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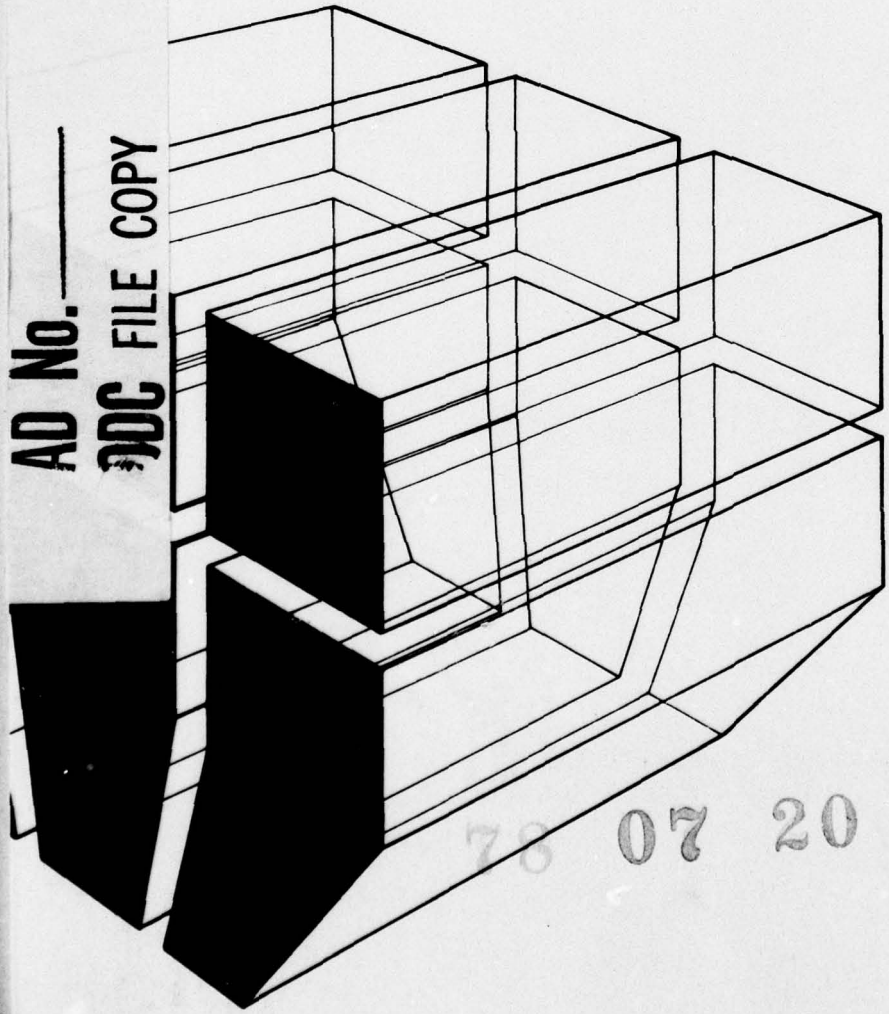
COMPUTER-AIDED ENVIRONMENTAL IMPACT ANALYSIS FOR INDUSTRIAL, PROCUREMENT, AND RESEARCH, DEVELOPMENT, TEST, AND EVALUATION ACTIVITIES: USER MANUAL



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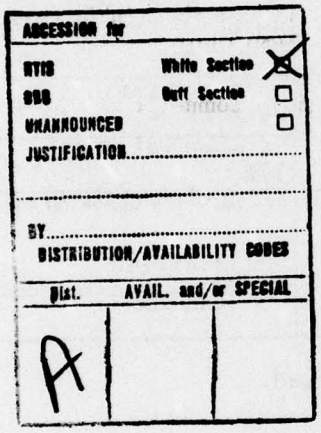
This manual and the associated information provided by the Environmental Impact Computer System (EICS) were prepared for proponents of Army industrial, procurement, and research, development, test, and evaluation activities to prepare adequate, comprehensive, and interdisciplinary environmental impact assessments and statements for their ongoing and proposed projects and programs. These procedures will enable the Army to meet the requirements of the National Environmental Policy Act (NEPA) and subsequent Army Regulations (AR 200-1).

(over)

Block 20 continued.

This manual discusses the philosophy behind the environmental impact assessment process; presents an overview of the Environmental Technical Information System (ETIS); discusses the criteria and general approach for using the EICS; defines the EICS components; provides instructions for accessing the EICS functions listed above; and provides detailed procedures necessary to use the EICS output in the environmental impact assessment process and in preparing a formal Environmental Impact Assessment (EIA) or Environmental Impact Statement (EIS). Instructions and procedures herein that are related to the use of EICS replace those provided in the earlier user manuals of this series.



FOREWORD

This manual was prepared for the Directorate of Military Construction, Office of the Chief of Engineers (OCE), under project 4A76270A896, "Environmental Quality for Construction and Operation of Military Facilities"; Task 01, "Environmental Quality Management for Military Facilities"; Work Unit 001, "Procedures for Evaluating Environmental Impacts of All Army Military Programs." The QCR is 1.03.006. The OCE Technical Monitor was Mr. V. J. Gottschalk.

The work which led to the development of this manual was the result of interdisciplinary cooperation between personnel of the U. S. Army Construction Engineering Laboratory (CERL), other Army personnel, and a team of scientists assembled for this study. The manual was written by the Environmental Division (EN), CERL.

Dr. Ravinder K. Jain is Chief of EN. COL J. E. Hays is Commander and Director of CERL, and Dr. L. R. Shaffer is Technical Director.

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COMPUTER-AIDED ENVIRONMENTAL IMPACT ANALYSIS FOR INDUSTRIAL, PROCUREMENT, AND RESEARCH, DEVELOPMENT, TEST, AND EVALUATION ACTIVITIES: USER MANUAL

1 INTRODUCTION

Background

This manual is the third of a series designed to assist Army personnel with preparation and review of Environmental Impact Assessments and Environmental Impact Statements (EIAs/EISs). The first manual of this series[1] presents instructions for using the Environmental Impact Computer System (EICS) for assessing the environmental impacts of construction activities, and presents an in-depth breakdown of the structure and function of the EICS. It provides general procedures for using the EICS output in the overall assessment process, and discusses how the output and subsequent analysis can be utilized in preparation of an EIA/EIS.* The second document in the series[2] presents instructions for using EICS to assess the environmental impacts resulting from Army mission change, operations and maintenance, and training activities. This manual contains information on Army industrial, procurement, and research, development, test, and evaluation (RDT&E) activities, as well as general information on EICS. It presents refinements and improvements in the instructions for accessing the EICS and using subsequent output in the environmental analysis process. It also includes information on addressing archaeological or historical sites and prime or unique farmlands during environmental assessments.

Objective

This report provides detailed instructions for using EICS to assess the environmental impacts resulting from Army industrial, procurement, and RDT&E activities. It is intended for use by actual preparers of environmental documents, primarily at the Army installation level, or by reviewers of environmental documents at any level.

Approach

Chapter 1 discusses the philosophy behind the environmental impact assessment process, and the objectives of this report. Chapter 2 provides an overview of the Environmental Technical Information System (ETIS), and discusses the criteria and general approach for using EICS. Chapter 3 describes and defines the specific EICS elements. The user should become thoroughly familiar with the elements available, as well as with newly defined terms which will be used repeatedly throughout the remaining text. Guidance is also provided on baseline elements and data sources necessary for adequate impact assessment. Chapter 4 discusses in detail the procedures necessary to use EICS output for assessing environmental impacts. It replaces the procedures provided in the first user manual in this series.[3] Chapter 4 also tells how EICS output relates to the requirements of the EIA/EIS format.

EICS uses Functional Areas (FAs) to categorize and classify military activities. Appendices A, B, and C contain detailed instructions for accessing the Industrial, Procurement, and RDT&E FAs respectively. Each of these sections contain samples of their own input forms. Detachable copies of blank input forms are provided beginning on p 175; as an alternative to retrieving the EICS output from a remote computer terminal, they can be completed and mailed or phoned into CERL for processing. The input required by EICS is designed to reduce the amount of irrelevant output and increase the specificity of the information provided. Appendix D addresses the question of assessing archaeological or historical sites and prime and unique farmlands in EIAs or EISs.

