUT, it is desirable to billet Noncommissioned Officer Academy students close to their associated general and applied instruction areas.

- **Combined Headquarters.** This concept tied with the Separate Headquarters concept for a bottom rating of 1.5 for this criterion. While the concept places the new barracks near the existing ones, thereby increasing flexibility in assignment of personnel, it fails to meet the criterion of a proximate location to general and applied instruction facilities.

- **Separate Headquarters.** This concept tied with Combined Headquarters concept for a bottom rating of 1.5 for this criterion. While it locates the new barracks near the existing ones (thereby increasing flexibility in assignment of personnel), it fails to meet the criterion of a proximate location to general and applied instruction facilities.

- **Combined Headquarters and Instruction.** This concept places new barracks within a short walk of the administrative and general instruction facilities. It also places the enlisted barracks adjacent to existing officer quarters, potentially allowing for cross-assignment of billets during peak periods. The short commuting distance to the general instruction facilities earned this option the top score of 3 for this criterion.

C.4.2.2.8 Proximity of Officer Quarters to Associated Applied Instruction Facilities. While it is desirable to have officers quarters next to their applied instruction facilities, there is no significant difference in any of the three concepts evaluated. Each received 2 points, as all three concepts located officer quarters a fair distance from the applied instruction areas.

C.4.2.2.9 Proximity of Officer Quarters to Associated General Instruction Facilities. When quarters are within walking distance of classrooms, less time during the training day is lost to transportation.

- **Combined Headquarters**. This concept was the best alternative of the alternatives considered, and earned a score of 3 for this criterion. The concept would provide new quarters next to the existing Morelli Heights Officers Quarters, which are a short walk from the proposed general instruction facilities to be located north of Lincoln Hall.

- **Separate Headquarters.** This concept was the least desirable of the three alternatives, and therefore earned a score of 1. The concept proposed new quarters at the southern end of the cantonment with general instruction facilities at the northern end. This will maximize travel time lost between the facilities and increase the cost of transporting officers between their quarters and the general instruction facilities.

- **Combined Headquarters and Instruction.** This concept proposed the conversion of existing available family housing and officers quarters to support the increased officer housing needs. These existing facilities are not close enough to the general instruction facilities to allow students to walk to the classrooms, but are more desirable than providing new facilities as would be provided under the Separate Headquarters alternative. Consequently this concept earned a score of 2 for this criterion.

C.4.2.2.10 Lowest Overall Construction Cost It is desirable to get the most effective facilities capable of supporting mission requirements at the least possible cost. The concept that provides needed facilities at the least cost receives the highest score.

- **Combined Headquarters**. This concept keeps the number of facilities and the extent of required renovations to a minimum, but still requires the construction of facilities to replace renovated facilities. Construction costs associated with replacement facilities add to the overall cost of this alternative. Consequently this concept earned a score of 2.

- **Separate Headquarters.** Construction of new headquarters for the Chemical and Military Police schools, when combined with the cost of modifying Lincoln Hall, earns this concept the lowest score of 1.

- **Combined Headquarters and Instruction**. This concept minimizes cost by proposing a large general instruction and headquarters facility near the existing Engineer School headquarters. This will increase economies of scale associated with the structural, mechanical and electrical systems, and reduce long-term maintenance and utilities costs. The combined libraries of all three service schools and the FLW community could be located in the Clarke Hall Library if minor interior modifications are made. These reductions in the amount of area that must be constructed and long-term maintenance costs make this the most desirable alternative based on this criterion; consequently this concept earned the score of 3 for this criterion.

C.4.2.2.11 Lowest Overall Site Development Cost. In addition to the cost of the basic facility, it is important to get the most effective use of site development funds. The concept that provides the required facilities at the lowest cost earns the highest score.

- **Combined Headquarters.** Although this concept has relatively low site development costs, several of the sites will require extensive site preparation making this option slightly less desirable than Separate Headquarters concept. Consequently this concept earned a score of 2 for this criterion.

- **Separate Headquarters.** All of the construction sites proposed under this option are located on relatively level and open ground. As a result, site development costs will be lowest for this option, earning the highest score of 3 for this criterion.

- **Combined Headquarters and Instruction.** This concept received the lowest score of 1. The costs to correct existing traffic flow problems exacerbated by construction near Lincoln Hall, combined with the cost of site preparation at the new barracks construction site increase the cost of site development required to support this concept.

C.4.2.2.12 Lowest Overall Utility System Construction Cost. In addition to the cost of the basic facility and site preparation, it is important to get the most effective use of existing utilities systems and to reduce the cost of constructing additional utility systems. The concept that provides the needed facilities at the lowest cost earned the highest score.

- **Combined Headquarters.** Conversion of a few existing rolling-pin barracks to administrative, general and applied instruction, and museum use will still require major changes to the electrical and telephone distribution systems in the area. These added utility system costs will not be required if the rolling-pin barracks remain in their current use. Consequently this concept earned a score of 2 for this criterion.

- **Separate Headquarters.** The extensive amount of administrative space proposed for the south end of the cantonment area will strain the electrical and telephone systems . The cost of these telephone system changes (in 1993) was estimated to exceed $500,000 by the Directorate of Information Management. Construction of a new sewage line and lift stations from the southern end of the cantonment to the sewage treatment plant will also be required to support this concept. When added together the high cost of utility systems construction makes this alternative the second least desired concept, thereby earning a score of 1.

- **Combined Headquarters and Instruction.** This concept will require the least amount of change to the existing telephone, electrical, water and gas distribution and sewage collection systems on post. The main electrical substation is located immediately adjacent to the two largest construction sites. Telephone services are also located immediately to the west of these sites. Water and gas lines large enough to service the complex are only 1,500 feet away. Although a new sewage line will be required between the north construction site and the sewage treatment plant, this concept offers the least overall utilities construction costs and therefore earned the highest score of 3 for this criterion.

C.4.3 Summary of Evaluation Criteria

Table C.22 summarizes the scores for each land use concept.

The Combined Headquarters and Instruction land use plan concept received the highest score in 9 of the 12 criteria, and the highest overall score with 31 out of a maximum of 36 points. Consequently the Combined Headquarters and Instruction land use plan (and associated construction project package) was selected as the Army's Proposed Action. The Combined Headquarters Land Use and Facility Plan which received the second highest score was selected as Alternative 1, and the Separate Headquarters Land Use and Facility Plan was selected as Alternative 2.

Table C.22:
1995 Ratings of the Three Land Use Alternatives

Criterion	***Combined Headquarters***	***Separate Headquarters***	***Combined Headquarters and Instruction***
Equality of Facilities	2	1	3
Use Existing, Available Facilities for Their Originally Designed Use	2	1	3
Conversion of Existing, Available Facilities for Other than Their Designed Use	1	2	3
On- and Off-Post Traffic Flow	2	1	3
Future Use of Facilities	2	1	3
Proximity of OSUT Billets to Their Associated General and Applied Instruction Facilities	1	3	2
Proximity of NCOA Billets to Their Associated General and Applied Instruction Facilities	1.5	1.5	3
Proximity of Officer Billets to Applied Instruction Classrooms/Facilities	2	2	2
Proximity of Officer Billets to General Instruction Classrooms/Facilities	3	1	2
Lowest Overall Construction costs	2	1	3
Lowest Overall Site Development Costs	2	3	1
Lowest Overall Utility System Construction Costs	2	1	3
Total Rating	**22.5**	**18.5**	**31**
Source: FLW DPW Master Planning			

C.5 IMPLEMENTATION OF THE ARMY'S PROPOSED LAND USE AND FACILITY PLAN CONSTRUCTION PROJECT PACKAGE

Implementation of the Combined Headquarters and Instruction land use plan and facility plan (LU & FP (CH&I)) will provide the following benefits:

- The Engineer School headquarters (HQ) and general instruction facility (GIF) will remain in Hoge and Lincoln halls. New Chemical and Military Police headquarters and instruction requirements will be located in the facility north of Lincoln Hall. This will allow use of approximately 57,000 gross square feet of administration area and 13,700 gross square feet of existing, available classroom area to support Chemical and Military Police requirements.

- Military Police - OSUT barracks will be provided at the 800-area. New Military Police (OSUT) applied instruction facilities will be located immediately adjacent to the 800-area. This complex will include a patrolling incident area.

- Three barracks in the 700-area will be converted for Chemical School OSUT requirements. These barracks will be adjacent to the applied instruction Decontamination Apparatus Training Facility that will be constructed west of the 800-area barracks.

- New NCOA barracks will be built to the "1 + 1" standards and will be located immediately north of the consolidated Chemical, Engineer, and Military Police Headquarters facility.

- Available general purpose warehouses in the existing FLW warehouse district will be renovated to store Military Police School and Chemical School training materials.

- Existing unaccompanied officer quarters in the 4100-area (Sturgis Heights) will be renovated to meet current housing standards.

- Integrated Training Resources Organization (ITRO) students will be housed in the southern part of the Specker Barracks.

- Permanent party E1-E4 personnel will be housed in the northern part of Specker Barracks.

- Currently existing, available family housing quarters along and north of Indiana Avenue will be renovated for unaccompanied senior enlisted personnel housing.

- The CDTF will be located south-southwest of the airfield providing required safety distances between it and the surrounding land uses.

Appendix D
ENVIRONMENTAL JUSTICE

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Appendix D: Environmental Justice

D.1 INTRODUCTION

Executive Order 12898, issued in February 1994, directs federal agencies to identify and analyze the potential socioeconomic impacts of proposed actions in accordance with health and environmental laws. In this regard, the Executive Order requires each federal agency to make the achievement of environmental justice a part of its mission by identifying and addressing disproportionately high and adverse human health and environmental effects of its programs, policies and activities on minority populations and low-income populations.

D.2 EXECUTIVE ORDER 12898 - ENVIRONMENTAL JUSTICE

EXECUTIVE ORDER

12898

FEDERAL ACTIONS TO ADDRESS ENVIRONMENTAL JUSTICE IN MINORITY POPULATIONS AND LOW-INCOME POPULATIONS

By the authority vested in me as President by the Constitution and the laws of the United States of America, it is hereby ordered as follows:

Section 1-1. Implementation.

1-101. Agency Responsibilities. To the greatest extent practicable and permitted by law, and consistent with the principles set forth in the report on the National Performance Review, each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States and its territories and possessions, the District of Columbia, the Commonwealth of Puerto Rico, and the Commonwealth of the Mariana Islands.

1-102. Creation of an Interagency Working Group on Environmental Justice. (a) Within 3 months of the date of this order, the Administrator of the Environmental Protection Agency ("Administrator") or the Administrator's designee shall convene an interagency Federal Working Group on Environmental Justice ("Working Group"). The Working Group shall comprise the heads of the following executive agencies and offices, or their designees: (a) Department of Defense; (b) Department of Health and Human Services; (c) Department of Housing and Urban Development; (d) Department of Labor; (e) Department of Agriculture; (f) Department of Transportation; (g) Department of Justice; (h) Department of the Interior; (i) Department of Commerce; (j) Department of Energy; (k) Environmental Protection Agency; (l) Office of Management and Budget; (m) Office of Science and Technology Policy; (n) Office of the Deputy Assistant to the President for Environmental Policy;

(o) Office of the Assistant to the President for Domestic Policy; (p) National Economic Council; (q) Council of Economic Advisers; and (r) such other Government officials as the President may designate. The Working Group shall report to the President through the Deputy Assistant to the President for Environmental Policy and the Assistant to the President for Domestic Policy.

(b) The Working Group shall: (1) provide guidance to Federal agencies on criteria for identifying disproportionately high and adverse human health or environmental effects on minority populations and low-income populations;

(2) coordinate with, provide guidance to, and serve as a clearinghouse for, each Federal agency as it develops an environmental justice strategy as required by section 1-103 of this order, in order to ensure that the administration, interpretation and enforcement of programs, activities and policies are undertaken in a consistent manner;

(3) assist in coordinating research by, and stimulating cooperation among, the Environmental Protection Agency, the Department of Health and Human Services, the Department of Housing and Urban Development, and other agencies conducting research or other activities in accordance with section 3-3 of this order;

(4) assist in coordinating data collection, required by this order;

(5) examine existing data and studies on environmental justice;

(6) hold public meetings as required in section 5-502(d) of this order; and

(7) develop interagency model projects on environmental justice that evidence cooperation among Federal agencies.

1-103. Development of Agency Strategies. (a) Except as provided in section 6-605 of this order, each Federal agency shall develop an agency-wide environmental justice strategy, as set forth in subsections (b)-(e) of this section that identifies and addresses disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. The environmental justice strategy shall list programs, policies, planning and public participation processes, enforcement, and/or rulemakings related to human health or the environment that should be revised to, at a minimum: (1) promote enforcement of all health and environmental statutes in areas with minority populations and low-income populations; (2) ensure greater public participation; (3) improve research and data collection relating to the health of and environment of minority populations and low-income populations; and (4) identify differential patterns of consumption of natural resources among minority populations and low-income populations. In addition, the environmental justice strategy shall include, where appropriate, a timetable for undertaking identified revisions and consideration of economic and social implications of the revisions.

(b) Within 4 months of the date of this order, each Federal agency shall identify an internal administrative process for developing its environmental justice strategy, and shall inform the Working Group of the process.

(c) Within 6 months of the date of this order, each Federal agency shall provide the Working Group with an outline of its proposed environmental justice strategy.

(d) Within 10 months of the date of this order, each Federal agency shall provide the Working Group with its proposed environmental justice strategy.

(e) Within 12 months of the date of this order, each Federal agency shall finalize its environmental justice strategy and provide a copy and written description of its strategy to the Working Group. During the 12 month period from the date of this order, each Federal agency, as part of its environmental justice strategy, shall identify several specific projects that can be promptly undertaken to address particular concerns identified during the development of the proposed environmental justice strategy, and a schedule for implementing those projects.

(f) Within 24 months of the date of this order, each Federal agency shall report to the Working Group on its progress in implementing its agency-wide environmental justice strategy.

(g) Federal agencies shall provide additional periodic reports to the Working Group as requested by the Working Group.

1-104. Reports to the President. Within 14 months of the date of this order, the Working Group shall submit to the President, through the Office of the Deputy Assistant to the President for Environmental Policy and the Office of the Assistant to the President for Domestic Policy, a report that describes the implementation of this order, and includes the final environmental justice strategies described in section 1-103(e) of this order.

Sec. 2-2. Federal Agency Responsibilities for Federal Programs. Each Federal agency shall conduct its programs, policies, and activities that substantially affect human health or the environment, in a manner that ensures that such programs, policies, and activities do not have the effect of excluding persons (including populations) from participation in, denying persons (including populations) the benefits of, or subjecting persons (including populations) to discrimination under, such programs, policies, and activities, because of their race, color, or national origin.

Sec. 3-3. Research, Data Collection, and Analysis.

3-301. Human Health and Environmental Research and Analysis. (a) Environmental human health research, whenever practicable and appropriate, shall include diverse segments of the population in epidemiological and clinical studies, including segments at high risk from environmental hazards, such as minority populations, low-income populations and workers who may be exposed to substantial environmental hazards.

(b) Environmental human health analyses, whenever practicable and appropriate, shall identify multiple and cumulative exposures.

(c) Federal agencies shall provide minority populations and low-income populations the opportunity to comment on the development and design of research strategies undertaken pursuant to this order.

3-302. Human Health and Environmental Data Collection and Analysis. To the extent permitted by existing law, including the Privacy Act, as amended (5 U.S.C. section 552a): (a) each Federal agency, whenever practicable and appropriate, shall collect, maintain, and analyze information assessing and comparing environmental and human health risks borne by populations identified by race, national origin, or income. To the extent practical and appropriate, Federal agencies shall use this information to determine whether their programs, policies, and activities have disproportionately high and adverse human health or environmental effects on minority populations and low-income populations;

(b) In connection with the development and implementation of agency strategies in section 1-103 of this order, each Federal agency, whenever practicable and appropriate, shall collect, maintain and analyze information on the race, national origin, income level, and other readily accessible and appropriate information for areas surrounding facilities or sites expected to have a substantial environmental, human health, or economic effect on the surrounding populations, when such facilities or sites become the subject of a substantial Federal environmental administrative or judicial action. Such information shall be made available to the public, unless prohibited by law; and

(c) Each Federal agency, whenever practicable and appropriate, shall collect, maintain, and analyze information on the race, national origin, income level, and other readily accessible and appropriate information for areas surrounding Federal facilities that are: (1) subject to the reporting requirements under the Emergency Planning and Community Right-to-Know Act, 42 U.S.C. section 11001-11050 as mandated in Executive Order No. 12856; and (2) expected to have a substantial environmental, human health, or economic effect on surrounding populations. Such information shall be made available to the public, unless prohibited by law.

(d) In carrying out the responsibilities in this section, each Federal agency, whenever practicable and appropriate, shall share information and eliminate unnecessary duplication of efforts through the use of existing data systems and cooperative agreements among Federal agencies and with State, local, and tribal governments.

Sec. 4-4. Subsistence Consumption of Fish and Wildlife.

4-401. Consumption Patterns. In order to assist in identifying the need for ensuring protection of populations with differential patterns of subsistence consumption of fish and wildlife, Federal agencies, whenever practicable and appropriate, shall collect, maintain, and analyze information on the consumption patterns of populations who principally rely on fish and/or wildlife for subsistence. Federal agencies shall communicate to the public the risks of those consumption patterns.

4-402. Guidance. Federal agencies, whenever practicable and appropriate, shall work in a coordinated manner to publish guidance reflecting the latest scientific information available concerning methods for evaluating the human health risks associated with the consumption of pollutant-bearing fish or wildlife. Agencies shall consider such guidance in developing their policies and rules.

Sec. 5-5. Public Participation and Access to Information. (a) The public may submit recommendations to Federal agencies relating to the incorporation of environmental justice principles into Federal agency programs or policies. Each Federal agency shall convey such recommendations to the Working Group.

(b) Each Federal agency may, whenever practicable and appropriate, translate crucial public documents, notices, and hearings relating to human health or the environment for limited English speaking populations.

(c) Each Federal agency shall work to ensure that public documents, notices, and hearings relating to human health or the environment are concise, understandable, and readily accessible to the public.

(d) The Working Group shall hold public meetings, as appropriate, for the purpose of fact-finding, receiving public comments, and conducting inquiries concerning environmental justice. The Working Group shall prepare for public review a summary of the comments and recommendations discussed at the public meetings.

Sec. 6-6. General Provisions.

6-601. Responsibility for Agency Implementation. The head of each Federal agency shall be responsible for ensuring compliance with this order. Each Federal agency shall conduct internal reviews and take such other steps as may be necessary to monitor compliance with this order.

6-602. Executive Order No. 12250. This Executive order is intended to supplement but not supersede Executive Order No. 12250, which requires consistent and effective implementation of various laws prohibiting discriminatory practices in programs receiving Federal financial assistance. Nothing herein shall limit the effect or mandate of Executive Order No. 12250.

6-603. Executive Order No. 12875. This Executive order is not intended to limit the effect or mandate of Executive Order No. 12875.

6-604. Scope. For purposes of this order, Federal agency means any agency on the Working Group, and such other agencies as may be designated by the President, that conducts any Federal program or activity that substantially affects human health or the environment. Independent agencies are requested to comply with the provisions of this order.

6-605. Petitions for Exemptions. The head of a Federal agency may petition the President for an exemption from the requirements of this order on the grounds that all or some of the petitioning agency's programs or activities should not be subject to the requirements of this order.

6-606. Native American Programs. Each Federal agency responsibility set forth under this order shall apply equally to Native American programs. In addition, the Department of the Interior, in coordination with the Working Group, and, after consultation with tribal leaders, shall coordinate steps to be taken pursuant to this order that address Federally-recognized Indian Tribes.

6-607. Costs. Unless otherwise provided by law, Federal agencies shall assume the financial costs of complying with this order.

6-608. General. Federal agencies shall implement this order consistent with, and to the extent permitted by, existing law.

6-609. Judicial Review. This order is intended only to improve the internal management of the executive branch and is not intended to, nor does it create any right, benefit, or trust responsibility, substantive or procedural, enforceable at law or equity by a party against the United States, its agencies, its officers, or any person. This order shall not be construed to create any right to judicial review involving the compliance or noncompliance of the United States, its agencies, its officers, or any other person with this order.

William J. Clinton

THE WHITE HOUSE,

February 11, 1994.

Appendix E
ECONOMIC IMPACT FORECAST SYSTEM (EIFS) MODEL METHODOLOGY

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APPENDIX E: ECONOMIC IMPACT FORECAST SYSTEM (EIFS) MODEL METHODOLOGY

Appendix E: Economic Impact Forecast System (EIFS) Model Methodology

E.1 INTRODUCTION

The U.S. Army Construction Engineering Research Laboratory (USACERL) has developed a computer-based model to provide a systematic method for evaluating the regional socioeconomic effects of government actions, such as military base operations and military realignments. This model is the Economic Impact Forecast System (EIFS) Model which was specifically designed for evaluating the effects of military actions such as construction programs, mission changes, or operations and maintenance programs. The following subsections respectively describe the EIFS Model methodology, and the inputs and outputs for the various FLW related actions pertaining to existing operations and realignment.

E.2 ECONOMIC IMPACT FORECAST SYSTEM METHODOLOGY

EIFS is a regional system best suited for analysis at the county or higher level. Thus, the results of the analysis for Fort Leonard Wood are applied to a regional area and not disaggregated to the local municipal or township level. In this regard, the surrounding nine-county area (Camden, Dent, Laclede, Maries, Miller, Phelps, Pulaski, Texas and Wright) has been defined by the EIFS Model as the region of influence for this EIFS assessment. This defined area represents the outer limit of a 60-minute or 50-mile commute, and the primary trade area for personnel associated with the installation. In addition, almost 100 percent of the combined civilian and military personnel associated with FLW reside within this nine-county area.

Using employment and income "multipliers" developed with the comprehensive database combined with economic export base techniques, EIFS estimates the regional economic impacts of actions resulting in changes in personnel or expenditures. These multipliers are applied to the direct economic effects of an action to calculate the total impacts upon the region. For example, ten new manufacturing jobs may spin off additional new jobs in several different sectors of the regional economy. EIFS evaluates socioeconomic impacts in terms of change in sales (business) volume, employment and personal income. EIFS also estimates other demographic indicators such as change in population, school children, demand for housing and government revenues. However, these demographic indicators are calculated only for those civilian and military personnel directly involved with a military action.

Three submodels of EIFS are executed to actually model the economic impacts of "operations/change in mission" and "construction" activities associated with the Fort Leonard Wood realignment. These are the "*Standard*" (Operations and Maintenance) forecast model; the

"Training" forecast model; and the *"Construction"* forecast model respectively. The standard and training models are used to estimate the impacts of ongoing missions/operations, and also for assessment of a change in operations due to realignment. The construction model is used to predict the economic impacts of the expenditures and employment from construction activities associated with the change in mission/realignment. These models require the inputs described below.

E.3 EIFS MODEL INPUTS

E.3.1 Existing or Change in:

- Expenditures for procurement of services and supplies for base operations;
- Civilian employment;
- Average annual civilian income;
- Military employment (permanent party military and trainees);
- Average annual income of military personnel;
- Percent of employees expected to relocate from outside of the ROI;
- Percent of military personnel expected to reside on base; and
- Total expenditures for construction and percent of:
  - construction expenditures for labor,
  - construction expenditures for materials, and
  - construction workers expected to relocate from outside of ROI.

The EIFS model uses price indices, or "deflators", as a means of converting dollars to equivalent dollar values in order to reflect price-adjustments as a result of inflation. The Consumer Price Index (CPI) and Producer Price Index (PPI) are the indices used in the "existing operations" model, while the "construction" model uses the CPI and the Engineering News-Record (ENR) construction cost index for building and construction. The latest EIFS default values for these indices are for the year 1993. In order to more accurately reflect the value of current and future projected dollars these price indices were adjusted upward to reflect FY95 and projected for future fiscal years (1997/98 and 1999). The adjustment factors used reflect recent (previous three years) annual average increases in these indices.

E.3.2 Calculation of Individual Inputs

- **Expenditures for Services and Supplies.** Expenditures for services and supplies correspond to the operating budget of the installation, excluding military and DA civilian salaries, under baseline conditions. Included are contractual services, military clothing, equipment, utilities and miscellaneous expenses. The annual expenditures ($165.7 million) used in the EIFS model reflect FY95 expenditures based upon information provided by the FLW-Directorate of Resource Management. Projected expenditures for future fiscal years were based upon an annual upward adjustment factor of 1.0275 reflecting the recent annual average increase in the CPI.

- **Civilian Employment.** Civilian employment is based on information provided by the FLW DRM. Current total DA and non-DA civilian employment is 4,271. The FLW DRM estimates an additional 341 DA civilian and 157 non-DA civilian employees resulting from the realignment, for a total of 498 new civilian employees.

- **Average Income of Civilian Employees.** Current annual Income is estimated based upon information provided by the FLW DRM. The average salaries of DA civilian, NAF, DFAS and contractual employees were estimated and weighted to arrive at an overall current (FY95) average civilian salary. Salaries were adjusted upward annually for future fiscal years by a factor of 1.020 reflecting recent standard annual salary increases.

- **Military Employment**. Current and projected military employment associated with the realignment is based upon information provided by the FLW DRM. For the EIFS modeling purposes the number of current (FY95) military personnel is 8,977, and the projected additional personnel associated with the realignment is 3,378 trainees/students (includes 83 civilian students) and1,599 permanent party military. These numbers represent the number of personnel adjusted to a full-time annual basis.

- **Average Income of Military Personnel.** Current annual income is estimated based upon information provided by the FLW DRM. Housing allowance and other benefits are included in this figure for permanent party personnel, but not for the trainees. Salaries were adjusted upward annually for future fiscal years by a factor of 1.025 reflecting standard annual salary increases.

- **Percent of New Employees Expected to Relocate (Live Outside of ROI).** It is estimated that 30 percent of the new civilian employees associated with the realignment will relocate to the ROI from outside the region. It is further assumed that less than one percent of the new employees would reside outside of the nine-county ROI. This is based upon the current geographic residency distribution of military personnel and civilian employees.

- **Percent of Military Expected to Reside on Base**. The percent of military personnel currently living on base is approximately 90 percent as defined by information provided from FLW DRM. The FLW DRM estimates that 99 percent, or 3,344, of the new trainees and 10 percent, or 160, of the permanent party military personnel associated with the realignment will reside on base. Thus, it is estimated that 3,504, or approximately 70 percent, of the total new military personnel will reside on base.

- **Construction Costs.** Total construction cost was used as an EIFS input to estimate the economic impacts of one-time construction of facilities to accommodate the realignment action. This total cost ($200 - $260 million) reflects FY97/98 dollars. The EIFS "default value" (30 percent) was used for estimating the percentage of construction employees expected to relocate into the ROI from elsewhere. Since the construction period will encompass a 2-year period, the total construction cost was pro-rated (50 percent per year) over this time period in order to determine the annual economic impacts of facility construction.

E.4 MODEL FORECASTS

The following section provides the EIFS model forecasts of the economic impacts of FLW on the nine-county ROI resulting from existing operations (E.4.1); realignment of the U.S. Army Chemical School and U.S. Army Military Police School (E.4.2); and construction activity associated with the realignment (E.4.3). Construction forecast models are included for each of the three facility construction alternatives.

E.4.1 Existing Operations

STANDARD EIFS FORECAST MODEL - EXISTING OPERATIONS (FY95)

Project Name: Fort Leonard Wood BRAC 95 EIS

```
Enter    d     to enter your own price deflators
     RETURN  to use the default price deflators (latest year): d
Price deflator for baseline year (ex b.v.) (CPI - 1987) : (100.0)
Price deflator for output  (ex b.v.)       (CPI - 1995) :  133.3
Price deflator for baseline year (business volume) (PPI-1987):100.0
Price deflator for output (business volume)      (PPI - 1995):121.6
(Enter decreases as negative numbers)
If entering total expenditures, enter  1
            local expenditures, enter  2  : 1
Change in expenditures for services and supplies:  $165,700,000
Change in expenditures for local services and supplies: $80,152,064
(calculated)
  price deflator (PPI - 1995) : 121.6
Change in civilian employment:  4,271
Average income of affected civilian personnel:  $24,800
  price deflator (CPI - 1995) : 133.3
Percent expected to relocate (enter <cr> to accept default):  (0.0) 0
Change in military employment:  8,977
Average income of affected military personnel:  $21,500
  price deflator (CPI - 1995) : 133.3
Percent of military living on-post:  90
```

**** STANDARD EIFS MODEL FORECAST FOR FLW BRAC 95 EIS ****

Export income multiplier:	1.9369	(RTV)
Change in local		
Sales volume .... Direct:	$210,182,000	
Induced:	$196,925,000	
Total:	$407,107,000	(16.525%)
Employment .... Direct:	2,388	
Total:	17,873	(16.905%)
Income .... Direct:	$30,327,000	
Total (place of work):	$357,668,000	
Total (place of residence):	$357,668,000	(12.051%)
Local population ....:	22,353	(10.654%)
Local off-base population ....:	2,235	
Number of school children ....:	3,886	
Demand for housing .... Rental:	575	
Owner occupied:	323	
Government expenditures............:	$10,718,000	
Government revenues ....:	$22,950,000	
Net Government revenues ....:	$12,232,000	
Civilian employees expected to relocate:	0	
Military employees expected to relocate:	8,977	

E.4.2 Realignment

EIFS TRAINING FORECAST MODEL - REALIGNMENT ACTION (FY99)
(TRAINEES ONLY)

Project Name: Fort Leonard Wood BRAC 95 EIS

```
Enter    d     to enter your own price deflators
      RETURN  to use the default price deflators (latest year): d
Price deflator for baseline year (ex b.v.) (CPI-1987) : (100.0)
Price deflator for output  (ex b.v.)       (CPI-1999) :  148.5
Price deflator for baseline year (business volume)(PPI-1987): (100.0)
Price deflator for output (business volume)       (PPI-1999) : 134.2
(Enter decreases as negative numbers)
If entering total expenditures, enter  1
            local expenditures, enter  2  : 1
Change in expenditures for services and supplies:  0
Change in expenditures for local services and supplies:  0.00
(calculated)
  price deflator (PPI-1999): 134.2
Number of (non-basic) trainees:  +3,378
Average income of trainees:  $17,100
  price deflator (CPI-1999) : 148.5
Percent of trainees living on-post:  99
```

**** TRAINING IMPACT FORECAST FOR FLW BRAC 95 EIS ****

```
Export income multiplier:                          1.9369     (RTV)
Change in local
  Sales volume .............. Direct:         $15,476,000
                             Induced:         $14,500,000
                               Total:         $29,975,000   (1.103%)
  Employment ................ Direct:                 159
                               Total:               3,687   (3.487%)
  Income .................... Direct:          $2,254,000
               Total (place of work):         $62,130,000
          Total (place of residence):         $62,707,000   (1.897%)
  Local population ..................:              3,378   (1.610%)
  Local off-base population .........:                 34
  Number of school children .........:                  0
  Demand for housing ......... Rental:                 22
                      Owner occupied:                 12
  Government expenditures............:           $367,000
  Government revenues ...............:         $3,818,000
  Net Government revenues ...........:         $3,450,000
Civilian employees expected to relocate:                0
Military employees expected to relocate:            3,378
```

STANDARD EIFS FORECAST MODEL - REALIGNMENT ACTION (FY99)
(PERMANENT PARTY MILITARY AND CIVILIAN PERSONNEL)

Project Name: Fort Leonard Wood BRAC 95 EIS

```
Enter    d    to enter your own price deflators
      RETURN  to use the default price deflators (latest year): d
Price deflator for baseline year (ex b.v.) (CPI-1987) : (100.0)
Price deflator for output  (ex b.v.)       (CPI-1999) :  148.5
Price deflator for baseline year (business volume) (PPI-1987): (100.0)
Price deflator for output (business volume)        (PPI-1999):  134.2
(Enter decreases as negative numbers)
If entering total expenditures, enter  1
            local expenditures, enter  2  : 1
Change in expenditures for services and supplies:  +$59,600,000
Change in expenditures for local services and supplies:  28,829,590.00
(calculated)
  price deflator (PPI-1999): 134.2
Change in civilian employment:  +498
Average income of affected civilian personnel:  $30,500
  price deflator (CPI-1999): 148.5
Percent expected to relocate (enter <cr> to accept default):  (0.0) 30
Change in military employment:  +1,599
Average income of affected military personnel:  $49,500
  price deflator (CPI-1999): 148.5
Percent of military living on-post:  10
```

**** STANDARD EIFS MODEL FORECAST FOR FORT LEONARD WOOD BRAC 95 EIS ****

Export income multiplier:	1.9369	(RTV)
Change in local		
Sales volume .... Direct:	$73,320,000	
Induced:	$68,695,000	
Total:	$142,014,000	(5.223%)
Employment .... Direct:	755	
Total:	3,559	(3.366%)
Income .... Direct:	$10,679,000	
Total (place of work):	$115,024,000	
Total (place of residence):	$115,024,000	(3.479%)
Local population ....:	4,291	(2.045%)
Local off-base population ....:	3,893	
Number of school children ....:	753	
Demand for housing .... Rental:	964	
Owner occupied:	624	
Government expenditures............:	$6,279,000	
Government revenues ....:	$9,486,000	
Net Government revenues ....:	$3,208,000	
Civilian employees expected to relocate:	149	
Military employees expected to relocate:	1,599	

E.4.3 Construction

EIFS CONSTRUCTION FORECAST MODEL (FY97/98)

ALTERNATIVE: *Combined Headquarters and Instruction*
Project Name: Fort Leonard Wood BRAC 95 EIS

Enter d to enter your own price deflators
RETURN to use the default price deflators (latest year): d
Price deflator for baseline year (ex b.v.) (CPI - 1987) : (100.0)
Price deflator for output (ex b.v.) (CPI - 1997/98): 142.7
Price deflator for baseline year(construction)(ENR-cost-1987): (100.0)
Price deflator for output (construction) (ENR-const-1997/98) : 136.2
If entering total expenditures, enter 1
local expenditures, enter 2 : 1
Dollar volume of construction project: $100,000,000
Local expenditures of project: 48,371,795.34 (calculated)
price deflator (ENR-const-1997/98):136.2
Percent for labor (enter new value or <cr> to accept default): (34.2)
Percent for materials (enter new value or <cr> to accept default):(57.8)
Percent allowed for other: 8.00 (calculated)
Percent of construction workers expected to migrate into the area
(enter <cr> to accept default): (30.0)

**** CONSTRUCTION IMPACT FORECAST FOR FLW BRAC 95 EIS ****

Export income multiplier:		1.9369	(RTV)
Change in local			
Sales volume	Direct:	$41,260,000	
	Induced:	$38,657,000	
	Total:	$79,917,000	(2.896%)
Employment	Direct:	418	
	Total:	1,583	(1.497%)
Income	Direct:	$5,690,000	
	Total (place of work):	$28,354,000	
	Total (place of residence):	$28,354,000	(0.892%)
Local population ....:		525	(0.250%)
Local off-base population ....:		525	
Number of school children ....:		96	
Demand for housing	Rental:	232	
	Owner occupied:	0	
Government expenditures............:		$2,172,000	
Government revenues ....:		$2,043,000	
Net Government revenues ....:		-$129,000	
Civilian employees expected to relocate:		232	
Military employees expected to relocate:		0	

EIFS CONSTRUCTION FORECAST MODEL (FY97/98)

ALTERNATIVE: *Combined Headquarters*
Project Name: Fort Leonard Wood BRAC 95 EIS

```
Enter    d     to enter your own price deflators
      RETURN  to use the default price deflators (latest year): d
Price deflator for baseline year (ex b.v.) (CPI - 1987): (100.0)
Price deflator for output  (ex b.v.)    (CPI - 1997/98):  142.7
Price deflator for baseline year (construction) (ENR-const-1987):(100.0)
Price deflator for output (construction) (ENR-const - 1997/98) :136.2
If entering total expenditures, enter  1
            local expenditures, enter  2  : 1
Dollar volume of construction project:  $127,500,000
Local expenditures of project:  $61,674,039.06 (calculated)
  price deflator (ENR-const - 1997/98):136.2
Percent for labor (enter new value or <cr> to accept default):  (34.2)
Percent for materials (enter new value or <cr> to accept default):
(57.8)
Percent allowed for other:  8.00 (calculated)
Percent of construction workers expected to migrate into the area
    (enter <cr> to accept default):  (30.0)
```

**** CONSTRUCTION IMPACT FORECAST FOR FLW BRAC 95 EIS ****

Export income multiplier:		1.9369	(RTV)
Change in local			
Sales volume	Direct:	$52,606,000	
	Induced:	$49,288,000	
	Total:	$101,894,000	(3.693%)
Employment	Direct:	534	
	Total:	2,018	(1.909%)
Income	Direct:	$7,255,000	
	Total (place of work):	$36,151,000	
	Total (place of residence):	$36,151,000	(1.138%)
Local population	:	669	(0.319%)
Local off-base population	:	669	
Number of school children	:	123	
Demand for housing	Rental:	295	
	Owner occupied:	0	
Government expenditures............	:	$2,770,000	
Government revenues	:	$2,605,000	
Net Government revenues	:	-$165,000	
Civilian employees expected to relocate:		295	
Military employees expected to relocate:		0	

EIFS CONSTRUCTION FORECAST MODEL (FY97/98)

ALTERNATIVE: *Separate Headquarters*
Project Name: Fort Leonard Wood BRAC 95 EIS

```
Enter     d     to use your own price deflators
      RETURN  to use the default price deflators (latest year): d
Price deflator for baseline year (ex b.v.) (CPI - 1987) : (100.0)
Price deflator for output  (ex b.v.)    (CPI - 1997/98) :  142.7
Price deflator for baseline year (construction)(ENR-const-1987):(100.0)
Price deflator for output (construction)  (ENR-const - 1997/98): 136.2
If entering total expenditures, enter  1
            local expenditures, enter  2  : 1
Dollar volume of construction project:  $130,000,000
Local expenditures of project:  62,883,333.95 (calculated)
  price deflator (ENR-const-1997/98): 136.2
Percent for labor (enter new value or <cr> to accept default):  (34.2)
Percent for materials (enter new value or <cr> to accept default):
(57.8)
Percent allowed for other:  8.00 (calculated)
Percent of construction workers expected to migrate into the area
    (enter <cr> to accept default):  (30.0)
```

**** CONSTRUCTION IMPACT FORECAST FOR FLW BRAC 95 EIS ****

Export income multiplier:	1.9369	(RTV)
Change in local		
Sales volume .... Direct:	$53,637,000	
Induced:	$50,254,000	
Total:	$103,892,000	(3.765%)
Employment .... Direct:	544	
Total:	2,057	(1.946%)
Income .... Direct:	$7,397,000	
Total (place of work):	$36,860,000	
Total (place of residence):	$36,860,000	(1.160%)
Local population ....:	682	(0.325%)
Local off-base population ....:	682	
Number of school children ....:	125	
Demand for housing .... Rental:	301	
Owner occupied:	0	
Government expenditures............:	$2,824,000	
Government revenues ....:	$2,656,000	
Net Government revenues ....:	-$168,000	
Civilian employees expected to relocate:	301	
Military employees expected to relocate:	0	

E.5 RATIONAL THRESHOLD VALUES

Using a technique termed the Rational Threshold Value (RTV), the EIFS estimates are compared to the historic trends for each economic indicator (business volume, personal income, employment and population) to determine whether the impacts are significant. To accomplish this, the EIFS model calculates the impacts of each of the above economic indicators as a percentage of the total of that indicator for the region. For example, the increase in employment as a result of the activity might account for a five percent increase in total regional employment. This percentage increase is compared to the normal annual variations in the growth rate for each indicator. EIFS calculates both positive and negative RTVs. If an EIFS impact exceeds the normal positive or negative RTV variation, then the impact is considered to be significant. The RTV for each of these economic indicators is noted in parentheses in each of the above EIFS forecast models. The historic positive and negative RTVs for the FLW ROI are as follows:

- business (sales) volume = 8.33 (-4.34) percent
- personal income = 5.81 (-2.70) percent
- employment = 5.75 (-4.06) percent
- population = 2.31 (-1.01) percent.