Use of EICS

This manual and the associated EICS were prepared to meet the requirements of the National Environmental Policy Act (NEPA) and subsequent guidelines published by the Council on Environmental Quality (CEQ), as well as the guidelines set forth under AR 200-1.[4] EICS should be used in conjunction with DA

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[1] L. V. Urban, H. E. Balbach, R. K. Jain, E. W. Novak, and R. E. Riggins, *Computer-Aided Environmental Impact Analysis for Construction Activities: User Manual*, Technical Report E-50/ADA008988 (U. S. Army Construction Engineering Research Laboratory [CERL], March 1975).

[2] R. Riggins and E. Novak, *Computer-Aided Environmental Impact Analysis for Mission Change, Operations and Maintenance, and Training Activities: User Manual*, Technical Report E-85/ADA022698 (CERL, February 1976).

*General EICS procedures in this manual replace those of the first manual of the series.

[3] *Computer-Aided Environmental Impact Analysis for Construction Activities: User Manual.*

[4] *Environmental Protection and Enhancement*, AR 200-1 (Department of the Army, 14 November 1975).

Pamphlet 200-1, *Handbook for Environmental Impact Analysis*; the handbook is primarily suited for preparing assessments of minor or short duration projects, while EICS is primarily useful in preparing major environmental impact assessments or large environmental impact statements involving many environmental considerations. In addition, DA Pamphlet 200-1 discusses how to address the major topics required in an EIS as outlined by AR 200-1. Future revisions of the Pamphlet will address the new CEQ regulations required by Executive Order 11991.[5]

Mode of Technology Transfer

No specific Corps or Army guidance documents which presently exist will be impacted by the results of this study. This manual, separately or in combination with earlier EICS manuals, will become a new pamphlet in the DA 200 series.

2 OVERVIEW OF ETIS AND EICS

CERL's work in research and development of environmental assessment methods has been structured around a concept called the Environmental Technical Information System (ETIS). ETIS currently consists of three subsystems; others are in the development phase and will be added later. This chapter presents an overview of the ETIS and then discusses criteria and a general approach for using the system presented by this manual—the EICS.

ETIS Components

The ETIS is composed of three primary computer systems which have been developed to support the preparation of EIAs/EISs. The basic system is the EICS described herein; its primary purpose is to qualitatively identify potential environmental impacts by relating Army activities to environmental elements which encompass the entire biophysical and socioeconomic environment. The details of EICS are described in Chapter 3 of this manual.

The Economic Impact Forecast System (EIFS), the second element of the ETIS, quantitatively estimates the effect on the local economy produced by a change in Army operations in the economic region of influence. Census data for the counties surrounding the project study are used in conjunction with location quotient techniques to calculate a number of parameters (such as change in total business volume, change in property values, and change in employment).[6]

The Computer-Aided Environmental Legislative Data System (CELDS), the third element of the ETIS, provides summaries of pertinent environmental legislation. Federal and state environmental laws can be retrieved by specifying environmental attributes, keywords, states, or any combination of these terms.[7] Most of the keywords used in the CELDS are very similar or identical to the environmental attributes used in EICS. Therefore, a user is easily able to investigate the legal ramifications of an environmental attribute which he/she finds, through the EICS, to be heavily impacted by the proposed activity.

The three subsystems of the ETIS were meant to be used together to provide a comprehensive approach to environmental impact analysis. However, they can and have been used separately. All three subsystems can be accessed by the batch mode using an input form processed through CERL, or by using remote access through a computer terminal located at the user station. This manual provides the instructions for using EICS only. The input form method of accessing the system is described for their respective FAs in Appendices A, B, and C.

Figure 1 shows the relationship of the three subsystems of ETIS described above and other subsystems and models currently under development, which will be available as a total DA environmental assessment capability.

EICS Utilization Criteria

Several criteria should be considered very seriously by the potential EICS user before he or she can use the current system in a practical and cost-effective manner.

Project Size and Cost

EICS is a comprehensive environmental tool for (1) assessing very large projects with many environ-

[5] *Executive Order 11991* (24 May 1977).

[6] *The Economic Impact Forecast System: Description and User Instructions*, DA PAM 200-2 (Department of the Army, December 1976).

[7] R. L. Welsh, *User Manual for the Computer-Aided Environmental Legislative Data System*, Technical Report E-78/ADA019018 (CERL, November 1975).

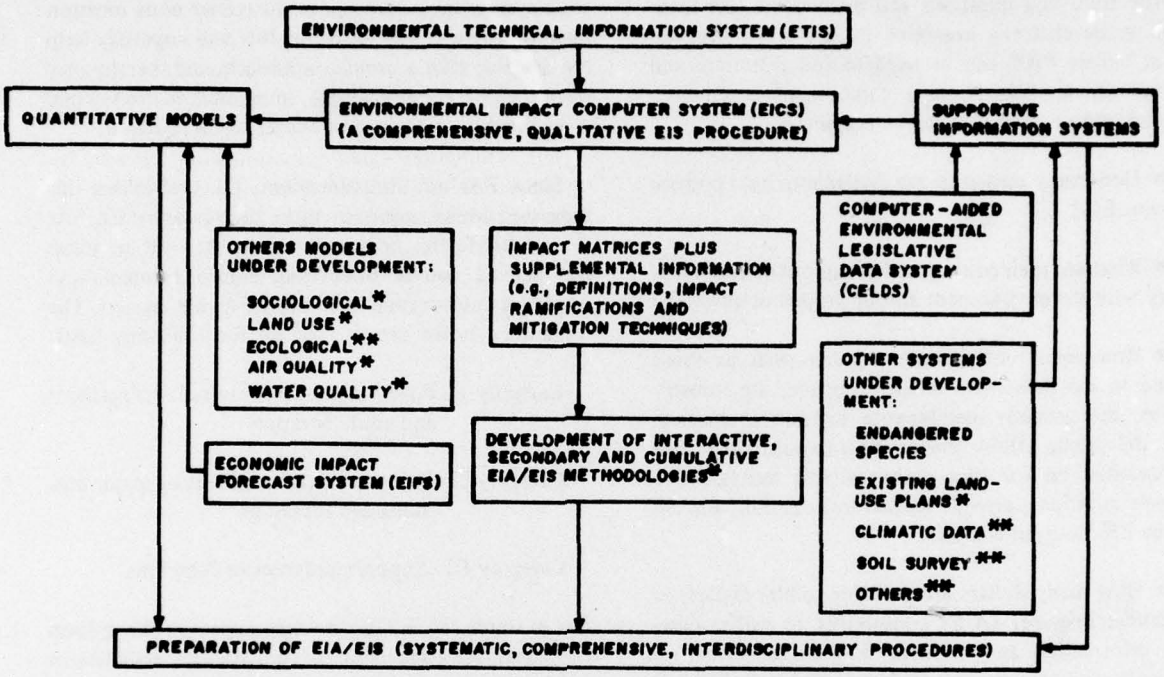

Figure 1. CERL's Environmental Technical Information Systems (ETIS).

mental implications in numerous environmental areas, (2) assessing a number of alternatives to a large project (using the review level output from EICS), and (3) reviewing large environmental assessments or impact statements. DA Pamphlet 200-1 (Department of the Army *Handbook for Environmental Impact Analysis*) is sufficient for assessing many of the small, routine projects found on all installations. Examples of minor assessments might include the installation of an artillery firing point, the construction of a small PX building on an installation cantonment, or the yearly installation assessment for a small depot. Examples of major EIAs/EISs in which the EICS could be used would include a major installation realignment, a major military construction project, or any large installation-wide assessment. Users should keep in mind that a typical set of detailed level output from EICS may be as much as an inch thick and may contain several thousand potential impact considerations.

Time Availability

Personnel tasked with assessing very large projects such as those listed above must have sufficient time—both in span of weeks or months and in total manpower—to perform the environmental analysis and prepare the several drafts of the EIA/EIS.

Even if EICS is used as an aid in preparing a large impact statement, CERL field test experience has shown that these kinds of assessments take from 1 to 9 months to prepare depending on the percentage of time available to the project coordinator and members of the assessment team, the amount of cooperation the coordinator obtains from other installation offices and personnel, and the priority given by the installation and Major Command Headquarters to producing a high quality environmental impact statement.

Number of Alternatives to Be Assessed

If the assessor has a considerable number of alternatives to consider for a given large project, he/she should enter EICS at the *review* level and obtain output for each alternative to determine a minimum number of reasonable environmental alternatives. A detailed assessment, using the *detailed* EICS output, could then be prepared.

Resources Available to the Project Coordinator

The following questions and many more like them need to be critically evaluated by the project coordinator before EICS can be used to full advantage and before an interdisciplinary, comprehensive environmental impact statement can be prepared.

- How many personnel are available to help prepare a major EIS?

- What are their educational backgrounds and familiarity with the environment and/or project in question?

- How many installation experts, such as those found in the preventive medicine office, the forestry office, the grounds maintenance division or branch, and the public affairs and/or information office, can be counted on for timely and reliable assistance to answer questions, provide factual information, and aid in the EICS output analysis?

- How many dollars are available to hire experts or Architect/Engineer (A/E) consultants to gather baseline information and perform analyses for which no expertise exists on the installation or within the Army? For example, are any archaeological and historic sites or objects going to be affected?[8, 9] Will there be an irreversible commitment of prime and unique farmlands? Experts in these fields must perform detailed investigations before such issues can be effectively addressed in an EIA/EIS. Even when an effective assessment system is used, CERL experience has shown that the project coordinator will need some thousands of dollars to accomplish these supplemental analyses for major or extensive projects.

Overall EICS Utilization

Army activities within the EICS are divided into nine Functional Areas (FAs) (Figure 2). These major activity areas correspond closely to the major program activities listed in Chapter 2 of AR 200-1. All FAs except Real Estate and Administration are now operational.

Most personnel starting out in the assessment process find themselves focusing too narrowly in their assessment. Periodic updates to an overall installation-wide assessment may occur in the course of an environmental program; knowledge of this will hopefully help the assessor take a broader approach, and thereby produce a more comprehensive, integrated environmental assessment or statement whenever one is required.

Since FAs are interdependent, the user taking this suggested broad approach must determine which FAs are needed for his or her own projects; most programs will involve two or more FAs. Figure 2 depicts one scheme demonstrating how EICS FAs are related. The categories shown are divided on the following basis:

Category I - Policy-making and overall management and administration

Category II - Army activities constituting major missions and functions

Category III - Support activities or functions

For example, an EICS user may approach the system with only an assessment of construction activities in mind (Category III). However, in trying to perform a comprehensive and total assessment, the user may find that this basic construction project is linked to a major mission change which, in addition to construction, involves major additions to training activities and new real estate acquisitions. At this point, the user should consider how the task of assessing the construction project can be integrated into the rest of the assessment process, and should identify whether these associated assessments or an overall comprehensive assessment are being completed. In general, the user should consider at least the associated operation and maintenance of the facility being constructed and its eventual disposal. Therefore, as a minimum, both the Construction and Operations and Maintenance (O&M) FAs of EICS should be assessed for a major construction project.

Each FA is described by a detailed list of Basic Activities associated with implementing Army Programs (BAAPs), which identify specific actions associated with the project and those likely to cause environmental impacts. A list of the specific activities along with their associated definitions can be found in the manual(s) which specifically address particular Functional Area(s). If a user has a question as to whether a given Functional Area is applicable to the assessment in question, he/she should review the list of activities within that function to better determine if those activ-

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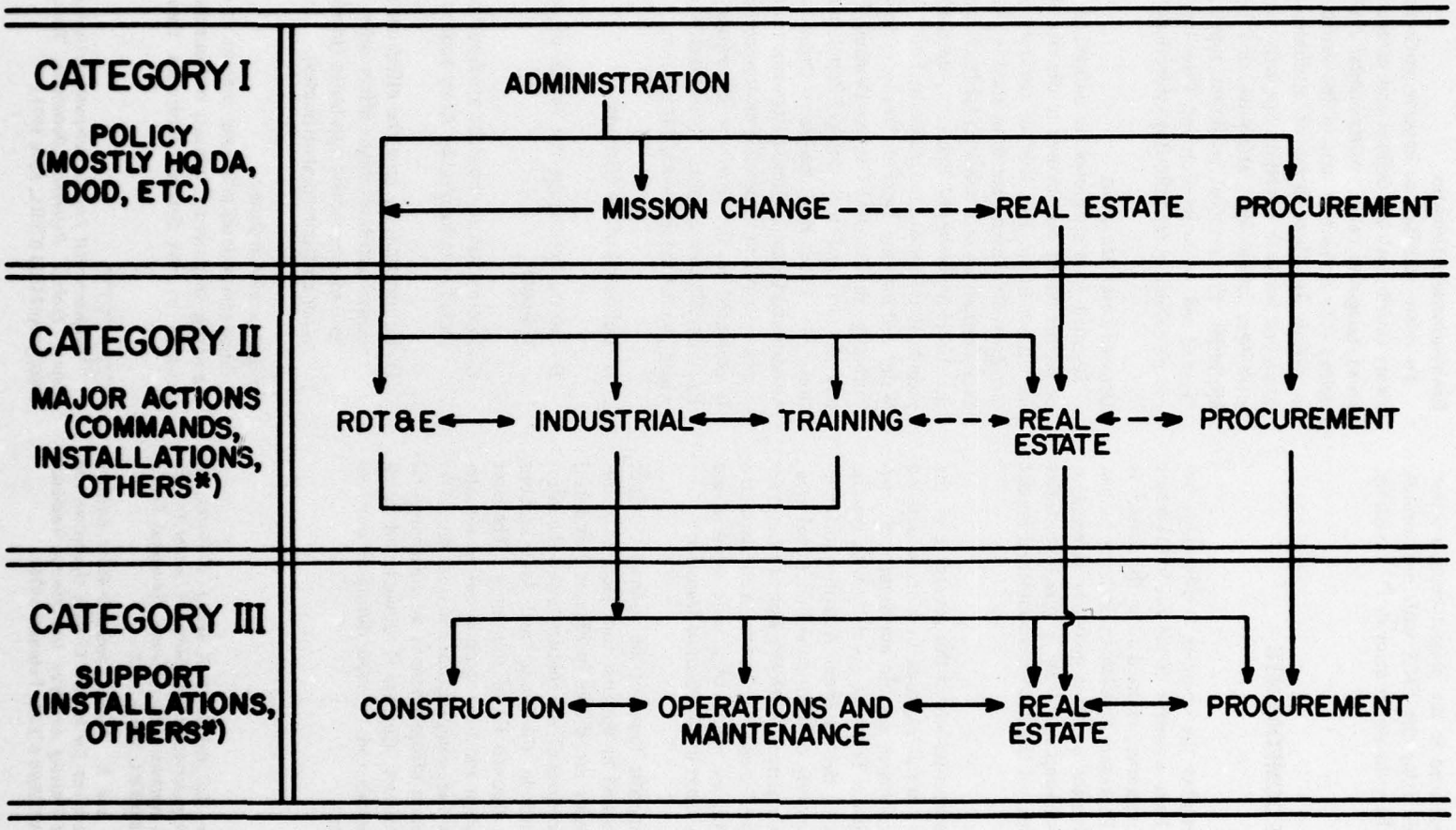
[8] *Master Planning for Army Installations Emergency Expansion Capability*, AR 210-23 (Department of the Army, 15 March 1976), p 3-5.

[9] *Historic Preservation: Administrative Procedures*, TM 5-801-1 (Department of the Army, 1 November 1975).



*Defense Logistics Agency, Corps of Engineers Districts, etc.

Figure 2. Army Functional Area relationships.

ities will be performed in the project being assessed. Therefore, before using the EICS with this manual, the user should have the earlier manuals[10,11] available.

3 THE EICS COMPONENTS

A matrix describes the complex relationships between the two basic elements of the EICS: (1) major environmental categories, referred to in the matrix as *environmental Technical Specialties*, and (2) human actions which impact on those activities, referred to in the matrix as *Functional Areas*. Figure 3 illustrates the general format of the EICS environmental impact matrix.

For each intersection within this general form, the EICS computer output expands to a more detailed matrix which compares specific *environmental attributes* of a particular Technical Specialty with specific Army activities, or BAAPs (Basic Activities to Implement Army Programs), of a particular Functional Area. These matrix interactions of BAAPs with attributes are scored on a *"need-to-consider" scale*. Also associated with each BAAP, by means of a code number, are *Ramification Remarks* and *Mitigation Statements*.

The above specific items of the computer output are further discussed in the first four sections of this chapter. (Examples are shown in Figures 9 and 10.) The final two sections of the chapter review the information contained in the Functional Area sections (Appendices A through C) of this report. The user manual information and the computer output are integral parts of the functioning EICS, and both should be used for maximum effectiveness in an environmental assessment procedure. Chapter 4 discusses in detail how these materials can be used during an environmental assessment.