An analysis of the RTVs indicates that the regional historic RTV for each economic indicator is significantly exceeded by the respective RTVs of the existing annual operations of FLW (E.4.1) which are as follows:

- business (sales) volume = 16.52 percent
- personal income = 12.05 percent
- employment = 16.90 percent
- population = 10.65 percent

The above disparities between the RTVs reflect the dominating influence of Fort Leonard Wood on the local and regional economy.

The EIFS models indicate that the RTVs for the economic indicators of the realignment impacts are all less than the regional historic RTVs when considering the economic impacts of the trainees and permanent party military/civilian components separately (E.4.2). However, the cumulative impacts of these two population groups result in the regional RTV being exceeded for employment (6.85 percent) and population (3.65 percent). None of the RTVs are equalled or exceeded under either of the construction models (E.4.3).

RATIONAL THRESHOLD VALUES

AREA: Fort Leonard Wood Region of Influence (ROI)

All dollar amounts are in thousands of dollars.
Dollar adjustment based on CPI (1987=100).

BUSINESS VOLUME (using Non-Farm Income)

YEAR	Non-Farm Income	Adjusted Income	Change	Deviation	%Deviation
1969	377,264	1,116,166			
1970	392,167	1,095,439	-20,727	-35,744	-3.202 %
1971	411,362	1,102,847	7,409	-7,609	-0.695 %
1972	440,778	1,141,912	39,065	24,047	2.180 %
1973	464,450	1,132,805	-9,107	-24,124	-2.113 %
1974	506,699	1,113,624	-19,181	-34,198	-3.019 %
1975	528,869	1,064,123	-49,501	-64,519	-5.794 %
1976	613,101	1,167,811	103,689	88,671	8.333 %
1977	636,854	1,139,274	-28,538	-43,555	-3.730 %
1978	684,109	1,136,394	-2,880	-17,897	-1.571 %
1979	744,958	1,111,878	-24,516	-39,533	-3.479 %
1980	808,690	1,062,668	-49,210	-64,227	-5.776 %
1981	873,131	1,040,681	-21,987	-37,004	-3.482 %
1982	934,836	1,051,559	10,878	-4,139	-0.398 %
1983	1,037,104	1,132,210	80,651	65,633	6.242 %
1984	1,141,425	1,204,035	71,825	56,808	5.017 %
1985	1,225,273	1,249,004	44,969	29,952	2.488 %
1986	1,292,731	1,339,618	90,614	75,596	6.053 %
1987	1,378,743	1,378,743	39,125	24,108	1.800 %
1988	1,438,841	1,383,501	4,758	-10,259	-0.744 %
1989	1,524,921	1,399,010	15,509	492	0.036 %
1990	1,617,579	1,410,269	11,259	-3,758	-0.269 %
1991	1,669,161	1,397,957	-12,312	-27,329	-1.938 %
1992	1,794,800	1,461,563	63,606	48,589	3.476 %

average yearly change:	15,017
maximum historic positive deviation:	88,671
maximum historic negative deviation:	-64,519
maximum historic % positive deviation:	8.333 %
maximum historic % negative deviation:	-5.794 %
positive rtv:	8.333 %
negative rtv:	-4.345 %

PERSONAL INCOME

YEAR	Personal Income	Adjusted Income	Change	Deviation	%Deviation
1969	483,280	1,429,823			
1970	517,307	1,444,992	15,169	-28,506	-1.994 %
1971	554,106	1,485,539	40,547	-3,128	-0.216 %
1972	600,351	1,555,314	69,775	26,100	1.757 %
1973	659,695	1,609,012	53,699	10,024	0.644 %
1974	727,273	1,598,402	-10,610	-54,285	-3.374 %
1975	798,607	1,606,855	8,453	-35,222	-2.204 %
1976	904,204	1,722,293	115,438	71,763	4.466 %
1977	960,162	1,717,642	-4,651	-48,326	-2.806 %
1978	1,068,509	1,774,932	57,290	13,615	0.793 %
1979	1,194,421	1,782,718	7,786	-35,889	-2.022 %
1980	1,335,203	1,754,537	-28,180	-71,855	-4.031 %
1981	1,484,184	1,768,992	14,454	-29,221	-1.665 %
1982	1,588,610	1,786,963	17,971	-25,704	-1.453 %
1983	1,723,161	1,881,180	94,217	50,542	2.828 %
1984	1,875,773	1,978,663	97,483	53,808	2.860 %
1985	2,001,618	2,040,385	61,722	18,047	0.912 %
1986	2,125,590	2,202,684	162,299	118,624	5.814 %
1987	2,226,431	2,226,431	23,747	-19,928	-0.905 %
1988	2,325,488	2,236,046	9,615	-34,060	-1.530 %
1989	2,521,321	2,313,139	77,092	33,417	1.494 %
1990	2,695,601	2,350,132	36,993	-6,682	-0.289 %
1991	2,815,263	2,357,842	7,710	-35,965	-1.530 %
1992	2,989,376	2,434,345	76,504	32,829	1.392 %

average yearly change:	43,675
maximum historic positive deviation:	118,624
maximum historic negative deviation:	-71,855
maximum historic % positive deviation:	5.814 %
maximum historic % negative deviation:	-4.031 %
positive rtv:	5.814 %
negative rtv:	-2.701 %

EMPLOYMENT

YEAR	Employment	Change	Deviation	%Deviation
1969	89,129			
1970	84,679	-4,450	-5,402	-6.061 %
1971	82,679	-2,000	-2,952	-3.486 %
1972	80,855	-1,824	-2,776	-3.358 %
1973	81,000	145	-807	-0.998 %
1974	81,968	968	16	0.019 %
1975	81,194	-774	-1,726	-2.106 %
1976	86,815	5,621	4,669	5.750 %
1977	85,946	-869	-1,821	-2.098 %
1978	87,194	1,248	296	0.344 %
1979	88,566	1,372	420	0.481 %
1980	89,725	1,159	207	0.233 %
1981	90,521	796	-156	-0.174 %
1982	90,491	-30	-982	-1.085 %
1983	94,893	4,402	3,450	3.812 %
1984	98,559	3,666	2,714	2.860 %
1985	101,307	2,748	1,796	1.822 %
1986	102,645	1,338	386	0.381 %
1987	105,722	3,077	2,125	2.070 %
1988	104,925	-797	-1,749	-1.655 %
1989	107,684	2,759	1,807	1.722 %
1990	109,851	2,167	1,215	1.128 %
1991	107,951	-1,900	-2,852	-2.597 %
1992	111,032	3,081	2,129	1.972 %

average yearly change:	952
maximum historic positive deviation:	4,669
maximum historic negative deviation:	-5,402
maximum historic % positive deviation:	5.750 %
maximum historic % negative deviation:	-6.061 %
positive rtv:	5.750 %
negative rtv:	-4.061 %

POPULATION

YEAR	Population	Change	Deviation	%Deviation
1969	182,600			
1970	182,400	-200	-1,748	-0.957 %
1971	185,400	3,000	1,452	0.796 %
1972	183,900	-1,500	-3,048	-1.644 %
1973	181,800	-2,100	-3,648	-1.984 %
1974	187,100	5,300	3,752	2.064 %
1975	188,000	900	-648	-0.346 %
1976	193,900	5,900	4,352	2.315 %
1977	198,700	4,800	3,252	1.677 %
1978	196,200	-2,500	-4,048	-2.037 %
1979	197,100	900	-648	-0.330 %
1980	198,600	1,500	-48	-0.024 %
1981	200,700	2,100	552	0.278 %
1982	203,800	3,100	1,552	0.773 %
1983	206,100	2,300	752	0.369 %
1984	209,500	3,400	1,852	0.899 %
1985	211,300	1,800	252	0.120 %
1986	208,900	-2,400	-3,948	-1.868 %
1987	209,800	900	-648	-0.310 %
1988	211,500	1,700	152	0.073 %
1989	211,400	-100	-1,648	-0.779 %
1990	212,700	1,300	-248	-0.117 %
1991	214,300	1,600	52	0.025 %
1992	218,200	3,900	2,352	1.098 %

average yearly change:	1,548
maximum historic positive deviation:	4,352
maximum historic negative deviation:	-4,048
maximum historic % positive deviation:	2.315 %
maximum historic % negative deviation:	-2.037 %
positive rtv:	2.315 %
negative rtv:	-1.019 %

Source: Bureau of Economic Analysis

Appendix F
BIOLOGICAL RESOURCE LISTS

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APPENDIX F: BIOLOGICAL RESOURCE LISTS

List of Tables

Appendix F: Biological Resource Lists

F.1 INTRODUCTION

The following tables identify a broad range of plant and animal species that are known to occur within the boundaries of Fort Leonard Wood. The comprehensive lists of species presented in this appendix were compiled using data from several sources that have been prepared for Fort Leonard Wood as part of their ongoing natural resource management activities. They include: the Land Condition - Trend Analysis reports; Missouri Department of Conservation Threatened and Endangered Species Faunal and Sensitive Habitat Surveys of Fort Leonard Wood; Preliminary Draft Technical Report: Effects of Certain Aerosol Contaminants on Federally Endangered Indiana Bats and Gray Bats at Fort Leonard Wood; and Monitoring Avian Productivity and Survivorship Program reports. Tables provided in this appendix include:

- Mammals (Table F.1)
- Birds (Table F.2)
- Fish (Table F.3)
- Freshwater Mussels (Table F.4)
- Insects (Table F.5)
- Plants (Table F.6)
- Neotropical Migrants (Table F.7)
- Species Mentioned in Scoping or Review Comments (Table F.8)

The species listed in Table F.8 were cited in scoping comments or in review comments on the DEIS. Table F.8 was developed to address these species and the resolution of their analysis.

Table F.1 Fort Leonard Wood Mammal List.
Source: Land Condition - Trend Analysis (LCTA) Data Summary and Analysis Report for Fort Leonard Wood, Missouri 1989-1993 (Proffitt, 1993).

Mammal List Key

Genus	:	Current scientific name listed.
Species Subspecies/Variety	:	Current scientific name listed.
Code	:	This is a four letter code with or without a number used by the USDA to identify the mammal.
Common Name	:	Locally known name.
FLW Status	:	The likelihood of the species occurrence based on state populations, abundance and distribution maps, with FLW located in the Ozarks. This is based on the Book: <u>The Wild Mammals of Missouri,</u> <u>C.W. Schwartz & E.R. Schwartz</u> University of Missouri Press and the Missouri Department of Conservation P.O. Box 1644 Columbia, Missouri 65211 ISBN-0-8262-0324-8
Recorded	:	The species has been recorded either by observation or sign (tracks, scat, bones or teeth) within the boundaries of Fort Leonard Wood. Observation was made from LCTA data or from personal communication by Natural Resource Staff. X = positive ID ? = unconfirmed reports, presently expanding range into Missouri from Arkansas populations.

****** For more detailed information please contact the FLW Natural Resource Office at (596 0871) ******

Table F.1 Fort Leonard Wood Mammal List.

GENUS	SPECIES	CODE	COMMON NAME	FLW STATUS	RECORD
Didelphis	virginiana	DIVI	Virginia opossum	common resident	X
Sorex	longirostris	SOLO	Southeastern shrew	uncommon resident	
Blarina	brevicauda	BLBR	Northern short-tailed shrew	common resident	X
Blarina	carolinensis	BLCA	Southern short-tailed shrew	common resident	X
Blarina	hylophaga	BLHY	Elliot's short-tailed shrew	common resident	X
Cryptotis	parva	CRPA	Least shrew	common resident	X
Scalopus	aquaticus	SCAQ	Eastern mole	common resident	X
Myotis	grisescens	MYGR	Gray bat	very rare resident	X
Myotis	lucifugus	MYLU1	Little brown bat	common resident	X
Myotis	keenii	MYKE	Keen's myotis	rare resident	X
Myotis	leibii	MYLE	Small-footed myotis	rare resident	
Myotis	sodalis	MYSO	Indiana bat	very rare winter resident	X
Lasionycteris	noctivagans	LANO	Silver-haired bat	rare to uncommon resident	
Pipistrellus	subflavus	PISU	Eastern pipistrelle	common resident	X
Eptesicus	fuscus	EPFU	Big brown bat	common resident	X
Lasiurus	borealis	LABO	Red bat	uncommon resident	X
Lasiurus	cinereus	LACI	Hoary bat	rare to uncommon resident	
Nycticeius	humeralis	NYHU	Evening bat	rare to uncommon resident	
Plecotus	townsendii	PLTO	Townsend's big-eared bat	very rare resident	
Plecotus	rafinesquii	PLRA	Rafinesque's big-eared bat	very rare winter resident	
Tadarida	brasiliensis	TABR	Brazilian free-tailed bat	very rare transient	
Sylvilagus	floridanus	SYFL	Eastern cottontail	common resident	X
Tamias	striatus	TAST	Eastern chipmunk	common resident	X
Marmota	monax	MAMO	Woodchuck	common resident	X
Sciurus	carolinensis	SCCA	Gray squirrel	common resident	X
Sciurus	niger	SCNI	Fox squirrel	common resident	X
Glaucomys	volans	GLVO	Southern flying squirrel	common resident	X
Geomys	bursarius	GEBU	Plains pocket gopher	uncommon resident	
Castor	canadensis	CACA	Beaver	common resident	X

Table F.1 Fort Leonard Wood Mammal List.

GENUS	SPECIES	CODE	COMMON NAME	FLW STATUS	RECORD
Reithrodontomys	megalotis	REME	Western harvest mouse	common resident	X
Reithrodontomys	fulvescens	REFU	Fulvous harvest mouse	rare resident	
Peromyscus	maniculatus	PEMA1	Deer mouse	common resident	X
Peromyscus	leucopus	PELE1	White-footed mouse	common reident	X
Ochrotomys	nuttalli	OCNU	Golden mouse	uncommon resident	X
Sigmodon	hispidus	SIHI	Hispid cotton rat	uncommon resident	X
Neotoma	floridana	NEFL	Eastern woodrat	rare to uncommon resident	X
Microtus	pennsylvanicus	MIPE	Meadow vole	rare resident	
Microtus	ochrogaster	MIOC	Prairie vole	common resident	X
Microtus	pinetorum	MIPI	Pine vole	rare to uncommon resident	X
Ondatra	zibethicus	ONZI	muskrat	common resident	X
Synaptomys	cooperi	SYCO	Southern bog lemming	common resident but localized	
Rattus	norvegicus	RANO	Norway rat	common resident	X
Rattus	rattus	RARA	Black rat	common resident	X
Mus	musculus	MUMU	House mouse	common resident	X
Zapus	hudsonius	ZAHU	Meadow jumping mouse	uncommon resident	X
Canis	latrans	CALA2	Coyote	common resident	X
Canis	canis	CAN S	Dog	common resident	X
Urocyon	cinereoargenteus	URC,	Gray fox	common resident	X
Vulpes	vulpes	VUVU	Red fox	common resident	X
Ursus	americanus	URAM	Black bear	very rare resident	?
Procyon	lotor	PRLO	Raccoon	common resident	X
Mustela	frenata	MUFR	Long-tailed weasel	uncommon resident	X
Mustela	nivalis	MUNI1	Least weasel	rare resident	
Mustela	vison	MUVI	Mink	uncommon resident	X
Taxidea	taxus	TATA	Badger	rare resident	
Spilogale	putorius	SPPU	Spotted skunk	rare resident	
Mephitis	mephitis	MEME1	Striped skunk	common resident	X
Lutra	canadensis	LUCA1	River otter	uncommon to rare resident	X

Table F.1 Fort Leonard Wood Mammal List.

GENUS	SPECIES	CODE	COMMON NAME	FLW STATUS	RECORD
Felis	concolor	FECO	Mountain lion	very rare resident	?
Felis	silvestris	FESI	House cat	common resident	X
Lynx	rufus	LYRU	Bobcat	common resident	X
Odocoileus	virginianus	ODVI	White-tailed deer	common resident	X

Table F.2 Fort Leonard Wood Bird List.
Source: LCTA Data Summary and Analysis Report for Fort Leonard Wood, Missouri 1989-1993 (Proffitt, 1993).

Bird List Key

Genus	:	Current scientific name listed.
Species Subspecies/Variety	:	Current scientific name listed.
Code	:	This is a four letter code with or without a number used by the USDA to identify the bird.
Common Name	:	Locally known name.
FLW Status	:	The likelihood of the species temporal occurrence. The State was divided into four Natural Communities, with FLW located in the Ozarks. This is based on the Book: <u>Birds of Missouri, Their Distribution and Abundance. M. Robbins & D. Easterla.</u> University of Missouri Press Columbia and London ISBN-0-8262-0791-X
Recorded	:	The species has been recorded either by observation or song within the boundaries of Fort Leonard Wood. Observation was made from LCTA data or from personal communication by Natural Resource Staff X = positive ID

****** For more detailed information please contact the FLW Natural Resource Office at (596 0871) ******

Table F.2 Fort Leonard Wood Bird List.

GENUS	SPECIES	CODE	COMMON NAME	FLW STATUS	RECORD
Gavia	immer	GAIM	Common loon	uncommon migrant & rare winter resident	X
Podiceps	auritus	POAU	Horned grebe	uncommon migrant & rare winter resident	X
Podiceps	nigricollis	PONI	Eared grebe	rare transient	
Podilymbu	podiceps	POP	Piedbilled grebe	common transient & rare winter resident	X
Pelecanus	erythrorhynchos	PEER	American white pelican	rare transient	
Phalacrocorax	auritus	PHAU	Double-crested cormorant	uncommon transient	X
Botaurus	lentiginosus	BOLE	American bittern	uncommon transient	
Ixobrychus	exilis	IXEX	Least bittern	rare summer resident	
Ardea	herodias	ARHE	Great blue heron	common resident & transient	X
Bubulcus	ibis	BUIB	Cattle egret	uncommon transient	X
Butorides	striatus	BUST	Green-backed heron	common resident	X
Nycticorax	nycticorax	NYNY	Black-crowned night-heron	uncommon transient & rare summer resident	
Nycticorax	violaceus	NYVI	Yellow-crowned night-heron	uncommon transient & rare summer resident	X
Egretta	thula	EGTH	Snowy egret	rare transient	X
Grus	canadensis	GRCA1	Sandhill crane	rare transient	
Cygnus	columbianus	CYCO	Tundra swan	rare transient	X
Cygnus	buccinator	CYBU	Trumpeter swan	uncommon transient	
Chen	caerulescens	CHCA	Snow goose	uncommon transient	X
Branta	canadensis	BRCA1	Canada goose	common transient & uncommon resident	X
Aix	sponsa	AISP	Wood duck	common resident	X
Anas	acuta	ANAC	Northern pintail	common transient	X
Anas	americana	ANAM	American wigeon	common transient	X
Anas	clypeata	ANCL	Northern shoveler	common transient	X
Anas	crecca	ANCR	Green-winged teal	common transient	X
Anas	cyanoptera	ANCY	Cinnamon teal	rare transient	
Anas	discors	ANDI	Blue-winged teal	common transient	X
Anas	penelope	ANPE	Eurasian wigeon	rare transient	
Anas	platyrhynchos	ANPL	Mallard	common transient & uncommon resident	X

Table F.2 Fort Leonard Wood Bird List.

GENUS	SPECIES	CODE	COMMON NAME	FLW STATUS	RECORD
Anas	rubripes	ANRU	American black duck	uncommon transient	
Anas	strepera	ANST	Gadwall	common transient	X
Aythya	affinis	AYAF	Lesser scaup	common transient & uncommon winter resident	X
Aythya	americana	AYAM	Redhead	uncommon transient	X
Aythya	marila	AYMA	Greater scaup	rare transient	
Aythya	valisineria	AYVA	Canvasback	uncommon transient	X
Bucephala	albeola	BUAL	Bufflehead	uncommon transient	X
Bucephala	clangula	BUCL	Common goldeneye	common transient & uncommon winter resident	X
Lophodytes	cucullatus	LOCU1	Hooded merganser	uncommon transient	X
Mergus	merganser	MEME2	Common merganser	common transient	X
Oxyura	jamaicensis	OXJA	Ruddy duck	common transient	X
Fulica	americana	FUAM	American coot	common transient & irregular winter resident	X
Actitis	macularia	ACMA	Spotted sandpiper	uncommon transient	X
Bartramia	longicauda	BALO	Upland sandpiper	very rare transient	
Calidris	fuscicollis	CAFU	White-rumped sandpiper	uncommon transient	
Calidris	minutilla	CAMI1	Least sandpiper	common transient	X
Calidris	pusilla	CAPU	Semipalmated sandpiper	common transient	X
Charadrius	semipalmatus	CHSE	Semipalmated plover	common transient	
Pluvialis	squatarola	PLSQ	Black-bellied plover	uncommon trasient	
Pluvialis	dominica	PLDO1	Lesser golden-plover	common transient	
Tringa	flavipes	TRFL	Lesser yellowlegs	common transient	X
Tringa	melanoleuca	TRME	Greater yellowlegs	common transient	X
Tringa	solitaria	TRSO	Solitary sandpiper	uncommon transient	
Charadrius	vociferus	CHVO	Killdeer	common summer resident	X
Recurvirostra	americana	REAM	American avocet	rare transient	
Phalaropus	tricolor	PHTR	Wilson's phalarope	uncommon transient	X
Rallus	elegans	RAEL	King rail	rare transient	
Rallus	limicola	RALI	Virginia rail	uncommon transient	X
Porzana	carolina	POCA1	Sora	uncommon transient	X
Scolopax	minor	SCMI	American woodcock	common transient & uncommon summer resident	X
Gallinago	gallinago	GAGA	Common snipe	common transient	X

Table F.2 Fort Leonard Wood Bird List.

GENUS	SPECIES	CODE	COMMON NAME	FLW STATUS	RECORD
Sterna	antillarum	STAN1	Least tern	rare transient	
Sterna	caspia	STCA1	Caspian tern	ncommon transient	X
Childonias	niger	CHNI	Black tern	common transient	
Sterna	forsteri	STFO	Forster's tern	common transient	X
Sterna	hirundo	STHI	Common tern	uncommon transient	
Larus	argentatus	LAAR	Herring gull	uncommon transient	X
Larus	atricilla	LAAT	Laughing gull	uncommon transient	X
Larus	philadelphia	LAPH	Bonaparte's gull	uncommon transient	
Larus	pipixcan	LAPI	Franklin's gull	uncommon transient	
Bonasa	umbellus	BOUM	Ruffed grouse	rare to uncommon resident	X
Colinus	virginianus	COVI	Northern bobwhite	common resident	X
Meleagris	gallopavo	MEGA	Wild turkey	common resident	X
Cathartes	aura	CAAU	Turkey vulture	common resident & transient	X
Pandion	haliaetus	PAHA	Osprey	uncommon transient & winter resident	X
Aquila	chrysaetos	AQCH	Golden eagle	rare transient	X
Haliaeetus	leucocephalus	HALE	Bald eagle	uncommon transient & winter resident	X
Accipiter	cooperii	ACCO	Cooper's hawk	uncommon resident & transient	X
Accipiter	gentilis	ACGE	Northern goshawk	rare transient	
Accipiter	striatus	ACST	Sharp-shinned hawk	uncommon resident & transient	X
Falco	columbarius	FACO	Merlin	rare transient & rare winter resident	X
Falco	sparverius	FASP	American kestrel	uncommon resident	X
Circus	cyaneus	CICY	Northern harrier	uncommon transient & winter resident	X
Buteo	jamaicensis	BUJA	Red-tailed hawk	common resident	X
Buteo	lagopus	BULA	Rough-legged hawk	rare transient	
Buteo	lineatus	BULI	Red-shouldered hawk	uncommon resident	X
Buteo	platypterus	BUPL	Broad-winged hawk	common transient & uncommon resident	X
Asio	otus	ASOT	Long eared owl	uncommon transient	
Aegolius	acadicus	AEAC	Nothern Saw-whet owl	rare transient	

Table F.2 Fort Leonard Wood Bird List.

GENUS	SPECIES	CODE	COMMON NAME	FLW STATUS	RECORD
Bubo	virginianus	BUVI	Great horned owl	common resident	X
Nyctea	scandiaca	NYSC	Snowy owl	rare winter migrant	
Strix	varia	STVA	Barred owl	common resident	X
Otus	asio	OTAS	Eastern screech-owl	common resident	X
Tyto	alba	TYAL	Barn owl	very rare resident	X
Columba	livia	COLI	Common pigeon	commom resident	X
Zenaida	macroura	ZEMA	Mourning dove	common summer resident & irregular winter resident	X
Coccyzus	americanus	COAM	Yellow-billed cuckoo	common summer resident	X
Coccyzus	erythropthalmus	COER	Black-billed cuckoo	uncommon transient	X
Geococcyx	californianus	GECA1	Greater roadrunner	rare resident	
Caprimulgus	carolinensis	CACA3	Chuck-will's-widow	uncommon summer resident	X
Caprimulgus	vociferus	CAVO	Whip-poor-will	common summer resident	X
Chordeiles	minor	CHMI	Common nighthawk	common summer resident	X
Archilochus	colubris	ARCO	Ruby-throated hummingbird	common resident & transient	X
Ceryle	alcyon	CEAL	Belted kingfisher	common summer resident & irregular winter resident	X
Colaptes	auratus	COAU	Northern flicker	common resident	X
Dryocopus	pileatus	DRPI	Pileated woodpecker	common resident	X
Melanerpes	carolinus	MECA	Red-bellied woodpecker	common resident	X
Melanerpes	erythrocephalus	MEER	Red-headed woodpecker	common resident	X
Picoides	pubescens	PIPU	Downy woodpecker	common resident	X
Picoides	villosus	PIVI	Hairy woodpecker	common resident	X
Sphyrapicus	varius	SPVA1	Yellow-bellied sapsucker	uncommon transient & uncommon winter resident	X

Table F.2 Fort Leonard Wood Bird List.

GENUS	SPECIES	CODE	COMMON NAME	FLW STATUS	RECORD
Contopus	borealis	COBO	Olive-sided flycatcher	uncommon transient	
Contopus	virens	COVI1	Eastern wood-pewee	common summer resident	X
Empidonax	alnorum	EMAL	Alder flycatcher	common transient	X
Empidonax	minimus	EMMI1	Least flycatcher	common transient & uncommon summer resident	X
Empidonax	traillii	EMTR	Willow flycatcher	uncommon summer resident	X
Empidonax	virescens	EMVI	Acadian flycatcher	common resident	X
Myiarchus	crinitus	MYCR	Great crested flycatcher	common summer resident	X
Tyrannus	forficatus	TYFO	Scissor-tailed flycatcher	rare transient	X
Tyrannus	tyrannus	TYTY	Eastern kingbird	common summer resident	X
Sayornis	phoebe	SAPH	Eastern phoebe	common summer resident	X
Eremophila	alpestris	ERAL	Horned lark	common transient & uncommon resident	X
Chaetura	pelagica	CHPE	Chimney swift	common summer resident	X
Hirundo	pyrrhonota	HIPY	Cliff swallow	uncommon summer resident	X
Hirundo	rustica	HIRU	Barn swallow	common summer resident	X
Progne	subis	PRSU	Purple martin	commom summer resident	X
Stelgidopteryx	serripennis	STSE	Northern rough-winged swallow	common summer resident	X
Tachycineta	bicolor	TABI	Tree swallow	common transient & locally uncommon resident	X
Corvus	brachyrhynchos	COBR1	American crow	common resident	X
Cyano	cittacristata	CYCR	Blue jay	common resident	X
Parus	atricapillus	PAAT	Black-capped chickadee	uncommon to rare winter resident	X
Parus	bicolor	PABI	Tufted titmouse	common resident	X
Parus	carolinensis	PACA2	Carolina chickadee	common resident	X
Sitta	canadensis	SICA1	Red-breasted nuthatch	common transient & uncommon winter resident	X
Sitta	carolinensis	SICA2	White-breasted nuthatch	common resident	X
Certhia	americana	CEAM	Brown creeper	common transient & uncommon winter resident	X

Table F.2 Fort Leonard Wood Bird List.

GENUS	SPECIES	CODE	COMMON NAME	FLW STATUS	RECORD
Thryomanes	bewickii	THBE	Bewick's wren	uncommon summer resident & rare winter resident	X
Thryothorus	ludovicianus	THLU	Carolina wren	common summer resident & irregular winter resident	X
Troglodytes	aedon	TRAE	House wren	uncommon summer resident & rare winter resident	X
Troglodytes	troglodytes	TRTR	Winter wren	uncommon transient & umcommon winter resident	X
Regulus	calendula	RECA	Ruby-crowned kinglet	common transient & rare winter resident	X
Regulus	satrapa	RESA	Golden-crowned kinglet	common transient & uncommon winter resident	X
Polioptila	caerulea	POCA	Blue-gray gnatcatcher	common summer resident	X
Dumetella	carolinensis	DUCA	Gray catbird	common summer resident & infrequent winter resident	X
Toxostoma	rufum	TORU	Brown thrasher	common summer resident	X
Mimus	polyglottos	MIPO	Northern mockingbird	common summer resident	X
Catharus	fuscescens	CAFU2	Veery	common transient	X
Catharus	guttatus	CAGU	Hermit thrush	uncommon transient	X
Catharus	minimus	CAMI2	Gray-cheeked thrush	uncommon transient	X
Catharus	ustulatus	CAUS	Swainson's thrush	common transient	X
Hylocichla	mustelina	HYMU	Wood thrush	common summer resident	X
Sialia	sialis	SISI	Eastern bluebird	common summer resident & irregular winter resident	X
Turdus	migratorius	TUMI	American robin	common summer resident & irregular winter resident	X
Lanius	ludovicianus	LALU	Loggerhead shrike	uncommon transient & rare resident	
Bombycilla	cedrorum	BOCE	Cedar waxwing	common transient & irregular winter resident	X
Vireo	bellii	VIBE	Bell's vireo	rare transient	X
Vireo	flavifrons	VIFL	Yellow-throated vireo	uncommon summer resident	X
Vireo	gilvus	VIGI	Warbling vireo	common summer resident	X
Vireo	griseus	VIGR	White-eyed vireo	common summer resident	X
Vireo	olivaceus	VIOL	Red-eyed vireo	common summer resident	X
Vireo	philadelphicus	VIPH	Philadelphia vireo	rare transient	
Vireo	solitarius	VISO	Solitary vireo	uncommon transient	X

Table F.2 Fort Leonard Wood Bird List.

GENUS	SPECIES	CODE	COMMON NAME	FLW STATUS	RECORD
Dendroica	caerulescens	DECA1	Black-throated blue warbler	rare transient	
Dendroica	castanea	DECA2	Bay-breasted warbler	uncommon transient	X
Dendroica	cerulea	DECE	Cerulean warbler	uncommon summer resident & trnasient	X
Dendroica	coronata	DECO	Yellow-rumped warbler	common transient & uncommon winter resident	X
Dendroica	discolor	DEDI	Prairie warbler	common transient & uncommon resident	X
Dendroica	dominica	DEDO	Yellow-throated warbler	common summer resident & transient	X
Dendroica	fusca	DEFU	Blackburnian warbler	uncommon transient	X
Dendroica	kirtlandii	DEKI	Kirtland's warbler	very rare transient	
Dendroica	magnolia	DEMA	Magnolia warbler	common transient	X
Dendroica	palmarum	DEPA	Palm warbler	common translet	X
Dendroica	pensylvanica	DEPE	Chestnut-sided warbler	common transient & uncommon resident	X
Dendroica	petechia	DEPE1	Yellow warbler	common transient	X
Dendroica	pinus	DEPI	Pine warbler	uncommon summer resident & rare winter resident	X
Dendroica	striata	DEST	Blackpoll warbler	common transient	X
Dendroica	tigrina	DETI	Cape May warbler	rare transient	
Dendroica	virens	DEVI	Black-throated green warbler	common transient	X
Geothlypis	trichas	GETR	Common yellowthroat	common summer resident	X
Helmitheros	vermivorus	HEVE	Worm-eating warbler	uncommon to common summer resident	X
Icteria	virens	ICVI	Yellow-breasted chat	common summer resident	X
Limnothlypis	swainsonii	LISW	Swainson's warbler	very rare summer resident	X
Mniotilta	varia	MNVA	Black-and-white warbler	common transient & uncommon summer resident	X
Oporornis	agilis	OPAG	Connecticut warbler	rare traslent	X
Oporornis	formosus	OPFO	Kentucky warbler	uncommon summer resident	X
Oporornis	philadelphia	OPPH	Mourning warbler	uncommon transient	X
Parula	americana	PAAM	Northern parula	common summer resident	X
Protonotaria	citrea	PRCI	Prothonotary warbler	common summer resident	X
Seiurus	aurocapillus	SEAU	Ovenbird	common summer resident	X
Seiurus	motacilla	SEMO	Louisiana waterthrush	common summer resident	X
Seiurus	noveboracensis	SENO	Northern waterthrush	common transient	X
Setophaga	ruticilla	SERU1	American redstart	common transient & uncommon summer resident	X
Vermivora	celata	VECE	Orange-crowned warbler	uncommon transient	X
Vermivora	chrysoptera	VECH	Golden-winged warbler	uncommon transient	X
Vermivora	peregrina	VEPE	Tennessee warbler	common transient	X

Table F.2 Fort Leonard Wood Bird List.

GENUS	SPECIES	CODE	COMMON NAME	FLW STATUS	RECORD
Vermivora	pinus	VEPI	Blue-winged warbler	common summer resident	X
Vermivora	ruficapilla	VERU	Nashville warbler	common transient	X
Wilsonia	canadensis	WICA	Canada warbler	uncommon transient	X
Wilsonia	citrina	WICI	Hooded warbler	uncommon transient & rare summer resident	X
Wilsonia	pusilla	WIPU	Wilson's warbler	common transient	X
Molothrus	ater	MOAT	Brown-headed cowbird	common summer resident	X
Euphagus	cyanocephalus	EUCY	Brewer's blackbird	rare transient	
Agelaius	phoeniceus	AGPH	Red-winged blackbird	common resident & transient	X
Quiscalus	quiscula	QUQU	Common grackle	common resident	X
Dolichonyx	oryzivorus	DOOR	Bobolink	uncommon transient	X
Sturnella	magna	STMA2	Eastern meadowlark	common resident	X
Sturnella	neglecta	STNE1	Western meadowlark	rare summer resident	
Sturnus	vulgaris	STVU	European starling	common resident	X
Icterus	galbula	ICGA	Northern oriole	uncommon summer resident & irregular winter resident	X
Icterus	spurius	ICSP	Orchard oriole	common summer resident	X
Piranga	olivacea	PIOL	Scarlet tanger	common summer resident	X
Piranga	rubra	PIRU	Summer tanager	common summer resident	X
Passera	domesticus	PADO	House sparrow	common resident	X
Spiza	americana	SPAM	Dickcissel	common summer resident	X
Junco	hyemalis	JUHY	Dark-eyed junco	common winter resident	X
Cardinalis	cardinalis	CACA	Northern cardinal	common resident	X
Loxia	curvirostra	LOCU2	Red crossbill	rare winter resident	
Carduelis	flammea	CAFL	Common redpoll	rare & irregular winter resident	
Carpodacus	mexicanus	CAME2	House finch	introduced species expanding range	
Carpodacus	purpureus	CAPU1	Purple finch	common transient & uncommon winter resident	X

Table F.2 Fort Leonard Wood Bird List.

GENUS	SPECIES	CODE	COMMON NAME	FLW STATUS	RECORD
Coccothraustes	vespertinus	COVE	Evening grosbeak	uncommon winter resident	X
Guiraca	caerulea	GUCA	Blue grosbeak	uncommon summer resident	
Pheucticus	ludovicianus	PHLU	Rose-breasted	grosbeak common transient	X
Carduelis	tristis	CATR	American goldfinch	common resident	X
Carduelis	pinus	CAPI1	Pine siskin	rare winter resident	
Passerina	cyanea	PACY	Indigo bunting	common summer resident	X
Pipilo	erythrophthalmus	PIER	Rufous-sided towhee	common resident	X
Chondestes	grammacus	CHGR	Lark sparrow	uncommon summer resident	X
Zonotrichia	albicollis	ZOAL	White-throated sparrow	common transient & common winter resident	X
Zonotrichia	leucophrys	ZOLE	White-crowned sparrow	common transient & common winter resident	X
Zonotrichia	querula	ZOQU	Harris' sparrow	rare transient & rare winter resident	
Spizella	arborea	SPAR2	American tree sparrow	uncommon winter resident	X
Spizella	passerina	SPPA2	Chipping sparrow	common summer resident & irregular winter resident	X
Spizella	pusilla	SPPU1	Field sparrow	common summer resident & uncommon winter resident	X
Ammodramus	savannarum	AMSA	Grasshopper sparrow	uncommon resident	X
Aimophila	aestivalis	AIAE	Bachman's sparrow [1]	very rare resident	X
Passerella	iliaca	PAIL	Fox sparrow	uncommon transient & winter resident	X
Melospiza	melodia	MEME	Song sparrow	common summer resident	X
Pooecetes	gramineus	POGR1	Vesper sparrow	uncommon transient	
Melospiza	lincolnii	MELI	Lincoln's sparrow	uncommon transient & rare winter resident	
Passerculus	sandwichensis	PASA	Savannah sparrow	common transient	X
Ammodramus	caudacutus	AMCA1	Sharp-tailed sparrow	rare transient	
Ammodramus	henslowii	AMHE	Henslow's sparrow	rare transient	
Ammodramus	leconteii	AMLE	Le Conte's sparrow	common transient & uncommon winter resident	

Table F.3 List of Fishes Known to Occur on Fort Leonard Wood.
Source: Threatened and Endangered Species Faunal and Sensitive Habitat Survey of Fort Leonard Wood, Missouri (Sternburg, 1995).

Species of fish collected at Fort Leonard Wood, Pulaski County, Missouri (April 1 - September 30, 1994).

Common Name	Scientific Name	Common Name	Scientific Name
Longnose gar	Lepisosteus osseus	Blackspotted topminnow	Fundulus olivaceus
Gizzard shad	Dorosoma cepedianum	Northern studfish	Fundulus catenatus
Common carp	Cyprinus carpio	Plains topminnow**	Fundulus sciadicus
Creek chub	Semotilus atromaculatus	Mosquitofish	Gambusia affinis
Southern redbelly dace	Phoxinus erythrogaster	Brook silverside	Labidesthes sicculus
Hornyhead chub	Nocomis biguttatus	Freshwater drum	Aplodinotus grunniens
Gravel chub	Erimystax x-punctatus	Ozark sculpin	Cottus hypselurus
Rosyface shiner	Notropis rubellus	Banded sculpin	Cottus carolinae
Bleeding shiner	Luxilus zonatus	Smallmouth bass	Micropterus dolomieu
Bigeye shiner	Notropis boops	Largemouth bass	Micropterus salmoides
Blacknose shiner*	Notropis heterolepis	Green sunfish	Lepomis cyanellus
Spotfin shiner	Cyprinella spiloptera	Longear sunfish	Lepomis megalotis
Ozark minnow	Notropis nubilus	Bluegill	Lepomis macrochirus
Bluntnose minnow	Pimephales notatus	Rock bass	Ambloplites rupestris
Largescale stoneroller	Campostoma oligolepis	Black crappie	Pomoxis nigromaculatus
Central stoneroller	Campostoma anomalum	White crappie	Pomoxis annularis
Northern hog sucker	Hypentelium nigricans	Logperch	Percina caprodes
Black redhorse	Moxostoma duquesnei	Bluestripe darter***	P. cymatotaenia
Golden redhorse	Moxostoma erythrurum	Gilt darter	P. evides
Shorthead redhorse	Moxostoma macrolepidotum	Missouri saddled darter	Etheostoma tetrazonum
Black bullhead	Ameiurus melas	Banded darter	E. zonale
Yellow bullhead	Ameiurus natalis	Greenside darter	E. blennioides
Slender madtom	Noturus exilis	Rainbow darter	E. caeruleum
Stonecat	Noturus flavus	Orangethroat darter	E. spectabile
Flathead catfish	Pylodictis olivaris	Fantail darter	E. flabellare

* State R
** Federal C2, state SU
*** Federal C2, state R
Federal and state statuses taken from the Rare and Endangered Species Checklist of Missouri (1994)

Table F.4 List of Freshwater Mussels Known to Occur at Fort Leonard Wood.
Source: Threatened and Endangered Species Faunal and Sensitive Habitat Survey of Fort Leonard Wood, Missouri (Sternburg, 1994b).