[10] L. V. Urban, H. E. Balbach, R. K. Jain, E. W. Novak, and R. E. Riggins, *Computer-Aided Environmental Impact Analysis for Construction Activities: User Manual*, Technical Report E-50/ADA008988 (CERL, March 1975).

[11] R. Riggins and E. Novak, *Computer-Aided Environmental Impact Analysis for Mission Change, Operations and Maintenance, and Training Activities: User Manual*, Technical Report E-85/ADA022698 (CERL, February 1976).

Environmental Attributes

To relate activities to impacts, environmental elements (attributes) are defined and categorized under broad categories called *environmental Technical Specialties* (the horizontal axis of the matrix illustrated in Figure 3). Three types of attributes have been developed for each Technical Specialty: detailed level attributes, review level attributes, and controversial attributes. Controversial attributes supplement both detailed and review level output. These levels and their use are defined in the following subsections.

Detailed Level Attributes

Detailed level attributes are defined as parameters or factors which can be used to describe the environmental condition. This level of attribute and its associated detailed matrix are to be used in evaluating the best alternatives in a major EIA/EIS. For example, in the Ecology Technical Specialty, detailed attributes include Rare/Endangered Animals, Food Webs, Warm Water Fishing, and Noxious Weeds; in Surface Water: Turbidity, Biochemical Oxygen Demand, Phosphorus, and Mercury; and in Sociology: Population Composition, Sex Categories, Religious Organizations, and Educational Organizations. A standard format for preparing descriptions of detailed environmental attributes is presented in the *Attribute Descriptor Package*.[12] Each description consists of sections A through D, which contain the following information:

A - Definition of the attributes

B - Information about the source of the effect or pollutant

C - Information on how the attributes might be affected or influenced by Army actions

D - Information on how the effect on an environmental attribute might affect other biophysical and socioeconomic attributes (interaction with other environmental attributes).

Review Level Attributes

Since review level attributes present an overview of the nature of potential impacts without the specificity provided by the detailed attributes, they provide a

[12] *Environmental Impact Computer System Attribute Descriptor Package Reference Document*, Technical Report E-86/ADA024303 (CERL, April 1976).

Technical Specialties / Basic Army Functions	Ecology	Health Science	Air Quality	Surface Water	Groundwater	Sociology	Regional Economics	Earth Science	Land Use	Noise	Transportation	Aesthetics	Energy–Resource Conservation
Construction													
Operation, Maintenance													
Training													
Mission Change													
Real Estate													
Procurement													
Industrial													
Research, Development, Test & Evaluation													
Administration													

Figure 3. Environmental impact matrix–general form.

useful summary of potential impacts *for reviewing EISs or for evaluating a number of alternatives to a project* to determine the two or three best from an environmental viewpoint. Examples of review level attributes are Community Profile, Pathogenic Organisms, and Increase in Undesirable Species–from the areas of Sociology, Surface Water, and Ecology, respectively. A brief, general description of each review level attribute has been developed and is also available in the *Attribute Descriptor Package.*

Controversial Attributes

Many factors contribute to controversy regarding Army activities, including intense public concern for environmental quality, confusion about potential environmental impacts, and the need to establish trade-offs between economic gains or mission accomplishments and environmental damage. NEPA specifically requires that potentially controversial effects be considered in assessing environmental impact. Therefore, environmental attributes considered particularly prone to such reaction have been identified.

Controversy may arise out of the public's fear of a project. For example, controversy regarding physical environmental pollutants may arise from:

1. Effects attributed to them at normal ambient concentrations

2. Cost of abating the pollutant, given the uncertain degree of its effect

3. Indecision concerning what constitutes available technology for control

4. The time necessary for legal compliance.

When Army activities, plans, or policies affect attributes of the socioeconomic environment, controversy is likely to develop. For example, economic attributes which could be identified as potentially controversial are those involving either basic philosophic questions dealing with political expediency, or those related to questions of economic efficiency and equity. Thus, controversy arises whenever there are responsible differences of opinion concerning the solution of environmental problems.

As mentioned earlier, descriptions of detailed, review, and controversial environmental attributes have been assembled into a separate document entitled ***Environmental Impact Computer System Attribute Descriptor Package Reference Document***. Figures 4 and 5 are examples of attributes (descriptors) found in this package.

BAAPs

The Army activities within Functional Areas–which actually may impact environmental attributes are called BAAPs (Basic Activities to Implement Army Programs) within the EICS. The scope of a BAAP may vary considerably from one FA to another. For instance, the Construction BAAP "Grading" is much more specific than the Real Estate BAAP "Acquire lands for military construction." Comparing the FAs covered by this report, the Industrial BAAP "Heat treat" and the RDT&E BAAP "Flight test aircraft or their fuels" are also quite different in scope. To complicate matters, BAAPs *within* Functional Areas may also differ in scope. These apparent inconsistencies result partially from various limitations of any information system. However, equally important is the varied nature of the Army's activities in accomplishing its missions and functions.

In fact, most BAAPs are general in scope *because of* the Army's wide range of activities; some are just more general than others. Even "Grading" can be performed several different ways, some of which may be more likely than others to cause environmental impacts. The existence of the "alternative methods" of accomplishing BAAPs (listed in Tables A2, B1, and C3 for this manual and its three Functional Areas) can allow the user flexibility in using the EICS system. For instance, it is relatively easy to imagine that the impacts of many types of radiation-related research and test programs can be covered under the RDT&E BAAP "Radiation Tests". See Appendix C, BAAP 180, pp 110, 120, and 121.

Need-to-Consider Scale

Intersections within the detailed matrix are identified with indicators of "need-to-consider" for the potential impact of the activity on the attribute.

Any particular activity may impact on virtually all the environmental attributes, but a person who is assessing environmental impact must identify the relative importance of the attributes in describing an impact. A "need-to-consider" scale was developed, therefore, to indicate which attributes are most likely to be impacted. The scale used is as follows:

A = Definitely consider this factor as being impacted by the activity

EXAMPLE 1

Detailed Attribute No. 9
Ecology

Endangered Animal Species

A. Endangered species are those animals whose populations are so small that they are in danger of extinction.

B. The reason behind the decreasing population is usually the encroachment of man's activities and resource needs on the home ranges of the animal. The grizzly bear is an example of an endangered species. Some species, such as certain hawks and eagles, can be accidentally killed following predator and insect poisoning programs. Still other species have been destroyed by commercial hunting interests. The American bison and the alligator are classic examples of this exploitation. The California condor is in danger of extinction due to drastic reduction of its breeding habitat.

C. Land-clearing operations are probably the most common activities affecting endangered species, especially in otherwise remote areas. Insect and rodent control programs often have unwanted side effects when nontarget species consume poisoned bait.

D. Threats to endangered species are certainly among the most likely to engender controversy. Many scientific and conservation organizations keep a close watch on rare and declining species. These groups are certain to create public discussion of any potential danger to such species.

Figure 4. Example of attribute descriptor for Ecology Technical Specialty.

EXAMPLE 2

Detailed Attribute No. 2
Land Use

Access to Minerals

A. Access to mineral resources is the capability of exploitation of valuable mineral resources. Mineral resources include iron and ferro-alloy metals (iron, boron, copper, molybdenum, silicon, titanium, vandium, chromium, cobalt, manganese, tungsten, zirconium); nonferrous metals (lead, copper, and zinc); light metals (bauxite, magnesium, and titanium); nonmetallic minerals (stone, limestone, sandstone, slate, granite, marble, sand, gravel, clay, lime, gypsum, salt, sulfur, phosphate, and potash); fossil fuel (coal, petroleum, and natural gas); and other fuel sources (uranium).

B. Access to mineral resources can be denied by the presence of structures, parks and recreational areas, and by other features associated with the presence of human activity, or an adjacent land use to which extraction operations may be in conflict.

Army activities can deny access to mineral resources. Activities or the results of activities can commit an area to a use which prevents extraction of minerals.

C. Use of the land adjacent to overlying mineral resources can deny access for an indefinite period of time.

D. Denial for access to mineral resources is largely a matter of incompatibility. If giving access to minerals would lead to health or safety threats, the existing land use is incompatible with extraction.

Figure 5. Example of attribute descriptor for Land Use Technical Specialty.

B = Possible effect, requires consideration

C = Consider in special cases

Blank = As far as we know, without knowing all the details of your project, you need not consider this intersection; please check Ramifications/ Mitigations.

Intersections within the matrix are identified with indicators of the appropriate rating on the need-to-consider scale. (NOTE: Scores do *not* indicate importance or significance of an impact.)

Ramification Remarks

Because of the complex nature of impacts and interactions associated with Army programs, it is necessary to qualify matrix scores (attribute/activity impact interactions) with Ramification (impact result) Remarks. These remarks, which typically address differing degrees of impact, depending on time of year, site condition, climate, and magnitude of activity, are linked to impacting activities by the "Ram-Mit Codes" (see Figure 9) and are presented by the EICS computer output following each matrix.

Mitigation Statements

Along with an evaluation of activities' potential effects on environmental attributes, EICS indicates measures that could minimize or avoid significant impacts and, where possible, the effectiveness of these measures. Choosing proper mitigation (abatement) procedures greatly depends on local conditions, and critical evaluation of the problem by an expert may be necessary.

Mitigation Statements, which are supplied with EICS output following each Technical Specialty matrix, indicate the general nature of the controls which might be exercised. These statements also serve to illustrate the nature of the potential impact and to demonstrate why a particular activity is an environmental concern.

Examples of Ramification Remarks and Mitigation Statements keyed to industrial activities may be found in Chapter 4, Figure 10.

Environmental Baseline Information

Basic data and background information are required to properly prepare EIAs and EISs. This information constitutes the environmental baseline and is useful not only in describing the existing environment, but also in relating project activities to the various environmental attributes.

Baseline data can be divided into two categories: data associated with environmental considerations available from "outside" sources, and available installation data applicable to the various environmental categories.

A summary for the first category of data is shown in Figure 6. Because actual agency titles may vary from state to state, sources are listed in general terms; they are marked according to their relationship to attributes in the various environmental categories. Further sources of environmental data for these various categories are listed in Appendices A through C (Tables A4-A15, B2-B14 and C4-C14) with the introductions to the various Technical Specialties discussed below. Initiative at the installation level is required to obtain more specific information regarding sources and the types and detail of data locally available. A directory of Federal, state, and local information sources keyed to attribute numbers can be developed for each installation.

The second category of information is available from data, records, and reports generated on the installation. Some of the installation and regional information sources are also listed with the above tables in Appendices A through C of this report. Similar tables in earlier EICS manuals provide information sources for other Functional Areas. Figure 2-8 of the 14 November 1975 AR 200-1 also lists some general sources of information on environmental baseline and/or impacts.

Technical Specialty Introductions and Filter Questions

In each Functional Area of this document (Appendices A through C) information is provided which summarizes the most important problems or impacts of those FAs on the various Technical Specialties. These Technical Specialty introductions may be used by the assessor to help decide which impacts at a particular location will be most important to avoid or mitigate during the course of a project. (They may also discuss specific filter questions–see next paragraph.) In addition to these introductory remarks, potential sources of environmental baseline information are also suggested for each Technical Specialty, either within the introduction or in separate lists. These lists are more detailed than that of Figure 6, as discussed above, and the type of information available is also more detailed. (Eventually CERL will have operational a computer-accessed and very specific list of environmental data sources. It is planned that this system will be accessible by geographic location and by keywords, with cross-reference to the EICS attributes.)

	AIR	WATER	EARTH	BIOTIC ENVIRONMENT	INSTITUTIONAL	DEMOGRAPHIC	ECONOMICS	RESOURCES	ACTIVITY SYST. & PLANS	NATURAL HAZARDS
U.S. Department of Interior										
Geological Survey		X	X					X		
National Parks Service		X	X	X	X	X		X		
Bureau of Land Management		X	X	X				X		X
Bureau of Miles			X					X		X
Fish and Wildlife Service		X	X	X				X		
U.S. Department of Commerce										
National Oceanic and Atmospheric Administration	X	X						X		X
Bureau of Census					X	X	X			X
U.S. Department of Agriculture										
Soil Conservation Service		X	X	X				X		
Agricultural Research Service		X	X	X			X	X		
Forest Service		X	X	X			X	X		X
U.S. Army Corps of Engineers -- District Engineers		X	X					X	X	
U.S. Army Environmental Hygiene Agency	X	X		X				X		
Local Universities, Architectural-Engineering Firms, Interest Groups	X	X	X	X	X	X	X	X		X
Aerial Photography		X	X							
Museums, Libraries, Newspapers, Local Experts	X	X	X	X	X	X	X	X		X
County Records			X		X	X	X	X		
State Water Resources Agencies		X	X					X		
Local Water Conservation Districts		X						X		
City and County Health Departments and Boards of Education					X	X				
State Game and Fish Agencies	X	X	X					X		
Air Pollution Control Districts	X			X	X	X				
State Highway Departments			X		X	X				
Chambers of Commerce	X	X	X	X	X	X	X	X	X	X
Regional, State, and Federal EPA	X	X	X	X				X	X	
State and Local Health Agencies					X	X				
Local and Regional Planning Agencies		X	X		X	X	X	X		

Figure 6. Sources of baseline data.

The sources of environmental baseline information may also be useful in helping to answer filter questions which follow each Technical Specialty introduction in the appendices. These filter questions are designed to reduce the amount of inapplicable computer output which is eventually sent to the user. The user will be requested to record filter question answers for the particular project on either the input form(s) for the desired FA(s) or on his/her remote computer terminal when requesting EICS output from CERL. Specific input form instructions are located within the individual FA sections (Appendix A, p 51; Appendix B, p 82; and Appendix C, p 125 for Industrial, Procurement, and RDT&E FAs, respectively, in this manual). Specific input instructions for use with a remote computer terminal are presented directly on the terminal. Currently, the computer output (matrices and Ramifications/Mitigations) is generated in batch form and mailed to the user by CERL.

4 EICS USE: INPUT, OUTPUT, AND PREPARATION OF AN EIS

Introduction

The EICS can assist in tasks other than EIA/EIS preparation. Used early in projects and program development, the system can help planners assess project alternatives. Management can use the system to assist in its review of an EIA/EIS. The review level output from the system is specially designed for these tasks.

This manual, however, is designed for use of the EICS system for preparing EIAs and EISs. The following chapter is the heart of the manual. It defines the logic of overall EICS utilization, from system access to use of the output for environmental impact analysis. It also discusses how the output from the EICS can be applied to the sections of an EIA or EIS and how supplemental information can be used in total environmental impact analysis. The material is slanted toward use of detailed level output, but a similar procedure can be followed when using the EICS to review documents or evaluate alternatives. Where appropriate, special reference to the use of review level output is made.

The discussions on EICS utilization which follow are keyed to Figure 7, "Steps in the EICS impact analysis procedure for EIA/EIS preparation." In summary, the user makes a request (Figure 7, item 1) for EICS computer output, by mail or on an interactive computer terminal, and receives the output (item 2) by mail. The computer output is then analyzed (item 3) to determine the likely project impacts and possible ways to mitigate them. The output, plus supporting EICS documents, can also be used to begin organizing the EIA/EIS structure (item 5). The main thrust of the user's output analysis will be to begin planning for further information acquisition (items 4 and 4a-c).