Scientific Name	Common Name	Location (watershed)
Actinonaias ligamentina	mucket	Big Piney, Roubidoux
Alasmidonta marginata	elktoe	Big Piney
Amblema plicata	threeridge	Big Piney
Anodonta grandis grandis	giant floater	Big Piney
Anodonta imbecilis	paper pondshell	Big Piney
Corbicula fluminea (exotic)	Asiatic clam	Big Piney
Cumberlandia monodonta	spectaclecase	Big Piney
Cyclonaias tuberculata	purple wartyback	Big Piney, Roubidoux
Cyprogenia aberti	western fanshell	Big Piney
Elliptio dilatata	spike	Big Piney, Roubidoux
Fusconaia flava	Wabash pigtoe	Big Piney, Roubidoux
Lampsilis cardium	plain pocketbook	Big Piney, Roubidoux
Lampsilis radiata	Eastern lampmussel	Big Piney, Roubidoux
Lampsilis reeviana brevicula	Ozark broken-ray	Big Piney
Lampsilis reeviana brittsi	Northern broken-ray	Big Piney, Roubidoux
Lampsilis teres anodontoides	yellow sand shell	Big Piney
Lasmigona costata	fluted-shell	Big Piney
Ligumia recta	black sandshell	Big Piney
Ligumia subrostrata	pond mussel	Big Piney
Obliquaria reflexa	threehorn wartyback	Big Piney
Pleurobema coccineum	round pigtoe	Big Piney, Roubidoux
Potamilus alatus	pink heelsplitter	Big Piney
Quadrula metanevra	monkeyface	Big Piney
Quadrula pustulosa	pimpleback	Big Piney
Strophitus undulatus	squawfoot	Big Piney
Tritogonia verrucosa	pistolgrip	Big Piney
Venustaconcha ellipsiformis	ellipse	Big Piney, Roubidoux

Table F.5 List of Insects Known to Occur at Fort Leonard Wood.
Source: Appendix II - Preliminary Draft Technical Report: Effects of Certain Aerosol Contaminants on Federally Endangered Indiana Bats and Gray Bats at Fort Leonard Wood, Missouri (3D/Env., 1996c).

Order	Family	Terrestrial (T)or Aquatic (A)
Lepidoptera (Moths)	Arctiidae	T
	Blastobasidae	T
	Gelechiidae	T
	Geometridae	T
	Limacodidae	T
	Noctuidae	T
	Oecophoridae	T
	Pyralidae	T
Coleoptera (Beetles)	Anthicidae	T
	Carabidae	T
	Chrysomnelidae	T
	Coccinelidae	T
	Colydiidae	T
	Curculionidae	T
	Elmidae	A
	Gyrinidae	A
	Heteroceridae	T
	Hydrophilidae	A
	Pselaphidae	T
	Scarabidae	T
	Silphidae	T
	Staphilinidae	T
Trichoptera (Caddisflies)	Hydropsychidae	A
	Hydroptillidae	A
	Leptoceridae	A
	Limnephilidae	A
	Odontoceridae	A
	Philopotamidae	A
	Phryganeidae	A
	Psychomyiidae	A
	Sericostomatidae	A
Homoptera (Hoppers)	Achilidae	T
	Aphididae	T
	Ceropidae	T
	Cicadellidae	T
	Cixiidae	T
	Delphacidae	T
	Derbidae	T
	Flatidae	T
	Psyllidae	T

Table F.5 List of Insects Known to Occur at Fort Leonard Wood.

Order	Family	Terrestrial (T)or Aquatic (A)
Hemiptera (Bugs)	Alydidae	T
	Lygaeidae	T
	Miridae	T
	Reduviidae	T
	Tingidae	T
Ephemeroptera (Mayflies)	Baetidae	A
	Caenidae	A
	Ephemerellidae	A
Neuroptera (Lacewings, Dustywings, Mantidflies)	Chrysopidae	T
	Coniopterygidae	T
	Hemerobiidae	T
	Mantispidae	T
Diptera (Flies)	Acroceridae	T
	Agromyzidae	T
	Anthomyiidae	T
	Bibionidae	T
	Calliphoridae	T
	Ceratopagonidae	A
	Chaoboridae	A
	Chironomidae	A
	Chloropidae	T
	Clusiidae	T
	Culicidae	A
	Dolichopodidae	A
	Drosophilidae	T
	Empididae	T
	Ephydridae	A
	Lauxaniidae	T
	Lonchaeidae	T
	Milichiidae	T
	Muscidae	T
	Mycetophilidae	T
	Otitidae	T
	Phoridae	T
	Ptychopteridae	T
	Scatopsidae	T
	Sciaridae	T
	Sciomyzidae	A
	Simuliidae	A

Table F.5 List of Insects Known to Occur at Fort Leonard Wood.

Order	Family	Terrestrial (T)or Aquatic (A)
Diptera (Flies) (continued)	Sphaeroceridae	T
	Syrphidae	T
	Tabanidae	A
	Tachinidae	T
	Tephritidae	T
	Tipulidae	A
	Trichoceridae	T
Orthoptera (Crickets, Mantids)	Grylidae	T
	Mantidae	T
	Tetrigidae	T
Hymenoptera (Wasps, Ants)	Braconidae	T
	Cynipidae	T
	Dryinidae	T
	Eulophidae	T
	Formicidae	T
	Ichneumonidae	T
Psocoptera (Barklice)	Psocidae	T
Thysanoptera (Thrips)	Thripidae	T
Arachnida (Spiders)	Araneida	T
Total		

Table F.6 Fort Leonard Wood Plant List.
Source: LCTA Data Summary and Analysis Report for Fort Leonard Wood, Missouri 1989-1993 (Proffitt, 1993).

Plant List Key

Code : This is a four letter code with or without a number used by the United State Department of Agriculture (USDA) to identify the plant.

Org : This classifies the plant origin.
N = Native
I = Introduced
* = Unknown

Lfe : This describes the growth habit of the plant.

A = Annual
B = Biennial
P = Perennial
E = Emergent

Frm : This describes the growth form of the plant.

F = Herbaceous
S = Shrub
T = Tree
G = Grasslike
H = Partly woody
W = Woody
$ = Succulent
V = Vine
Z = Submersed
/ = Floating
@ = Tree epiphiyte
+ = parasitic
- = saprophyte
* = unknown

Genus, Species and Subspecies/Variety are the current scientific names listed.

Common Name is the locally known name.

****** For more detailed information please contact the FLW Natural Resource Office at (596 0871) or refer to the plant collection herbarium. ******

Table F.6 Fort Leonard Wood Plant List.

Code.	Org	Lfe	Frm	Family	Genus	Species	Subsp/Var.	Common Name
ACRH	N	A	F	Euphorbiaceae	Acalypha	rhomboidea		three-seeded mercury
ACMI2	N	P	F	Compositae	Achillea	millefolium		western yarrow
ACCA4	N	P	F	Araceae	Acorus	calamus		sweet flag
ADPE	N	P	F	Polypodiaceae	Adiantum	pedatum		maidenhair
AGTE3	*	A	F	Scrophulariaceae	Agalinis	tenuifolia		gerardia
AGNE2	N	P	F	Labiatae	Agastache	nepetoides		yellow giant hyssop
AGALR	N	P	F	Compositae	Ageratina	altissima	roanensis	white snakeroot
AGAL5	N	P	F	Compositae	Ageratina	altissima		Tall joe-pye weed
AGPA6	N	P	F	Rosaceae	Agrimonia	parviflora		many-flowered agrimony
AGRO3	N	P	F	Rosaceae	Agrimonia	rostellata		woodland agrimony
ALPL	*	PE	F	Alismataceae	Alisma	plantago-aquatica		water plantain
ALBI3	N	P	F	Liliaceae	Allium	bivalve		false garlic
ALCA3	N	P	F	Liliaceae	Allium	canadense		wild onion
ALST	N	P	F	Liliaceae	Allium	stellatum		wild onion
AMARE	N	A	F	Compositae	Ambrosia	artemisiifolia	elatior	common ragweed
AMBI2	N	A	F	Compositae	Ambrosia	bidentata		ragweed
AMTR	N	A	F	Compositae	Ambrosia	trifida		
AMIL	N	P	F	Apocynaceae	Amsonia	illustris		bluestar
ANAR	I	A	F	Primulaceae	Anagallis	arvensis		pipernel
ANVI3	N	P	F	Rhanunculaceae	Anemone	virginiana		thimbleweed
ANPL	N	P	F	Compositae	Antennaria	plantaginifolia		pussy toes
APCA	N	P	F	Apocynaceae	Apocynum	cannabinum		hemp dogbane
AQCAL	N	P	F	Rhanunculaceae	Aquilegia	canadensis	latiuscula	columbine
ARLY2	N	B	F	Cruciferae	Arabis	lyrata		rock cress
ARMI5	N	P	F	Cruciferae	Arabis	missouriensis		rock cress
ARLE3	I	A	F	Caryophyllaceae	Arenaria	leptoclados		thyme-leaved sandwort
ARSE2	I	A	F	Caryophyllaceae	Arenaria	serpyllifolia		thyme-leaved sandwort
ARDR3	N	P	F	Araceae	Arisaema	dracontium		green dragon
ARTR	N	P	F	Araceae	Arisaema	triphyllum		indian turnip
ARAT	*	*	F	Compositae	Arnoglossum	atriplicifolium		indian plantain
ASCAA	N	P	F	Aristolochiaceae	Asarum	canadense	acuminatum	wild ginger
ASHI	N	P	F	Asclepiadaceae	Asclepias	hirtella		prairie milkweed
ASIN	N	PE	F	Asclepiadaceae	Asclepias	incarnata		swamp milkweed
ASST	N	P	F	Asclepiadaceae	Asclepias	stenophylla		narrow-leaf milkweed
ASSY	N	P	F	Asclepiadaceae	Asclepias	syracia		common milkweed
ASTUI	N	P	F	Asclepiadaceae	Asclepias	tuberosa	interior	butterfly milkweed
ASVI	N	P	F	Asclepiadaceae	Asclepias	viridiflora		green milkweed
ASPL	N	P	F	Polypodiaceae	Asplenium	platyneuron		ebony spleenwort
ASRH2	*	*	F	Polypodiaceae	Asplenium	rhizopyllum		walking fern
ASAN	N	P	F	Compositae	Aster	anomalus		many-ray aster
ASDR	N	P	F	Compositae	Aster	drummondii		Drummonds aster
ASLA6	N	P	F	Compositae	Aster	lateriflorus		white woodland aster
ASLI2	N	P	F	Compositae	Aster	linariifolius		stiff-leaf aster
ASMO	N	P	F	Compositae	Aster	novae-angliae		New England aster
ASOB2	N	P	F	Compositae	Aster	oblongifolius		oblong-leaf aster
ASPAP	*	*	F	Compositae	Aster	patens	patentissimus	spreading aster
ASPID3	N	P	F	Compositae	Aster	pilosus	demotus	white heath aster
ASPI2	N	P	F	Compositae	Aster	pilosus		white heath aster

Table F.6 Fort Leonard Wood Plant List.

Code	Org	Lfe	Frm	Family	Genus	Species	Subsp/Var.	Common Name
ASTU2	N	P	F	Compositae	Aster	turbinellus		prairie aster
ASCRT	N	P	F	Leguminosae	Astragalus	crassicarpus	trichocalyx	ground plum
AUGRC	N	P	F	Scrophulariaceae	Aureolaria	grandiflora	cinerea	false foxglove
AUPE	N	A	F	Scrophulariaceae	Aureolaria	pectinata		
BABRG	N	P	F	Leguminosae	Baptisia	bracteata	glabrescens	plains wild indigo
BALA2	N	P	F	Leguminosae	Baptisia	lactea		white wild indigo
BAVU	I	B	F	Cruciferae	Barbarea	vulgaris		yellow rocket
BECH	N	P	F	Iridaceae	Belamcanda	chinensis		blackberry lily
BETE2	N	HP	F	Compositae	Berlandiera	texana		green eyes
BIPO	N	AB	F	Compositae	Bidens	polylepis		tickseed sunflower
BLCI	N	P	F	Labiatae	Blephilia	ciliata		Ohio horsemint
BLHI	N	P	F	Labiatae	Blephilia	hirsuta		wood mint
BOCY	N	P	F	Urticaceae	Boehmeria	cylindrica		false nettle
BOBI	N	P	F	Ophioglossaceae	Botrychium	virginianum		rattlesnake fern
BREU	*	*	F	Compositae	Brickellia	eupatorioides		false boneset
CASC5	N	P	F	Liliaceae	Camassia	scilloides		wild hyacinth
CAAM6	N	A	F	Campanulaceae	Campanula	americana		tall bellflower
CABU2	I	A	F	Cruciferae	Capsella	bursa-pastoris		shepherd's purse
CABU3	N	P	F	Cruciferae	Cardamine	bulbosa		spring cress
CACO26	N	P	F	Cruciferae	Cardamine	concatenata		toothwort
CAAL11	N	P	F	Cyperaceae	Carex	albursina		
CAAR5	N	P	F	Cyperaceae	Carex	arkansana		
CABU5	N	P	F	Cyperaceae	Carex	bushii		
CACA15	N	P	F	Cyperaceae	Carex	caroliniana		
CACE	N	P	F	Cyperaceae	Carex	cephalophora		
CACO9	N	P	F	Cyperaceae	Carex	complanata		
CAEB2	N	P	F	Cyperaceae	Carex	eburnea		
CAFE3	N	P	F	Cyperaceae	Carex	festucacea		
CAFL9	N	P	F	Cyperaceae	Carex	flaccidula		
CAFR	N	PE	F	Cyperaceae	Carex	frankii		
CAGR3	N	P	F	Cyperaceae	Carex	granularis		
CALE6	N	P	F	Cyperaceae	Carex	leavenworthii		
CAME2	N	P	F	Cyperaceae	Carex	meadii		
CAMU4	N	P	F	Cyperaceae	Carex	muhlenbergii		
CAMUE	N	P	F	Cyperaceae	Carex	muhlenbergii	enervis	
CANO	N	P	F	Cyperaceae	Carex	normalis		
CARE3	N	P	F	Cyperaceae	Carex	retroflexa		
CASH2	N	P	F	Cyperaceae	Carex	shortiana		
CATE3	N	P	F	Cyperaceae	Carex	tenera		
CATR7	N	P	F	Cyperaceae	Carex	tribuloides		
CAFA	N	A	F	Leguminosae	Cassia	fasciculata		partridge pea
CAMA15	N	P	F	Leguminosae	Cassia	marilandica		wild senna
CANI4	N	A	F	Leguminosae	Cassia	nictitans		sensitive pea
CACO17	N	A	F	Scrophulariaceae	Castillega	coccinea		indian paintbrush
CEVI3	I	A	F	Caryophyllaceae	Cerastium	viscosum		clammy chickweed
CHFE	N	P	F	Polypodiaceae	Cheilanthes	feei		Fee's lip-fern
CHLA2	N	P	F	Polypodiaceae	Cheilanthes	lanosa		hairy lip-fern
CIIN	I	PB	F	Compositae	Cichorium	intybus		chicory

Table F.6 Fort Leonard Wood Plant List.

Code	Org	Lfe	Frm	Family	Genus	Species	Subsp/Var.	Common Name
CIMA2	N	PBE	F	Umbelliferae	Cicuta	maculata		spotted cowbane
CILU	N	P	F	Onagraceae	Circaea	lutetiana		enchanter's nightshade
CIAL2	N	B	F	Compositae	Cirsium	altissimum		tall thistle
CLVI3	N	P	F	Portulaceae	Claytonia	virginica		spring beauty
COUM	N	P	F	Santalaceae	Comandra	umbellata		bastard toadflax
COERA	N	P	F	Commelinaceae	Commelina	erecta	angustifolia	day-flower
COCO13	N	P	F	Compositae	Conoclinium	coelestinum		mist-flower
COCA5	N	A	F	Compositae	Conyza	canadensis		horse weed
COOD	N	P	F	Orchidaceae	Corallorhiza	odontorhiza		late coral root
COPA10	N	P	F	Compositae	Coreopsis	palmata		finger coreopsis
COPU2	N	P	F	Compositae	Coreopsis	pubescens		star tickseed
COTR4	N	P	F	Compositae	Coreopsis	tripteris		tall tickseed
COVA2	I	P	F	Leguminosae	Coronilla	varia		crown vetch
CRGLS	N	A	F	Euphorbiaceae	Croton	glandulosus	septentrionalis	tropic croton
CRMO6	N	A	F	Euphorbiaceae	Croton	monanthogynus		one-seeded croton
CREL2	N	A	F	Euphorbiaceae	Crotonopsis	elliptica		rush-foil
CRCA9	N	P	F	Umbelliferae	Cryptotaenia	canadensis		honewort
CUOR	N	*	F	Labiatae	Cunila	origanoides		stone mint
CUVI	N	A	F	Lythraceae	Cuphea	viscosissima		blue waxweed
CUGL3	N	P	F	Convolvulaceae	Cuscuta	glomerata		dodder
CYAC2	N	ABP	F	Cyperaceae	Cyperus	acuminatus		
CYES	N	P	F	Cyperaceae	Cyperus	esculentus		yellow nut grass
CYST	N	PE	F	Cyperaceae	Cyperus	strigosus		
CYBU3	N	P	F	Polypodiaceae	Cystopteris	bulbifera		bulblet fern
CYPR4	*	*	F	Polypodiaceae	Cystopteris	protrusa		fragile fern
DAPU5	N	P	F	Leguminosae	Dalea	purpurea		purple prairie clover
DACA6	I	B	F	Umbelliferae	Daucus	carota		wild carrot
DECA3	N	P	F	Rhanunculaceae	Delphinium	carolinianum		Carolia larkspur
DECA7	N	P	F	Leguminosae	Desmodium	canadense		Canada tickclover
DECI	N	P	F	Leguminosae	Desmodium	ciliare		slender tickclover
DECU	N	P	F	Leguminosae	Desmodium	cuspidatum		long-leaved tickclover
DEGL5	N	P	F	Leguminosae	Desmodium	glutinosum		large-flower tickclover
DENU4	N	P	F	Leguminosae	Desmodium	nudiflorum		scapose tickclover
DEPA6	N	P	F	Leguminosae	Desmodium	paniculatum		panicled tickclover
DERI3	N	P	F	Leguminosae	Desmodium	rigidum		tick trefoil
DERO3	N	P	F	Leguminosae	Desmodium	rotundiflorum		dollarleaf
DESE	N	P	F	Leguminosae	Desmodium	sessilifolium		sessil-leaved tickclover
DIAR	I	BA	F	Caryophyllaceae	Dianthus	armeria		Deptford pink
DITE2	N	AP	F	Rubiaceae	Diodia	teres		rough buttonweed
DOME	N	P	F	Primulaceae	Dodecatheon	meadia		shooting star
DRBR	N	A	F	Cruciferae	Draba	brachycarpa		whitlow grass
DRVE2	I	A	F	Cruciferae	Draba	verna		vernal whitlow grass
ECPU	N	P	F	Compositae	Echinacea	purpurea		purple coneflower
ECVU	I	BP	F	Boraginaceae	Echium	vulgare		blue-weed
ELOB2	N	APE	F	Cyperaceae	Eleocharis	obtusa		
ELPA3	N	PE	F	Cyperaceae	Eleocharis	palustris		
ELTEV	N	P	F	Cyperaceae	Eleocharis	tenuis	verrucosa	
ELCA3	N	P	F	Compositae	Elephanopus	carolinianus		elephant's foot

Table F.6 Fort Leonard Wood Plant List.

Code	Org	Lfe	Frm	Family	Genus	Species	Subsp/Var.	Common Name
EQAR	N	P	F	Equisetaceae	Equisetum	arvense		common horsetail
ERHI2	N	A	F	Compositae	Erechtites	hieraciifolia		fireweed
ERAN	N	A	F	Compositae	Erigeron	annuus		daisy fleabane
ERPU	N	P	F	Compositae	Erigeron	pulchellus		robin's plantain
ERST3	N	A	F	Compositae	Erigeron	strigosus		daisy fleabane
ERYU	N	P	F	Umbelliferae	Eryngium	yuccifolium		rattlesnake-master
ERAL9	N	P	F	Liliaceae	Erythronium	albidum		prairie dog-tooth violet
EUPU8	N	*	F	Compositae	Eupatoriadelphus	purpureus		Joe-pye weed
EUPE3	N	P	F	Compositae	Eupatorium	perfoliatum		boneset
EUSE2	N	P	F	Compositae	Eupatorium	serotinum		late boneset
EUCO10	N	P	F	Euphorbiaceae	Euphorbia	corollata		flowering spurge
EUDE4	N	A	F	Euphorbiaceae	Euphorbia	dentata		toothed spurge
EUMA7	N	A	F	Euphorbiaceae	Euphorbia	maculata		spotted spurge
EUNU	I	A	F	Euphorbiaceae	Euphorbia	nutans		nodding spurge
FIAU2	N	A	F	Cyperaceae	Fimbristylis	autumnalis		
FICA3	N	P	F	Cyperaceae	Fimbristylis	caroliniana		
FRVI	N	P	F	Rosaceae	Fragaria	virginiana		wild strawberry
FRGR3	N	A	F	Amaranthaceae	Froelichia	gracilis		cottonweed
GAAP2	N	A	F	Rubiaceae	Galium	aparine		bedstraw
GACA3	N	P	F	Rubiaceae	Galium	concinnum		bedstraw
GAPI2	N	P	F	Rubiaceae	Galium	pilosum		hairy bedstraw
GABI2	N	B	F	Onagraceae	Gaura	biennis		biennial gaura
GEPU5	*	P	F	Gentianaceae	Gentiana	puberulenta		downy gentian
GEMA	N	P	F	Geraniaceae	Geranium	maculatum		wild geranium
GECA7	N	P	F	Rosaceae	Geum	canadense		white avens
GNOB	N	AB	F	Compositae	Gnaphalium	obtusifolium		sweet everlasting
HEPU	N	A	F	Labiatae	Hedeoma	pulegioides		pennyroyal
HEAU	N	P	F	Compositae	Helenium	autumnale		sneezeweed
HEFL	N	P	F	Compositae	Helenium	flexuosum		sneezeweed
HEAN2	N	P	F	Compositae	Helianthus	angustifolius		
HEHI2	N	P	F	Compositae	Helianthus	hirsutus		hairy sunflower
HELA	N	P	F	Compositae	Helianthus	laetiflorus		prairie sunflower
HEMO2	N	P	F	Compositae	Helianthus	mollis		ashy sunflower
HEOC2	N	P	F	Compositae	Helianthus	occidentalis		
HERI2	N	P	F	Compositae	Helianthus	rigidus		stiff sunflower
HEST	N	P	F	Compositae	Helianthus	strumosus		
HETU	N	P	F	Compositae	Helianthus	tuberosus		Jerusalem artichoke
HEHES	N	P	F	Compositae	Heliopsis	helianthoides	scabra	rough ox-eye
HETE3	N	A	F	Boraginaceae	Heliotropium	tenellum		heliotrope
HEFU	I	P	F	Liliaceae	Hemerocallis	fulva		orange day lily
HIMOL	N	PAE	F	Malvaceae	Hibiscus	moscheutos	lasiocarpos	rose mallow
HIGRF	N	P	F	Compositae	Hieracium	gronivii	foliosum	hawkweed
HILO2	N	P	F	Compositae	Hieracium	longipilum		long-beard hawkweed
HOLO	N	P	F	Rubiaceae	Houstonia	longifolia		slender-leaved bluets
HONI	N	P	F	Rubiaceae	Houstonia	nigricans		narrow-leaved bluets
HYAP	N	B	F	Hydrophyllaceae	Hydrophyllum	appediculatum		woolen breeches
HYGE	N	A	F	Guttiferae	Hypericum	gentianoides		pine-weed
HYPE	I	P	F	Guttiferae	Hypericum	perforatum		St. John's wort

Table F.6 Fort Leonard Wood Plant List.

Code	Org	Lfe	Frm	Family	Genus	Species	Subsp/Var.	Common Name
HYPU	N	P	F	Guttiferae	Hypericum	punctatum		spotted St. John's wort
HYHI2	N	P	F	Amaryllidaceae	Hypoxis	hirsuta		yellow star grass
IMCA	N	A	F	Balsaminaceae	Impatiens	capensis		spotted touch-me-not
IMPA	N	A	F	Balsaminaceae	Impatiens	pallida		pale touch-me-not
IRRH	N	P	F	Amaranthaceae	Iresine	rhizomatosa		bloodleaf
JUAC	*	P	F	Juncaceae	Juncus	acuminatus		knotty-leaved rush
JUBR	N	P	F	Juncaceae	Juncus	brachycarpus		
JUIN2	N	P	F	Juncaceae	Juncus	interior		
JUTO	N	P	F	Juncaceae	Juncus	torreyi		
JUAM	N	PE	F	Acanthaceae	Justicia	americana		water willow
KIBI	N	P	F	Compositae	Krigia	biflora		
LACA	N	BA	F	Compositae	Lactuca	canadensis		wild lettuce
LAFL	N	BA	F	Compositae	Lactuca	floridana		Florida lettuce
LASA	I	B	F	Compositae	Lactuca	saligna		willow leaved lettuce
LASEI	I	AB	F	Compositae	Lactuca	serriola	integrata	prickly lettuce
LAPU2	I	A	F	Labiatae	Lamium	purpureum		dead nettle
LACA3	N	P	F	Urticaceae	Laportea	canadensis		wood nettle
LETE	N	P	F	Cistaceae	Lechea	tenuifolia		pinweed
LIVI3	N	AB	F	Cruciferae	Lepidium	virginicum		pepper grass
LECA8	I	P	F	Leguminosae	Lespedeza	capitata		round-head lespedeza
LECU	I	P	F	Leguminosae	Lespedeza	cuneata		sericea lespedeza
LEHI2	N	P	F	Leguminosae	Lespedeza	hirta		hairy lespedeza
LEPR	N	P	F	Leguminosae	Lespedeza	procumbens		trailing lespedeza
LERE2	N	P	F	Leguminosae	Lespedeza	repens		creeping lespedeza
LEST3	I	A	F	Leguminosae	Lespedeza	stipulacea		Korean lespedeza
LEVI7	N	P	F	Leguminosae	Lespedeza	virginica		slender bush lespedeza
LEVU	I	P	F	Compositae	Leucanthemum	vulgare		ox-eye daisy
LEMU	N	A	F	Scrophulariaceae	Leucospora	multifida		leucospora
LIAS	N	P	F	Compositae	Liatris	aspera		gay-feather
LICY	N	P	F	Compositae	Liatris	cylindracea		gay-feather
LISQ	N	P	F	Compositae	LIATRIS	squarrosa		gay-feather
LIMET	N	PA	F	Linaceae	Linum	medium	texanum	sucker flax
LICA12	N	P	F	Boraginaceae	Lithospermum	canescens		hoary puccoon
LOCA2	N	P	F	Campanulaceae	Lobelia	cardinalis		cardinal-flower
LOIN	N	A	F	Campanulaceae	Lobelia	inflata		Indian tobacco
LOSI	N	P	F	Campanulaceae	Lobelia	siphilitica		blue cardinal flower
LOSP	N	P	F	Campanulaceae	Lobelia	spicata		palespike lobelia
LUBU	N	P	F	Juncaceae	Luzula	bulbosa		wood rush
LYAM	N	P	F	Labiatae	Lycopus	americanus		American bugle weed
LYLA	N	P	F	Primulaceae	Lysimachia	lanceolata		loosestrife
LYAL4	N	*	F	Lythraceae	Lythrum	alatum		winged loostrife
MANE	I	ABP	F	Malvaceae	Malva	neglecta		common mallow
MAVI5	N	P	F	Amaryllidaceae	Manfreda	virginica		false aloe
MEAL2	I	AB	F	Leguminosae	Melilotus	alba		white sweet clover
MEOF	I	AB	F	Leguminosae	Melilotus	officinalis		yellow sweet clover
MEOL	N	P	F	Loasaceae	Mentzelia	oligosperma		stick-leaf mentzelia
MEVI3	N	P	F	Boraginaceae	Mertensia	virginica		bluebells
MIAL2	N	P	F	Scrophulariaceae	Mimulus	alatus		monkey flower

Table F.6 Fort Leonard Wood Plant List.

Code	Org	Lfe	Frm	Family	Genus	Species	Subsp/Var.	Common Name
MIRI	N	P	F	Scrophulariaceae	Mimulus	ringens		monkey flower
MIPA6	N	A	F	Caryophyllaceae	Minuartia	patula		sandwort
MILI3	N	P	F	Nyctaginaceae	Mirabilis	linearis		narrow-leaved four-o'clock
MINY	N	P	F	Nyctaginaceae	Mirabilis	nyctaginea		wild four-o'clock
MOFIM2	N	P	F	Labiatae	Monarda	fistulosa	mollis	wild bergamot
MOUN3	N	P	F	Pyrolaceae	Monotropa	uniflora		Indian pipe
MYVE	I	A	F	Boraginaceae	Myosotis	verna		scorpion grass
NYLUM	N	PE	F	Nymphaeaceae	Nuphar	luteum	macrophyllum	yellow pond lily
OEBI	I	B	F	Onagraceae	Oenothera	biennis		evening primrose
OELI	N	A	F	Onagraceae	Oenothera	linifolia		sundrops
OEMA	N	P	F	Onagraceae	Oenothera	macrocarpa		Missouri evening primrose
OEPI2	N	P	F	Onagraceae	Oenothera	pilosella		sundrops
OSCL	N	P	F	Umbelliferae	Osmorhiza	claytonii		sweet cicely
OSLO	N	P	F	Umbelliferae	Osmorhiza	longistylis		anise root
OXCO	I	P	F	Oxalidaceae	Oxalis	corniculata		creeping lady's sorrel
OXDI2	N	P	F	Oxalidaceae	Oxalis	dellenii		yellow wood sorrel
OXVI	N	P	F	Oxalidaceae	Oxalis	violacea		violet wood sorrel
PACA11	N	A	F	Caryophyllaceae	Paronychia	canadensis		forked chickweed
PAINH2	N	P	F	Compositae	Parthenium	integrifolium	hispidum	
PECA	N	P	F	Scrophulariaceae	Pedicularis	canadensis		wood betany
PEAT2	N	P	F	Polypodiaceae	Pellaea	atropurpurea		purple cliff-brake
PEGL	N	P	F	Polypodiaceae	Pelleae	glabella		smooth cliff-brake
PEDI	N	P	F	Scrophulariaceae	Penstemon	digitalis		smooth penstemon
PEPA7	N	P	F	Scrophulariaceae	Penstemon	pallidus		pale penstemon
PETU	N	P	F	Scrophulariaceae	Penstemon	tubiflorus		tube penstemon
PESE6	N	P	F	Crassulaceae	Penthorum	sedoides		ditch stonecrop
PEFR4	I	A	F	Labiatae	Perilla	frutescens		beef-steak plant
PHGI	N	A	F	Hydrophyllaceae	Phacelia	gilioides		hairy phacelia
PHDIL4	N	P	F	Polemoniaceae	Phlox	divaricata	laphamii	blue phlox
PHPA9	N	P	F	Polemoniaceae	Phlox	paniculata		perennial phlox
PHPI	N	P	F	Polemoniaceae	Phlox	pilosa		prairie phlox
PHLE5	N	P	F	Phrymaceae	Phryma	leptostachya		lopseed
PHLA3	N	P	F	Verbenaceae	Phyla	lanceolata		fog fruit
PHHE5	N	P	F	Solanaceae	Physalis	heterophylla		clammy ground cherry
PHVI8	N	P	F	Labiatae	Physostegia	virginiana		false dragonhead
PHAM4	N	P	F	Phytolaccaceae	Phytolacca	americana		poke berry
PIPU2	N	A	F	Urticaceae	Pilea	pumila		gray clearweed
PLAR3	N	A	F	Plantaginaceae	Plantago	aristata		buckhorn
PLLA	I	PBA	F	Plantaginaceae	Plantago	lanceolata		English plantain
PLRU	N	P	F	Plantaginaceae	Plantago	rugelii		Rugel plantain
PLVI	N	A	F	Plantaginaceae	Plantago	virginica		hoary plantain
POPE	N	P	F	Berberidaceae	Podophyllum	peltatum		may apple
PORE2	N	P	F	Polemoniaceae	Polemonium	reptans		Jacob's ladder
POSA3	N	A	F	Polygalaceae	Polygala	sanguinea		blood polygala
POBI2	N	P	F	Liliaceae	Polygonatum	biflorum		Solomon's seal
POAM8	N	PE	F	Polygonaceae	Polygonum	amphibium		water smartweed
POAV	I	AP	F	Polygonaceae	Polygonum	aviculare		knotweed
POHY2	N	PE	F	Polygonaceae	Polygonum	hydropiperoides		wild water pepper

Table F.6 Fort Leonard Wood Plant List.

Code	Org	Lfe	Frm	Family	Genus	Species	Subsp/Var.	Common Name
POPE2	N	AE	F	Polygonaceae	Polygonum	pensylvanicum		Pennsylvania smartweed
POPE3	I	A	F	Polygonaceae	Polygonum	persicaria		lady's thumb
POVI2	N	AP	F	Polygonaceae	Polygonum	virginianum		virginia knotweed
POCA11	N	P	F	Compositae	Polymnia	canadensis		leaf-cup
POAC4	N	P	F	Polypodiaceae	Polystichum	acrostichoides		Christmas fern
PONU4	N	P	F	Umbelliferae	Polytainia	nuttallii		prairie parsley
POST5	N	P	F	Rosaceae	Porteranthus	stipulatus		indian physic
POAM5	N	P	F	Potamogetonaceae	Potamogeton	amplifolius		
PONO2	N	P	F	Potamogetonaceae	Potamogeton	nodosus		
PORE5	I	P	F	Rosaceae	Potentilla	recta		rough-fruited cinquefoil
POSI2	N	P	F	Rosaceae	Potentilla	simplex		cinquefoil
PRALC	N	P	F	Compositae	Prenanthes	altissima	cinnamomea	white lettuce
PRVU	I	P	F	Labiatae	Prunella	vulgaris		self-heal
PSPSE	N	P	F	Leguminosae	Psoralea	psoralioides	eglandulosa	Sampson's snakeroot
PYAL	N	P	F	Labiatae	Pycnanthemum	albescens		
PYPI	N	P	F	Labiatae	Pycnanthemum	pilosum		hairy mountain mint
PYTE	N	P	F	Labiatae	Pycnanthemum	tenuifolium		slender mountain mint
PYCA2	N	AB	F	Compositae	Pyrrhopappus	carolinianus		false dandelion
RAHA	N	P	F	Rhanunculaceae	Ranunculus	harveyi		Harvey's buttercup
RASE	N	P	F	Rhanunculaceae	Ranunculus	septentrionalis		swamp buttercup
RAPI	N	P	F	Compositae	Ratibida	pinnata		gray-head coneflower
RORA	N	AE	F	Lythraceae	Rotala	ramosior		tooth-cup
RUFU2	N	P	F	Compositae	Rudbeckia	fulgida		coneflower
RUHI2	N	P	F	Compositae	Rudbeckia	hirta		black-eyed susan
RULA3	N	P	F	Compositae	Rudbeckia	laciniata		golden glow
RUMI	N	P	F	Compositae	Rudbeckia	missouriensis		
RUSU	N	P	F	Compositae	Rudbeckia	subtomentosa		sweet coneflower
RUTR2	N	P	F	Compositae	Rudbeckia	triloba		brown-eyed susan
RUHU	N	P	F	Acanthaceae	Ruellia	humilis		wild petunia
RUST2	N	P	F	Acanthaceae	Ruellia	strepens		wild petunia
RUAC3	I	P	F	Polygonaceae	Rumex	acetosella		red sorrell
RUCR	I	P	F	Polygonaceae	Rumex	crispus		sour dock
SAAN	N	A	F	Gentianaceae	Sabatia	angularis		rose pink
SALA2	N	PE	F	Alismataceae	Sagittaria	latifolia		duck potato
SACA13	N	P	F	Papaveraceae	Sanguinaria	canadensis		bloodroot
SACA15	N	B	F	Umbelliferae	Sanicula	canadensis		black snakeroot
SAOF4	I	P	F	Caryophyllaceae	Saponaria	officinalis		bouncing bet
SCAM2	N	PE	F	Cyperaceae	Scirpus	americanus		chairmaker's rush
SCAT2	N	PE	F	Cyperaceae	Scirpus	atrovirens		common bulrush
SCVA	N	PE	F	Cyperaceae	Scirpus	validus		great bulrush
SCMA2	N	P	F	Scrophulariaceae	Scrophularia	marilandica		figwort
SCEL	N	P	F	Labiatae	Scutellaria	elliptica		
SCIN	N	P	F	Labiatae	Scutellaria	incana		hoary skullcap
SCLA2	N	P	F	Labiatae	Scutellaria	lateriflora		blue skullcap
SEAU2	N	P	F	Compositae	Senecio	aureus		golden ragwort
SEPL	N	BP	F	Compositae	Senecio	plattensis		prairie groundsel
SIVI2	N	A	F	Cruciferae	Sibara	virginica		
SICA6	N	P	F	Caryophyllaceae	Silene	caroliniana	wherryi	wild pink

Table F.6 Fort Leonard Wood Plant List.

Code	Org	Lfe	Frm	Family	Genus	Species	Subsp/Var.	Common Name
SIST	N	P	F	Caryophyllaceae	Silene	stellata		starry campion
SIVI4	*	P	F	Caryophyllaceae	Silene	virginica		fire pink
SIAS2	N	P	F	Compositae	Silphium	asteriscus		starry rosin-weed
SIIN2	N	P	F	Compositae	Silphium	integrifolium		rosin-weed
SILA3	N	P	F	Compositae	Silphium	laciniatum		compass plant
SITE	N	P	F	Compositae	Silphium	terebinthinaceum		prairie dock
SICA9	N	P	F	Iridaceae	Sisyrinchium	campestre		prairie blue-eyed grass
SOAM	N	A	F	Solanaceae	Solanum	americanum		black nightshade
SOCA3	N	P	F	Solanaceae	Solanum	carolinense		Carolina horse nettle
SOAL4	N	P	F	Compositae	Solidago	altissima		tall goldenrod
SOCAG	N	P	F	Compositae	Solidago	canadensis	gilvocanescens	Canada goldenrod
SODR	N	P	F	Compositae	Solidago	drummondii		
SOGIS	N	P	F	Compositae	Solidago	gigantea	serotina	late goldenrod
SOHI	N	P	F	Compositae	Solidago	hispida		
SOMIF	N	P	F	Compositae	Solidago	missouriensis	fasciculata	Missouri goldenrod
SONE	N	P	F	Compositae	Solidago	nemoralis		old-field goldenrod
SOPE	N	P	F	Compositae	Solidago	petiolaris		downy goldenrod
SOPT4	*	P	F	Compositae	Solidago	ptarmicoides		white upland aster
SORA	N	P	F	Compositae	Solidago	radula		rough goldenrod
SORI2	N	P	F	Compositae	Solidago	rigida		stiff goldenrod
SOUL2	N	P	F	Compositae	Solidago	ulmifolia		elm-leaf goldenrod
SPAN	N	PE	F	Sparganiaceae	Sparganium	androcladum		bur-reed
SPLA4	N	P	F	Orchidaceae	Spiranthes	lacera		slender ladies tresses
SPOD	N	P	F	Orchidaceae	Spiranthes	odorata		common ladies tresses
SPPO	N	P	F	Lemnaceae	Spirodela	polyrhiza		duckweed
STTE	N	P	F	Labiatae	Stachys	tenuifolia		slender-leaf betony
STBI2	N	P	F	Leguminosae	Stylosanthes	biflora		pencil flower
TAOF	I	P	F	Compositae	Taraxacum	officinale		common dandelion
TEVI	N	P	F	Leguminosae	Tephrosia	virginiana		goat's rue
TECA3	N	PE	F	Labiatae	Teucrium	canadense		wood sage
THTH2	N	P	F	Rhanunculaceae	Thalictrum	thalictroides		rue anemone
THPE	I	A	F	Cruciferae	Thlaspi	perfoliatum		perfoliate penny cress
TOJA	I	A	F	Umbelliferae	Torilis	japonica		hedge parsley
TROH	N	P	F	Commelinaceae	Tradescantia	ohiensis		spiderwort
TRDU	I	BA	F	Compositae	Tragopogon	dubius		goat's beard
TRBR5	I	A	F	Labiatae	Trichostema	brachiatum		false pennyroyal
TRDI2	N	A	F	Labiatae	Trichostema	dichotomum		blue curls
TRCA5	I	AB	F	Leguminosae	Trifolium	campestre		large hop clover
TRPR2	I	PB	F	Leguminosae	Trifolium	pratense		red clover
TRRE3	I	P	F	Leguminosae	Trifolium	repens		white clover
TRSE2	N	P	F	Liliaceae	Trillium	sessile		wake robin
TRPE4	N	A	F	Campanulaceae	Triodanis	perfoliata		clasping venus lookingglass
GRPE5	N	P	F	Caprifoliaceae	Triosteum	perfoliatum		horse gentian
TYFO	N	PE	F	Typhaceae	Typha	domingensis		
TYLA	N	PE	F	Typhaceae	Typha	latifolia		cat-tail
UVGR	N	P	F	Liliaceae	Uvularia	grandiflora		bellwort
VARA	N	B	F	Valerianaceae	Valerianella	radiata		
VEBL	I	B	F	Scrophulariaceae	Verbascum	blattaria		moth mullein

Table F.6 Fort Leonard Wood Plant List.

Code	Org	Lfe	Frm	Family	Genus	Species	Subsp/Var.	Common Name
VETH	I	B	F	Scrophulariaceae	Verbascum	thapsus		common mullein
VECA4	N	P	F	Verbenaceae	Verbena	canadensis		rose verbena
VESI	N	P	F	Verbenaceae	Verbena	simplex		narrow-leaved vervain
VEST	N	PA	F	Verbenaceae	Verbena	stricta		hoary vervain
VEUR	N	PA	F	Verbenaceae	Verbena	urticifolia		white vervain
VEAL	N	P	F	Compositae	Verbesina	alternifolia		yellow ironweed
VEHE	N	P	F	Compositae	Verbesina	helianthoides		wingstem
VEVI3	N	P	F	Compositae	Verbesina	virginica		frostweed
VEAR3	N	P	F	Compositae	Vernonia	arkansana		ironweed
VEBA	N	P	F	Compositae	Vernonia	baldwinii		Baldwin's ironweed
VEGI	N	P	F	Compositae	Vernonia	gigantea		ironweed
VEAR	I	A	F	Scrophulariaceae	Veronica	arvensis		corn speedwell
VEVI4	N	P	F	Scrophulariaceae	Veronicastrum	virginicum		culver's root
VIBI	N	A	F	Violaceae	Viola	bicolor		wild pansy
VIPA5	N	P	F	Violaceae	Viola	papilionacea		meadow violet
VIPE	*	*	F	Violaceae	Viola	pedata		pansy violet
VIPE4	N	P	F	Violaceae	Viola	pensylvanica		smooth yellow violet
VISO	N	P	F	Violaceae	Viola	sororia		wolly blue violet
VIST3	N	P	F	Violaceae	Viola	striata		pale violet
VITR2	N	P	F	Violaceae	Viola	triloba		three-lobed violet
WOOB2	N	P	F	Polypodiaceae	Woodsia	obtusa		blunt-lobed woodsia
XASTG	N	A	F	Compositae	Xanthium	strumarium	glabratum	sleep daisy
ZIAU	N	P	F	Umbelliferae	Zizia	aurea		golden alexanders
ZODU	N	PA	F	Pontederiaceae	Zosterella	dubia		water stargrass
HYSP2	N	P	FH	Guttiferae	Hypericum	sphaerocarpum		roundfruit St. John's wort
AMBR2	N	PA	FV	Leguminosae	Amphicarpaea	bracteata		hog peanut
APAM	N	P	FV	Leguminosae	Apios	americana		groundnut
CASE13	I	P	FV	Convolvulaceae	Calystegia	sepium		hedge bindweed
CUPO	N	P	FV	Convolvulaceae	Cuscuta	polygonorum		smartweed dodder
LALA4	I	P	FV	Leguminosae	Lathyrus	latifolius		everlasting pea
TRUR2	N	P	FV	Euphorbiaceae	Tragia	urticifolia		nose-burn
IPLA	N	A	VF	Convolvulaceae	Ipomoea	lacunosa		small white morning glory
PALU2	N	P	VF	Passifloraceae	Passiflora	lutea	glabriflora	passion flower
STLE6	N	A	VF	Leguminosae	Strophostyles	leiosperma		slick-seed bean
STUM2	N	P	VF	Leguminosae	Strophostyles	umbellata		wild bean
AGAL3	I	P	G	Gramineae	Agrostis	alba		redtop
AGHY	N	P	G	Gramineae	Agrostis	hyemalis		bent grass
ANGE	N	P	G	Gramineae	Andropogon	gerardii		big bluestem
ANVI2	N	P	G	Gramineae	Andropogon	virginicus		broomsedge bluestem
BOCU	N	P	G	Gramineae	Bouteloua	curtipendula		side-oats grama
BRER2	N	P	G	Gramineae	Brachyelytrum	erectum		
BRJA	I	A	G	Gramineae	Bromus	japonicus		Japanese brome
BRPU4	N	P	G	Gramineae	Bromus	purgans		
BRRA2	I	A	G	Gramineae	Bromus	racemosus		hairy brome
BRTE	I	A	G	Gramineae	Bromus	tectorum		downy brome
CELO3	N	A	G	Gramineae	Cenchrus	longispinus		sandbur
CHLA5	N	P	G	Gramineae	Chasmanthium	latifolium		wild oats
CIAR2	N	P	G	Gramineae	Cinna	arundinacea		woodreed grass

Table F.6 Fort Leonard Wood Plant List.

Code	Org	Lfe	Frm	Family	Genus	Species	Subsp/Var.	Common Name
DAGL	I	P	G	Gramineae	Dactylis	glomerata		orchard grass
DASP2	N	P	G	Gramineae	Danthonia	spicata		poverty grass
DIAC2	*	*	G	Gramineae	Dichanthelium	acuminatum		
DIBO2	*	*	G	Gramineae	Dichanthelium	boscii		
DICL	*	*	G	Gramineae	Dichanthelium	clandestinum		
DIDE4	*	*	G	Gramineae	Dichanthelium	depauperatum		
DIDI6	*	*	G	Gramineae	Dichanthelium	dichotomum		
DILI2	*	*	G	Gramineae	Dichanthelium	linearifolium		
DIOLS	N	P	G	Gramineae	Dichanthelium	oligosanthes	scribnerianum	Scribner's panicum
DIIS	I	A	G	Gramineae	Digitaria	ischaemum		crab grass
ECCR	I	A	G	Gramineae	Echinochloa	crusgalli		barnyard grass
ELIN3	I	A	G	Gramineae	Eleusine	indica		goose grass
ELCA4	N	P	G	Gramineae	Elymus	canadensis		Canada wild rye
ELVI	N	P	G	Gramineae	Elymus	villosus		hairy wild rye
ELVI3	N	P	G	Gramineae	Elymus	virginicus	jejunus	Virginia wild rye
ERCI	I	A	G	Gramineae	Eragrostis	cilianensis		stink grass
ERPE	N	A	G	Gramineae	Eragrostis	pectinacea		Carolina lovegrass
ERPI2	I	A	G	Gramineae	Eragrostis	pilosa		India lovegrass
ERSP	N	P	G	Gramineae	Eragrostis	spectabilis		purple lovegrass
FEAR3	I	P	G	Gramineae	Festuca	arundinacea		tall fescue
FEOB	N	P	G	Gramineae	Festuca	obtusa		nodding fescue
FEPR	*	P	G	Gramineae	Festuca	pratensis		meadow fescue
GLST	N	PE	G	Gramineae	Glyceria	striata		fowl meadow grass
HOPU	N	A	G	Gramineae	Hordeum	pusillum		little barley
HYPA3	N	P	G	Gramineae	Hystrix	patula		bottle-brush
MENI	N	P	G	Gramineae	Melica	nitens		melic grass
MUSO	N	P	G	Gramineae	Muhlenbergia	sobolifera		rock muhly
PAAN	N	P	G	Gramineae	Panicum	anceps		beaked panicum
PAIR4	N	A	G	Gramineae	Panicum	rigidulum		redtop panicum
PAVI2	N	P	G	Gramineae	Panicum	virgatum		switchgrass
PAPUG	N	P	G	Gramineae	Paspalum	pubiflorum	glabrum	
PASET2	N	P	G	Gramineae	Paspalum	setaceum	ciliatifolium	
PHPR3	I	P	G	GRAMINEAE	Phleum	pratense		timothy grass
POPR	N	P	G	Gramineae	Poa	pratensis		Kentucky bluegrass
SCSC	N	P	G	Gramineae	Schizachyrium	scoparium		little bluestem
SEGE	N	P	G	Gramineae	Setaria	geniculata		prairie foxtail
SEGL2	I	A	G	Gramineae	Setaria	glauca		yellow foxtail
SEVI4	I	A	G	Gramineae	Setaria	viridis		green foxtail
SONU2	N	P	G	Gramineae	Sorghastrum	nutans		Indiangrass
SOHA	I	P	G	Gramineae	Sorghum	halepense		Johnsongrass
SPPE	N	P	G	Gramineae	Spartina	pectinata		Prairie cordgrass
SPOB	N	PA	G	Gramineae	Spenopholis	obtusata		wedgegrass
SPCL	N	P	G	Gramineae	Sporobolus	clandestinus		rough dropseed
TRFL2	N	P	G	Gramineae	Tridens	flavus		purple top
VUMY	I	A	G	Gramineae	Vulpia	myuros		
VUOC	N	A	G	Gramineae	Vulpia	octoflora		six-weeks fescue
AMCA6	N	P	S	Leguminosae	Amorpha	canescens		lead-plant
ASHY	N	P	S	Guttiferae	Ascyrum	hypericoides		St. Andrew's cross

Table F.6 Fort Leonard Wood Plant List.

Code	Org	Lfe	Frm	Family	Genus	Species	Subsp/Var.	Common Name
ASHYN	N	P	S	Guttiferae	Ascyrum	hypericoides	multicaule	St. Andrew's cross
ASTR	N	T	S	Annonaceae	Asimina	triloba		pawpaw
BETH	I	P	S	Berberidaceae	Berberis	thunbergii		Japanese barberry
COAMO	N	P	S	Cornaceae	Cornus	amomum	obliqua	pale dogwood
COFOR	N	P	S	Cornaceae	Cornus	foemina	racemosa	gray dogwood
COAM3	N	P	S	Betulaceae	Corylus	americana		hazelnut
CYOB2	*	P	S	Rosaceae	Cydonia	oblonga		flowering quince
ELUM	I	P	S	Elaeagnaceae	Eleagnus	umbellata		
EUOB2	N	P	S	Celastraceae	Euonymus	obovatus		running strawberry bush
HAVE2	N	P	S	Hamamelidaceae	Hamamelis	vernalis		witch hazel
HYAR	N	*	S	Saxifragaceae	Hydrangea	arborescens	discolor	wild hydrangea
HYPR	N	P	S	Guttiferae	Hypericum	prolificum		shrubby St. John's wort
LISI	I	P	S	Oleaceae	Ligustrum	sinense		
LIVU	I	P	S	Oleaceae	Ligustrum	vulgare		common privet
PHOPI	N	P	S	Rosaceae	Physocarpus	opulifolius	intermedius	ninebark
QUPR	N	P	S	Fagaceae	Quercus	prinoides		chinquapin oak
RHAR4	N	P	S	Anacardiaceae	Rhus	aromatica		aromatic sumac
RIMI	N	P	S	Saxifragaceae	Ribes	missouriense		wild gooseberry
ROAR3	N	P	S	Rosaceae	Rosa	arkansana		Arkansa wild rose
ROCA4	N	?	S	Rosaceae	Rosa	carolina		pasture rose
ROMU	I	P	S	Rosaceae	Rosa	multiflora		Japanese rose
ROSET	I	P	S	Rosaceae	Rosa	setigera	tomentosa	prairie rose
RUFL	N	P	S	Rosaceae	Rubus	flagellaris		northern dewberry
RUTR	N	P	S	Rosaceae	Rubus	trivialis		southern dewberry
SAEX	N	P	S	Salicaceae	Salix	exigua	interior	sandbar willow
SAHU2	N	P	S	Salicaceae	Salix	humilis		upland willow
SACA12	N	P	S	Caprifoliaceae	Sambucus	canadensis		common elderberry
SYOR	N	P	S	Caprifoliaceae	Symphoricarpos	orbiculatus		buckbrush
VAVA	N	P	S	Ericaceae	Vaccinium	vacillans		blueberry->
VIRE7	N	*	S	Caprifoliaceae	Viburnum	recognitum		arrow-wood
VIRU	I	*	S	Caprifoliaceae	Viburnum	rufidulum		southern black haw
YUFI	N	*	S	Liliaceae	Yucca	filamentosa		yucca
CEAMP	N	P	SH	Rhamnaceae	Ceanothus	americanus	pitcheri	New Jersey tea
ALSE2	N	P	ST	Betulaceae	Alnus	serrulata		common alder
AMAR3	N	P	ST	Rosaceae	Amelanchier	arborea		shadbush
BULA	N	P	ST	Sapotaceae	Bumelia	lanuginosa		chittim-wood
CEOC	N	P	ST	Ulmaceae	Celtis	occidentalis		hackberry
CETE	N	P	ST	Ulmaceae	Celtis	tenuifolia		dwarf hackberry
CEOC2	N	P	ST	Rubiaceae	Cephalanthus	occidentalis		buttonbush
COOR	N	P	ST	Cornaceae	Cornus	drummondii		rough-leaved dogwood
CRCR2	N	P	ST	Rosaceae	Crataegus	crus-galli		cockspur thorn
ELAN	I	P	ST	Elaeagnaceae	Elaeagnus	agustifolia		Russian olive
EUAT	N	P	ST	Celastraceae	Euonymus	atropupureus		burning bush, wahoo
LIBE3	N	P	ST	Lauraceae	Lindera	benzoin		spice bush
PRAM	N	P	ST	Rosaceae	Prunus	americana		wild plum
PRAN3	N	P	ST	Rosaceae	Prunus	angustifolia		chickasaw plum
PRMU	N	P	ST	Rosaceae	Prunus	munsoniana		wild goose plum
PTTR	N	P	ST	Rutaceae	Ptelea	trifoliata		hop-tree

Table F.6 Fort Leonard Wood Plant List.

Code	Org	Lfe	Frm	Family	Genus	Species	Subsp/Var.	Common Name
RHCA2	N	P	ST	Rhamnaceae	Rhamnus	caroliniana		Carolina buckthorn
RHCO	N	P	ST	Anacardiaceae	Rhus	copallina		dwarf sumac
RHGL	N	P	ST	Anacardiaceae	Rhus	glabra		smooth sumac
STTR	N	P	ST	Staphylaceae	Staphylea	trifolia		bladder-nut
VAAR	N	P	ST	Ericaceae	Vaccinium	arboreum		farkleberry
ACSAO	N	P	TS	Aceraceae	Acer	saccharum	ozarkense	sugar maple
CECA4	N	P	TS	Leguminosae	Cercis	canadensis		redbud
GLTR	N	P	TS	Leguminosae	Gleditsia	triacanthos		honey locust
MAIO	N	P	TS	Rosaceae	Malus	ioensis		wild crab
QUMA2	N	P	TS	Fagaceae	Quercus	macrocarpa		bur oak
ULPU	I	P	TS	Ulmaceae	Ulmus	pumila		Siberian elm
CESC	N	P	SWV	Celastraceae	Celastrus	scandens		bittersweet
ACNE2	N	P	T	Aceraceae	Acer	negundo		box elder
ACRU	N	P	T	Aceraceae	Acer	rubrum		red maple
ACSA2	N	P	T	Aceraceae	Acer	saccharinum		silver maple
ACSA3	N	P	T	Aceraceae	Acer	saccharum		sugar maple
ACSAF	N	P	T	Aceraceae	Acer	saccharum	floridanum	southern sugar maple
AEGL	N	P	T	Hippocastanaceae	Aesculus	glabra		Ohio buckeye
BENI	N	P	T	Betulaceae	Betula	nigra		river birch
BRPA4	I	P	T	Moraceae	Broussonetia	papyrifera		paper mulberry
CACA18	N	P	T	Betulaceae	Carpinus	caroliniana		hornbeam, blue beech
CACO15	N	P	T	Juglandaceae	Carya	cordiformis		bitternut hickory
CAIL2	N	P	T	Juglandaceae	Carya	illinoensis		pecan
CAOV3	N	P	T	Juglandaceae	Carya	ovalis		pignut, false shagbark
CATE9	N	P	T	Juglandaceae	Carya	texana		black hickory
CATO6	N	P	T	Juglandaceae	Carya	tomentosa		mockernut hickory
CASP8	N	P	T	Bignoniaceae	Catalpa	speciosa		catalpa
CELA	N	P	T	Ulmaceae	Celtis	laevigata		sugarberry
COFL2	N	P	T	Cornaceae	Cornus	florida		flowering dogwood
DIVI5	N	P	T	Ebenaceae	Diospyros	virginiana		persimmon
*	*	*	T	Celastraceae	Euonymus	japonicus		
FRAM2	N	P	T	Oleaceae	Fraxinus	americana		white ash
FRPE	N	P	T	Oleaceae	Fraxinus	pennsylvanica		green ash
FRQU	N	P	T	Oleaceae	Fraxinus	quadrangulata		blue ash
GYDI	N	P	T	Leguminosae	Gymnocladus	dioicus		Kentucky coffee tree
JUCI	N	P	T	Juglandaceae	Juglans	cinerea		butternut
JUNI	N	P	T	Juglandaceae	Juglans	nigra		black walnut
JUVI	N	P	T	Pinaceae	Juniperus	virginiana		red cedar
KOPA	I	P	T	Sapindaceae	Koelreuteria	paniculata		golden raintree
LIST2	N	P	T	Hamamelidaceae	Liquidambar	styraciflua		
MAPU	I	P	T	Rosaceae	Malus	pumila		apple tree
MOAL	I	P	T	Moraceae	Morus	alba		white mulberry
MORU2	N	P	T	Moraceae	Morus	rubra		red mulberry
NYSY	N	P	T	Cornaceae	Nyssa	sylvatica		black gum
OSVI	N	P	T	Betulaceae	Ostrya	virginiana		hop hornbeam
PIBA2	N	P	T	Pinaceae	Pinus	banksiana		jack pine
PIEC2	N	P	T	Pinaceae	Pinus	echinata		yellow pine
PISY	I	P	T	Pinaceae	Pinus	sylvestris		Scotch pine

Table F.6 Fort Leonard Wood Plant List.

Code	Org	Lfe	Frm	Family	Genus	Species	Subsp/Var.	Common Name
PIVI2	N	P	T	Pinaceae	Pinus	virginiana		scrub pine
PLOC	N	P	T	Plantanaceace	Platanus	occidentalis		sycamore
POAL7	I	P	T	Salicaceae	Populus	alba		white poplar
PODE3	N	P	T	Salicaceae	Populus	deltoides		cottonwood
PRCE	I	P	T	Rosaceae	Prunus	cerasus		sour cherry
PRME	N	P	T	Rosaceae	Prunus	mexicana		big tree plum
PRSE2	N	P	T	Rosaceae	Prunus	serotina		wild cherry
QUAL	N	P	T	Fagaceae	Quercus	alba		white oak
QUBI	N	P	T	Fagaceae	Quercus	bicolor		swamp white oak
QUCO2	N	P	T	Fagaceae	Quercus	coccinea		scarlet Oak
QUMA2	N	P	T	Fagaceae	Quercus	macrocarpa		bur Oak
QUIM	N	P	T	Fagaceae	Quercus	imbricaria		shingle oak
QUMA3	N	P	T	Fagaceae	Quercus	marilandica		black jack oak
QUMU	N	P	T	Fagaceae	Quercus	muhlenbergii		chestnut oak
QUPA2	N	P	T	Fagaceae	Quercus	palustris		pin oak
QURU	N	P	T	Fagaceae	Quercus	rubra		red oak
QUSH	N	P	T	Fagaceae	Quercus	shumardii		shumard oak
QUST	N	P	T	Fagaceae	Quercus	stellata		post oak
QUVE	N	P	T	Fagaceae	Quercus	velutina		black oak
ROPS	N	P	T	Leguminosae	Robinia	pseudoacacia		black locust
SABA2	I	P	T	Salicaceae	Salix	babylonica		weeping willow
SACA5	N	P	T	Salicaceae	Salix	caroliniana		Carolina willow
SANI	N	P	T	Salicaceae	Salix	nigra		black willow
SAAL5	N	P	T	Lauraceae	Sassafras	albidum		sassafras
TADI2	N	*	T	Pinaceae	Taxodium	distichum		bald cypress
TIAM	N	P	T	Tiliaceae	Tilia	americana		basswood
ULAM	N	P	T	Ulmaceae	Ulmus	americana		American elm, white elm
ULRU	N	P	T	Ulmaceae	Ulmus	rubra		red elm
CUCU2	N	P	V	Convolvulaceae	Cuscuta	cuspidata		cusp dodder
DIVI4	N	P	V	Dioscoreaceae	Dioscorea	villosa		wild yam
ECLO	N	A	V	Cucurbitaceae	Echinocystis	lobata		wild cucumber vine
GAVO	N	P	V	Leguminosae	Galactia	volubilis		milk pea
IPHE	I	A	V	Convolvulaceae	Ipomoea	hederacea		blue morning glory
MADE3	N	P	V	Asclepiadaceae	Matelea	decipiens		climbing milkweed
MECA3	N	W	V	Menispermaceae	Menispermum	canadense		moonseed
PAQU2	N	W	V	Vitaceae	Parthenocissus	quinquefolia		virginia creeper
POSC3	N	P	V	Polygonaceae	Polygonum	scandens		false buckwheat
VIAE	N	W	V	Vitaceae	Vitis	aestivalis		summer grape
VICCI2	N	W	V	Vitaceae	Vitis	cinerea		grayback grape
VIRI	N	W	V	Vitaceae	Vitis	riparia		riverbank grape
VIVU	N	W	V	Vitaceae	Vitis	vulpina		winter grape
AMCO2	N	W	VS	Vitaceae	Ampelopsis	cordata		raccoon grape
SMHI	N	W	VS	Liliaceae	Smilax	hispida		bristly greenbriar
ARTO3	N	P	WV	Aristolochiaceae	Aristolochia	tomentosa		pipe vine
CARA2	N	P	WV	Bignoniaceae	Campsis	radicans		trumpet creeper
LOFL	N	P	WV	Caprifoliaceae	Lonicera	flava		yellow honeysuckle
TORA2	N	P	WV	Anacardiaceae	Toxicodendron	radicans		poison ivy
VIMI2	I	P	WV	Apocynaceae	Vinca	minor		common periwinkle

Table F.6 Fort Leonard Wood Plant List.

Code	Org	Lfc	Frm	Family	Genus	Species	Subsp/Var.	Common Name
NAOF	I	P	ZEF	Cruciferae	Nasturtium	officinale		water cress
BRSC	N	P	ZF	Nymphaeaceae	Brasenia	schreberi		water shield
CEDE4	N	P	ZF	Ceratophyllaceae	Ceratophyllum	demersum		coontail
ELCA7	N	P	ZF	Hydrocharitaceae	Elodea	canadensis		waterweed
POFO3	N	P	ZF	Potamogetonaceae	Potamogeton	foliosus		

Table F.7 Neotropical Migrant Birds Known to Occur at Fort Leonard Wood.
Source: Land Condition - Trend Analysis (LCTA) Data Summary and Analysis Report for Fort Leonard Wood, Missouri 1989-1993 (Proffitt, 1993); The 1993 Annual Report of the Monitoring Avian Productivity and Survivorship (MAPS) Program on Three Military Installations in the Midwest: Ft. Leavenworth, Ft. Riley, and Ft. Leonard Wood (DeSante, 1994); and The 1994 Annual Report of the Monitoring Avian Productivity Installations in the Midwest: Ft. Riley, Ft. Leavenworth and Sunflower Army Ammunition Plant, Ft. Leonard Wood, Crane Naval Surface Warfare Center, Jefferson Proving Ground, and Ft. Knox (DeSante, 1995).

Species Name	Potential Breeder	Transient Migrant	Specialized Habitats		
			Forest Interior	Riparian/ Bottomland Hardwood	Glades
Acadian flycatcher	X		X	X	
hooded warbler	X		X	X	
Kentucky warbler	X		X	X	
Louisiana waterthrush	X		X	X	
parula warbler	X		X	X	
prothonotary warbler	X		X	X	
American redstart	X		X		
black-and-white warbler	X		X		
blue-gray gnatcatcher	X		X		
common nighthawk	X				X
grasshopper sparrow	X				X
ovenbird	X		X		
red-eyed vireo	X		X		
whippoor-will	X		X		
wood thrush	X		X		
worm-eating warbler	X		X		
barn swallow	X				
blue-winged warbler	X				
catbird	X				
chipping sparrow	X				
chuck-will's-widow	X				
cliff swallow	X				
eastern kingbird	X				
eastern wood-pewee	X				
great-crested flycatcher	X				
house wren	X				
indigo bunting	X				
lark sparrow	X				
least flycatcher	X				
northern oriole	X				
orchard oriole	X				
prairie warbler	X				
purple martin	X				

Species Name	Potential Breeder	Transient Migrant	Specialized Habitats		
			Forest Interior	Riparian/ Bottomland Hardwood	Glades
rough-winged swallow	X				
ruby-throated hummingbird	X				
summer tanager	X				
warbling vireo	X				
white-eyed vireo	X				
willow flycatcher	X				
yellow-billed cuckoo	X				
yellow-breasted chat	X				
yellow-throated warbler	X				
yellowthroat	X				
Blackburnian warbler		X	X		
Canada warbler		X	X		
northern waterthrush		X	X		
Swainson's thrush		X	X		
veery		X	X		
yellow-throated vireo		X	X		
yellow warbler		X		X	
alder flycatcher		X			
bay-breasted warbler		X			
black-billed cuckoo		X			
black-throated green warbler		X			
Blackpoll warbler		X			
bobolink		X			
broad-winged hawk		X			
chimney swift		X			
Connecticut warbler		X			
dickissel		X			
golden-winged warbler		X			
gray-cheeked thrush		X			
magnolia warbler		X			
merlin		X			
mourning warbler		X			
Nashville warbler		X			
orange-crowned warbler		X			
palm warbler		X			
rose-breasted grosbeak		X			
scissor-tailed flycatcher		X			
solitary vireo		X			
Tennessee warbler		X			
Wilson's warbler		X			

F.2 SPECIES MENTIONED IN SCOPING OR REVIEW COMMENTS

The species listed in Table F.8 were mentioned in scoping comments or in review comments on the DEIS. Extensive informal and formal consultation has been completed with the Columbia Field Office of the USFWS and the Natural History Division of the MDC. Since it was determined in the initial assessment of potential effects that any impacts are expected to be confined within the FLW boundary, only those species known to occur on FLW were analyzed in Section 5.

Table F.8 Species Mentioned in Scoping or Review Comments

Species	Resolution of Analysis
Cooper's hawk (*Accipiter cooperi*)	1
marsh wren (*Cistothorus palustrus*)	2
sharp-shinned hawk (*Accipiter stratus*)	1
spectacle case (*Cumberlandia monodonta*)	1
Central Missouri cave amphipod (*Allocrangonyx hubrichti*)	1
Salem cave crayfish (*Cambarus hubrichti*)	2
blacknose shiner (*Notropis heterolepia*)	1
bluestripe darter (*Percina cymatotaenia*)	1
Ozark shiner (*Notropis ozarcanus*)	2
plains topminnow (*Fundulus sciadicus*)	1
black bear (*Ursus americanus*)	2
four-toed salamander (*Hermidacryllus scutatum*)	2
American barberry (*Berberis canadensis*)	2
bald grass (*Sporobolus ozarkanus*)	1
barren strawberry (*Wadsteinia fragarioides* spp *fragar*)	2
big-leaved aster (*Aster macrophyllus*)	2
bristly sedge (*Carex comosa*)	2
brown creeper (*Certhia americana*)	1
buffalo clover (*Trifolium reflexum*)	1
celestial lily (*Nemastylis nuttallii*)	1
golden glade-moss (*Rhytidium rogosum*)	2
Goldie's fern (*Dryopteris goldiana*)	2
green adder's mouth (*Malaxis unifolia*)	2
lake cress (*Armoracia lacutris*)	2
little leaved alum root (*Heuchera parviflora* var. *parviflora*)	2
Loesel's twayblade (*Liparis loeselii*)	2
oval ladies' tresses (*Spiranthes ovalis* var. *erostellata*)	2
Ozark spiderwort (*Tradescantia ozarkana*)	2
reed bent grass (*Calamagrostis porteri* spp *insperata*)	2
running buffalo clover (*Trifolium stoloniferum*)	2
sedge (*Carex fissa* var. *fissa*)	2
sedge (*Carex nigromarginata* var. *nigromargi*)	2
shaggy moss (*Rhytidiadelphus triquetrus*)	2
sharp-scaled manna grass (*Glyceria acutiflora*)	2

Table F.8 Species Mentioned in Scoping or Review Comments	
Species	**Resolution of Analysis**
slender pondweed (*Potamogenton pusillus* var. *pusillus*)	2
triangular sedge (*Carex triangularis*)	2
white camas (*Zigadenus elegans*)	2
no common name (*Dicranella rufescens*)	2
1 - analyzed in Section 5 of the EIS 2 - no known occurrences of the species on FLW; not analyzed	

Appendix G
CULTURAL RESOURCE COORDINATION

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APPENDIX G: CULTURAL RESOURCE COORDINATION

Appendix G: Cultural Resource Coordination

G.1 INTRODUCTION

This appendix has been included to provide a copy of correspondence demonstrating compliance with Section 106 of the National Historic Preservation Act of 1966, and its implementing regulation, 36 CFR 800 "Protection of Historic Properties". The following letters have been included to demonstrate FLW's compliance with Section 106 requirements:

- State of Missouri, Department of Natural Resources letter dated May 28, 1993, subject: *Section 106 Cultural Resource Compliance and Programmatic Agreement at Fort Leonard Wood*; and
- State of Missouri, Department of Natural Resources letter dated April 23, 1996, subject: *"No effect" finding for BRAC Facilities from State Historic Preservation Office.*

The letter dated May 28, 1993 documents continuing efforts by FLW to comply with Section 106 and 110 of the National Historic Preservation Act (NHPA) guidelines; Archaeological Resources Protection Act (ARPA); Native American Grave Protection and Repatriation Act of 1990 (NAGPRA); and 36 CFR 79 requirements. Additionally page two the letter states "...The HPP [Historic Preservation Plan] was completed in July of 1992 and has full acceptance by this office..." The letter also documents the practice of completing Phase I and II survey and testing of cultural resources in order to eliminate and avoid future damage to resources by training and construction activities. The completion of Phase I surveys on all proposed training areas should eliminate the potential for any impacts on cultural resources.

The letter dated April 23, 1996 provides State Historic Preservation Officer concurrence that the "...proposed [BRAC facilities] project activities will have `no effect´ on any significant cultural resources."

G.2 SECTION 106 CULTURAL RESOURCE COMPLIANCE AND PROGRAMMATIC AGREEMENT AT FORT LEONARD WOOD

STATE OF MISSOURI

Mel Carnahan, Governor • David A. Shorr, Director

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF STATE PARKS

P.O. Box 176 Jefferson City, MO 65102-0176 (314)751-2479

FAX (314)751-8656

May 25, 1993

Mr. Scott Murrell (ATZT-DEH-EE)
Chief, Environmental Branch
US Army Engineer Center
Fort Leonard Wood, MO. 65473-5000

RE: Cultural Resources Compliance and Programmatic Agreement at Fort Leonard Wood, Missouri

The Missouri State Historic Preservation Office has reviewed the list of cultural resource projects slated for 1383 TRADOC funding in 1993 and beyond. The SHPO has determined that the Army at Fort Leonard Wood, Missouri, is working toward compliance regarding the inventory and protection of cultural resources -- as outlined in Section 106 and 110 of the National Historic Preservation Act (NHPA) -- provided adequate funding for Phase I-II survey and testing of cultural resources and the implementation of the Fort Leonard Wood Historic Preservation Plan in FY 1993 is obtained.

The basis for compliance is threefold:

1. The Army at Fort Leonard has, in the past, conducted destructive training on non-surveyed lands; however, recent Phase I surveys funded by TRADOC, in advance of training, has worked to resolve this problem with adequate funding. A deferment of funds for FY 1993 can reverse this trend, resulting in a continued non-compliance situation; and

2. Since 1991, Fort Leonard Wood has begun a Phase II Testing program to evaluate for National Register significance recorded sites on the installation. The Historic Preservation Manager (HPM) has developed a strategy to sample sites from various parts of the installation addressing the simple fact that, as long as these sites remain in a state of non-evaluation, they are "at risk" and represent non-compliance by the installation with regards to Section 106 and 110 of the NHPA. Site destruction as documented in the past will continue to occur; and

3. The Fort Leonard Wood Historic Preservation Plan (HPP) was written to address basic Section 106 and 110 guidelines, ARPA, NAGPRA and the 36 CFR 79, the curation of federally owned archaeological collections. Standard Operating Procedures outlined in the HPP (1992:83-103) describe how Fort Leonard Wood can comply with Federal and State Preservation Laws, and its implementation will go a long way in meeting compliance.

Since 1982, 18 sites have been destroyed or severely impacted by Army activities, and over 25 sites have been severely impacted by vandalism within the present boundaries of the fort. In 1992-93 our office was notified that two sites, 23PU371 and 23PU356, were severely damaged by training and construction by the Army. Seven sites were damaged by vandalism resulting in an ongoing

Archaeological Resources Protection Act Violation investigation. Without an adequate testing program in place, all sites are at risk and in a continued state of non-compliance.

If adequate funding is not forthcoming for Phase I-II cultural resources, expect enforcement action from the State of Missouri, which is potentially detrimental to the growing mission at Fort Leonard Wood. However, if the post continues to conduct the survey and inventory of its cultural resources as described above the SHPO will consider that the post, as a TRADOC installation, as working towards compliance pursuant to Section 110 (a)(1-4) and Section 106 as governed by 36 CFR 800 of the NHPA.

In a meeting at Fort Leonard Wood in November 1992, your Historic Preservation Manager described the Cultural Resource Management Program in detail. He estimated that over 65 % of the installation has not been surveyed for cultural resources. Archaeological surveys since November have added to the site data base now totalling 300 prehistoric and historic sites. Of these sites over 200 sites (70%) are considered potentially eligible or have not been evaluated for listing in the National Register of Historic Places. This requires Phase II investigation.

Since 1991, in consultation with the Missouri State Historic Preservation Office, the Environmental Division's Historic Preservation Manager has developed a Phase I survey goal of 5,000 acres per year be surveyed for cultural resources at Fort Leonard Wood through the year 2001. The Cultural Resource Management Program also entails the testing of 10-15 sites per year through 1999 for National Register eligibility.

It is the opinion of this office that the proposed budgets from FY 1993-2001 were designed by the Historic Preservation Manager, Environmental Division to alleviate the potential for non-compliance status while protecting cultural resources. Any reduction in funding through this period will seriously impact this strategy and place the installation in a non-compliance posture. And ultimately it will effect the growing mission of a TRADOC installation. I urge you to consider this in not only this years funding but in the next several years.

To ensure that adverse effects are avoided or mitigated with regards to the training mission at Fort Leonard Wood, rather than with respect to a particular project, procedures will be set forth in a Programmatic Agreement written by the HPM (currently in draft form). The Advisory Council for Historic Preservation (ACHP) should be contacted by letter. As you know, the Programmatic Agreement will be the second major agreement of its kind initiated at Fort Leonard Wood. The first, a Memorandum of Agreement between the state, TRADOC, Fort Leonard Wood and the ACHP was completed in 1986; and stipulated that a Historic Preservation Plan for the management of cultural properties be developed and implemented by the Army at the installation. The HPP was completed in July of 1992 and has full acceptance by this office. This document clearly states that Fort Leonard Wood initiate Section 106 and 110 review and procedures.

Again, the Army at Fort Leonard Wood is currently working towards compliance with Section 106 and 110 of the NHPA depending upon adequate funding for Phase I-II survey and testing. While the state recognizes the importance of the continuing and growing mission at the post, unless the Army continues to make measurable annual improvements based on ongoing survey and testing, the SHPO will be forced to take enforcement action. This situation can be avoided in FY 1993 and in the future, if the Army adheres to pertinent sections of the NHPA and funds accordingly.

If you have questions regarding this letter, which I expect you may, please write, or call the Department of Natural Resources' State Historic Preservation Office at 314/751-7958.

Sincerely,

HISTORIC PRESERVATION PROGRAM

Michael S. Weichman
Senior Archaeologist

mc

c Richard Edging, HPM/FLW

G.3 "NO EFFECT" FINDING FOR BRAC FACILITIES FROM STATE HISTORIC PRESERVATION OFFICE

STATE OF MISSOURI
Mel Carnahan Governor • David A. Shorr Director

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF STATE PARKS
P.O. Box 176 Jefferson City, 65102-0176 (573) 751-2479
FAX (573) 751-8656

23 April 1996

Scott Murrell
Chief, Energy, Environment, and
Natural Resources Division, DPW
HQ, USAEC & Fort Leonard Wood
Fort Leonard Wood, Missouri 65473-5000

Re: New Training Facilities (DOD) Fort Leonard Wood, Missouri

Dear Mr. Murrell:

Staff of the Historic Preservation Program, Missouri Department of Natural Resources have reviewed the information submitted with your letter dated 17 April 1996. Based on this information, and conversations between Dr. Richard Edging, post archaeologist, and Judith Deel, Historic Preservation Program, and on the results of cultural resources investigations which have been completed for all of the proposed BRAC facilities, we concur with your recommendation that the proposed project activities will have "no effect" on any significant cultural resources.

If you have any questions, please write or call Judith Deel at 573/751-7862.