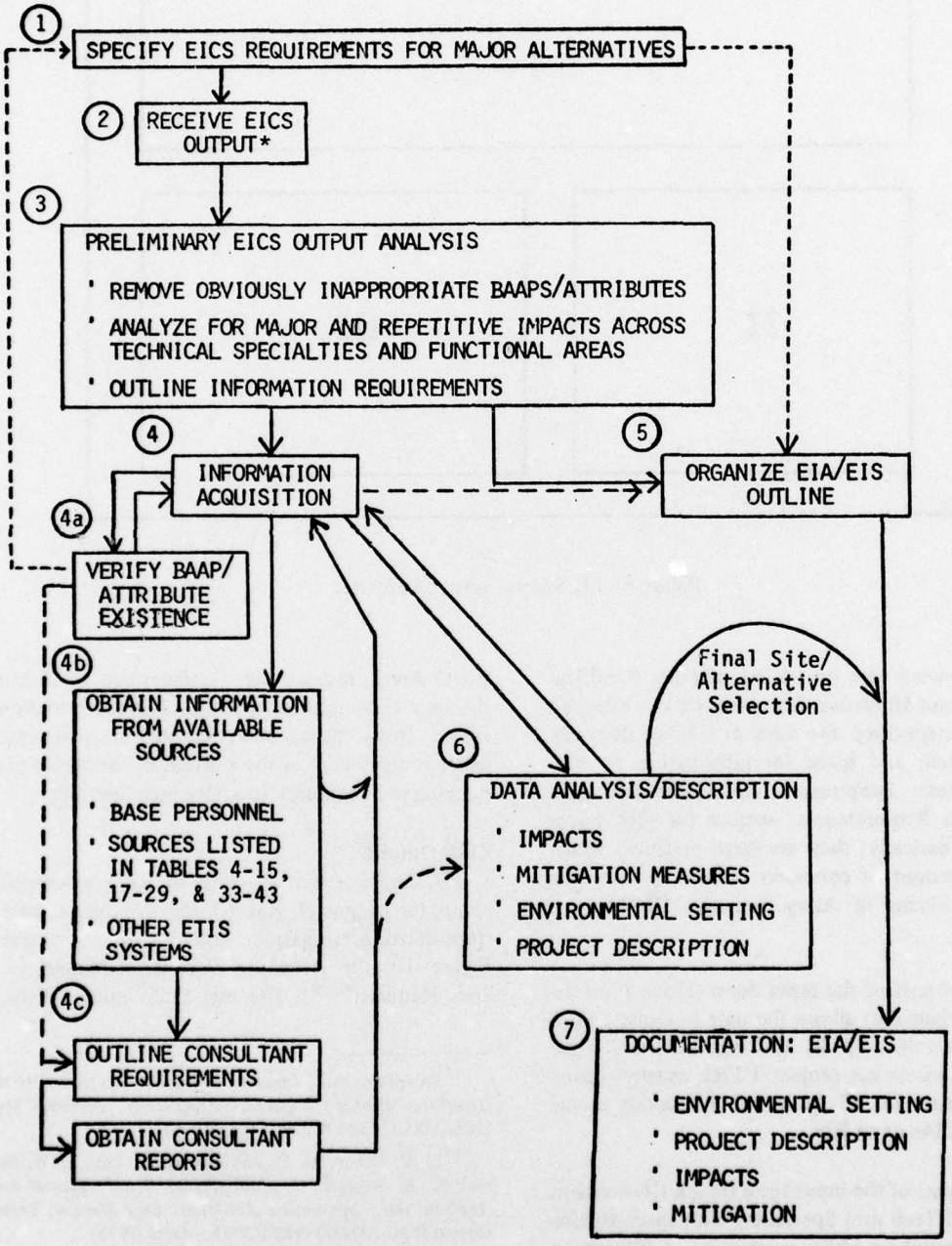
As data is gathered it must be analyzed (item 6) further to determine its usefulness to the goal of producing an EIA/EIS. This data analysis will include final evaluation of probable impact magnitude (intensity) and importance (significance), as well as detailed description of the project and its environmental setting. All major alternatives are examined carefully during the analysis phase, and the preferred one(s)* identified as the document organization continues. The finished (draft) EIA/EIS document (item 7) is produced at the end of this process. Note that items 1 through 3 occur at the beginning of the assessment process and item 7 mostly at the end, but that all the other steps will be occurring throughout the entire assessment process and will interact with each other.

EICS Input: Specifying Project Requirements

Procedures for requesting EICS output are outlined in detail in Appendices A through C for the Industrial, Procurement, and RDT&E Functional Areas. In general, input procedures (Figure 7, item 1) require the user to request EICS output by filling out an input form, which is mailed to CERL, for each Functional Area requested. Input may also be requested over an interactive computer terminal, eliminating the first part of the mailing process; batch output will still be mailed to the user. Separate inputs are required for each major project alternative, including alternative locations. A project which will be conducted at two to several different locations also may require separate requests for each site. The schematic shown in Figure 8 shows the general types of information requested on EICS input forms.

The first box in the schematic shows the location (on an input form) which contains space for information about the requesting user or office (address, telephone, date of request) and about the project request. The latter may include such items as level of output

*The environmentally preferred and the agency preferred alternatives will not necessarily be identical.



*Review output may be sent at the same time to MACOMs and/or ACE.

Figure 7. Steps in the EICS impact analysis procedure for EIA/EIS preparation.

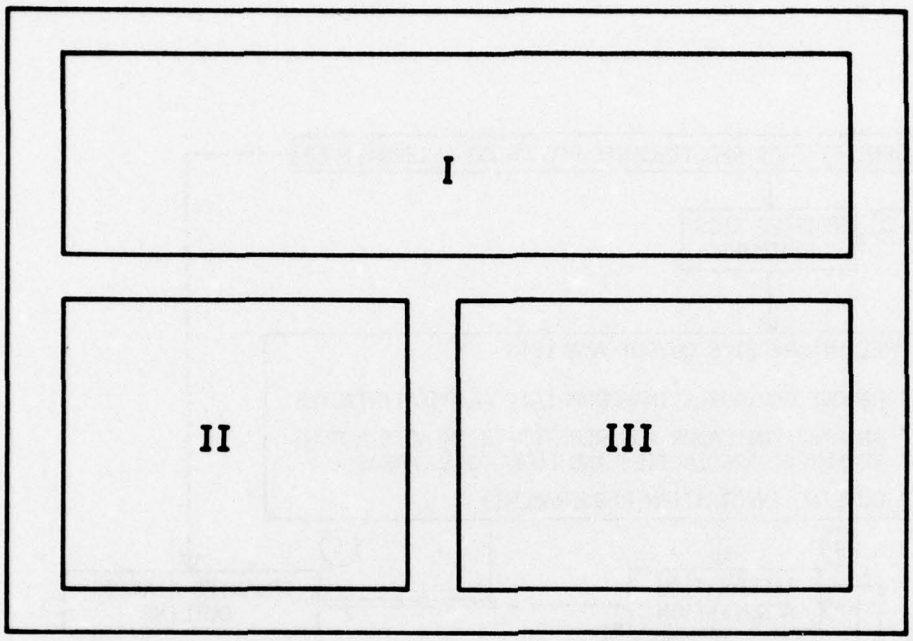


Figure 8. EICS input form schematic.

(detailed or review–see pp 14-16), whether Ramification Remark and Mitigation Statement texts are desired (p 18), a user-specified site number if more than one site is involved, and space for information on subprogram requests. Subprograms are defined separately in the "Input Requirements" section for each Functional Area; basically, they are large prefilters which reduce the amount of computer output by removing inapplicable blocks of Army activities (BAAPs–see p 16).

The second part of the input form (block II on the input form schematic) allows the user to request EICS Technical Specialties (p 14 and Figure 3) which are applicable to his or her project. CERL usually recommends a request for all Technical Specialties in the case of large EIAs or an EIS.

The third part of the input form (block III) contains a listing of all Technical Specialties with space following to insert numbers which correspond to filter question (pp 18-20) answers. The filter questions for each Technical Specialty are found in Appendices A, B, and C for the Industrial, Procurement, and RDT&E Functional Areas, respectively. As described in Chapter 3, the user answers these questions with information obtained from maps, other installation personnel, or other sources such as those listed in the tables accompanying the Technical Specialty introductions.

EICS Output

EICS information available to the user consists of computer output (Figure 9) and supportive materials (Ramification/Mitigation texts, such as shown in Figure 10, the *Attribute Descriptor Package*,[13] and User Manuals[14,15]). The user must study, verify, and

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[13] *Environmental Impact Computer System Attribute Descriptor Package Reference Document*, Technical Report E-86/ADA024303 (CERL, April 1976).

[14] L. V. Urban, H. E. Balbach, R. K. Jain, E. W. Novak, and R. E. Riggins, *Computer-Aided Environmental Impact Analysis for Construction Activities: User Manual*, Technical Report E-50/ADA008988 (CERL, March 1975).

[15] R. Riggins and E. Novak, *Computer-Aided Environmental Impact Analysis for Mission Change, Operations and Maintenance, and Training Activities: User Manual*, Technical Report E-85/ADA022698 (CERL, February 1976).