Sincerely,

HISTORIC PRESERVATION PROGRAM

Claire F. Blackwell, Director and
Deputy State Historic Preservation Officer

CFB:jd

c Richard Edging
  Emily Brown

Appendix H
FORT LEONARD WOOD EXISTING ENVIRONMENTAL MONITORING

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APPENDIX H: FORT LEONARD WOOD EXISTING ENVIRONMENTAL MONITORING

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Appendix H: Fort Leonard Wood Existing Environmental Monitoring

H.1 INTRODUCTION

This appendix provides a summary of the existing environmental monitoring that occurs at Fort Leonard Wood. Monitoring is conducted in accordance with the following permits and monitoring programs:

- Permit # MO-0029742 Wastewater Plant, which authorizes wastewater discharges from FLW's Wastewater Treatment Plant;
- Permit # MO-0029769 LORA Lagoon, which authorizes the discharge of wastewater from an Army operated wastewater lagoon located at the Lake of the Ozarks recreation area, Linn Creek, Missouri;
- Permit # MO-0029777 LORA Lagoon, which authorizes the discharge of wastewater from an Army operated wastewater lagoon located at the Lake of the Ozarks recreation area, Linn Creek, Missouri;
- Permit # MO-0117251 Storm water, which authorizes the discharge of storm water from 12 outfalls located within Roubidoux Creek (Gasconade Basin) and Big Piney (Big Piney Basin);
- Permit # MO-0058068 Water Plant Industrial, which authorizes wastewater discharges from FLW's Water Treatment Plant (sedimentation basin), Bridge Training Area (settling basin) and Military Training Base (wash rack/oil water separator);
- Hazardous Waste Management Plan, which establishes procedures and policies, and assigns responsibilities associated with the generation, handling, management and disposition of hazardous waste at FLW;
- Permit # 3079500 Water Plant, which authorizes FLW to dispense water to the public from the Water Treatment Plant;
- Permit # 0590-004 Pathological Incinerator, which authorizes the use of the incinerator located at the FLW Army Community Hospital; and
- Miscellaneous Permits.

In preparation for implementing the proposed BRAC related (training and construction) activities FLW pursued modification of the existing storm water permit (Permit # MO-0117251 Storm water) and obtained two new permits.

- Permit # MO-0117251 Storm water, (which as noted above is required to allow for storm water discharges from the entire installation) was modified in April 1995 to take into account the estimated effects of the proposed mission assignments. Modifications made to the permit were intended to take into account any effect the new mission activities might have on storm water discharges. These modifications included increases in the frequency of monitoring, and the addition of monitoring for zinc and lead (which are sometimes present in trace amounts in petroleum product).

- Permit # 0495-013 Chemical Decontamination Training Facility (CDTF), was obtained. The permit allows the construction and operation of a Chemical Decontamination Training Facility and an associated Thermal Treatment Unit (TTU). During the development of this EIS, further review concerning the disposal of decontaminated waste by-products associated with CDTF training resulted in elimination of the on-site TTU from the Army's Proposed Action.

- Permit # 0695-010 Smoke Training was obtained. This permit allow the Army to construct and operate facilities required to support obscurant training operations planned for the installation, including both static and mobile smoke (fog oil) training facilities.

The parameters and frequency at which the monitoring occurs is provided in Table H.1. Table H.2 provides the priority pollutants sampled for bio-sludge. Table H.3 provides the constituents and detection limits of organic and inorganic analyses for water and/or leachate samples, USEPA drinking water maximum contaminant level (MCL), and constituents and detection limits of organic analyses for soil and sediment samples.

Table H.1:

Fort Leonard Wood Existing Monitoring Sites

Parameter	Media	Frequency	Limits	Duration	Location	Miscellaneous
Permit # MO-0029742 Wastewater Plant						
Flow	Water	Weekly	-----	5 years/(19 Dec 00)	Outfall 001	
BOD	Water	Weekly	10 mg/L	5 years/(19 Dec 00)	Outfall 001	
Total Suspended Solids	Water	Weekly	15 mg/L	5 years/(19 Dec 00)	Outfall 001	
pH	Water	Weekly	6.0 - 9.0 mg/L	5 years/(19 Dec 00)	Outfall 001	
Whole Effluent Toxicity	Water	Annual	65% A.E.C.	5 years/(19 Dec 00)	Outfall 001	
Flow	Water	Quarterly	-----	5 years/(19 Dec 00)	Outfall 002 - 007	
BOD	Water	Quarterly	45 mg/L	5 years/(19 Dec 00)	Outfall 002 - 007	
Total Suspended Solids	Water	Quarterly	-----	5 years/(19 Dec 00)	Outfall 002 - 007	
Oil and Grease	Water	Quarterly	15 mg/L	5 years/(19 Dec 00)	Outfall 002 - 007	
pH	Water	Quarterly	6.0 - 9.0 mg/L	5 years/(19 Dec 00)	Outfall 002 - 007	
Total Solids	Sludge	Daily (when applying)	-----	5 years/(19 Dec 00)	Sludge Holding Basin	
Total Arsenic	Sludge	Monthly	75 mg/kg	5 years/(19 Dec 00)	Sludge Holding Basin	
Total Cadmium	Sludge	Monthly	85 mg/kg	5 years/(19 Dec 00)	Sludge Holding Basins	
Total Chromium	Sludge	Monthly	3,000 mg/kg	5 years/(19 Dec 00)	Sludge Holding Basins	
Total Copper	Sludge	Monthly	4,300 mg/kg	5 years/(19 Dec 00)	Sludge Holding Basins	
Total Lead	Sludge	Monthly	840 mg/kg	5 years/(19 Dec 00)	Sludge Holding Basins	
Total Mercury	Sludge	Monthly	57 mg/kg	5 years/(19 Dec 00)	Sludge Holding Basins	
Total Molybdenum	Sludge	Monthly	75 mg/kg	5 years/(19 Dec 00)	Sludge Holding Basins	
Total Nickel	Sludge	Monthly	420 mg/kg	5 years/(19 Dec 00)	Sludge Holding Basins	
Total Selenium	Sludge	Monthly	100 mg/kg	5 years/(19 Dec 00)	Sludge Holding Basins	
Total Zinc	Sludge	Monthly	7,500 mg/kg	5 years/(19 Dec 00)	Sludge Holding Basins	
Total Kjeldahl Nitrogen	Sludge	Monthly	50,000 mg/kg	5 years/(19 Dec 00)	Sludge Holding Basins	
Total Phosphorus as P	Sludge	Monthly	-----	5 years/(19 Dec 00)	Sludge Holding Basins	
Total Potassium as K	Sludge	Monthly	-----	5 years/(19 Dec 00)	Sludge Holding Basins	

Table H.1:
Fort Leonard Wood Existing Monitoring Sites

Parameter	Media	Frequency	Limits	Duration	Location	Miscellaneous
Pathogen	Sludge	Monthly	2 Million cfu/g/tts	5 years/(19 Dec 00)	Sludge Holding Basins	
Vector Reduction	Sludge	Monthly	-----	5 years/(19 Dec 00)	Sludge Holding Basins	
pH	Soil	5 Years	Above 6.0	5 years/(19 Dec 00)	Sites 1 - 17	
Cation Exchange Capacity	Soil	5 Years	-----	5 years/(19 Dec 00)	Sites 1 - 17	
Available Phosphorus	Soil	5 Years	-----	5 years/(19 Dec 00)	Sites 1 - 17	
See Table H.2 Priority Pollutants	Sludge	Annual	-----	5 years/(19 Dec 00)	Sites 1 - 17	
Permit # MO-0029769 LORA Lagoon						
Flow	Water	Monthly	-----	5 years/(11 Dec 99)	Outfall 001	
BOD	Water	Monthly	20 mg/L	5 years/(11 Dec 99)	Outfall 001	
Total Suspended Solids	Water	Monthly	20 mg/L	5 years/(11 Dec 99)	Outfall 001	
pH	Water	Monthly	> 6.0 mg/L	5 years/(11 Dec 99)	Outfall 001	
Fecal Coliform	Water	Monthly	400/100 mL	5 years/(11 Dec 99)	Outfall 001	
Permit # MO-0029777 LORA Lagoon						
Flow	Water	Monthly	-----	5 years/(25 Dec 99)	Outfall 001	
BOD	Water	Monthly	20 mg/L	5 years/(25 Dec 99)	Outfall 001	
Total Suspended Solids	Water	Monthly	20 mg/L	5 years/(25 Dec 99)	Outfall 001	
pH	Water	Monthly	> 6.0 mg/L	5 years/(25 Dec 99)	Outfall 001	
Fecal Coliform	Water	Monthly	400/100 mL	5 years/(25 Dec 99)	Outfall 001	
Permit # MO-0117251 Stormwater						
Flow	Water	Annual	1.5 ml/L/hr	5 years/(16 Feb 00)	Outfall 001	
Settable Solids	Water	Annual	10 mg/L	5 years/(16 Feb 00)	Outfall 001	
Oil/Grease	Water	Annual	15 mg/L	5 years/(16 Feb 00)	Outfall 001	
pH	Water	Annual	-----	5 years/(16 Feb 00)	Outfall 001	
Nitrate	Water	Annual	10 mg/L	5 years/(16 Feb 00)	Outfall 001	
Ammonia / Nitrogen	Water	Annual	5 mg/L	5 years/(16 Feb 00)	Outfall 001	
Lead - Total Recoverable (TR)	Water	Annual	0.020 mg/L	5 years/(16 Feb 00)	Outfall 001	
Iron - (TR)	Water	Annual	1.0 mg/L	5 years/(16 Feb 00)	Outfall 001	
Zinc - (TR)	Water	Annual	0.345 mg/L	5 years/(16 Feb 00)	Outfall 001	
Copper - (TR)	Water	Annual	0.029 mg/L	5 years/(16 Feb 00)	Outfall 001	
Color	Water	Quarterly	-----	5 years/(16 Feb 00)	Outfall 001	

Table H.1:
Fort Leonard Wood Existing Monitoring Sites

Parameter	Media	Frequency	Limits	Duration	Location	Miscellaneous
Flow	Water	Annual	-----	5 years/(16 Feb 00)	Outfalls 002, 004, 005	
Settable Solids	Water	Annual	1.5 ml/L/hr	5 years/(16 Feb 00)	Outfalls 002, 004, 005	
Oil/Grease	Water	Annual	10 mg/L	5 years/(16 Feb 00)	Outfalls 002, 004, 005	
TPH	Water	Annual	15 mg/L	5 years/(16 Feb 00)	Outfalls 002, 004, 005	
pH	Water	Quarterly	-----	5 years/(16 Feb 00)	Outfalls 002, 004, 005	
Color	Water	Quarterly	-----	5 years/(16 Feb 00)	Outfalls 002, 004, 005	
Color	Water	Quarterly	-----	5 years/(16 Feb 00)	Outfall 003	
Flow	Water	Annual	-----	5 years/(16 Feb 00)	Outfall 006 (SW)	
pH	Water	Annual	-----	5 years/(16 Feb 00)	Outfall 006 (SW)	
Oil/Grease	Water	Annual	10 mg/L	5 years/(16 Feb 00)	Outfall 006 (SW)	
TPH	Water	Annual	15 mg/L	5 years/(16 Feb 00)	Outfall 006 (SW)	
Settleable Solids	Water	Annual	1.0 ml/L/hr	5 years/(16 Feb 00)	Outfall 006 (SW)	
Color	Water	Quarterly	-----	5 years/(16 Feb 00)	Outfall 006 (SW)	
Flow	Water	Annual	-----	5 years/(16 Feb 00)	Outfall 006 (DW)	
pH	Water	Annual	-----	5 years/(16 Feb 00)	Outfall 006 (DW)	
TSS	Water	Annual	-----	5 years/(16 Feb 00)	Outfall 006 (DW)	
Color	Water	Quarterly	-----	5 years/(16 Feb 00)	Outfall 006 (DW)	
Flow	Water	Annual	-----	5 years/(16 Feb 00)	Outfall 007 (SW)	
pH	Water	Annual	-----	5 years/(16 Feb 00)	Outfall 007 (SW)	
TSS	Water	Annual	15 mg/L	5 years/(16 Feb 00)	Outfall 007 (SW)	
Color	Water	Quarterly	-----	5 years/(16 Feb 00)	Outfall 007 (SW)	
Flow	Water	Annual	-----	5 years/(16 Feb 00)	Outfall 007 (DW)	
Settable Solids	Water	Annual	0.5 mL/L/hr	5 years/(16 Feb 00)	Outfall 007 (DW)	
pH	Water	Annual	-----	5 years/(16 Feb 00)	Outfall 007 (DW)	
Color	Water	Quarterly	-----	5 years/(16 Feb 00)	Outfall 007 (DW)	
Flow	Water	Quarterly	-----	5 years/(16 Feb 00)	Outfall 008	
Rainfall	Water	Daily	-----	5 years/(16 Feb 00)	Outfall 008	
BTEX	Water	Quarterly	0.75 mg/L	5 years/(16 Feb 00)	Outfall 008	
BOD	Water	Quarterly	45 mg/L	5 years/(16 Feb 00)	Outfall 008	
COD	Water	Quarterly	90 mg/L	5 years/(16 Feb 00)	Outfall 008	
TSS	Water	Quarterly	60 mg/L	5 years/(16 Feb 00)	Outfall 008	
Settleable Solids	Water	Quarterly	1.0 mL/L/hr	5 years/(16 Feb 00)	Outfall 008	
TDS	Water	Quarterly	-----	5 years/(16 Feb 00)	Outfall 008	
Conductivity (Spec.)	Water	Quarterly	-----	5 years/(16 Feb 00)	Outfall 008	

Table H.1:
Fort Leonard Wood Existing Monitoring Sites

Parameter	Media	Frequency	Limits	Duration	Location	Miscellaneous
Chloride plus Sulfates	Water	Quarterly	1,000 mg/L	5 years/(16 Feb 00)	Outfall 008	
Iron, Total Recoverable (TR)	Water	Quarterly	-----	5 years/(16 Feb 00)	Outfall 008	
pH	Water	Quarterly	-----	5 years/(16 Feb 00)	Outfall 008	
Color	Water	Quarterly	-----	5 years/(16 Feb 00)	Outfall 008	
Calcium	Water	Annual	-----	5 years/(16 Feb 00)	Outfall 008	
Fluoride	Water	Annual	-----	5 years/(16 Feb 00)	Outfall 008	
total Hardness	Water	Annual	-----	5 years/(16 Feb 00)	Outfall 008	
Barium - (TR)	Water	Annual	-----	5 years/(16 Feb 00)	Outfall 008	
Boron - (TR)	Water	Annual	-----	5 years/(16 Feb 00)	Outfall 008	
Cadmium - (TR)	Water	Annual	-----	5 years/(16 Feb 00)	Outfall 008	
Chromium - (TR)	Water	Annual	-----	5 years/(16 Feb 00)	Outfall 008	
Cobalt - (TR)	Water	Annual	-----	5 years/(16 Feb 00)	Outfall 008	
Copper - (TR)	Water	Annual	-----	5 years/(16 Feb 00)	Outfall 008	
Sodium - (TR)	Water	Annual	-----	5 years/(16 Feb 00)	Outfall 008	
Ammonia as N	Water	Annual	5.0	5 years/(16 Feb 00)	Outfall 008	
Nitrate & Nitrite as N	Water	Annual	-----	5 years/(16 Feb 00)	Outfall 008	
Phosphorus - (TR)	Water	Annual	-----	5 years/(16 Feb 00)	Outfall 008	
Mercury - (TR)	Water	Annual	-----	5 years/(16 Feb 00)	Outfall 008	
Arsenic - (TR)	Water	Annual	-----	5 years/(16 Feb 00)	Outfall 008	
Lead - (TR)	Water	Annual	-----	5 years/(16 Feb 00)	Outfall 008	
Selenium - (TR)	Water	Annual	-----	5 years/(16 Feb 00)	Outfall 008	
Silver - (TR)	Water	Annual	-----	5 years/(16 Feb 00)	Outfall 008	
Manganese - (TR)	Water	Annual	-----	5 years/(16 Feb 00)	Outfall 008	
Magnesium - (TR)	Water	Annual	-----	5 years/(16 Feb 00)	Outfall 008	
Zinc - (TR)	Water	Annual	-----	5 years/(16 Feb 00)	Outfall 008	
Antimony - (TR)	Water	Annual	-----	5 years/(16 Feb 00)	Outfall 008	
Beryllium - (TR)	Water	Annual	-----	5 years/(16 Feb 00)	Outfall 008	
Nickel - (TR)	Water	Annual	-----	5 years/(16 Feb 00)	Outfall 008	
Sulfate	Water	Annual	-----	5 years/(16 Feb 00)	Outfall 008	
Thallium - (TR)	Water	Annual	-----	5 years/(16 Feb 00)	Outfall 008	
Total Organic Carbon	Water	Annual	-----	5 years/(16 Feb 00)	Outfall 008	
Vanadium - (TR)	Water	Annual	-----	5 years/(16 Feb 00)	Outfall 008	
Oil/Grease	Water	Annual	10 mg/L	5 years/(16 Feb 00)	Outfall 008	
TPH	Water	Annual	15 mg/L	5 years/(16 Feb 00)	Outfall 008	
Flow	Water	Quarterly (Monthly when Training)	-----	5 years/(16 Feb 00)	Outfalls 009, 010, 011, 012	
TPH	Water	Quarterly (Monthly when Training)	15 mg/L	5 years/(16 Feb 00)	Outfalls 009, 010, 011, 012	
Oil/Grease	Water	Quarterly (Monthly when Training)	10 mg/L	5 years/(16 Feb 00)	Outfalls 009, 010, 011, 012	

Table H.1:
Fort Leonard Wood Existing Monitoring Sites

Parameter	Media	Frequency	Limits	Duration	Location	Miscellaneous
pH	Water	Quarterly (Monthly when Training)	-----	5 years/(16 Feb 00)	Outfalls 009, 010, 011, 012	
Color	Water	Quarterly (Monthly when Training)	-----	5 years/(16 Feb 00)	Outfalls 009, 010, 011, 012	
Lead	Water	Quarterly (Monthly when Training)	-----	5 years/(16 Feb 00)	Outfalls 009, 010, 011, 012	
Zinc	Water	Quarterly (Monthly when Training)	-----	5 years/(16 Feb 00)	Outfalls 009, 010, 011, 012	
Permit # MO-0058068 Water Plant Industrial						
Flow	Water	Annual	-----	5 years/(26 Sept 00)	Outfalls 001, 002	
Setteable Solids	Water	Annual	1.0 mL/L/hr	5 years/(26 Sept 00)	Outfalls 001, 002	
pH	Water	Annual	6.0 - 9.0 SU	5 years/(26 Sept 00)	Outfalls 001, 002	
Flow	Water	Annual	-----	5 years/(26 Sept 00)	Outfall 003	
Setteable Solids	Water	Annual	1.0 mL/L/hr	5 years/(26 Sept 00)	Outfall 003	
Oil/Grease	Water	Annual	1.0 mg/L	5 years/(26 Sept 00)	Outfall 003	
Permit # Hazardous Waste Analysis Plan						
Flash Point	Liquid	Annual	-----	Indef.	Bldg 2350	Solvent
TCLP Metals	Liquid	Annual	-----	Indef.	Bldg 2350	Solvent
TCLP Volatiles	Liquid	Annual	-----	Indef.	Bldg 2350	Solvent
Ash	Liquid	As Required	-----	Indef.	Bldg 2350	Solvent
BTU	Liquid	As Required	-----	Indef.	Bldg 2350	Solvent
pH	Liquid	Quarterly	-----	Indef.	Bldg 1000	Photo Lab Wast
Flash Point	Liquid	Quarterly	-----	Indef.	Bldg 1000	Photo Lab Wast
TCLP Metals	Liquid	Quarterly	-----	Indef.	Bldg 1000	Photo Lab Wast
Flash Point	Liquid	Annual	-----	Indef.	Bldg 1000	Photo Lab Wast
TCLP Metals	Liquid	Annual	-----	Indef.	Bldg 1000	Silk Screen
TCLP Volatiles	Liquid	Annual	-----	Indef.	Bldg 1000	Silk Screen
TCLP Semivolatiles	Liquid	Annual	-----	Indef.	Bldg 1000	Silk Screen
TCLP Metals	Sludge	Biannually	-----	Indef.	Bldg 5265	Batt Acid
% Acidity	Sludge	Biannually	-----	Indef.	Bldg 5265	Batt Acid
TCLP Metals	Liquid	Biannually	-----	Indef.	Bldg 5265	Batt Acid
pH	Liquid	Biannually	-----	Indef.	Bldg 5265	Batt Acid
% Acidity	Liquid	Biannually	-----	Indef.	Bldg 5265	Batt Acid
TCLP Metals	Solid	Annual	-----	Indef.	Bldg 5265	Bead Blaster
Flash Point	Semi-Solid	Annual	-----	Indef.	Bldg 5265	Furn Repair
TCLP Metals	Semi-Solid	Annual	-----	Indef.	Bldg 5265	Furn Repair
TCLP Volatiles	Semi-Solid	Annual	-----	Indef.	Bldg 5265	Furn Repair
Volatiles	Semi-Solid	Annual	-----	Indef.	Bldg 5265	Furn Repair
Ash	Semi-Solid	As Required	-----	Indef.	Bldg 5265	Furn Repair

Table H.1:
Fort Leonard Wood Existing Monitoring Sites

Parameter	Media	Frequency	Limits	Duration	Location	Miscellaneous
BTU	Semi-Solid	As Required	-----	Indef.	Bldg 5265	Furn Repair
TPH	Semi-Solid	As Required	-----	Indef.	Bldg 5265	Furn Repair
Flash Point	Sludge	Annual	-----	Indef.	Bldg 5265	Spray Booth
TCLP Metals	Sludge	Annual	-----	Indef.	Bldg 5265	Spray Booth
Volatiles	Sludge	Annual	-----	Indef.	Bldg 5265	Spray Booth
TCLP Volatiles	Sludge	Annual	-----	Indef.	Bldg 5265	Spray Booth
TCLP Semivolatiles	Sludge	Annual	-----	Indef.	Bldg 5265	Spray Booth
Ash	Sludge	As Required	-----	Indef.	Bldg 5265	Spray Booth
BTU	Sludge	As Required	-----	Indef.	Bldg 5265	Spray Booth
TCLP Metals	Liquid	Biannually	-----	Indef.	Bldg 2581	Oil
Flash Point	Liquid	Biannually	-----	Indef.	Bldg 2581	Oil
Total Halogene	Liquid	Biannually	-----	Indef.	Bldg 2581	Oil
pH	Liquid	Quarterly	-----	Indef.	Bldg 310, 2100, 885	Silver
Flash Point	Liquid	Quarterly	-----	Indef.	Bldg 310, 2100, 885	Silver
TCLP Metals	Liquid	Quarterly	-----	Indef.	Bldg 310, 2100, 885	Silver
Total Metals	Sludge	Biannually	-----	Indef.	Bldg 2581	Oil Sludge

Permit # 3079500 Water Plant						
Turbidity	Water	Daily	0.5 NTU	Indef.	Bldg 1601	
Chlorine Residual	Water	Daily	-----	Indef.	Bldg 1601	
Bac-T (28)	Water	Monthly	less than one colony/100 mL	Indef.	Bldg 1601	Throughout Dist. System
Bac-T	Water	Weekly	less than one colony/100 mL	Indef.	Bldg 10222, 10309, 6505, 1420, 5282 (Wells)	
Follows all Primary & Secondary Monitoring Requirements	Water	As Required	-----	Indef.	All Supplies	

Miscellaneous Permits						
TPH, BTEX	Soil	As Needed	-----	-----	-----	Infrequent Sampling Spills, POL
Lead	Solid	As Needed	0.5%	-----	-----	Lead-Base Paint
% Asbestos	Solid	As Needed	1.0%	-----	-----	Asbestos
See Table H.2	Water	As Needed	-----	-----	Landfill #116909	Leachate from Current Landfill
TCLP, Metals, Semi Volatiles	Liquid, Solid	As Needed	-----	-----		New Wastestreams (20 yr)
See Table H.3	Liquid, Solid					Water and/or Leachate Monitoring

Table H.1:

Fort Leonard Wood Existing Monitoring Sites

Parameter	Media	Frequency	Limits	Duration	Location	Miscellaneous
Permit # 0695-010 Smoke Training (Monitoring Plans Are In Draft Form)						
PM10	Air		-----			
Ozone	Air		-----			
Meteorological	Air		-----			
Soil & Vegetation	Soil & Vegetation		-----			
Permit # 0590-004 Pathological Incinerator						
Opacity	Air	Biannually	20%	Indef.	Bldg 311, Hospital	

Table H.2:
Priority Pollutants for Bio-Sludge

Analyte	Detection Limit	Units	Type
Aldrin	100	mg/kg	Organochlorine Pesticides and PCB's
alpha-BHC	100	mg/kg	Organochlorine Pesticides and PCB's
beta-BHC	100	mg/kg	Organochlorine Pesticides and PCB's
delta-BHC	100	mg/kg	Organochlorine Pesticides and PCB's
gamma-BHC (Lindane)	100	mg/kg	Organochlorine Pesticides and PCB's
Chlordane	2000	mg/kg	Organochlorine Pesticides and PCB's
4,4'-DDD	600	mg/kg	Organochlorine Pesticides and PCB's
4,4'-DDE	200	mg/kg	Organochlorine Pesticides and PCB's
4,4'-DDT	600	mg/kg	Organochlorine Pesticides and PCB's
Dieldrin	200	mg/kg	Organochlorine Pesticides and PCB's
Endosulfan I	200	mg/kg	Organochlorine Pesticides and PCB's
Endosulfan II	200	mg/kg	Organochlorine Pesticides and PCB's
Endosulfan sulfate	600	mg/kg	Organochlorine Pesticides and PCB's
Endrin	200	mg/kg	Organochlorine Pesticides and PCB's
Endrin aldehyde	600	mg/kg	Organochlorine Pesticides and PCB's
Heptachlor	100	mg/kg	Organochlorine Pesticides and PCB's
Heptachlor expoxide	100	mg/kg	Organochlorine Pesticides and PCB's
Methoxychlor	2000	mg/kg	Organochlorine Pesticides and PCB's
Toxaphene	8000	mg/kg	Organochlorine Pesticides and PCB's
PCB-1016	2000	mg/kg	Organochlorine Pesticides and PCB's
PCB-1221	8000	mg/kg	Organochlorine Pesticides and PCB's
PCB-1232	2000	mg/kg	Organochlorine Pesticides and PCB's
PCB-1242	2000	mg/kg	Organochlorine Pesticides and PCB's
PCB-1248	2000	mg/kg	Organochlorine Pesticides and PCB's
PCB-1254	2000	mg/kg	Organochlorine Pesticides and PCB's
PCB-1260	2000	mg/kg	Organochlorine Pesticides and PCB's
Acenaphtene	3300	mg/kg	Semi-Volatile Organics
Acenaphthylene	3300	mg/kg	Semi-Volatile Organics
Anthracene	3300	mg/kg	Semi-Volatile Organics
Benzo(a)anthracene	3300	mg/kg	Semi-Volatile Organics
Benzo(b)fluoranthene	3300	mg/kg	Semi-Volatile Organics
Benzo(k)fluoranthene	3300	mg/kg	Semi-Volatile Organics
Benzo(g,h,l)perylene	3300	mg/kg	Semi-Volatile Organics
Benzo(a)pyrene	3300	mg/kg	Semi-Volatile Organics
Benzidine	6600	mg/kg	Semi-Volatile Organics
Bis(2-chloroethoxy)methane	3300	mg/kg	Semi-Volatile Organics
Bis(2-chloroethyl)ether	3300	mg/kg	Semi-Volatile Organics
Bis(2-chloroisopropyl)ether	3300	mg/kg	Semi-Volatile Organics
Bis(2-ethylhexyl)phthalate	3300	mg/kg	Semi-Volatile Organics
4-Bromophenyl phenyl ether	3300	mg/kg	Semi-Volatile Organics
Butyl benzyl phthalate	3300	mg/kg	Semi-Volatile Organics
2-Chloronaphthalene	3300	mg/kg	Semi-Volatile Organics
4-Chloro-3-methylphenol	3300	mg/kg	Semi-Volatile Organics
2-Chlorophenol	3300	mg/kg	Semi-Volatile Organics
4-Chlorophenyl phenyl ether	3300	mg/kg	Semi-Volatile Organics
Chrysene	3300	mg/kg	Semi-Volatile Organics
Dibenz(a,h)anthracene	3300	mg/kg	Semi-Volatile Organics
Di-N-butyl phthalate	3300	mg/kg	Semi-Volatile Organics

Table H.2:
Priority Pollutants for Bio-Sludge

Analyte	Detection Limit	Units	Type
1,3-Dichlorobenzene	3300	mg/kg	Semi-Volatile Organics
1,4-Dichlorobenzene	3300	mg/kg	Semi-Volatile Organics
1,2-Dichlorobenzene	3300	mg/kg	Semi-Volatile Organics
3,3-Dichlorobenzidine	6600	mg/kg	Semi-Volatile Organics
2,4-Dichlorophenol	3300	mg/kg	Semi-Volatile Organics
Diethyl phthalate	3300	mg/kg	Semi-Volatile Organics
2,4-Dimethylphenol	3300	mg/kg	Semi-Volatile Organics
Dimethyl phthalate	3300	mg/kg	Semi-Volatile Organics
4,6-Dinitro-2-methylphenol	16000	mg/kg	Semi-Volatile Organics
2,4-Dinitrophenol	16000	mg/kg	Semi-Volatile Organics
2,4-Dinitrotoluene	3300	mg/kg	Semi-Volatile Organics
2,6-Dinitrotoluene	3300	mg/kg	Semi-Volatile Organics
Di-N-octyl phthalate	3300	mg/kg	Semi-Volatile Organics
Fluoranthene	3300	mg/kg	Semi-Volatile Organics
Fluorene	3300	mg/kg	Semi-Volatile Organics
Hexachlorobenzene	3300	mg/kg	Semi-Volatile Organics
Hexachlorobutadiene	3300	mg/kg	Semi-Volatile Organics
Hexachlorocyclopentadiene	3300	mg/kg	Semi-Volatile Organics
Hexachloroethane	3300	mg/kg	Semi-Volatile Organics
Indeno(1,2,3-cd)pyrene	3300	mg/kg	Semi-Volatile Organics
Naphthalene	3300	mg/kg	Semi-Volatile Organics
Nitrobenzene	3300	mg/kg	Semi-Volatile Organics
2-Nitrophenol	16000	mg/kg	Semi-Volatile Organics
4-Nitrophenol	16000	mg/kg	Semi-Volatile Organics
N-Nitrosodiphenylamine	3300	mg/kg	Semi-Volatile Organics
N-Nitroso-di-N-propylamine	3300	mg/kg	Semi-Volatile Organics
N-Nitrosodimethylamine	16000	mg/kg	Semi-Volatile Organics
Pentachlorophenol	16000	mg/kg	Semi-Volatile Organics
Phenathrene	3300	mg/kg	Semi-Volatile Organics
Phenol	3300	mg/kg	Semi-Volatile Organics
Pyrene	3300	mg/kg	Semi-Volatile Organics
1,2,4-Trichlorobenzene	3300	mg/kg	Semi-Volatile Organics
2,4,6-Trichlorophenol	3300	mg/kg	Semi-Volatile Organics
Acrolein	10.0	mg/kg	Volatile Organics
Acrylonitrile	10.0	mg/kg	Volatile Organics
Benzene	2.0	mg/kg	Volatile Organics
Bromoform	5.0	mg/kg	Volatile Organics
Chlorobenzene	5.0	mg/kg	Volatile Organics
Carbon tetrachloride	5.0	mg/kg	Volatile Organics
Chloroform	5.0	mg/kg	Volatile Organics
Chloroethane	10.0	mg/kg	Volatile Organics
2-Chloroethyl vinyl ether	10.0	mg/kg	Volatile Organics
Dibromochloromethane	5.0	mg/kg	Volatile Organics
1,1-Dichloroethane	5.0	mg/kg	Volatile Organics
1,2-Dichloroethane	5.0	mg/kg	Volatile Organics
1,1-Dichloroethene	5.0	mg/kg	Volatile Organics
trans-1,2-Dichloroethene	5.0	mg/kg	Volatile Organics
1,2-Dichloropropane	5.0	mg/kg	Volatile Organics

Table H.2:
Priority Pollutants for Bio-Sludge

Analyte	Detection Limit	Units	Type
cis-1,3-Dichloropropene	5.0	mg/kg	Volatile Organics
trans-1,3-Dichloropropene	5.0	mg/kg	Volatile Organics
Ethylbenzene	2.0	mg/kg	Volatile Organics
Methylene chloride	5.0	mg/kg	Volatile Organics
1,1,2,2-Tetrachloroethane	5.0	mg/kg	Volatile Organics
Tetrachloroethene	5.0	mg/kg	Volatile Organics
Toluene	2.0	mg/kg	Volatile Organics
1,1,1-Trichloroethane	5.0	mg/kg	Volatile Organics
1,1,2-Trichloroethane	5.0	mg/kg	Volatile Organics
Trichloroethene	5.0	mg/kg	Volatile Organics
Vinyl chloride	10.0	mg/kg	Volatile Organics
Antimony	2.0	mg/kg	Metals
Arsenic	5.0	mg/kg	Metals
Beryllium	2.0	mg/kg	Metals
Cadmium	5.0	mg/kg	Metals
Chromium	1.0	mg/kg	Metals
Copper	5.0	mg/kg	Metals
Lead	0.5	mg/kg	Metals
Mercury	0.02	mg/kg	Metals
Nickel	5.0	mg/kg	Metals
Selenium	5.0	mg/kg	Metals
Silver	5.0	mg/kg	Metals
Thallium	5.0	mg/kg	Metals
Zinc	5.0	mg/kg	Metals
Cyanide	2.0	mg/kg	Metals
% Solids	4.04%		

Table H.3:

Constituents and Detection Limits of Organic and Inorganic Analyses for Water and/or Leachate Samples and U.S. Environmental Protection Agency Drinking Water Maximum Contaminant Level (MCL).
Constituents and Detection Limits of Organic Analyses for Soil and Sediment Samples.

		Water and/or Leachate Samples			Soil & Sediment Samples	
Group or Family	Analyte	MDL	EPA MCL	Units	MDL	Units
Volatile Organic Compounds (total)						
Ethane	Chloroethane	0.200	---	µg/L	10.000	µg/kg
	1,2-Dibromoethane (EDB)	0.200	0.050	µg/L		
	1,1-Dichloroethane	0.200	---	µg/L	5.000	µg/kg
	1,2-Dichloroethane	0.200	5.000	µg/L	5.000	µg/L
	1,1,1-Trichloroethane	0.200	200.000	µg/L	5.000	µg/kg
	1,1,2-Trichloroethane	0.200	5.000	µg/L	5.000	µg/kg
	1,1,1,2-Tetrachloroethane	0.200	---	µg/L		
	1,1,2,2-Tetrachloroethane	0.200	---	µg/L	5.000	µg/kg
	Trichlorotrifluoroethane	0.200	---	µg/L		
Ethene	Vinyl chloride	0.200	2.000	µg/L	10.000	µg/kg
	1,1-Dichloroethene	0.200	7.000	µg/L	5.000	µg/kg
	cis-1,2-Dichloroehene	0.200	70.000	µg/L		
	trans-1,2-Dichloroethene	0.200	100.000	µg/L	5.000	µg/kg
	1,1,2-Trichloroethene	0.200	5.000	µg/L	5.000	µg/kg
	Tetrachloroethene	0.200	5.000	µg/L	5.000	µg/kg
Methane	Bromomethane	0.200	---	µg/L	10.000	µg/kg
	Dibromomethane	0.200	---	µg/L		
	Bromoform	0.200	100.000	µg/L	5.000	µg/kg
	Bromochloromethane	0.200	---	µg/L		
	Dibromochloromethane	0.200	100.000	µg/L	5.000	µg/kg
	Chloromethane	0.200	---	µg/L	10.000	µg/kg
	Dichloromethane	0.200	5.000	µg/L	5.000	µg/kg
	Chloroform	0.200	100.000	µg/L	5.000	µg/kg
	Chlorofluoromethane	0.200	---	µg/L		
	Carbon tetrachloride	0.200	5.000	µg/L	5.000	µg/kg
	Dichlorobromomethane	0.200	100.000	µg/L	5.000	µg/kg
	Dichlorodifluoromethane	0.200	---	µg/L		
	Trichlorofluoromethane	0.200	---	µg/L		
	Methyl iodide	0.200	---	µg/L		
Propane	1,2-Dichloropropane	0.200	5.000	µg/L	5.000	µg/kg
	1,3-Dichloropropane	0.200	5.000	µg/L		
	2,2-Dichloropropane	0.200	---	µg/L		
	1,2,3-Trichloropropane	0.200	---	µg/L		
	1,2-Dibromo-3-chloropropane (DBCP)	0.200	0.200	µg/L		
	1,1-Dichloropropene	0.200	---	µg/L		
	cis-1,3-Dichloropropene	0.200	---	µg/L	5.000	µg/kg
	trans-1,3-Dichloropropene	0.200	---	µg/L	5.000	µg/kg
	Acrylonitrile	20.000	---	µg/L		
	Hexachlorobutadiene	0.200	---	µg/L		
Aromatic Hydrocarbon	Benzene	0.200	5.000	µg/L	5.000	µg/kg
	Chlorobenzene	0.200	100.000	µg/L	5.000	µg/kg
	1,2-Dichlorobenzene	0.200	600.000	µg/L		
	1,3-Dichlorobenzene	0.200	600.000	µg/L		
	1,4-Dichlorobenzene	0.200	75.000	µg/L		
	1,2,3-Trichlorobenzene	0.200	---	µg/L		
	1,2,4-Trichlorobenzene	0.200	70.000	µg/L		
	Bromobenzene	0.200	---	µg/L		
	Ethylbenzene	0.200	70.000	µg/L	5.000	µg/kg
	Isopropylbenzene	0.200	---	µg/L		
	n-Proylbenzene	0.200	---	µg/L		
	Sec-butylbenzene	0.200	---	µg/L		
	tert-butylbenzene	0.200	---	µg/L		
	n-butylbenzene	0.200	---	µg/L		
	1,2,4-Trimethylbenzene	0.200	---	µg/L		
	1,3,5-Trimethylbenzene	0.200	---	µg/L		
	Xylenes, total	0.200	10.000	µg/L	5.000	µg/kg
	Styrene	0.200	100.000	µg/L	5.000	µg/kg
	Toluene	0.200	1.000	µg/L	5.000	µg/kg
	Acetone	5.000	---	µg/L	100.000	µg/kg
	2-Butanone (Methyl ethyl ketone)	20.000	---	µg/L	100.000	µg/kg
	2-Hexanone (Methyl butyl ketone)	20.000	---	µg/L	50.000	µg/kg
	4-Methyl-2-pentanone	20.000	---	µg/L	50.000	µg/kg

Table H.3:
Constituents and Detection Limits of Organic and Inorganic Analyses for Water and/or Leachate Samples and U.S. Environmental Protection Agency Drinking Water Maximum Contaminant Level (MCL).
Constituents and Detection Limits of Organic Analyses for Soil and Sediment Samples.

		Water and/or Leachate Samples			Soil & Sediment Samples	
Group or Family	Analyte	MDL	EPA MCL	Units	MDL	Units
	1,2-Chlorotoluene	0.200	---	µg/L		
	1,4-Chlorotoluene	0.200	---	µg/L		
	p-Isopropyltoluene	0.200	---	µg/L		
	Acrolein	20.000	---	µg/L		
	Carbon Disufide	0.200	---	µg/L	5.000	µg/kg
	Vinyl acetate	0.200	---	µg/L	50.000	µg/kg
	Ethyl ether	0.200	---	µg/L		
Ether	2-Chloroethyl vinyl ether	0.200	---	µg/L	10.000	µg/kg
	Methyl-tertiary-butyl ether (MTBE)	0.200	---	µg/L		
Aldehyde	Naphthalene	0.200	---	µg/L		
Semivolatile Organic Compounds (total)						
Acidic	2-Chlorophenol	5.000	---	µg/L	200.000	µg/kg
	2,4-Dichlorophenol	30.000	---	µg/L	200.000	µg/kg
	2,4-Dimethylphenol	5.000	---	µg/L	200.000	µg/kg
	4,6-Dinitro-ortho-cresol	30.000	---	µg/L	600.000	µg/kg
	2,4-Dinitrophenol	20.000	---	µg/L	600.000	µg/kg
	2-Nitrophenol	5.000	---	µg/L	200.000	µg/kg
	4-Nitrophenol	30.000	---	µg/L	600.000	µg/kg
	Para-chloro-meta cresol	30.000	---	µg/L	600.000	µg/kg
	Pentachlorophenol	30.000	1.000	µg/L	600.000	µg/kg
	Phenol	5.000	---	µg/L	200.000	µg/kg
	2,4,6-Trichlorophenol	20.000	---	µg/L	600.000	µg/kg
Basic and Neutral	Acenaphthene	5.000	---	µg/L	200.000	µg/kg
	Acenaphthylene	5.000	---	µg/L	200.000	µg/kg
	Anthracene	5.000	---	µg/L	200.000	µg/kg
	Benzidine	40.000	---	µg/L	***	µg/kg
	Benzo[a]anthracene	10.000	0.100	µg/L	400.000	µg/kg
	Benzo[a]pyrene	10.000	0.200	µg/L	400.000	µg/kg
	Benzo[b]fluoranthene	10.000	0.200	µg/L	400.000	µg/kg
	Benzo[g,h,i]perylene	10.000	---	µg/L	400.000	µg/kg
	Benzo[k]fluoranthene	10.000	0.200	µg/L	400.000	µg/kg
	bis(2-Chloroethoxy)methane	5.000	---	µg/L	200.000	µg/kg
	bis(2-Chloroethyl)ether	5.000	---	µg/L	200.000	µg/kg
	bis(2-Chloroisopropyl)ether	5.000	---	µg/L	200.000	µg/kg
	bis(2-Ethylhexyl)phthalate	5.000	---	µg/L	200.000	µg/kg
	4-Bromophenyl phenyl ether	5.000	---	µg/L	200.000	µg/kg
	n-Butylbenzyl phthalate	5.000	100.000	µg/L	200.000	µg/kg
	2-Chloronaphthalene	5.000	---	µg/L	200.000	µg/kg
	4-Chlorophenly phenyl ether	5.000	---	µg/L	200.000	µg/kg
	Chrysene	10.000	0.200	µg/L	400.000	µg/kg
	1,2,5,6-Dibenzanthracene	10.000	0.300	µg/L	400.000	µg/kg
	1,2-Dichlorobenzene	5.000	600.000	µg/L	200.000	µg/kg
	1,3-Dichlorobenzene	5.000	600.000	µg/L	200.000	µg/kg
	1,4-Dichlorobenzene	5.000	75.000	µg/L	200.000	µg/kg
	3,3'-Dichlorobenzidine	20.000	---	µg/L	***	µg/kg
	Dietylphthalate	5.000	---	µg/L	200.000	µg/kg
	Dimethylphthalate	5.000	---	µg/L	200.000	µg/kg
	Di-n-butyl phthalate	5.000	---	µg/L	200.000	µg/kg
	2,4-Dinitrotoluene	5.000	---	µg/L	200.000	µg/kg
	2,6-Dinitrotoluene	5.000	---	µg/L	200.000	µg/kg
	Di-n-octyl phthalate	10.000	---	µg/L	400.000	µg/kg
	1,2-Diphenylhydrazine	5.000	---	µg/L	***	µg/kg
	Fluoranthene	5.000	---	µg/L	200.000	µg/kg
	Fluorene	5.000	---	µg/L	200.000	µg/kg
	Hexachlorobenzene	5.000	1.000	µg/L	200.000	µg/kg
	Hexachlorobutadiene	5.000	---	µg/L	200.000	µg/kg
	Hexachlorocyclopentadiene	5.000	50.000	µg/L	200.000	µg/kg
	Indeno[1,2,3-cd]pyrene	10.000	0.400	µg/L	400.000	µg/kg
	Isophorone	5.000	---	µg/L	200.000	µg/kg
	Naphthalene	5.000	---	µg/L	200.000	µg/kg
	Nitrobenzene	5.000	---	µg/L	200.000	µg/kg
	n-Nitrosodimethylamine	5.000	---	µg/L	200.000	µg/kg
	n-Ntrosodi-n-propylamine	5.000	---	µg/L	200.000	µg/kg

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Constituents and Detection Limits of Organic Analyses for Soil and Sediment Samples.

		Water and/or Leachate Samples			Soil & Sediment Samples	
Group or Family	Analyte	MDL	EPA MCL	Units	MDL	Units
	n-Nitrosodiphenylamine	5.000	---	µg/L	200.000	µg/kg
	Phenanthrene	5.000	---	µg/L	200.000	µg/kg
	Pyrene	5.000	---	µg/L	200.000	µg/kg
	1,2,4-Trichlorobenzene	5.000	70.000	µg/L	200.000	µg/kg
Pesticides (dissolved)						
Acetanilide	Alachlor	0.009	2.000	µg/L		
Amide	Napropamide	0.010	---	µg/L		
	Propanil	0.016	---	µg/L		
Benzamide	Pronamide	0.009	---	µg/L		
Benzenamine	Ethalfluralin	0.013	---	µg/L		
Carbamate	Butylate	0.008	---	µg/L		
	Carbaryl	0.046	---	µg/L		
	Carbofuran	0.013	40.000	µg/L		
	EPTC (Eptan)	0.005	---	µg/L		
	Pebulate	0.009	---	µg/L		
	Thiobencarb	0.008	---	µg/L		
Carbothioate	Molinate	0.007	---	µg/L		
Chloractetanilide	Metolachlor	0.009	L	µg/L		
	Propachlor	0.015	---	µg/L		
Cyclohexane	Alpha BHC	0.007	---	µg/L		
	Lindane	0.011	0.200	µg/L		
Dichloroethylene	2,6-Diethylaniline	0.006	---	µg/L		
	P,P' DDE	0.010	---	µg/L		
Dinitroaniline	Pendimethalin	0.018	---	µg/L		
	Trifluralin	0.012	L	µg/L		
Methyluracil	Terbacil	0.030	---	µg/L		
Napthalene	Dieldrin	0.008	---	µg/L		
Organophosphate	Ethoprop	0.012	---	µg/L		
	Malathion	0.010	---	µg/L	0.100	µg/kg
	Methyl Parathion	0.035	---	µg/L	0.100	µg/kg
	Parathion	0.022	---	µg/L	0.100	µg/kg
	Phorate	0.011	---	µg/L		
	Terbufos	0.012	---	µg/L		
Organophosphorus	Disulfoton	0.008	---	µg/L		
	Methyl Azinphos	0.038	---	µg/L		
Phosphonodithioate	Fonofos	0.008	---	µg/L		
	Dimethoate	0.024	---	µg/L		
Phosphorothioate	Chlorpyrifos	0.005	---	µg/L		
	Diazinon	0.008	---	µg/L	0.100	µg/kg
Pyrethroid	Permethrin	0.016	---	µg/L		
Substituted Urea	Linuron	0.039	---	µg/L		
	Tebuthiuron	0.015	---	µg/L		
Sulfite Ester	Propargite	0.006	---	µg/L		
Terepthalate/Dimethyl	DCPA (Dacthal)	0.004	L	µg/L		
Thiocaramate	Triallate	0.008	---	µg/L		
Toluidine	Benfluralin	0.013	---	µg/L		
Triazine	Atrazine	0.017	3.000	µg/L		
	Cyanazine	0.013	---	µg/L		
	Desethyl Atrazine	0.007	---	µg/L		
	Prometon	0.008	L	µg/L		
	Simazine	0.008	4.000	µg/L		
Triazinone	Metribuzin	0.012	L	µg/L		
Organochlorine Compounds (total)						
Pesticides	Aldrin	0.010	---	µg/L	0.100	µg/kg
	Chlordane	0.100	2.000	µg/L	1.000	µg/kg
	DDD	0.010	---	µg/L	0.100	µg/kg
	DDE	0.010	---	µg/L	0.100	µg/kg
	DDT	0.010	---	µg/L	0.100	µg/kg
	Dieldrin	0.010	---	µg/L	0.100	µg/kg
	Endosulfan				0.100	µg/kg
	Endosulfan I	0.010	---	µg/L		
	Endrin	0.010	2.000	µg/L	0.100	µg/kg
	Ethion				0.100	µg/kg

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		Water and/or Leachate Samples			Soil & Sediment Samples	
Group or Family	**Analyte**	**MDL**	**EPA MCL**	**Units**	**MDL**	**Units**
	Heptachlor	0.010	0.400	μg/L	0.100	μg/kg
	Heptachlor epoxide	0.010	0.200	μg/L	0.100	μg/kg
	Lindane	0.010	0.200	μg/L	0.100	μg/kg
	Methoxychlor	0.010	40.000	μg/L	0.100	μg/kg
	Methyl trithion				0.100	μg/kg
	Mirex	0.010	---	μg/L	0.100	μg/kg
	Perthane	0.100	---	μg/L	1.000	μg/kg
	Toxaphene	1.000	3.000	μg/L	10.000	μg/kg
	Trithion				0.100	μg/kg
PCB	PCBs total	0.100	0.500	μg/L	1.000	
PCN	PCNs total	0.100	---	μg/L	1.000	
Chlorophenoxy-acid Herbicides						
	2,4,5-T	0.010	L	μg/L	0.100	μg/kg
	2,4-D	0.010	70.000	μg/L	0.100	μg/kg
	2,4-DP	0.010	---	μg/L	0.100	μg/kg
	Dicamba	0.010	L	μg/L	0.100	μg/kg
	Picloram	0.010	500.000	μg/L	0.100	μg/kg
	Silvex	0.010	---	μg/L	0.100	μg/kg
Explosives						
	Nitrobenzine	0.100	---	μg/L		
	2-Nitrotoluene	0.400	---	μg/L		
	3-Nitrotoluene	0.400	---	μg/L		
	4-Nitrotoluene	0.300	---	μg/L		
	1,3-Dinitrobenzene	0.050	---	μg/L	0.250	mg/kg
	2,6-Dinitrotoluene	0.005	L	μg/L	0.260	mg/kg
	2,3-Dinitrotoluene	0.010	---	μg/L		
	2,4-Dinitrotoluene	0.006	L	μg/L	0.250	mg/kg
	3,4-Dinitrotoluene	0.003	---	μg/L		
	1,3,5-Trinitrobenzene	0.100	---	μg/L	0.250	mg/kg
	2,4,6-Trinitrotoluene	0.009	---	μg/L	0.250	mg/kg
	Tertyl	0.100	---	μg/L	0.650	mg/kg
	RDX	0.300	---	μg/L	1.000	mg/kg
	4-Amino 2,6-DNT	0.200	---	μg/L	0.260	mg/kg
	3,5-Dinitroanaline	0.200	---	μg/L		
	2-Amino 4,6-DNT	0.200	---	μg/L	0.260	mg/kg
	HMX	0.050	---	μg/L	2.200	mg/kg
Inorganics						
	Total Dissolved Solids	1.000	500.000	mg/L		
	Spcific Conductance	1.000	---	μS/cm		
	COD (high level)	10.000	---	mg/L		
	Antimony total	1.000	6.000	μg/L		
	Carbon, Organic total	0.100	---	μg/L		
	Arsenic total	1.000	50.000	μg/L		
	Nitrogen (NH4-N) total	0.010	---	μg/L		
	Phosphorus total	0.010	---	μg/L		
	Mercury total	0.100	2.000	μg/L		
	Selenium total	1.000	50.000	μg/L		
	Chloride dissolved	0.100	250.000	mg/L		
	Nitrogen (NO2+NO3-N) total	0.020	10.000	mg/L		
	Thallium total	1.000	2.000	μg/L		
	Fluoride dissolved	0.010	4.000	mg/L		
	Sulfate dissolved	0.200	250.000	mg/L		
	Lead total	1.000	15.000	μg/L		
	Calcium total	0.020	---	μg/L		
	Magnesium total	0.002	---	μg/L		
	Sodium total	0.500	---	μg/L		
	Barium total	5.000	2000.000	μg/L		
	Beryllium total	1.000	4.000	μg/L		
	Cadmium total	5.000	5.000	μg/L		
	Chromium total	10.000	100.000	μg/L		
	Cobalt total	10.000	---	μg/L		
	Copper total	10.000	1000.000	μg/L		
	Cyanide	0.010	0.200	mg/L		

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Constituents and Detection Limits of Organic Analyses for Soil and Sediment Samples.

Group or Family	Analyte	Water and/or Leachate Samples			Soil & Sediment Samples	
		MDL	EPA MCL	Units	MDL	Units
	Iron total	5.000	300.000	μg/L		
	Manganese total	5.000	50.000	μg/L		
	Nickel total	10.000	100.000	μg/L		
	Silver total	5.000	100.000	μg/L		
	Vanadium total	10.000	L	μg/L		
	Zinc total	5.000	5000.000	μg/L		
	Boron total	20.000	L	μg/L		

MDL - Method Dection Level
L - listed
*** - not determined

Appendix I
ALTERNATIVE METHODS FOR CDTF WASTE DISPOSAL

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APPENDIX I: ALTERNATIVE METHODS FOR CDTF WASTE DISPOSAL

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Appendix I: Alternative Methods for CDTF Waste Disposal

I.1 INTRODUCTION

This appendix describes the process used to define alternative methods for disposing of the decontaminated waste by-products of Toxic Agent Training at the Chemical Defense Training Facility (CDTF). Training at the CDTF involves the use of small quantities of toxic chemical agents (GB and VX). The unique solid and liquid decontaminated wastes that are generated during training require application of technically sound management, treatment and disposal methods. The Army has developed standards in Army Regulation (AR) 385-61 (DA, 1992b) which address responsibilities for safety and prescribe general safety precautions and procedures to be used at facilities such as the CDTF. The Department of the Army Pamphlet 385-61 (DA, 1992a) specifies minimum safety criteria and standards for use in processing, handling, storage, transportation, disposal and decontamination of chemical agents, including GB and VX. US Army Training and Doctrine Command (TRADOC) Regulation 385-2 defines the chemical surety safety operation. Department of the Army (DA) pamphlet (PAM) 385-61 establishes various levels of chemical agent decontamination which must be monitored for prior to the release of previously contaminated and potentially contaminated materials that have been decontaminated as part of the training.

- **Must Remain Under Government Control** - Previously contaminated and potentially contaminated materials that have been decontaminated must be monitored and verified as having vapor concentrations below 0.0001 mg/m^3 for GB and below 0.00001 mg/m^3 for VX (using available miniature continuous agent monitors (MINICAMS) and ACAMS systems). The DA PAM requires that items be monitored for a minimum of 24 hours, however, established CDTF SOPs require that the items be monitored for a minimum of 48 hours. Items certified as having contamination levels less than these levels may be removed from the training facility by personnel that have undergone specific training and thereby have special knowledge in agent symptomatology and agent characteristics. The handling of these items must be done at facilities equipped with appropriate safeguards.

- **May Be Released from Government Control** - Material or equipment that has been treated to ensure higher levels of decontamination may be released from Government control. Items may be released from government control if one of the following conditions have been meet:

  1) An analysis, approved by the Department of Defense Explosive Safety Board (DDESB), verifies that the total quantity of residual agent is less than the *no effects* dosage under worst case conditions of exposure. This condition must be certified by the commander or designated representative.

  2) Decontamination can be obtained by ensuring an item has been decontaminated by locally approved procedures, bagged or contained, and ensuring that appropriate tests or monitoring

have verified the nerve agent (GB or VX) vapor concentrations are not above 0.000003 mg/m^3.

At the existing CDTF at FMC, wastewater resulting from the decontamination of equipment props in controlled atmosphere training rooms flows to a center trench (in each training room), then to a common sump located in Bay 7 in the CDTF. Water is pumped through a closed pipe system to a 20,000 gallon storage tank which is located in a concrete and bermed secondary containment area outside the CDTF building, but still inside the fenced area of the CDTF. The wastewater is stirred by an agitator inside the tank prior to sampling to determine if residuals of GB and VX remain. The sample is analyzed by a GC method which provides a detection limit of 20 parts per billion (ppb). If concentrations are found to be above 20 ppb the wastewater is further treated with DS2 solution. The wastewater will again be tested to assure VX and GB are below 20 ppb. The significance of 20 ppb is drinking water containing nerve agents at this concentration can be consumed by troops in combat areas for up to 7 consecutive days; however, there is a potential for health impacts at this concentration (DA, 1986b).

A chemical analysis of wastewater from the CDTF at FMC (FMC, 1997) is provided in Table I,1.

Table I.1:
Chemical Characterization of CDTF Wastewater

Parameter	Method	Health Criteria in Air	Result
Alkalinity, mg/L, $CaCO_3$	EPA 310.1	NA[a]	3,350 mg/L
Ignitability, degrees F	EPA 1010	NA	>180
Residual Chlorine, mg/L	EPA 330.5	NA	<0.50 mg/L
Total Dissolved Solids, mg/L	EPA 160.1	NA	7,390 mg/L
Total Organic Carbon, mg/L	EPA 415.1	NA	1,540 mg/L
Total Suspended Solids, mg/L	EPA 160.2	NA	2,480 mg/L
Diethylenetriamine, mg/L	EPA 8015 mod	[1]TLV-TWA 4.2 mg/m^3	300 mg/L
Ethylene glycol monomethylether, mg/L	EPA 8015 mod	[2]TLV-TWA 16 mg/m^3	680 mg/L
pH	501 Orion Meter	NA	10.23
GB Agent, $\mu g/L$	Gas Chromatograph	[3] AEL-TWA 0.0001 mg/m^3	< 20 $\mu g/L$
VX Agent, $\mu g/L$	Gas Chromatograph	[4]AEL-TWA 0.00001 mg/m^3	<20 $\mu g/L$
48 hr. Tox. to *Ceriodaphnia dubia*	EPA 600/4-90/027F	NA	1.5% LC50
96 hr. Tox. to *Pimephales promelas*	EPA 600/4-90/027F	NA	3.8% LC50

Notes: a NA = Not Applicable
1 Threshold Limit Value-Time Weighted Average (TLV-TWA) of 4.2 mg/m^3 for diethylenetriamine ACGIH (1994)
2 TLV-TWA of 16 mg/m^3 for ethylene glycol monomethylether ACGIH (1994)
3 Atmospheric Exposure Limit-Time Weighted Average (AEL-TWA) of 0.0001 mg/m^3 for GB (DA, 1996b)
4 (AEL-TWA) of 0.00001 mg/m^3 for VX (DA, 1996a)

Results of the CDTF wastewater analysis along with other input data were used to estimate the risk of shipping wastewater from FLW to a commercial disposal or treatment facility by use of the Chemical Accident Statistical Risk Assessment Statistical Model (CASRAM)(FMC, 1997). The CASRAM is a statistical model which predicts the probability of transportation accidents, the probability of a release given an accident and the probability of humans being affected given accidental releases. To predict risks, the model uses type of transportation (e.g., rail, truck, etc.); amount of material shipped and frequency; toxicity of the material; and concentration of the toxic ingredients.

The model contains an extensive meteorological database to statistically model chemical release rates and material dispersion through Monte Carlo sampling of accident scenarios. This information is combined with health criteria for the applicable chemicals to predict exposures from spills to populations along the route traveled.

The probability that one or more persons will be exposed to a concentration exceeding the emergency response criteria, during any given year of operation, is 6.88×10^{-5}. This probability indicates that one person has a chance of being affected in 348,000 shipments. At this rate it is expected that one person has the potential to be affected by exposure from an accidental spill in 14,500 years of shipping.

Similarly, the probability that 100 or more persons will be exposed to concentrations exceeding criteria, during one spill event is 3.33×10^{-9}. This probability indicates that 100 people have a chance of being affected by one spill event in 7,200,000,000 shipments. At this rate one can expect 100 people to be affected by a release event in 300 million years of shipping.

The statistical probabilities predicted by the CASRAM model show the chance that a person or group of people will be affected by a transportation related spill of the CDTF wastewater is very remote.

The screening of waste disposal methods had to ensure compliance with these standards during the disposal process. The screening of alternate waste disposal methods was modeled along the same pattern that was used for the review and screening of training methods. Additional information on the method is contained in Volume IV, *Identification and Screening of Alternatives to Accomplish Training Goals at FLW.* The method included:

- an initial screening of identified waste disposal methods to determine their viability,
- followed by a more detailed screening of viable waste disposal methods to determine the Environmentally Preferred and the Army's Optimum Waste Disposal Methods that would be analyzed in Volume 1, Section 5 for environmental impacts.

I.2 INITIAL VIABILITY SCREENING OF ALTERNATIVE WASTE DISPOSAL METHODS

The initial viability screening included the consideration of decontamination procedures as well as consideration of disposal methods that could be implemented either on-post or off-post. Waste disposal methods were determined to be non-viable if they:

- failed to provide a safe environment, thereby putting students, instructors or personnel in the surrounding civilian community at unnecessary risk;
- failed to provide the required level of decontamination;
- failed to ensure compliance with established Federal, state, local and Army standards for waste disposal; and
- could not be implemented.

Training methods which failed any of the four criteria were determined to be non-viable.

As discussed below, the analysis of what may be viable on-post yielded differing results than what may be viable off-post due to existing environmental conditions at FLW, the nature of the technology used, existing environmental regulations, and the ability to implement the disposal methods. Unless otherwise noted, all of these on-post and off-post alternatives could include government owned and operated facilities; government owned and contractor operated facilities; or contractor owned and operated facilities. The nature of ownership and operation was not deemed to be an important consideration during the analysis of these alternatives.

All of the on-post and off-post disposal methods include caustic/oxidative decontamination of waste by-products associated with toxic agent training. This decontamination is accomplished as part of the training effort.

I.2.1 On-Post Disposal

Waste disposal methods considered for the disposal of the training materials on-post included Caustic/Oxidative Decontamination followed by the use of:

1) **A Dedicated Thermal Treatment Unit.** This method of treatment could be used for both liquid and solid wastes. This method is similar to the Relocate Current Practice Alternative and is considered to be effective. However without the use of continuous air monitoring equipment it is not possible to ensure compliance with the existing State of Missouri, Permit to Construct. Therefore this alternative is considered to be non-viable and non-reasonable.

2) **A Thermal Treatment Unit, with additional Air Monitoring Equipment and Carbon Absorption System.** This method of treatment could be used for both liquid and solid wastes, and is a modification intended to improve the current practice. This method is considered to be adequate for the disposal of the wastes, and with the addition of the air monitoring equipment, compliance with the State of Missouri, Permit to Construct would be documentable. The addition of the carbon absorption system would add an additional level of safety against an inadvertent release of agent. This system is considered viable and reasonable.

3) **An Existing On-Post, Approved Waste Incinerator.** This alternative would propose the use of the existing medical waste incinerator at General Leonard Wood Army Community Hospital for the destruction of the decontaminated solid wastes generated at the CDTF. Assuming effective modification of the existing incinerator, this alternative would provide the required level of treatment to decontaminate all chemical agents contained in or on the solid materials. The alternative would require modification of the existing permit to operate the medical waste incinerator, may require modification to the existing incinerator (to account for the potential high salt content of the wastes from the CDTF), and would result in additional maintenance and operation costs for that incinerator. It is anticipated that these additional costs may be lower than the cost of constructing and maintaining a dedicated thermal treatment unit as called for in the "Relocate Current Practice" alternative. The ramifications of attempting to incinerate solid waste at the hospital incinerator, would have to be evaluated in light of the special training qualifications, required by Army regulations, for handling and disposing of these materials. This alternative is considered viable and reasonable.

4) **Local, On-Site Disposal in Evaporation Ponds.** This method of treatment could be used for the treatment of liquid wastes only. Disposal of solids would need to be accomplished thorough a different procedure. Large, earthen evaporation ponds would be constructed to accommodate up to 10,000 gallons per month of wastewater and sized to allow evaporation rates to exceed annual precipitation. The treatment ponds would be lined to prevent groundwater contamination and would have to be permitted and approved by the Missouri Department of Natural Resources. Due to potential problems with maintaining liner integrity and the large surface areas required this, alternative is considered to be non-viable and non-reasonable.

5) **Deep Well Injection.** Implementation of this alternative, at a deep well injection site in the State of Missouri is considered non-viable. Application would be made to MDNR to permit an injection disposal well for non-hazardous wastewater. Missouri Revised Statute 577.155 prohibits waste disposal by injection with the exception of certain mining, septic, oil and gas (industry), and heat pump (thermal) wastewaters. The existing Missouri Statute would have to be amended to allow injection disposal of CDTF wastewater. Therefor this alternative method is considered to be non-viable and non-reasonable.

6) **Landfill Disposal.** Implementation of this alternative on-post a FLW is considered viable, but unreasonable since FLW does not currently operate a landfill and has recently conducted efforts to close existing landfills. The construction and operation of a landfill to handle the wastes is considered viable, but non-reasonable.

7) **Ground Application.** Decontaminated wastewater would be tilled into soil at FLW at a permitted landfarm treatment facility. Given the types of wash solutions used to decontaminate equipment and facilities, there is a great possibility of elevated dissolved solids (i.e., salts) in decontaminated CDTF wastewater. As a result, this method of disposal could cause a buildup of salts in soil over time and therefore, negatively affect soil microbial degradation of residual organic compounds in the wastewater. The potential for leaching of residual chemicals from the treated wastewater applied to the soil may necessitate placement of a liner under the treatment plot. Disruption of the liner integrity by tilling equipment is a distinct possibility. The loss of liner integrity could lead to groundwater contamination by residual organics and salts in the wastewater. Because of the potential for groundwater contamination in the treatment plot and the large amount of salt-contaminated soil potentially resulting from landfarming, this alternative is considered non-viable and non-reasonable.

8) **Innovative Technologies.** In addition to these alternatives, several innovative and developing technologies were reviewed. The total development timeframe and cost to implement these technologies on-post at FLW are unknown. The effectiveness of some of these technologies in the disposal of the types of wastes being considered is also unknown at this time. Consequently implementation of these innovative technologies on-post was determined to be non-viable and non-reasonable at this time. These technologies included:

   - Electrochemical Oxidation;
   - Oxidizing Agents Plus UV Light;
   - Biological Processes;
   - Wet Air Oxidation;
   - Supercritical Water Oxidation;
   - Solidification and encapsulation of liquids;
   - Molten Metal Pyrolysis;
   - Catalytic Fluidized-Bed Oxidation; and
   - Catalytic Oxidation.

I.2.2 Off-Post Disposal

Waste disposal methods for disposal of the training materials off-post included, caustic/oxidative decontamination followed by the use of:

1) **A Dedicated Thermal Treatment Unit.** This method of treatment could be used for both liquid and solid wastes. Without the use of continuous air monitoring equipment it is not possible to ensure complete destruction of the materials. Therefore this alternative is considered to be non-viable and non-reasonable.

2) **A Thermal Treatment Unit, with additional Air Monitoring Equipment.** This method of treatment could be used for both liquid and solid wastes, and is a modification intended to improve the current practice. The method is considered viable and reasonable.

3) **Local, Off-Site Disposal in Evaporation Ponds.** As stated above in the on-post screening, this method is non-viable and non-reasonable because of potential problems with maintaining liner integrity and the large surface areas required.

4) **Deep Well Injection.** Although this alternative is non-viable within the State of Missouri, several other locations have been identified that have the capability of using this method for disposal of the liquid wastes generated during the training. Liquid wastes could be shipped to an approved,

licensed deep well injection site for disposal in accordance with the operating permit at the approved off-site location. This alternative would include commercial disposal, as the Army does not operate a deep well injection site. Off-post commercial disposal is considered to be viable and reasonable.

5) **Land-Fill Disposal.** Although this alternative is considered non-viable on FLW, solid wastes could be shipped to an approved, licensed land fill for disposal in accordance with the operating permit at the approved off-site location. If this alternative would include the use of a land-fill in the State of Missouri, it would require review and approval by MDNR since non-residential waste would be landfilled. Off-post land-fill disposal is considered to be viable and reasonable.

6) **Ground Application.** As discussed in the on-post analysis of this alternative, the ground application of liquid wastes is considered non-viable due to the potential for groundwater contamination in the treatment plot and the large amount of salt-contaminated soil potentially resulting from landfarming. This alternative is considered non-viable and non-reasonable.

7) **Innovative Technologies.** In addition to the alternatives stated above, the potential of using one or more the innovative and developing technologies (listed in On-Post Innovative Technologies subsections above) were reviewed. Although the total development costs associated with these options make implementation of the technologies by the Army non-viable, commercial industry is actively pursuing the development of these technologies. If these technologies demonstrate that they are able to properly dispose of the wastes, in a cost effective manner, then they should be considered viable and reasonable. The potential technologies reviewed included:

   - Electrochemical Oxidation;
   - Oxidizing Agents Plus UV Light;
   - Biological Processes;
   - Wet Air Oxidation;
   - Supercritical Water Oxidation;
   - Solidification and encapsulation of liquids;
   - Molten Metal Pyrolysis;
   - Catalytic Fluidized-Bed Oxidation; and
   - Catalytic Oxidation.

   During the review of available technologies (which included a cost comparison of potential methods) it was determined that the s*olidification and encapsulation of liquids* emerging technology may already be more cost effective than existing deep well injection technology for the types, classification and quantity of wastes that are anticipated to be generated at the CDTF. Consequently it was determined that consideration of the deep well injection, land fill and the "Innovative Technologies" alternatives would be considered under a single *Alternative Technologies* category (as discussed in subsection I.3.4 below).

I.3 SECONDARY SCREENING TO SELECT THE ENVIRONMENTALLY PREFERRED AND ARMY'S PROPOSED WASTE DISPOSAL METHODS

The secondary screening of viable disposal methods reviewed the potential for implementing the following disposal methods. Each of these disposal methods includes caustic/oxidative decontamination of the materials used in the training area. This procedure is included in each of the alternatives as the use of these decontamination methods are part of the key training goal that the use of toxic agents in training are attempting to reinforce. These treatment procedures will also ensure that the materials are decontaminated, monitored and verified as having vapor concentrations below 0.0001 mg/m^3 for GB and below 0.00001 mg/m^3 for VX. Viable methods of disposal include caustic/oxidative decontamination followed by the use of:

- a thermal treatment unit on-post, with continuous air monitoring equipment and carbon absorption systems as a modification of the current practice;

- an existing on-post, approved waste incinerator;
- a thermal treatment unit at an off-post facility with additional air monitoring equipment; or
- an alternative technology for disposal.

I.3.1 Thermal Treatment Unit On-Post, with Continuous Air Monitoring Equipment - Relocation of the (Modified) Current Practice

The modification of the current practice for waste disposal at FMC consists of segregating liquid and solid wastes in the training area, and treating them independently to ensure decontamination procedures have provided the required level of treatment.

- **Liquid Waste Decontamination and Disposal.** As part of the current practice liquids are decontaminated through the use of a caustic/oxidative treatment process. The Chemical School then monitors the decontamination of liquids to ensure compliance with Alabama Department of Environmental Management (ADEM) drinking water standards for nerve agent or nerve agent waste which are established at not to exceed 20 parts per million of either GB or VX. The Chemical School, CDTF staff conducts wastewater analysis to verify compliance with ADEM drinking water standards. The CDTF will also verify the pH of the wastewater prior to incineration to ensure compliance with the ADEM air permit (301-0017-Z007).

  Incineration of the liquid mixture is performed as an additional safety check in the system. During the incineration process the decontaminated liquid mixture is introduced into the "dwell chamber" of the thermal treatment unit. The temperature of the dwell chamber is approximately 1700^{0}F at the time the decontaminated liquid mixture is introduced, and the dwell time is estimated (by the current operator) to be approximately 2 seconds.

  Because stack emission tests have not been conducted at the current CDTF facility, it is uncertain that this alternative would provide the required level of treatment to decontaminate the residual chemical agents potentially remaining in treated wastewater to the degree required in the State of Missouri air permit. Although it is believed that this method will provide the required level of decontamination, without integrated stack monitors providing emission tests, proof of compliance is not possible. Addition of the stack emission monitors is provided in another alternative. Given a successful thermal treatment unit stack test demonstration, this alternative would demonstrate the required level of treatment of wastewater from the CDTF.

  Based on the estimated number of students that will be trained at the CDTF, items that will be classified as special wastes include approximately 100,000 gallons per year of liquid wastes (pH of approximately 10.5) are anticipated to be generated as a by-product of toxic agent training.

- **Solid Waste Decontamination and Disposal.** Solid wastes generated at the CDTF include items that are classified as hazardous waste, medical/infectious waste and special wastes.

  Hazardous wastes generated at the CDTF include:

  - approximately 150 decontaminated protective mask filters which contain Chromium VI are used per year by Allied Forces;
  - mercuric cyanide from the M256A1 detector kits;
  - silver nitrate from the MINICAMS Chemical Agent Detectors; and
  - mercury and silver fluoride from laboratory equipment.

  A medical monitoring program for all personnel that receive training at the CDTF results in the generation of medical/infectious waste. This program includes taking a blood sample from every student prior to training, taking samples from foreign students after the training and taking a sample from any student that shows any signs of potential contamination or that came into physical contact with agent. The medical/infectious wastes include:

- syringes used to obtain blood samples;
- gauze,
- test tubes, and
- other medical materials.

Fort Leonard Wood currently has a established procedures for the disposal of hazardous wastes and medical/infectious wastes from medical and dental clinics that are not in General Leonard Wood Army Community Hospital. These procedures specify that wastes will be segregated from other wastes at the point of origin for proper disposal.

Both of these types of wastes are transported off-post by a licensed waste transporter, and then disposed of by a licensed waste disposal operation in an approved manner. The transportation and disposal of the wastes is conducted in accordance with Federal, State and Army regulations. As discussed in Volume I, Section 5, subsection 5.2.2.8.5, FLW has existing procedures that will be used for the disposal of the Hazardous and Medical Infectious wastes that are generated at the CDTF.

If constructed, the thermal treatment unit at the CDTF would only be used for the treatment of the *special wastes* generated during training. Following caustic/oxidative decontamination and monitoring for a minimum of 48 hours, waste solids (e.g. boots, gloves, hoods, overgarments, carbon filters and gas mask filters) would be treated in a dedicated thermal treatment unit at the CDTF. This alternative would provide the required level of treatment to decontaminate solids. Use of continuous air monitoring systems would allow for documentation of compliance with the restrictions contained in the State of Missouri, Permit to Construct.

Based on the estimated number of students that would be trained at the CDTF, the solid decontaminated special waste by-products of toxic agent training would include approximately:

- 12,880 pounds per year of solid wastes consisting entirely of used Battle Dress Overgarment (BDO) uniforms. The estimate for BDO uniforms includes the charcoal filters used in the protective masks.;
- 1,050 pounds per year of other solid wastes consisting entirely of German Army suits;
- 2,800 pounds per year of other solid wastes consisting entirely of U.S. Navy chemical protective overgarments; and
- less than fifty 55-gallon drum containers of other decontaminated solid wastes per year which consist of detection kits and paper, decontamination kits, and other expendable materials used to support training at the CDTF.

The use of the thermal treatment unit would be augmented by two autoclaves to hygienically clean the BDOs between uses by different personnel. The autoclaves are not intended to provide decontamination protection from the GB and VX on the uniforms, only hygienic treatment between uses by different personnel. All items will be monitored for compliance with the 0.0001 mg/m^3 for GB and 0.00001 mg/m^3 for VX vapor levels prior to being placed in the autoclaves.

Implementation of this alternative at FLW would require the construction of a dedicated thermal treatment unit and the maintenance of a separate permit to operate from the State of Missouri and is considered viable.

I.3.2 An Existing On-Post, Approved Waste Incinerator

This alternative would propose the use of the existing medical waste incinerator at General Leonard Wood Army Community Hospital for the destruction of the decontaminated solid wastes generated at the CDTF. As part of the SOPs for this alternative the liquid and solid wastes would be segregated as outlined above.

This alternative varies from the use of dedicated incinerator in that the medical wastes could be disposed of at the incinerator also. It is anticipated that extensive renovation of the existing incinerator would be required to allow for the acceptance and treatment of the high salt content liquid and solid wastes from the CDTF. Assuming effective modification of the existing incinerator, this alternative would provide the required level of treatment. The alternative would require modification of the existing permit to operate the medical waste incinerator.

I.3.3 A Thermal Treatment Unit at an Off-Post Facility with Additional Air Monitoring Equipment

This plan is identical to the *Thermal Treatment Unit On-Post, with Continuous Air Monitoring Equipment - Relocation of the (Modified) Current Practice* discussed above, except that the thermal treatment would occur off-post versus on-post. The location of the off-post treatment would depend upon the contractor selected to perform the treatment. The identification and selection of an individual disposal contractor, at this time would be speculation. However disposal of the items by a contractor would be performed in accordance with established procedures and the operating permit obtained by the contractor.

I.3.4 Use of an Alternative Technology for Disposal

As stated above during the analysis of Innovative Technologies, commercial industry is actively pursuing the development of the innovative technologies (as an alternative to incineration of wastes in properly licensed and permitted hazardous waste incinerators) including:

- Electrochemical Oxidation;
- Oxidizing Agents Plus UV Light;
- Biological Processes;
- Wet Air Oxidation;
- Supercritical Water Oxidation;
- Solidification and encapsulation of liquids and solids;
- Molten Metal Pyrolysis;
- Catalytic Fluidized-Bed Oxidation; and
- Catalytic Oxidation.

Because future developments in these technologies cannot be predicted, selection of one as the proposed method for disposal of decontaminated by-products of toxic agent training would be premature at this point. During a two step screening process of alternative methods for CDTF Waste Disposal alternatives it was determined that some of these emerging technologies may already be available, and more effective than other readily available disposal methods, such as incineration of the wastes in a properly licensed and permitted hazardous waste incinerator which would be used if none of the technologies proves to be viable and reasonable. During this review of available technologies it was determined that the *solidification and encapsulation of liquids* emerging technology may already be more effective than existing deep well injection technology for the types, classification and quantity of wastes that are anticipated to be generated at the CDTF. Based on this screening it was determined that consideration of the deep well injection, incineration at a properly licensed and permitted hazardous waste incinerator, land fill and the "Innovative Technologies" alternatives (as discussed in subsection I.2.2.7)) would be considered under a single *Alternative Technologies* category. This would allow for the selection of the most effective method of disposing of the wastes off-post, with an initial decision as to how, where, and by-whom the wastes would be disposed of decided prior to the start of training. The review of alternative disposal methods, disposal commercial contractors and disposal sites indicated that numerous sites, methods and contractors were authorized and interested in handling disposal of the decontaminated liquid and solid special wastes associated with toxic agent training. As new technologies become available and effective in handling the wastes, the Army would base their decision as to which disposal method to use based on competitive selection criteria. Criteria used in the selection process would include:

- the nature of the disposal method;
- the disposal method performance in limiting the risk of future contamination;

- the performance of the disposal facility, to include environmental management and compliance practices; and
- the disposal contractor having appropriate Federal, state, and local environmental licenses and permits.

I.4 SELECTION OF THE ENVIRONMENTALLY PREFERRED AND ARMY'S PROPOSED WASTE DISPOSAL ALTERNATIVES

Criteria used in the initial screening of alternative disposal methods included the ability of the disposal method to:

- meet the objective of disposing of wastes in accordance with Federal and state regulations; and
- the safety of the alternative for students, cadre and personnel in the surrounding community.

Disposal methods which are able to meet both of the initial screening criteria, were then screened to determine the Environmentally Preferred Waste Disposal Method and the Army's Optimum Waste Disposal Method. Table I.2 provides a summary of the selection criteria used in these evaluations and selections.