FUNCTIONAL AREA: industrial

TECHNICAL SPECIALTY: transportation

ATTRIBUTES

1 off-road right-of-way
3 off road support facilities
9 roadway
11 road support facilities
13 railway
15 rail support facilities
18 air system characteristics
20 air performance characteristics
22 water system characteristics
24 water performance characteristics
* 26 creation of driving hazards
2 off-road system characteristics
4 off-road performance characteristics
10 road system characteristics
12 road performance characteristics
14 rail system characteristics
16 rail performance characteristics
19 air support facilities
21 waterway
23 water support facilities
* 25 modif/extension of system facilities
* 27 disruption of existing service

* preceeded attributes are CONTROVERSIAL

MATRIX

attributes

	1	2	3	4	9	10	11	12	13	14	15	16	19	21	23	24	25	26	27	
10						A	A	A		A	A	A	A	A		A	A	A	A	5010 r
20						A	A	A		A	A	A	A	A		A	A	A	A	5020 a
30	A	A	A	A	A		A	A	A		A	A	B	B	B	B	B		A	5030 m
40						A					A		A			A			B	5040 s
150														B			B		B	5150 /
240					C		C												C	5240 m
251					A		A	A											A	5251 i
254							A	A			B	B							A	5254 t
255							A	A			B	B							A	5254 s
256							A	A			B	B							A	5254
257							A	A			A	A	A	A		B	B		A	5257
258							A	A			A	A	A	A		B	B	A		5257
261						A	A	A												5261

ACTIVITIES

10 pack
30 loading and unloading
150 demilitarize munitions
251 increase personnel
255 operate two shifts
257 increase local procurement of goods
261 decrease personnel
20 unpack
40 storage
240 waste material processing
254 operate one shift
256 operate three shifts
258 increase local procurement of services

Figure 9. The EICS matrix printout.

TRANSPORTATION

5010

RAMIFICATIONS

STANDARDS AND SPECIFICATIONS FOR PACKING, AS SPELLED OUT BY FEDERAL CODE OF REGULATIONS, THE DEFENSE SUPPLY AGENCY MANUALS, AR 700-15, AND CUSTOMER REQUIREMENTS IN SPECIFIED PROCUREMENT INSTRUCTIONS ALL DETERMINE REQUIREMENTS FOR PACKING CERTAIN ITEMS AND MODES OF TRANSPORT TO BE USED. FURTHER REGULATIONS DETERMINE THE SUPPORT SERVICES REQUIRED OF TRANSPORT COMPANIES (SUCH AS STORAGE FACILITIES, CARGO HANDLING EQUIPMENT). FAILURE TO MEET STANDARDS COULD VOID A CONTRACT AND MAY EVEN RESULT IN LITIGATION. CARELESS PACKING COULD RESULT IN ACCIDENTS.

MITIGATIONS

COMPLY WITH EXISTING STANDARDS AND REGULATIONS FOR PACKING. PROTECT AGAINST LOOSE PACKING MATERIALS WHERE THEY MAY ESCAPE FROM THE CARRIER, BECOMING A DRIVING HAZARD AND LITTERING PUBLIC OR PRIVATE PROPERTY.

5020

RAMIFICATIONS

SHIPPING CONTAINERS THAT ARE EITHER REUSED OR RECYCLED REQUIRE RETURN TRANSPORT (EMPTY RAIL CARS, TANK CARS, FLAT BED TRUCKS, CONTAINERIZED CARGO, SHIPPING CRATES, OIL DRUMS AND SO ON). WASTE MATERIAL FROM PACKING, SUCH AS EXCESS DUNNAGE, REQUIRES TRANSPORT TO DISPOSAL SITE.

MITIGATIONS

SCHEDULE REGULAR PICK-UP AND RETURN OF CONTAINERS AS WELL AS DELIVERY.

5030

RAMIFICATIONS

LOADING AND UNLOADING OPERATIONS COULD CREATE TEMPORARY TRAFFIC DISRUPTIONS IF AN OVERSIZED CARRIER (TANK TRUCK OR VAN) PROTRUDES ONTO A PUBLIC ROADWAY AND BLOCKS TRAFFIC FLOW. SIMILARLY, RAIL SWITCHING TO ACCESS INDUSTRIAL RAIL SPURS COULD TEMPORARILY RESTRICT TRAFFIC MOVEMENT AT CROSSINGS. THOUGH MOST LOADING OPERATIONS ARE SELF-CONTAINED ON THE INDUSTRIAL SITE, THE USE OF FORK LIFTS OR OTHER SUPPORT SYSTEMS COULD IMPEDE TRAFFIC MOVEMENT IN THE AREAS IMMEDIATELY SURROUNDING THE FACILITY. DISRUPTION TO TRAFFIC FLOW THAT CAUSES POTENTIAL HAZARDS WOULD NECESSITATE SPECIAL SIGNAGE OR TRAFFIC CONTROLS (WARNING LIGHTS, CROSSING GATES, AND SO ON). LOADING AND UNLOADING HAZARDOUS SUBSTANCES COULD PROVIDE OPPORTUNITIES FOR ACCIDENTS SUCH AS EXPLOSIONS, CHEMICAL SPILLS, ETC.

MITIGATIONS

SITE LOADING AND UNLOADING AREA AWAY FROM PUBLIC ROADWAYS WERE TRAFFIC FLOW MIGHT BE BLOCKED BY OVERSIZED TRANSPORT CARRIERS. CONSULT LOCAL HIGHWAY OFFICIALS TO INSURE THAT LOCAL PAVEMENT WIDTHS AND STRENGTHS ARE ADEQUATE FOR HEAVY VEHICLES. ROUTE TRAFFIC TO MINIMIZE TRUCK-RAILWAY CROSSINGS. AVOID USING SUPPORT EQUIPMENT SUCH AS FORKLIFTS OR CRANES WHERE TRAFFIC FLOW MAY BE IMPEDED, UNLESS USE IS TEMPORARY AND DURING OFF-PEAK HOURS. OBSERVE SAFETY PRECAUTIONS WHEN LOADING AND UNLOADING HAZARDOUS SUBSTANCES.

Figure 10. Example of Ramification Remarks and Mitigation Statements.

manipulate this information (items 3, 4, and 6) to prepare an EIA/EIS. (For a more complete discussion, see the "Preliminary Output Analysis" section of this chapter.)

EICS output is mailed to the user (Figure 7, item 2) with a copy of the original input form(s) or computer input(s) to show what output was requested. EICS computer output consists of a complete list of all BAAPs for the Functional Area(s), plus sets of information for each Technical Specialty requested. A set of information for a Technical Specialty consists of the following items.

The Technical Specialty Matrix

Impact predictions appear in matrix form (Figure 9). Attributes are coded by numbers which appear horizontally as the first line of data. The left column of numbers, entitled "BAAPs", refers to the potentially impacting activities being performed during the project for a particular program. A possible impact is shown by the letter A, B, or C at the intersection of the horizontal and vertical axes corresponding to a given activity and attribute. (For an explanation of these letters, see the "Need-to-Consider Scale" section of Chapter 3.) Absence of a letter at an intersection means that no impact is predicted, or that insufficient information is available to predict an impact on a particular attribute. A column at the right side of the matrix, headed "Rams-Mits" with four-digit numbers arranged below it, corresponds to Ramification Remarks and Mitigation Statements. Ramification Remarks explain why the activity, or some subactivity listed for that BAAP, will cause a problem; Mitigation Statements give possible means to reduce the problem or level of impact.

Activities and Attributes

Also printed with the matrix (Figure 9) are lists of impacted attributes coded to the matrix attribute numbers, and lists of impacting BAAPs, also coded to the corresponding BAAP numbers on the matrix. Controversial attributes are identified with an asterisk.

Ramifications-Mitigations

Decoded sets of Ramification Remarks and Mitigation Statements are provided with output. Each set contains one or more Ramification Remarks and one or more Mitigation Statements and is identified by a code number corresponding to a code number in the right-hand column of Figure 9, labeled "Rams-Mits." A specific Ramification Remark or Mitigation Statement may be used more than once or in different combinations with other Remarks or Statements if it applies to more than one activity. Figure 10 illustrates typical Ramification-Mitigation output.

Dividing the Work

Especially on a large project, the person in charge of producing an environmental assessment document should be planning work assignments even before doing the preliminary EICS output analysis discussed below. The work of environmental assessment and document preparation can be divided among the available persons in several ways:

- By Technical Specialty area (or groups of Technical Specialties),
- By activity locations,
- By activity types, such as (for RDT&E, for example) aeronautics, weaponry, medical research, etc., *or*
- By section of the EIA/EIS.