Selection of the Environmentally Preferred Waste Disposal Method was based on the relative potential for the alternative method to impact on the following environmental criteria:

- Air Quality;
- Noise;
- Fish and Wildlife;
- Federal T & E species;
- Water Quality; and
- Wetlands.

Selection of the Army's Optimum Waste Disposal Method was based on the relative potential for the alternative method to impact on the environmental criteria listed above and the following operating efficiency criteria:

- Construction cost;
- Development time and costs to implement;
- Relative safety;
- Support requirements;
- Operational flexibility; and
- Operational effectiveness.

Scores of between 1 and 5 were assigned to each of the viable alternatives for each of these criteria. The scores were based on the anticipated, relative impact of alternative. Alternatives which were assigned higher relative scores were preferred to alternatives which were assigned lower relative scores. The Environmentally Preferred Waste Disposal Method alternative was the alternative that received the highest total score on the environmental criteria. The Army's Optimum Waste Disposal Method was the alternative that received the highest total score for both environmental and operational criteria. Additional supporting material concerning this review process is located in the *Chemical Defense Training, Waste Disposal* (FLW, 1996d) analysis.

Table I.2

Selection of Preferred Methods for Waste Disposal at the Chemical Defense Training Facility

		Environmental Criteria							Operating Efficiency Criteria							Summary			
	Viable/Non-Viable	Air Quality	Noise	Fish & Wildlife	T & E Species	Water Quality	Wetlands	Environmental Subtotal	Construction Costs	Development Costs	Relative Safety	Support Requirements	Flexibility	Effectiveness	Training & Ops. Subtotal	Total Points	Relocate Current Practice	Operationally Preferred Training Method	Environmentally Preferred Training Method
On-Post Alternatives																			
1 Dedicated On-Post Thermal Treatment Unit	No																		
2 Dedicated On-Post Thermal Treatment Unit (Modified RCP)	Yes	3	3	5	5	5	5	26	1	3	3	2	4	5	18	44	●		
3 Existing On-Post Medical Waste Incinerator	Yes	3	2	5	5	5	5	25	3	3	3	3	4	5	21	46			
4 Evaporation Pond On Post	No																		
5 Deep Well Injection On-Post	No																		
6 Land Fill On-Post	No																		
7 Ground Application On-Post	No																		
8 Innovative Technologies On-Post	No																		
Off-Post Alternatives																			
1 Off-Post Approved Incinerator	Yes	2	3	5	5	5	5	25	5	3	4	4	3	5	24	49			
2 Off-Post Approved Incinerator, with Air Monitoring	Yes	3	3	5	5	5	5	26	5	3	4	4	3	5	24	50			
3 Evaporation Pond Off-Post	No																		
4 Deep-Well Injection Off-Post	Yes	5	5	5	5	5	5	30	5	4	4	4	3	3	23	53			
5 Land-Fill Off-Post	Yes	5	5	5	5	5	5	30	5	4	4	4	3	3	23	53			
6 Ground Application Off-Post	No																		
7 Innovative Technologies Off-Post	Yes	5	5	5	5	5	5	30	5	3	4	4	3	3	22	52			
8 Alternative Technology	Yes	5	5	5	5	5	5	30	5	4	4	4	5	5	27	57		●	●

Notes:
- ● Indicates selected alternative
- 1 Based on viability screening contained in subsection I.2.1.2
- 2 Scores based on the anticipated, relative impact as discussed in subsection I.3

Based on the analysis illustrated on Table I.2, the *Caustic/Oxidative Decontamination, Followed by the Use of an Alternative Technology for Disposal* alternative was selected as both the Environmentally Preferred Waste Disposal Method and the Army's Optimum Waste Disposal Method. Selection of the specific *Alternative Technologies* disposal method that will be used (as discussed in subsection I.3.4 above) will be accomplished by the Army prior to the start of training (and periodically as required in the future) using the initial and secondary screening criteria provided above, along with the following criteria:

- the nature of the disposal method;
- the disposal method performance in limiting the risk of future contamination;
- the performance of the disposal facility, to include environmental management and compliance practices; and
- the disposal contractor having appropriate Federal, state, and local environmental licenses and permits.

Based on the analysis illustrated on Table I.2 the environmental impacts of the alternative waste disposal alternatives analysis (located in Volume 1, Section 5) will include the evaluation of the:

- *Thermal Treatment Unit On-Post, with Continuous Air Monitoring Equipment* as the Relocate Current Practice Alternative; and

- *Caustic/Oxidative Decontamination, Followed by the Use of an Alternative Technology for Disposal* as both the Environmentally Preferred Waste Disposal Method and the Army's Optimum Waste Disposal Method.

Appendix J
AIR PERMIT

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APPENDIX J: AIR PERMIT

Appendix J: Air Permit

J.1 INTRODUCTION

This appendix provides a copy of air quality permit #0695-010, issued by the Missouri Department of Natural Resources, which allows the Army to conduct obscurant (fog oil) training at Fort Leonard Wood (FLW). The air permit is a Prevention of Significant Deterioration (PSD) permit and was issued by the MDNR on June 7, 1995 pursuant to 10 CSR 10-6.060. The purpose of providing the permit in the EIS is to provide reviewers of this document the opportunity to clearly understand the requirements and conditions associated with the permit. The permit contains 37 different conditions with which FLW must comply. A summary of permit conditions has been provided in Volume I, subsection 5.2.2.3.7.

The permit is designed to ensure that the obscurant (fog oil) training is carried out in a manner that protects environmental resources and human health. Conducting fog oil training in accordance with the air permit ensures compliance with National Ambient Air Quality Standards (NAAQS) at the installation boundary. For the purposes of the Air Permit, the FLW cantonment area is considered to be outside of the installation boundary. One of the requirements pursuant to obtaining this permit was the extensive use of predictive air dispersion modeling (as required by 10 CSR 10-6.060) to determine ambient air quality concentrations. The results of the dispersion modeling formed the basis for the restrictions on annual and daily fog oil quantities allowed and for the meteorological conditions under which training can occur. Compliance with the NAAQS will be verified and documented by ambient air monitoring as described in Volume II, Appendix K, Summary of Monitoring Programs.

J.2 AIR QUALITY PERMIT (#0695-010)

STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

MISSOURI AIR CONSERVATION COMMISSION

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PERMIT TO CONSTRUCT

Under the authority of RSMo 643 and the Federal Clean Air Act the applicant is authorized to construct the facility described below, in accordance with the laws, rules, and conditions as set forth herein.

Permit Number:	0695-010	Facility I.D. Number:	3860-0004-015
Owner:	U. S. Army Engineer Center and Fort Leonard Wood		
Owner's Address:	Department of Defense		
Facility Name:	U. S. Army Engineer Center and Fort Leonard Wood		
Facility Address:	ATTN: ATZT-DPW-EE; Ft. Leonard Wood, MO 65473		
Legal Description:	Pulaski County, All or parts of T33, 34, 35N, R10, 11, 12W		

Application for Authority to Construct was made for:

**** Permission to construct a static and mobile fog oil smoke training facility. This review was conducted in accordance with Section (8), Missouri State Rule 10 CSR 10-6.060, "Construction Permits Required." ****

☐ Special Conditions are not applicable to this permit.

☒ Special Conditions do apply to this permit and are listed as attachments starting on page 2.

June 7, 1995
EFFECTIVE DATE

John A. Young
DIRECTOR
DIVISION OF ENVIRONMENTAL QUALITY

MO 780-1204 (6-93)

RECYCLED PAPER

STANDARD CONDITIONS:

Permission to construct may be revoked if you fail to begin construction or modification within two (2) years from the date of this letter.

You must construct, modify, and operate your installation in the manner proposed in your application. You will be in violation of 10 CSR 10-6.060 if you fail to adhere to the specifications listed in this permit or in your application.

You must notify the Air Pollution Control Program of the anticipated date of start up of this facility. The information must be made available not more than sixty (60) days but at least thirty (30) days in advance of this date. Also, you must notify the Air Pollution Control Program within fifteen (15) days after the actual start up of this facility.

A copy of this permit and permit review shall be kept at the facility address and be made available to Department of Natural Resources' personnel upon request.

You may appeal this permit or any of the listed special conditions as provided in RSMo 643.075. If you choose to appeal, the Air Pollution Control Program must receive your written declaration within thirty (30) days of this letter.

If you do not choose to appeal, this certificate, your application, and associated correspondence constitutes your permit to construct. The permit allows you to construct and operate the facility, but in no way relieves you of the obligation to meet the air pollution control regulations, other Department of Natural Resources' regulations, or other federal, state, or local agencies' regulations.

If you have any questions regarding this air pollution permit, contact the New Source Review Section Chief, Air Pollution Control Program, (314) 751-4817. Correspondence should be addressed to the Air Pollution Control Program, P.O. Box 176, Jefferson City, MO 65102.

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

Emissions Limitations

1. *Annual Throughput*. The U.S. Army Engineering Center, Fort Leonard Wood, (the "Permittee") shall process no more than 65,000 gallons of SGF-2 fog oil for smoke training during any 12-month period. This total shall include the fog oil used in the mobile (valley) operations and the static (introductory) operations.

2. *Daily Throughput*. The Permittee shall process no more than 3700 pounds of SGF-2 fog oil during any 24-hour period. This total shall include the fog oil used in the mobile (valley) operations and the static (introductory) operations. Fog oil shall not be processed at a rate in excess of 3700 pounds per hour.

3. *SGF-2 Fog Oil Material Requirements*. The Permittee shall only use the fog oil designated SGF-2 (CAS# 64742-52-5) to generate smoke during smoke training. The fog oil shall contain no additives nor any rerefined oils.

   In addition, the fog oil shall have the following properties and characteristics:

   a. The fog oil shall be severely hydrotreated to remove polycyclic aromatic hydrocarbons (PAHs) and their nitrogen and oxygen analogues, and

   b. The fog oil shall contain no carcinogenic or potentially carcinogenic constituents as defined under the Hazard Communication Standard (HCS) 29 CFR 1910.1200, and

   c. The fog oil shall contain no more than 0.5% (one-half percent) by weight of any single hazardous air pollutant (HAP) as defined by 10 CSR 10-6.020(2)(C), "Table 3 — Hazardous Air Pollutants." The combination of all HAPs in the fog oil shall comprise no more than 1% (one percent) by weight of the fog oil.

   The Permittee is prohibited from using to create smoke for

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

smoke training any fog oil designated PY8035000 on the Registry of Toxic Effects of Chemical Substances (RTECS) of the National Institute for Occupational Safety and Health (NIOSH).

The Permittee may not introduce any other substance into the fog oil used to generate smoke, e.g., kerosene to reduce viscosity in cold temperatures, graphite or brass to change or enhance obscurant effectiveness, etc.

4. *Fog Oil Material Certification*. The Permittee shall maintain fog oil Military Specifications, Material Safety Data Sheets (MSDS), and records of quantitative analytical chemical test data demonstrating compliance with Condition 3.

   Said military specifications, test data, MSDSs, and certifications shall be maintained by the Permittee and made available to Missouri Department of Natural Resources (MDNR) personnel on request.

   The Permittee shall certify in writing no less frequently than annually that all fog oil used in smoke training complies with Condition 3.

5. *Reporting of Violations*. The Permittee shall report to the Enforcement Section, Air Pollution Control Program (APCP), MDNR, no later than ten days after any fog oil not complying with Condition 3 or not certified in compliance with Condition 4 is used to create smoke for smoke training.

6. *Smoke Generating Equipment*. The Permittee shall use only the pulse jet mechanical smoke generator, Model M3A3 ("emm-three-A-three"). The smoke generators shall only be fueled with unleaded gasoline. The Permittee shall only generate smoke with smoke generators maintained in good working condition and operated in accordance with the manufacturer's specifications.

7. *Emissions Limitation*. The Permittee shall not emit particulate matter less than 10 microns (PM_{10}) at a rate in

PERMIT NUMBER
0695-010

FACILITY I.D. NUMBER
3860-0004-015

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

excess of 2600 pounds per hour. This rate corresponds to processing fog oil at the maximum rate of 3700 pounds per hour with a particulate conversion factor of 70%.

8. *Recordkeeping*. The Permittee shall record the amount of fog oil processed by the smoke generators during the previous month and the previous twelve months. During any month in which smoke training occurs, the Permittee shall record daily and hourly consumption of fog oil. The Permittee shall maintain said records and provide them to MDNR personnel on request.

9. *Reporting of Violations*. The Permittee shall report to the Enforcement Section, APCP, no later than ten days after the end of each month during which the preceding 12-month cumulative total of fog oil processed exceeds 65,000 gallons of fog oil (Condition Number 1).

10. *Reporting of Violations*. The Permittee shall report to the Enforcement Section, APCP, no later than ten days after an exceedance of the 3700 pound daily limit or the 3700 pound/hour maximum rate limit of fog oil (Condition 2).

Ambient Air Monitoring

11. *Quality Assurance Project Plan*. The Permittee shall file two copies of a Quality Assurance Project Plan (QAPP) within 90 days of issuance of this permit for review and approval by the Staff Director, APCP. The QAPP shall describe the method and manner for collecting air quality monitoring data for PM_{10} and ozone required by this permit.

12. *Pre-Startup Monitoring*. Beginning as soon as possible after this permit is issued, the Permittee shall collect at least one year of continuous air quality monitoring data for PM_{10} and ozone in a manner and at locations to be determined by the Permittee with review and approval by the APCP. Collection of monitoring data shall begin no later than eighteen months immediately prior to the beginning of smoke training. Ozone monitoring is only required from April 1

MO 780-1204 (6-93)

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

through October 31.

13. *Reporting*. The Permittee shall submit to the APCP no less frequently than quarterly the air quality monitoring data collected pursuant to Condition 12. All air quality monitoring data collected pursuant to Condition 12 shall be submitted to APCP no later than 60 days prior to the commencement of smoke training.

14. *Corrective Action*. If the air quality monitoring data of Condition 12 does not substantially conform with the assumptions and conclusions of air quality modeling or if the smoke training is shown to cause or contribute to a violation of National Ambient Air Quality Standards (NAAQS), the Director, MDNR, may require the Permittee to take corrective action or may revoke the permit.

15. *Post-Startup Monitoring*. Beginning with the commencement of smoke training, the Permittee shall collect at least two years of continuous air quality monitoring data for PM_{10} and ozone in a manner and at locations to be determined by the Permittee with review and approval by the APCP. Ozone monitoring is only required from April 1 through October 31.

16. *Reporting*. The Permittee shall submit to the APCP no less frequently than quarterly the air quality monitoring data collected pursuant to Condition 15.

<u>Meteorological Monitoring</u>

17. *Observers*. At all times during the operation of the smoke generators, a network of observers shall be stationed at locations from which they can observe the behavior of generated smoke and whether smoke crosses the Fort Leonard Wood property boundary. The observers shall maintain continuous electronic or visual communications with the smoke generator operators.

18. *Meteorological Monitoring*. For the entire period beginning no less than one hour prior to generating smoke and ending

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

no less than one hour after ceasing generating smoke, the Permittee shall measure and record no less frequently than every sixty seconds meteorological data including ambient air temperature, atmospheric pressure, relative humidity, atmospheric stability, mixing height, and wind speed and direction at each training site at which smoke training is conducted. The monitoring records shall indicate those periods during which smoke is generated. Meteorological monitoring records shall be maintained by the Permittee and made available to the MDNR personnel on request.

19. *Limitations on Operations*. Smoke training shall only be conducted at the locations and under the meteorological conditions as described in Attachment A.

The Permittee may conduct smoke training operations at more than one location listed in Attachment A during any 24-hour period. However, smoke training operations may not occur at more than one location simultaneously, and the smoke training operations at multiple sites may not exceed the limitations of Condition 2.

20. *Meteorologist*. Meteorological monitoring and forecasting activities required by this permit shall be coordinated and supervised by a person (the "Meteorologist") with at least a Bachelor of Science degree in meteorology or atmospheric science from an accredited university or college.

21. *Forecasting Acceptable Conditions*. Smoke training may take place only if the Meteorologist forecasts no earlier than two hours prior to each smoke training exercise that the approved meteorological conditions described in Attachment A will exist throughout the anticipated smoke training exercise.

22. *Forecast Certification*. Prior to each smoke training exercise, the Meteorologist shall certify in writing the pre-exercise forecast required by Condition 21. Said forecast certification shall be maintained by the Permittee and made available to MDNR personnel on request.

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

23. *Pre-Exercise Computer Modeling*. Prior to each smoke training exercise, the Permittee shall use the Tactical Smoke computer model, TACSMK, or equivalent, to perform pre-exercise predictions of smoke behavior during anticipated smoke training exercises. Printouts of the TACSMK pre-exercise predictions shall be maintained by the Permittee and made available to MDNR personnel upon request.

24. *Prohibitions*. Generation of smoke shall cease if:

    a) Meteorological conditions are not within those approved for smoke training as described in Attachment A, or

    b) Smoke behavior differs significantly from the pre-exercise predictions of Condition 23 so as to indicate a reasonable likelihood that visible smoke will drift beyond the Fort Leonard Wood property boundary, or

    c) Conditions or smoke behavior are such so as to create a reasonable likelihood that visible smoke will cross the Fort Leonard Wood property boundary or that National Ambient Air Quality Standards at the Fort Leonard Wood property boundary will be exceeded, or

    d) There is an interruption for 2 minutes in the meteorological monitoring required by Condition 18, or

    e) Under other conditions as may be determined by the Director, MDNR.

    For the purposes of determining compliance with Condition 24a, meteorological conditions shall be deemed outside the approved conditions when three consecutive measurements recorded at one-minute intervals are outside approved conditions.

Soil and Vegetation Sampling

25. *Soil and Vegetation Sampling Plan (SVSP)*. Within 180 days of the issuance of this permit, the Permittee shall submit

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

two copies of a SVSP to the Staff Director, APCP, for review and approval.

The SVSP shall describe the method and manner of collecting and analyzing soil and vegetation samples and of monitoring the impact of smoke training activities on soils and vegetation. The SVSP shall include an inventory of vegetation found within the impact area that has any recreational or commercial value and shall identify any of the vegetation which may be sensitive to elevated ozone or particulate levels. The SVSP shall also include descriptions of operational or seasonal restrictions that could be used to minimize emissions and any accompanying deposition effects.

26. *Pre-Startup Sampling*. For no less than one year prior to the commencement of smoke training, the Permittee shall collect and analyze soil and vegetation samples no less frequently than quarterly at each location described in Attachment A and at other locations described in the SVSP.

27. *Reporting*. The Permittee shall report the results of the sampling and analysis required by Condition 26 to the APCP within 60 days of the date the samples are collected. All soil and vegetation sampling data collected pursuant to Condition 26 shall be submitted to APCP no later than 60 days prior to the commencement of smoke training.

28. *Post-Startup Sampling*. Upon commencement of smoke training, the Permittee shall collect and analyze soil and vegetation samples no less frequently than monthly at each location described in Attachment A and at other locations described in the SVSP. After two years of sampling, the Permittee may petition the Staff Director, APCP, for modification of the sampling schedule and frequency.

29. *Reporting*. The Permittee shall report to the APCP no less frequently than quarterly the soil and vegetation sampling data collected pursuant to Condition 28.

30. *Corrective Action*. MDNR may reevaluate the Best Available

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

Control Technology (BACT) analysis in support of this permit, establish any necessary operational restrictions, e.g., restricting smoke training to only the summer months, or require the Permittee to take any necessary corrective action, if the results of the soil, vegetation, or ambient air sampling indicate adverse deposition effects.

Other Special Conditions

31. *Record Retention*. All records required by this permit shall be maintained by the Permittee and made available for inspection by MDNR personnel for no less than ten years from the date the record is created.

32. *Public Information*. The Permittee shall cooperate with the APCP in presenting the air quality monitoring data of Condition 12 and soil and vegetation sampling data of Condition 26 to the public at an informational meeting to be convened by the APCP.

33. *Effects on Visibility*. Smoke training shall not be conducted so as to constitute or contribute to a safety hazard to air traffic or vehicular traffic on highways accessible to the public during smoke training exercises.

34. *Reporting of Violations*. Unless a different requirement is expressly provided for in this permit, the Permittee shall report to the Enforcement Section, APCP, MDNR, no later than ten days after any noncompliance with any condition or requirement of this permit.

35. *Corrective Action*. If in the opinion of the Director, MDNR, the presence of PM_{10} or ozone in the ambient air exists in quantities and durations that directly or proximately cause or contribute to injury to human, plant, or animal life or health, or to property, or that unreasonably interferes with the enjoyment of life or the use of property, the Director, MDNR, may require the Permittee to submit a corrective action plan adequate to timely and significantly mitigate the emission or the impact of PM_{10} or ozone. The Permittee

PERMIT NUMBER 0695-010

FACILITY I.D. NUMBER 3860-0004-015

SPECIAL CONDITIONS:

The permittee is authorized to construct and operate subject to the following special conditions:

shall implement any such plan immediately upon its approval by the Director, MDNR. Failure to either submit or implement such a plan shall be a violation of the permit.

36. *Compliance With Other MDNR Permits*. The Permittee shall comply with the sampling and monitoring conditions of Missouri State Operating Permit No. MO-0117251 granted by the Missouri Department of Natural Resources, Missouri Clean Water Commission.

37. *Notification of Commencement of Smoke Training*. The Permittee shall not commence smoke training activities subject to this permit without first providing written notification of such commencement to the Director, MDNR, no later than 30 days prior thereto. Said notification shall include the certification by the Responsible Official that the Permittee has satisfied all conditions precedent to the commencement of smoke training as described in this permit.

Appendix K
SUMMARY OF MONITORING PROGRAMS

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Appendix K: Summary of Monitoring Programs

K.1 INTRODUCTION

This appendix provides information concerning the monitoring programs (monitoring plans and the adaptive management strategies) that will be implemented by Fort Leonard Wood (FLW) to ensure that the Proposed Action is carried out in a manner that protects environmental resources and values. The Army's Proposed Action for FLW is described in Section 3 of the *Environmental Impact Statement for the Relocation of US Army Chemical School and US Army Military Police School to Fort Leonard Wood, Missouri* (EIS).

This summary is intended to be a living document that is updated as necessary to reflect changes in environmental conditions and monitoring or management requirements. It provides an overview of the monitoring commitments being made by FLW and a road-map to the completion of the individual monitoring plans that will be prepared to satisfy these commitments. In addition, it was agreed that FLW would prepare and implement an adaptive management strategy to evaluate the monitoring data and determine the need for modification of the Proposed Action.

The information contained in this appendix was developed in coordination with the US Environmental Protection Agency (USEPA). A meeting was conducted with the USEPA on January 21, 1997, to provide an overview of the work in progress and identify USEPA concerns regarding the content, format, level of detail, and direction of the document.

K.2 EXISTING MONITORING PROGRAMS

Existing environmental monitoring programs that occur at FLW are conducted to comply with the requirements of the permits and monitoring programs identified in Appendix H of this EIS. These programs monitor water quality, air quality, hazardous materials, and miscellaneous other environmental parameters. It should be noted that these existing monitoring programs are ongoing and independent of the relocation of the US Army Chemical School and US Army Military Police School to FLW, but will provide additional baseline data to document conditions at FLW prior to relocation.

Two of the existing monitoring programs have been modified or expanded in response to BRAC-related activities. These two monitoring programs include water quality monitoring that is being conducted pursuant to Missouri State Operating Permit MO-0117251, and air quality monitoring which is being conducted pursuant to the Missouri Department of Natural Resources (MDNR), Air Pollution Control Program (APCP), Permit to Construct 0695-010. The monitoring requirements associated with these two permits have been incorporated into the monitoring programs for the BRAC action.

K.3 ADAPTIVE MANAGEMENT STRATEGY

Adaptive management is described within *The Ecosystem Approach: Healthy Ecosystems and Sustainable Economies* (Report of the Interagency Ecosystem Management Task Force, June 1995) as the "process of adjusting management actions and directions in light of new information about the ecosystem and about progress toward ecosystem goals." The adaptive management approach recognizes that there is often a need to adjust resource management programs based on increased understanding of ecosystem structure and function, and their relationship to specific management actions.

In overview, adaptive management works as follows: potential environmental effects are analyzed based on the best available information; management measures are implemented; monitoring is conducted; feedback is provided based on new insights gained; and management adjustments are made. This process allows for review and revision of environmental and other management approaches based on new knowledge and new technology.

The permit process currently used to monitor compliance with many environmental statutes and regulations is, in effect, an adaptive management strategy. For example, in FLW's current NPDES Operating Permit, the installation is required to monitor water quality parameters and report any exceedences of the permit standards. When an accedence is detected, FLW enters into a consultation process with the MDNR, Water Pollution Control Program, to identify potential management response actions that will be implemented to maintain permit compliance.

A similar approach will be used to monitor and respond to environmental compliance issues associated with the relocation of the US Army Chemical School and US Army Military Police School to FLW. The Environment, Energy and Natural Resources Division, Directorate of Public Works at FLW will be responsible for monitoring environmental parameters to ensure compliance with the following permits or implementation requirements:

- Missouri Department of Natural Resources, Air Pollution Control Program, Permit to Construct 0695-010;
- US Fish and Wildlife Service (USFWS) Final Biological Opinion for the Relocation of the US Army Chemical School and US Army Military Police School to FLW (Log No. 96-R3-CMFO-02); and
- Missouri Department of Natural Resources, Water Pollution Control Program, Operating Permit MO-0117251.

The results of this monitoring will be used to assess the environmental effects of BRAC-relocated training activities. If any exceedences of the permit standards are detected, FLW will coordinate with the permitting agency in developing and implementing an adaptive management response. This strategy will ensure compliance with the standards and conditions of the identified permits. It should be noted that the adaptive management strategy for certain monitoring programs also includes additional monitoring that is not required pursuant to the conditions of the regulatory permit. This additional monitoring is associated with FLW's commitment to respond to specific monitoring recommendations from the USEPA.

In addition to permit compliance, FLW will use an adaptive management strategy to respond to the recommendations of the USEPA to conduct air monitoring for potential human health effects and biomonitoring for potential effects to wildlife. Although these monitoring activities are not required pursuant to a regulatory permit, FLW will coordinate with USEPA in developing mutually-agreeable monitoring plans and adaptive management strategies for each of these issues.

K.4 BRAC MONITORING PLANS

The following sections provide an overview of the monitoring plans and adaptive management strategies that will be implemented in conjunction with the BRAC relocation of the US Army Chemical School and US Army Military Police School to FLW. Where draft monitoring plans have been prepared, the monitoring protocol is briefly summarized. In instances where a monitoring plan is not yet available, the monitoring plan summary identifies the permit conditions or agency recommendations to which the monitoring plan will respond. The regulatory agencies responsible for approving each monitoring plan, and the advisory agencies (where applicable), are also identified.

The tables contained within each section provide an overview of the monitoring activities, evaluation criteria, reporting guidelines, permitting or coordinating agency, and possible adaptive management responses that could be implemented if there is non-compliance with the identified evaluation criteria. Monitoring briefly describes the actions that will be taken to monitor specific environmental parameters that could be affected by the Army's Proposed Action. The evaluation criteria provide a measurable threshold by which the monitoring data can be evaluated to determine if changes in the measured parameters are significant or less than significant. Reporting identifies the type, frequency, and receiving entity of any reporting that is required as part of the monitoring plan. The permitting or coordinating agency is the entity that has regulatory or permitting authority over the resources that are addressed by the monitoring program. Lastly, the adaptive management response describes the action(s) that would be taken if non-compliance with an established evaluation criteria is identified.

It should be noted that potential response actions that could be implemented to avoid or reduce significant impacts are provided in order to allow for some evaluation of their efficacy. However, the adaptive management approach recognizes that forecasting the magnitude of these impacts or the response actions that will be most effective in avoiding or reducing these impacts, is extremely difficult. By requiring formulation of response actions in coordination with the permitting or coordinating agency, the adaptive management strategy allows for the identification and implementation of other response actions in addition to or in lieu of the identified potential responses. The key to this approach is that regardless of the response action that is chosen and implemented, the action must, at a minimum, comply with the evaluation criteria. This approach allows for continual reevaluation of the potentially impacted resources through the assessment of monitoring feedback and current information sources, and implementation of the most appropriate and cost effective solution available at that time.

K.4.1 Air Quality

K.4.1.1 Introduction

The air quality monitoring program will be implemented to ensure compliance with National Ambient Air Quality Standards (NAAQS) and Prevention of Significant Deterioration (PSD) increment. Fort Leonard Wood is located within an air quality attainment area, indicating that the NAAQS are met. New or modified stationary sources of air emissions may not cause an exceedence of the NAAQS. In addition, new or modified sources within attainment areas may not generate emissions of criteria pollutants that exceed the PSD increment established for the area. Prevention of Significant Deterioration increment identifies the amount of air quality deterioration that may occur within an area without exceeding the NAAQS, and are intended to prevent new sources from causing an attainment area to become a non-attainment area.

The MDNR, Air Pollution Control Program, is responsible for reviewing new or modified sources of air emissions and establishing special conditions on project construction and operation that will avoid exceedences of the NAAQS and PSD increments. These conditions are set forth in a Permit to Construct (air permit). Pursuant to BRAC procedural requirements, FLW applied for and was granted an air permit for smoke training prior to preparation of this EIS. The permit application was based on the best available information at the time the permit was prepared and submitted.

The current air permit (permit number 0695-010) establishes emission limitations and other special conditions that describe the manner in which the Proposed Action will be implemented. The air permit also establishes specific requirements for ambient air quality monitoring and meteorological monitoring. The purpose of these monitoring programs is to monitor PM-10 and ozone to ensure that NAAQS are not exceeded. In addition, the permit requires a public information meeting to review pre-startup monitoring results.

The Draft *Ambient Air Monitoring and Quality Assurance Manual for Fort Leonard Wood Smoke Training P.D. Permit (Revised)* (AeroMet, 1996) was prepared to satisfy the air permit requirements. The manual sets forth the methodology for pre-startup (prior to the commencement of smoke training at FLW) and post-startup ambient air quality and meteorological monitoring. Pre-startup monitoring was initiated in October 1996 based on the protocols established in this manual.

Following the initial permit application, further investigation of optimum smoke training methods resulted in the adoption of a preferred alternative (identified in the EIS as the Optimum Training Method or OPTM). The OPTM allows use of greater quantities of fog oil than allowed under the existing air permit. In order to implement the OPTM alternative, FLW will need to pursue a revised air permit. If a new air permit is granted, FLW will revise the existing air monitoring manual as necessary to achieve consistency with the monitoring requirements of the revised air permit. A revised ambient air quality monitoring and meteorological monitoring program will be prepared in coordination with MDNR. This coordination will also involve the USEPA in an advisory capacity. Smoke training associated with the OPTM may not commence until the revised air permit is issued and the revised air quality monitoring plan is approved by MDNR.

K.4.1.2 Air Quality Monitoring Plan Summary and Adaptive Management Strategy

The air quality monitoring plan was prepared based on published USEPA guidelines, including: *Quality Assurance Handbook for Air Pollution Measurement Systems, Volumes I, II, and III*; *On-Site Meteorological Program Guidelines for Regulatory Modeling Applications*; and *Ambient Monitoring Guidelines for Prevention of Significant Deterioration (PSD).* The purpose of the air quality monitoring plan is to identify the specific procedures that will be used to measure and document ambient air quality prior to and following the onset of smoke training at FLW. The plan provides detailed descriptions of monitoring protocols; chain of custody procedures; data processing, validation, and reporting; quality assurance and performance auditing; and overall project coordination.

The air quality monitoring plan includes three types of monitoring activities: (1) ambient air quality monitoring; (2) meteorological monitoring; and (3) smoke movement monitoring. Ambient air quality monitoring and meteorological monitoring will be conducted using a network of nine monitoring stations located on and near FLW. The locations of these monitoring stations were selected in consultation with MDNR, the US Army Corps of Engineers, and the Missouri Highway Department County Roads Commissioner. The monitoring stations are sited both in areas that were predicted to experience the highest pollutant concentrations, and in areas of potential public exposure to fog oil emissions.

The ambient air quality monitoring stations will monitor concentrations of PM-10 and ozone. In addition, a SODAR Acoustic Sounding unit will be housed in one station to monitor mixing heights, turbulence, and wind speed and direction. The meteorological monitoring stations will monitor wind speed, wind direction, temperature, solar radiation, relative humidity, and barometric pressure. The ozone analyzer, SODAR unit, and all meteorological sensors will operate on a continuous basis. Data loggers or internal data storage units will be used to capture and store this data, and regular site visits will be conducted to maintain equipment and confirm proper operation. Pre-startup monitoring for PM-10 will be conducted pursuant to the USEPA six-day particulate sampling schedule. Post-startup monitoring schedules are still being discussed with MDNR.

Ambient air quality monitoring and meteorological monitoring began in October 1996 and will be conducted for a minimum of one year prior to the startup of smoke training at FLW, in accordance with the existing air quality permit. Although the air permit only requires a minimum of one year of pre-startup monitoring, FLW is committed to conducting pre-startup monitoring for a minimum of two consecutive years to ensure the collection of representative data. The pre-startup monitoring will be used to establish a database on existing air quality and meteorology in the vicinity of the source (smoke training areas) prior to initiation of smoke training at FLW. Additionally, as specified in the existing air quality permit post-startup monitoring will be conducted for a minimum of two years. At the end of this two-year period, the data will be evaluated by MDNR and monitoring may be continued as specified in the air permit. Fort Leonard Wood is committed to conducting post-startup monitoring for a maximum of five consecutive years

Smoke movement monitoring will be conducted during mobile and field training exercises. A network of observers will be stationed at locations where they can observe the behavior and movement of generated smoke. The observers will maintain continuous electronic or visual communications with the smoke generators. If smoke behavior differs significantly from the pre-exercise predictions (indicating a reasonable likelihood that visible smoke will drift beyond the FLW property boundary), generation of smoke will cease.

Table K-1 identifies monitoring requirements, evaluation criteria, reporting requirements, permitting agency, and adaptive management responses for ensuring air quality compliance at FLW.

Table K-1:
Air Quality Monitoring Plan Summary and Adaptive Management Strategy

Monitoring	Evaluation Criteria	Reporting	Permitting Agency	Adaptive Management Response
Ambient Air Monitoring				
FLW will collect at least two years of pre-startup air quality monitoring data for PM-10 and ozone in a manner consistent with the MDNR approved Ambient Air Monitoring and Quality Assurance Manual.	N/A	FLW will submit air quality monitoring data to the APCP no less than quarterly. All pre-startup air quality monitoring data will be submitted to the APCP no less than 60 days prior to the commencement of smoke training at FLW.	MDNR, Air Pollution Control Program	No management response is required.
Fort Leonard Wood will collect at least two years of post-startup air quality monitoring data for PM-10 and ozone in a manner consistent with the MDNR approved Ambient Air Monitoring and Quality Assurance Manual.	Ozone: NAAQS PM-10: NAAQS, PSD Increment	FLW will submit air quality monitoring data to the APCP no less than quarterly.	MDNR, Air Pollution Control Program	If the air quality monitoring data demonstrates that smoke training causes or contributes to a violation of the NAAQS or PSD increment for PM-10, FLW will initiate consultation with MDNR to develop an appropriate management response. Consultation will involve the USEPA in an advisory capacity.

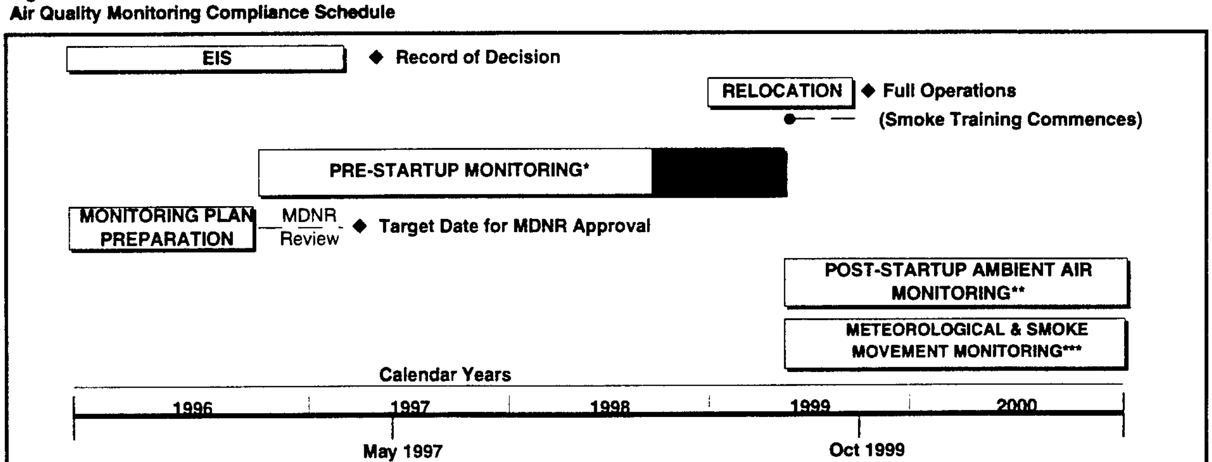
Table K-1: Air Quality Monitoring Plan Summary and Adaptive Management Strategy				
Monitoring	**Evaluation Criteria**	**Reporting**	**Permitting Agency**	**Adaptive Management Response**
Meteorological Monitoring				
Fort Leonard Wood will measure and record meteorological data as specified in the MDNR approved Ambient Air Monitoring and Quality Assurance Manual.	N/A	Meteorological monitoring records will be maintained by FLW and made available to MDNR personnel on request. Stability class data will be submitted at the end of one year.	MDNR, Air Pollution Control Program	No management response is required.
Smoke Movement Monitoring				
Smoke movement monitoring will be conducted during all smoke training exercises as specified in the MDNR approved Ambient Air Monitoring and Quality Assurance Manual.	Movement of visible smoke beyond FLW property boundaries.	N/A	MDNR, Air Pollution Control Program	Observers will maintain continuous electronic or visual communication with the smoke generators. If smoke behavior differs significantly from the pre-exercise predictions, and indicates a reasonable likelihood that visible smoke will drift beyond the FLW property boundaries, generation of smoke will cease.

K.4.1.3 Compliance Schedule

Figure K-1 illustrates the compliance schedule for air quality monitoring. Pre-startup monitoring began in October 1996 and will continue for at least two years. The Draft *Ambient Air Monitoring and Quality Assurance Manual for Fort Leonard Wood Smoke Training PSD Permit (Revised)* (AeroMet, 1996) was completed and submitted to MDNR in October 1996. The plan has been reviewed twice by MDNR, and the target date for final approval is February 1997. If a new air permit is obtained, a revised monitoring plan will be submitted within 90 days of MDNR permit approval. Smoke training based on the new permit may not commence until the revised air quality monitoring plan is approved by MDNR.

Post-startup ambient air quality monitoring, meteorological monitoring, and smoke movement monitoring will begin with the commencement of smoke training. Post-startup ambient air quality monitoring will be conducted for a period of two years. An additional three years of post-startup ambient air quality monitoring may be conducted if monitoring results and consultation with MDNR indicate that additional data is required. Meteorological monitoring and smoke movement monitoring will continue as specified in the air permit.

Figure K-1
Air Quality Monitoring Compliance Schedule



*Pre-startup ambient air and meteorological monitoring will continue for a minimum of two years and may continue until post-startup monitoring begins (hatched box). Ozone monitoring is only required from April 1 through October 31.
** Post-startup ambient air monitoring will continue unitl October 2001. Ozone monitoring is only required from April 1 through October 31.
***Post-startup meteorological and smoke movement monitoring will continue as specified in the air permit.

K.4.2 Soils and Vegetation

K.4.2.1 Introduction

A Soils and Vegetation Monitoring Program will be developed to comply with Special Conditions 25 through 30 of MDNR Permit to Construct 0695-010, comply with the Federal Clean Air Act, and evaluate when detectable levels of fog oil residues (total petroleum hydrocarbons) on vegetation or in soils occur as result of mission activities associated with the BRAC relocation. The Soils and Vegetation Monitoring Program, when implemented, will provide for the ongoing evaluation of potential impacts to soils and vegetation from the deposition of fog oil residues. The monitoring program also provides for the reevaluation of the Best Available Control Technology (BACT) in support of the current air permit to construct and development of an appropriate management response if fog oil residues are found.

Fort Leonard Wood will conduct quarterly soil and vegetation sampling at each smoke training area for at least two years prior to commencement of smoke training to assist in the establishment of the environmental baseline for total petroleum hydrocarbons (TPH) levels. Although the air permit requires a minimum of one year of monitoring prior to smoke training, FLW is committed to conducting pre-startup monitoring for a minimum of two consecutive years to ensure the adequate collection of representative data. The two years of post-startup soil and vegetation monitoring data for TPH will then be compared against the pre-startup environmental baseline to determine what concentration of measured TPH is associated with deposition from smoke training.

K.4.2.2 Soils and Vegetation Monitoring Plan Summary and Adaptive Management Strategy

A draft *Soil and Vegetation Sampling Plan* that addresses pre-startup and post-startup monitoring was prepared by Burns and McDonnell in September 1996 and submitted to MDNR for approval. MDNR has not yet taken action on this draft plan. Preliminary sampling according to the draft plan was initiated in February 1997. In addition, the MDNR Permit to Construct suggests that corrective actions may be required if adverse deposition impacts from smoke training are indicated.

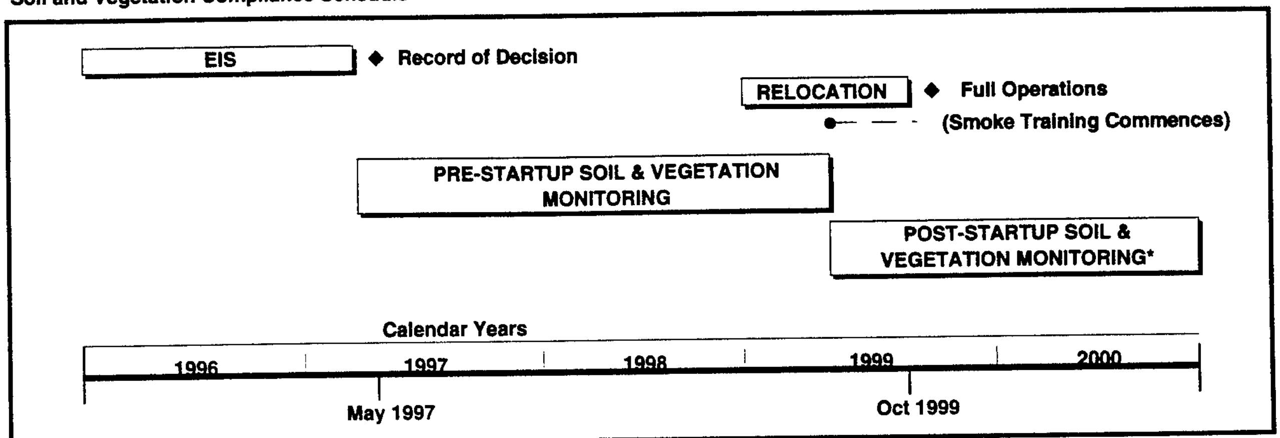
Table K-2 provides a framework for the development of the Soils and Vegetation Monitoring Program. The table provides a summary of the monitoring requirements that must be addressed by the monitoring plan and identifies the evaluation criteria and adaptive management response(s) that complete the adaptive management strategy.

Table K-2: Soils and Vegetation Monitoring Plan Summary and Adaptive Management Strategy				
Monitoring	**Evaluation Criteria**	**Reporting**	**Permitting Agency**	**Adaptive Management Response**
Fort Leonard Wood will conduct soils and vegetation monitoring for detectable levels of fog oil residues (i.e., total petroleum hydrocarbons) on vegetation or in soils at the identified locations in Attachment A of MDNR Permit to Construct 0695-010. Other soils and vegetation monitoring requirements of this permit include an inventory of vegetation in the impact area that has recreational or commercial value and which may be sensitive to elevated ozone or particulate levels.	Detectable levels of TPH on vegetation or in soils	The reporting of the results of the Soils and Vegetation Monitoring Program will be conducted as required by Special Conditions 27 and 29 in MDNR Permit to Construct 0695-010. In summary, the monitoring results will be recorded and submitted to the APCP no less than quarterly for each of the sites that are to be monitored in the pre-startup sampling and no less than monthly for each of the sites that are to be monitored in the post-startup sampling. In addition, all soils and vegetation sampling results for pre-startup sampling will be submitted at least 60 days prior to the commencement of smoke training.	MDNR, APCP	Fort Leonard Wood will evaluate the results of the Soils and Vegetation Monitoring Program to determine if detectable levels of TPH are occurring on vegetation or in soils and then forward the results to MDNR for review. If detectable levels of fog oil residues TPH are found on vegetation or in soils, the APCP may reevaluate the Best Available Control Technology (BACT) analysis in support of MDNR Permit to Construct 0695-010 and establish new operational or seasonal restrictions. The USEPA will assist, in an advisory capacity, in any reevaluation of the BACT to develop an appropriate management response.

K.4.2.3 Compliance Schedule

Figure K-2 provides an overview of the time line for implementation of the Soil and Vegetation Monitoring Program in relation to other significant events associated with the BRAC relocation and NEPA process for the relocation. A draft *Soil and Vegetation Sampling Plan* was prepared by Burns and McDonnell in September 1996. Post-startup soil and vegetation monitoring is required to be conducted for a minimum of two years. After completion of the two years of post-startup monitoring FLW may petition the APCP to reduce or eliminate the monitoring schedule based on the sampling results.

Figure K-2
Soil and Vegetation Compliance Schedule



* Post-startup soil & vegetation monitoring will continue until October 2001.

K.4.3 Human Health

K.4.3.1 Introduction

The human health effects of exposures to fog oil were evaluated in a Preliminary Risk Evaluation (PRE) based on review of existing toxicity literature and in-depth chemical analysis of fog oil for chemicals of concern in fog oil smoke and liquid fog oil. The PRE concluded that sustained exposure of military personnel to fog oil smoke at a concentration of about 5 mg/m^3 (or less) presented an insignificant hazard or risk. Occasional brief excursions to levels between 5 and 10 mg/m^3 for unprotected personnel were considered an insignificant health threat. Additionally, it was determined to be highly unlikely that individuals positioned away from fog oil training areas would be exposed to fog oil at concentrations that would pose a health risk. Based on the findings and conclusions of the PRE, the EIS for the Proposed Action did not identify significant adverse human health effects associated with exposure to fog oil.

The USEPA comment letter on the Draft EIS identified a concern about the potential human health effects of smoke training. The principal concerns cited in the letter were: (1) the chemical composition of fog oil was not defined to the extent that toxic effects could be evaluated; (2) compositional changes could occur in the fog oil due to the heat of the generator; and (3) unhealthy concentrations of fog oil could move beyond installation boundaries or into the cantonment area. Through a series of meetings between USEPA and FLW, it was agreed that FLW would commit to implementing a monitoring program that would consist of: testing of fog oil after it leaves the generator for mutagenicity by a modified Ames test; and testing of fog oil smoke for chemical compounds including benzene, toluene, ethylbenzene, xylene (BTEX), and polycyclic organic matter (POM)/Polycyclic Aromatic Hydrocarbons (PAHs). In addition, it was agreed that FLW would prepare and implement an adaptive management strategy to evaluate the monitoring data and determine the need for modification of the Proposed Action.

K.4.3.2 Human Health Monitoring Plan Summary and Adaptive Management Strategy

Air monitoring and fog oil testing will be conducted to address USEPA concerns regarding the potential for human health effects due to smoke training at FLW. The details of study design, chemical parameters to be analyzed, and sampling and analytical methods have not been developed, but will be mutually agreed with USEPA, MDNR, and FLW before monitoring is initiated.

It should be noted that FLW is currently engaged in an experimental program to sample and test fog oil smoke for mutagenicity to address USEPA concerns regarding the potential of chemical transformations from heat of the generator. The results of this testing will be available to the decision-maker before the Record of Decision (ROD) for the EIS is completed and signed.

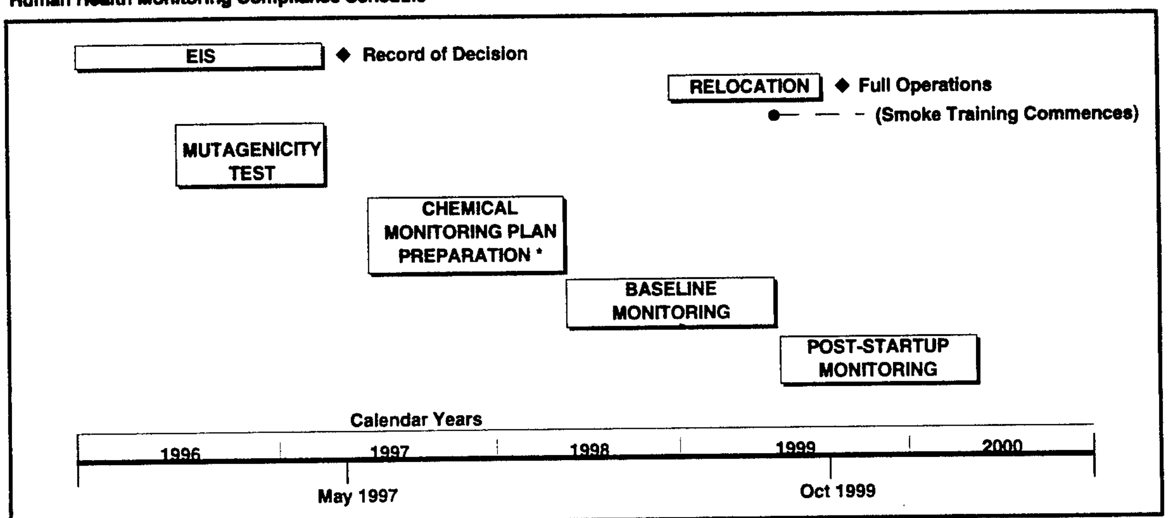
Table K-3:
Human Health Monitoring Plan Summary and Adaptive Management Strategy

Monitoring	Evaluation Criteria	Reporting	Coordinating Agency	Adaptive Management Response
Mutagenicity Testing				
Fort Leonard Wood will conduct sampling and analysis of fog oil after it leaves the generator and mutagenicity testing of the re-captured fog oil.	Mutagenicity index: less than 1 is considered safe (non-mutagenic).	Data to be available for ROD. Data will also be submitted to USEPA and MDNR no more than 60 days after the completion of testing.	USEPA, MDNR	If monitoring and data analysis results in a mutagenicity index greater than 1, FLW will consult with USEPA and MDNR to develop a mutually agreeable management response.
Chemical Testing				
Fort Leonard Wood will conduct additional tests of fog oil for Benzene, Toluene, Ethylbenzene, Xylene (BTEX), Polycyclic Organic Matter (POM)/Polycyclic Aromatic Hydrocarbons (PAHs), and total oil.	Protective (safe) concentration of fog oil recommended in National Academy of Science report; in conjunction with published inhalation toxicity values for target compounds.	Data will be submitted to USEPA and MDNR no more than 30 days after taste results are available.	USEPA, MDNR	If test results exceed established criteria, FLW will consult with USEPA and MDNR to develop a mutually agreeable monitoring program.
Chemical Monitoring				
Fort Leonard Wood will develop monitoring program for chemicals based on chemical test results. * monitoring will only be conducted if test results exceed established criteria.	same as above	Data will be submitted to USEPA and MDNR no more than 60 days after the completion of monitoring.	USEPA, MDNR	If monitoring values exceed established criteria, FLW will consult with USEPA and MDNR to develop a mutually agreeable management response.

K.4.3.3 Compliance Schedule

Figure K-3 provides an overview of the time line for implementation of the Human Health Monitoring Program in relation to other significant events associated with the BRAC relocation and NEPA process for the relocation. It is currently anticipated that air sampling to collect baseline data for the human health monitoring will begin at least 12 months prior to the commencement of smoke training at FLW. Monitoring could continue for at least 12 months after smoke training is initiated.

Figure K-3
Human Health Monitoring Compliance Schedule



* Chemical testing of fog oil may eliminate the need for chemical monitoring.

K.4.4 Endangered Species

K.4.4.1 Introduction

An Endangered Species Monitoring Program will be developed to comply with the terms and conditions of the Biological Opinion for the Relocation of the US Army Chemical School and US Army Military Police School to FLW (Log No. 96-R3-CMFO-02), comply with the Endangered Species Act of 1973 (ESA), as amended, and evaluate if take of federally-listed species will occur as a result of mission activities associated with the BRAC relocation. The Endangered Species Monitoring Program will provide for the ongoing evaluation of potential impacts to the federally-listed species addressed by the Biological Opinion (i.e., monitoring) and will allow for an appropriate and timely response (i.e., adaptive management response) to be implemented if impacts occur.

K.4.4.2 Endangered Species Monitoring Plan Summary and Adaptive Management Strategy

An Endangered Species Monitoring Plan which describes how monitoring will be conducted will be submitted to the USFWS and Missouri Department of Conservation (MDC) for approval prior to the initiation of endangered species monitoring for the 1997 field season. This plan will provide for the implementation of the terms and conditions of the Biological Opinion for the Relocation of the US Army Chemical School and US Army Military Police School to FLW (Log No. 96-R3-CMFO-02). In summary, monitoring required by the Biological Opinion includes fog oil and TPA contaminant studies of a non-listed surrogate bat species that resides on the installation; analysis of fog oil and TPA contaminants in the bat guano from specific caves located on the installation; annual monitoring of Indiana and gray bat population demographics in specific caves located on the installation; TPA contaminant studies of common bird species that reside on the installation; studies of the number and distribution of wintering bald eagles on the installation; and studies of whether fog oil hydrocarbons and TPA, occurring in sediments from the Big Piney River and Roubidoux Creek are bioavailable to or bioaccumulating in fish, and constitute a risk to bald eagles. It should be noted that there is substantial overlap between the terms and conditions of the above referenced Biological Opinion and the Biological Opinion for the Master Plan and Ongoing Mission for the US Army Engineer Center and Fort Leonard Wood, Missouri (Log No. 96-R3-CMFO-01). Therefore, relevant data collected during monitoring required by the latter biological opinion may be used to meet the data requirements for this monitoring program.

Table K-4 provides a framework for the development of the Endangered Species Monitoring Program. The table provides a summary of the monitoring requirements that must be addressed by the monitoring plan and identifies the evaluation criteria and adaptive management response that complete the adaptive management strategy.

Table K-4:
Endangered Species Monitoring Plan Summary and Adaptive Management Strategy

Monitoring	Evaluation Criteria	Reporting	Permitting Agency	Adaptive Management Response
Fort Leonard Wood will conduct monitoring for federally-threatened and endangered species as specified in the Biological Opinion for the Relocation of the US Army Chemical School and US Army Military Police School to FLW (Log No. 96-R3-CMFO-02).	Incidental take statement for Indiana bat, gray bat, and bald eagle in the Biological Opinion for the Relocation of the US Army Chemical School and US Army Military Police School to FLW (Log No. 96-R3-CMFO-02).	Incidental take of Indiana bat, gray bat, or bald eagle during BRAC-associated mission activities will be reported to the USFWS within 15 days. In addition, an annual report summarizing all progress and results to date in implementing the Endangered Species Monitoring Program, including management and research recommendations, will be submitted to the USFWS and MDC by December 31 of each year.	USFWS	Fort Leonard Wood will compare the results of the Endangered Species Monitoring Program to the incidental take statement in the Biological Opinion for the Relocation of the US Army Chemical School and US Army Military Police School to FLW (Log No. 96-R3-CMFO-02). Fort Leonard Wood will immediately cease any activities which result in an exceedence of the amount or extent of incidental take identified in the above biological opinion pending reinitiation of Section 7 consultation. In addition, FLW will reinitiate Section 7 consultation with the USFWS within 30 days of determining that consultation is required. FLW will then implement the terms and conditions identified by the USFWS during consultation to maintain the exemption provided by Section 7(o)(2) of the Endangered Species Act.

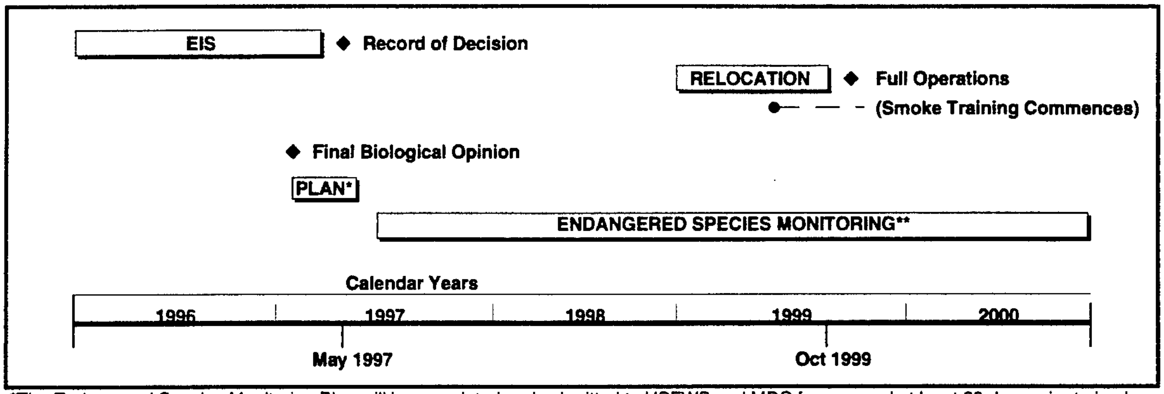
Table K-4:
Endangered Species Monitoring Plan Summary and Adaptive Management Strategy

Monitoring	Evaluation Criteria	Reporting	Permitting Agency	Adaptive Management Response
Fort Leonard Wood will be responsible for evaluating new information on mission activities associated with the BRAC relocation that may affect federally-threatened and endangered species that occur on the installation.	Previously unidentified effects to listed species from BRAC-associated mission activities as a result of (1) new and previously unconsidered information on the effects of mission activities, (2) modification of mission activities in a manner that causes effects that were not previously considered, or (3) listing of a new species or designation of critical habitat that may be affected by mission activities.	Previously unidentified effects to listed species from BRAC-associated mission activities will be reported to the USFWS within 15 days and discussed in the annual report that is submitted to the USFWS and MDC by December 31 of each year.	USFWS	Fort Leonard Wood will evaluate new information on mission activities associated with the BRAC relocation against the evaluation criteria that require reinitiation of Section 7 consultation as identified in the Final Biological Opinion for the Relocation of the US Army Chemical School and US Army Military Police School to FLW (Log No. 96-R3-CMFO-02). In addition, FLW will reinitiate Section 7 consultation with the USFWS within 30 days of determining that consultation is required. FLW will then implement terms and conditions identified by the USFWS during consultation to maintain the exemption provided by Section 7(o)(2) of the Endangered Species Act.

K.4.4.3 Compliance Schedule

Figure K-4 provides an overview of the time line for development and implementation of the Endangered Species Monitoring Program in relation to other significant events associated with the BRAC relocation and NEPA process for the relocation. The Endangered Species Monitoring Plan is required to be submitted to the USFWS and MDC for approval at least 60 days prior to initiation of endangered species monitoring activities. The plan must provide a thorough discussion of sample locations, statistical design, and sample and analysis protocols. Monitoring will be initiated during the 1997 field season and will be continued for a minimum of five years after relocation of mission activities.

Figure K-4
Endangered Species Monitoring Compliance Schedule



*The Endangered Species Monitoring Plan will be completed and submitted to USFWS and MDC for approval at least 60 days prior to implementation, which must commence during the 1997 field season.
**The endangered species monitoring will continue for five years.

K.4.5 Biological Indicators

K.4.5.1 Introduction

The Biological Indicators Monitoring Program for the relocation of the US Army Chemical School and US Army Military Police School to FLW will be developed to comply with the USEPA's request to monitor potential effects of smoke training on local biota. Limited monitoring of a select group of biota will be conducted to determine whether toxic effects attributable to smoke training are occurring. Specific effects of concern will be determined during consultation with the USFWS, USEPA and MDC. Monitored biota will be selected based on the following minimum criteria in order to be considered a proper biological indicator: (1) is abundant enough to ensure sufficient collection of data; (2) is not a federally protected species; (3) is representative of species that reside on the installation; and (4) has potential for exposure. It should be noted that this monitoring program is intended to address concerns raised by the USEPA and does not address similar biomonitoring issues that are required as terms and conditions of the Biological Opinion for the Relocation of the US Army Chemical School and US Army Military Police School to FLW (Log No. 96-R3-CMFO-02). These latter requirements are addressed by the Endangered Species Monitoring Program.

K.4.5.2 Biological Indicators Monitoring Plan Summary and Adaptive Management Strategy

A Biological Indicators Monitoring Plan which describes how monitoring will be conducted will be submitted to the USFWS, USEPA and MDC prior to the initiation of monitoring. Fort Leonard Wood will coordinate with each of these agencies in the development of a monitoring plan that addresses discrete issues of concern associated with smoke training. Fort Leonard Wood's coordination with these agencies will establish the goals (i.e., evaluation criteria) of the monitoring program and identify a study methodology and select group of biological indicators that will provide the necessary data and analysis.

Table K-5 provides a framework for the development of the Biological Indicators Monitoring Program. The table provides a summary of the monitoring requirements that must be addressed by the monitoring plan and identifies the evaluation criteria and adaptive management response that complete the adaptive management strategy.

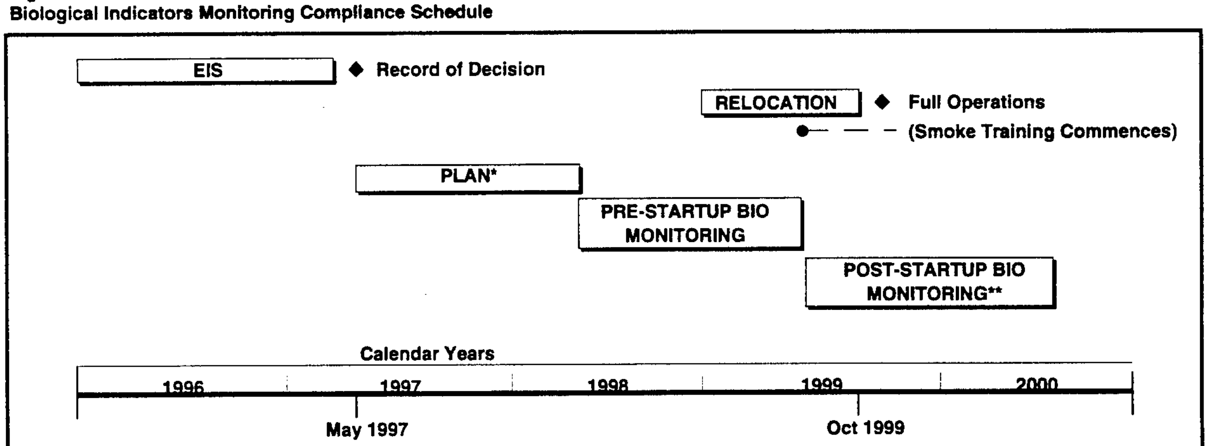
Table K-5: Biological Indicators Monitoring Program

Monitoring	Evaluation Criteria	Reporting	Coordinating Agencies	Adaptive Management Response
A study methodology will be developed by FLW in coordination with the USFWS, USEPA, and MDC to address potential toxic effects to biota from smoke training. These potential effects will address issues that are not covered by the biomonitoring required in the terms and conditions of the Biological Opinion for the Master Plan and Ongoing Mission (Log No. 96-R3-CMFO-010), or the Biological Opinion for the Relocation of the US Army Chemical School and US Army Military Police School (Log No. 96-R3-CMFO-02).	Fort Leonard Wood will develop appropriate evaluation criteria for issues of concern in coordination with the USFWS, USEPA, and MDC.	An annual report that addresses monitoring activities that have been conducted and the results of those activities will submitted to the USFWS, USEPA and MDC by December 31 of each year.	USFWS, USEPA, and MDC	Fort Leonard Wood will evaluate the results of the Biological Indicators Monitoring Program to determine if the evaluation criteria for the program have been exceeded and then forward the results to the USFWS, USEPA, and MDC for review. Fort Leonard Wood will then consult with the USFWS, USEPA, and MDC to evaluate the effects and associated mission activities. An appropriate management response will be developed.

K.4.5.3 Compliance Schedule

Figure K-5 provides an overview of the time line for implementation of the Biological Indicators Monitoring Program in relation to other significant events associated with the BRAC relocation and NEPA process for the relocation. It is currently anticipated that biomonitoring associated with the Biological Indicators Monitoring Program will begin at least one year prior to the commencement of smoke training at FLW. The time line for biomonitoring after smoke training is initiated has yet to be determined by FLW, the USFWS, USEPA, and MDC, but is expected to be conducted for a minimum of two years. This time line is consistent with other monitoring programs associated with the BRAC relocation. Development of a Biological Indicators Monitoring Plan will therefore need to be completed prior to September 1997.

Figure K-5
Biological Indicators Monitoring Compliance Schedule



* Bioloical Indicators Monitoring Plan will be developed prior to September 1997.
** The timeline for post-startup biomonitoring has not been develope by FLW, USFWS, USEPA and MDC, but is expected to occur over a minimum of two years.

K.4.6 Water Quality

K.4.6.1 Introduction

The Water Quality Monitoring Program for the relocation of the US Army Chemical School and US Army Military Police School to FLW will be developed to comply with the effluent limitations, monitoring requirements, and special conditions of Missouri State Operating Permit MO-0117251; comply with the Missouri Clean Water Law and Federal Water Pollution Control Act; and evaluate when significant non-point source impacts to local water quality occur as a result of mission activities associated with the BRAC relocation. The ongoing evaluation of stormwater effluent parameter levels then allows for an appropriate and timely response (i.e., actions to avoid or reduce significant water quality impacts) to be implemented if impacts occur. An additional intent of the Water Quality Monitoring Program is to consolidate all non-point source water quality monitoring that is specifically associated with MDNR permitting for the relocation of the schools.

K.4.6.2 Water Quality Monitoring Plan Summary and Adaptive Management Strategy

To date, water quality monitoring to comply with the current operating permit has been conducted under standard operating procedures (SOPs) developed by FLW. A monitoring plan that formalizes the procedures to be used during monitoring has not been prepared. It is expected however that the current SOPs will be used by FLW in developing a Water Quality Monitoring Plan which describes how monitoring required by the current operating permit will be conducted. This monitoring plan will describe the procedures and schedule that will be used in the monitoring of specific effluent parameters, as identified in the operating permit, at 12 outfall locations on FLW. In addition, FLW will sample stormwater runoff in the vicinity of smoke training within 24 hours of 1.0 inches or more of rain falling. The Water Quality Monitoring Plan will also describe the procedures and schedule for conducting this latter monitoring.

Table K-6 provides a framework for the development of the Water Quality Monitoring Program. The table provides a summary of the monitoring requirements that must be addressed by the monitoring plan and identifies the evaluation criteria and adaptive management response that complete the adaptive management strategy.

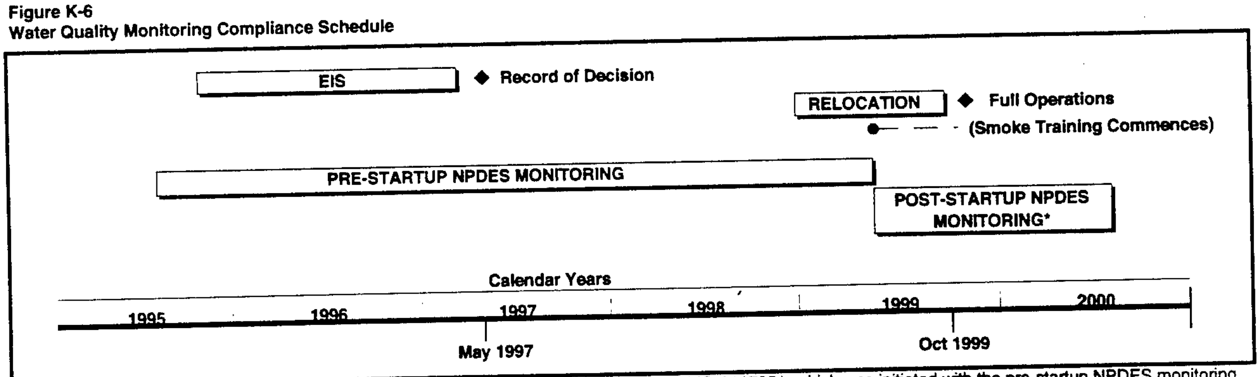
K.4.6.3 Compliance Schedule

Figure K-6 provides an overview of the time line for implementation of the Water Quality Monitoring Program in relation to other significant events associated with the BRAC relocation and NEPA process for the relocation. The figure shows that water quality monitoring was initiated in April 1995 as required by the current Missouri State Operating Permit. Continued monitoring is intended to provide evaluation of effluent parameters of concern, but is also intended to develop a water quality baseline to later assess potential water quality impacts associated with the BRAC relocation. Post-startup water quality monitoring will begin with initial relocation activities at FLW and will continue in accordance with the NPDES permit, currently through February 2000. Post-startup water quality monitoring will continue to provide evaluation of effluent parameters of concern, but will also provide information on potential water quality impacts that are specifically associated with the relocated mission activities.

Table K-6:
Water Quality Monitoring Plan Summary and Adaptive Management Strategy

Monitoring	Evaluation Criteria	Reporting	Permitting Agency	Adaptive Management Response
Fort Leonard Wood will conduct water quality monitoring for the identified effluent parameters at the identified outfall sites using the identified measurement frequency as referenced in Missouri State Operating Permit MO-0117251. Other monitoring requirements of this permit include reporting of all activities conducted to control erosion on the landfill site (as part of the monitoring for outfall site #008) and sampling of rainfall in the immediate vicinity of obscurant smoke training for lead and zinc and the identified effluent parameters that will be monitored at outfall sites #009, #010, #011, and #012.	Final effluent limitations as referenced in Missouri State Operating Permit MO-0117251	Reporting of the results of the Water Quality Monitoring Program will be conducted as outlined in Missouri State Operating Permit MO-0117251. In addition, the monitoring results will be recorded and reported on forms provided by the Missouri Department of Natural Resources (MDNR). Signed copies of these reports and all other required reports will be postmarked no later than the 28th day of the month following the completed reporting period and submitted to the Jefferson City Regional Office of the MDNR.	MDNR, Water Pollution Control Program	Fort Leonard Wood will evaluate the results of the Water Quality Monitoring Program against the final effluent limitations as referenced in Missouri State Operating Permit MO-0117251 and will notify MDNR as soon as a known accedence of the final effluent limitations has been documented. Fort Leonard Wood will immediately cease and desist any activities which result in the accedence. In addition, FLW will enter into consultation with the MDNR Water Pollution Control Program within 10 days of notifying MDNR of a known accedence of the final effluent limitations. Fort Leonard Wood will then implement measures identified by MDNR during consultation to avoid or reduce the identified accedence. Consultation will involve the USEPA in an advisory capacity.

Figure K-6
Water Quality Monitoring Compliance Schedule



*Post-startup monitoring is a continuation of compliance with Missouri Operating Permit #MO-0117251, which was initiated with the pre-startup NPDES monitoring.

K.4.7 Summary of Monitoring Commitments

A total of six separate monitoring plans will be prepared to implement the monitoring requirements described in this appendix. Table K-7 identifies the target completion dates, completion date assumptions, and permitting or coordinating agency for each of the six monitoring plans. It should be noted that although each monitoring program has been developed as a "stand alone" program, there are opportunities for each of the monitoring programs to provide pertinent data to support the other programs. Therefore, FLW will develop a mechanism for disseminating all applicable monitoring data to each of the other monitoring program directors. Although this mechanism cannot be developed until each of the monitoring plans has been developed and approved, it is expected that the Environment, Energy and Natural Resources Division, Directorate of Public Works at FLW will be responsible for developing and implementing this integrated approach to data dissemination.

Table K-7:
Summary of Monitoring Plans

Monitoring Plan	Target Completion Date [1]	Assumptions for Completion	Permitting Agency	Coordinating Agency
Ambient Air Monitoring and Quality Assurance Manual for Fort Leonard Wood Smoke Training PSD Permit	February 1997	Plan has already been submitted and reviewed; final approval is expected in February 1997.	MDNR	USEPA
Soil and Vegetation Sampling Plan	April 1997	Plan must be completed and approved in time to conduct the required minimum of 2 years of monitoring before the commencement of smoke training (target completion date allows 1 month for approval).	MDNR	
Human Health Monitoring Plan	April 1998	Plan must be completed at least 14 months prior to the commencement of smoke training in order to conduct 1 year of sampling for human health monitoring before the commencement of smoke training (target completion date allows 2 months for approval).		USEPA, MDNR
Endangered Species Monitoring Plan	May 1997	Plan must be submitted for approval no less than 60 days prior to any scheduled monitoring; monitoring must also be initiated during the 1997 field season (target completion date assumes monitoring starts no later than July 1997).	USFWS	MDC
Biological Indicators Monitoring Plan	April 1998	Plan must be completed in time to conduct the one year of monitoring before the commencement of smoke training (target completion date allows 1 month for approval).		USEPA, USFWS, and MDC
Water Quality Monitoring Plan	January 1998	Plan should be completed and approved within the next 12 months; it should be noted that the NPDES permit does not require a formal monitoring plan, therefore the target completion date is not a firm date.	MDNR	USEPA

Note: 1 Target Completion Date indicates the date by which the plan should be finalized and submitted for permitting or coordinating agency approval.

Appendix L
PUBLIC AWARENESS PROGRAM

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APPENDIX L: PUBLIC AWARENESS PROGRAM

Appendix L: Public Awareness Program

L.1 INTRODUCTION

As discussed in subsection 5.5.7 of the EIS, the Army will develop a Public Awareness Program to inform the public in the surrounding community and those living at, working at, or visiting Fort Leonard Wood (FLW) about fog oil obscurant training, and the potential health risks associated with exposures to fog oil.

The Public Awareness Program will be conducted in addition to new public access conditions and use requirements unique to the obscurant training mission. The Public Awareness Program and the new access restrictions will supplement the current, ongoing activities that protect human health and safety. The new conditions and requirements, as well as the current, ongoing activities, are described in subsection 5.2.2.15.A.1.

The Public Awareness Program will be implemented a minimum of three months prior to the start of obscurant training at FLW. This appendix provides an outline of key elements to be included in the FLW fog oil obscurant training Public Awareness Program.

L.2 ELEMENTS OF THE PROGRAM

The Public Awareness Plan will include the following sections:

Section 1 - Plan Overview

- Purpose of the program.
- Objectives.
- Special circumstances the program will address.

Section 2 - Action Description

- Describe fog oil obscurant training.
- Location of training relative to the FLW cantonment area, on- and off-post recreation areas, and homes, schools, and population centers.

- Health effects and the potential for off-site exposure.
- Training restrictions designed to limit off-site drift of the obscurant cloud.

Section 3 - Community Background

- Community interest in training activities at FLW.
- History of community reaction to the proposed relocation of the US Army Military Police School and the US Army Chemical School to FLW.
- Key concerns regarding the action as voiced by members of the community during the scoping and Draft EIS public review process.

Section 4 - Methods to be Used to Inform the Public and Fort Leonard Wood of Obscurant Training, and Related Precautions

- Fact sheets.
- News releases for radio, TV, and newspapers.
- Informational sessions for those wishing to hunt and fish at FLW.
- Publicly accessible repositories of pertinent health studies on fog oil.
- Identifying to the public, a point of contact at FLW for information on fog oil obscurant training and for reporting complaints or concerns.

Section 5 - Program Implementation Timing and Strategy

- Program to be finalized at least 6 months prior to the initiation of fog oil training.
- Program to be implemented at least 3 months prior to the initiation of training.
- Prepare a Fact Sheet to present pertinent information about fog oil training and address concerns which have been raised. The general content of the fact sheet and its distribution is described in greater detail in subsection L.3 of this Appendix.
- Develop an informational session on fog oil in the hunting and fishing orientation classes conducted each year for those who have applied to hunt and fish on FLW.
- Prepare and distribute (on a periodic basis) news releases for the media (radio, TV, and newspapers) to communicate important information about fog oil training. News releases will be used initially to communicate the impending action prior to the start of training. Subsequent news releases will be on an as needed basis, prompted mainly when there are significant changes in fog oil training that are relevant to the community and if significant concerns or complaints have been expressed.
- Provide training for Range Personnel and to ensure that they are aware of pertinent fog oil environmental and human health information so that they are prepared to communicate the issues to non-military individuals that they encounter in or near training areas.
- Evaluate the effectiveness of the public awareness program each year by conducting interviews with key community leaders, interested parties and individuals in the community,

and documenting and reviewing concerns or complaints that are received by the installation throughout the year.

L.3 FOG OIL FACT SHEET

The Fact Sheet on fog oil obscurant training will be an important means of communicating pertinent information regarding this training activity to the general public. The Fact Sheet will be available at the Information Center, Welcome Center/MP Guard House at the Main Gate, the Legal Assistance Office, the Billeting Office (including remotely located Family Housing, Unaccompanied Enlisted Personnel Housing and Unaccompanied Officer Personnel Housing offices), Family Service Center, and Soldier Service Center for military and civilian personnel at FLW and visitors on the post. The Fact Sheet will be made available at the Contract Administration Office for contractors working at FLW. Distribution of the fact sheet to the general public will be by placement of copies in the FLW Information Center and Fire Station. The Fact Sheet contents shall include, but not necessarily be limited to the following information:

- The military use of fog oil obscurants in combat and training with fog oil obscurants to prepare for combat.

    - Types of training exercises and location of training at FLW.
    - Frequency and duration of training exercises.
    - Meteorological restrictions and observer programs in place to control fog oil obscurant cloud drift.

- The environmental fate of fog oil (deposition, volatilization, degradation, bioaccumulation, etc.).

- The human health effects of fog oil.

    - Safe levels for short and long-term exposures (inhalation, ingestion, and dermal routes) for men, women, elderly, infants and children.
    - Training practices in place to preclude exposures to the general public.
    - Anticipated exposure of fog oil to the general public and related health implications.

- Recommended precautions to be taken in the event a cloud of fog oil obscurant inadvertently drifts into areas occupied by the general public.

- Protection of hypersensitive individuals that typically exhibit reactions from exposures to many different materials (natural or man-made) and may be sensitive to fog oil.

- Telephone of the point of contact for the Army on issues related to fog oil.

The Fact Sheet will be updated at the following times:

1) when new, significant health information becomes available;
2) if training undergoes major modifications that would alter potential health impacts; or
3) every 2 years (in conjunction with the MDNR Air Quality Permit), whichever comes first.

L.4 PROGRAM COORDINATOR

A Program Coordinator will be identified at FLW and will be responsible for developing, implementing and administering the Public Awareness Program. The Program Coordinator will coordinate with other offices at FLW that have responsibilities assigned in the plan.

L.5 PUBLIC AWARENESS PROGRAM REVIEW

The draft Public Awareness Program will be submitted for information to Missouri Department of Natural Resources (MDNR), the US Environmental Protection Agency (USEPA), and the Commanding General, Fort Leonard Wood, at least 6 months before the scheduled date for completion of the final plan.

L.6 SCHEDULE

ITEM	TIMELINE
• Draft Program	- 15 months prior to start of fog oil training
• MDNR/USEPA Review	- 12 months prior to start of fog oil training
• Final Program	- 6 months prior to start of fog oil training
• Program Implementation	- 3 months prior to start of fog oil training