As much as is possible, the project leader should seek workers for a large assessment who represent various disciplines. Such a multidisciplinary approach is required by NEPA and will result in a document superior to one produced from a single viewpoint.

Preliminary Output Analysis

Once chosen, the user(s) should perform preliminary analysis of the output (Figure 7, item 3) to further tailor it to the site, become familiar with the impacts associated with the project, and organize an approach to the assessment process. He or she should first remove obviously inappropriate BAAPs and attributes. If an activity will not be performed, it can be deleted; if it is certain that an attribute does not exist at the site, it can be deleted. In order to perform these deletions, the user may need to become familiar with the attributes on the matrix by examining pertinent descriptors in the *Attribute Descriptor Package*, and with the BAAPs by reviewing their definitions (Appendices A through C) and the alternate methods of accomplishing them (Tables A2, B1, and C3).

After reviewing the Ramifications and Mitigations (in a Technical Specialty) for each BAAP, the user can study the matrix output to identify major impacts in each Technical Specialty and repetitive or associated impacts among several Technical Specialties. To assist the user in this procedure, a simple worksheet has been developed for use during the impact analysis process. (It is a *suggested* worksheet; others may be developed by the individual user.)

Figure 11–Worksheet #1: Output Analysis–is a sample worksheet which may be used to organize the information obtained during output analysis of a Technical Specialty matrix. (Several sheets may be required for each Technical Specialty.) Working from left to right, the three main sections of the worksheet can be used as listed below:

1. Matrix Factors Section

a. Each BAAP may be examined individually across a horizontal matrix row by listing it in the left-hand portion of the section, and then placing pertinent attributes or groups of attributes in the right-hand column. Individual scores may be noted, if necessary, in the center. (The examples in Figure 12 follow this procedure.)

b. A similar procedure may be followed for the vertical matrix columns of individual attributes.

c. Several BAAPs performed by a particular organization or at a particular location may be examined as a group.

d. Particular attention may be given to horizontal rows and vertical columns which have large numbers of impacts scored.

2. Implications Section

This column provides space to note (a) the essential implications of the Ramifications Statements, (b) the suggested mitigations, and (c) which impacts may be unavoidable, short-term, or long-term. (Although the Ramifications/Mitigations should be fairly easy to use as provided with the computer output, the individual "Rams" and "Mits" could also be attached here in particular cases where note-taking proves overly repetitious.) Known or possible controversies may be noted here.

3. Information/Consultant Requirements Section

a. Questions raised about specific impacts, mitigations currently in use, and their success in reducing impacts, etc., should be listed in this section of the worksheet.

b. This portion can also be used to list persons or organizations which should be consulted to provide the answers to these questions. Such names could be obtained from the user's own knowledge, from the information sources listed for each Technical Specialty in the appendices, or from suggestions in the Ramification Remarks or Mitigation Statements.

c. Known documentation of relevant information should be noted.

d. When information needed to determine extent of impact is not currently available, field work requirements should also be noted; include whether the work can be provided in-house or through some government or educational institution, or whether it will require contracting to an outside consultant.

Figure 12 is an example analysis from the Construction Functional Area showing how the Output Analysis Worksheet can be used to summarize the possible impacts of an activity and the steps to verify its presence and significance.

EICS is designed for general use. As can be seen from the above discussion on the Information Requirements section of the Output Analysis Worksheet, the EICS matrix does not provide *all* the information required to perform the analysis. The user must provide or acquire additional (environmental baseline and other) information (items 4a through 4c of Figure 7) in order to answer the questions raised by the matrix analysis. Some information requirements are used initially to answer filter questions. The user should refer to the baseline information section in Chapter 3 and to the information source lists in Appendices A through C (Tables A4 through A15, B2 through B14, and C4 through C14) for assistance. Further details on information acquisition for an environmental assessment begin on p 33.

Because the user may not understand the implications of some environmental attributes at his or her particular location, he/she should consult with experts as the need arises (Figure 7, items 4b and 4c) even while performing preliminary output analysis. The texts in the *Attribute Descriptor Package* are designed to reduce this need; if necessary, they also will help the user communicate with experts in the Technical Specialty areas. As mentioned above, information sources (experts) are listed in the source tables in the appendices.

Finally, regardless of whether the Output Analysis Worksheet is used, or some other method of output

MATRIX FACTORS	SCORE		IMPLICATIONS (RAMS–MITS)	INFO/CONSULTANT REQUIREMENTS

Figure 11. Worksheet #1: output analysis.

MATRIX FACTORS	SCORE		IMPLICATIONS (RAMS-MITS)	INFO/CONSULTANT REQUIREMENTS
Example of Output Analysis: 2 BAAPs from the Construction Functional Area.				
BAAP		Ecology Technical Specialty attributes		
65 Solid Waste	A	Disease vectors Other undesirable species	User's Notes: Debris on site: rats, bugs, etc. Control problem by weekly disposal (landfill, incinerator)	See contracting officer (Procurement Office) on past construction. How was debris and other solid waste disposed of, by whom, and how often? Is contractor's landfill "sanitary"? See pest control records for rat, bug problems on past construction sites, overall base pest problems. Site visit--find best spot for temporary dump. Can we get separate contract for waste disposal on this project, or will current disposal contractors be able to handle it? Looks like a controllable problem -- probably not significant problem if controlled. Require fencing to conceal debris?
	B	Small mammals	(Original Ram-Mit: "Ramification: Temporary on-site disposal of packing materials and other organic debris may lead to increased populations of rats, mice, roaches, termites, and other undesirable animals. "Mitigation: Require, by contract provision or by providing service, that all organic solid waste be disposed of in an approved landfill or incinerator no less frequently than once a week.")	

Figure 12. Example for Worksheet #1.

MATRIX FACTORS (SCORE)			IMPLICATIONS (RAMS–MITS)	INFO/CONSULTANT REQUIREMENTS
Construction Output Analysis Example, continued:				
BAAP		Ecology attributes		
73 Clearing site	A	trees, shrubs, fish, amphibians, food webs, encroachment on natural habitat	User Notes: Removes animal habitat, animal food sources, stresses small plants, can lead to pests increase, increased runoff, and thus siltation. Unavoidable in area cleared. Specify clearing limits carefully, or choose alternate sites.	See base forester, resource manager, facilities engineer, or environmental engineer. Reference the base master plan, section on forests. What percent of proposed site is currently forested? Same question for entire base. May need field survey of timber, other plants, animals -- how much baseline information already in current master plan? How much contractable? Call university forestry and biology departments. Can we shift construction site so less forest is cut? Is current site of any particular importance? Any nearby streams or ponds (see base maps)? What is planned to control erosion? Any pests or weeds of particular importance around (so increases would be a problem)? Any threatened species known to site, to base, to the region?
	B	herbs, birds, endangered plants, impacts on game animals	(Original Ram-Mit:	
	C	small mammals, reptiles, productivity, seasonal aspect, small game hunting, threatened species	"Ramification: Removal of trees drastically alters the ecological balance and aesthetic interest of any area where it is done. It removes habitat for many animals, removes food sources for still others, stresses remaining smaller plant associations, and often leads to increases in plant and animal pests. It can also allow increased runoff after rains, impacting downstream aquatic organisms. "Mitigation: Removal of trees is an unavoidable impact if the site is to be used. But contracts should clearly specify limits of clearing. Alternate sites might be used if forested areas are locally scarce.")	

Figure 12. (cont'd).

analysis is chosen, the user should arrange the potential impacts developed from matrix analysis into categories such as the following:

1. Impacts which the preparer(s) can address

2. Impacts which will occur simply because of the presence of an attribute

3. Impacts requiring scientific consultation for analysis

4. Impacts about which information is readily available

5. Impacts for which field work will be required to obtain adequate information

6. Impacts associated with more than one Technical Specialty which might require analysis in the primary specialty being impacted before analysis of secondary (indirect) or cumulative impacts in other specialties

7. Impacts associated with more than one Technical Specialty which can be adequately analyzed in any of the Technical Specialties (duplication).

Preparing an EIA/EIS Document

During the environmental impact analysis procedure, the EICS user should have two primary goals: (1) to determine the probable environmental impacts of the various alternative projects and ways to mitigate them; and (2) to document such information so that the pertinent decision-maker can make an informed decision about whether to go ahead with the preferred alternative, as is, modify it, choose a different project or site alternative, or cancel the project entirely.

Meeting the first goal can be greatly facilitated by using EICS, since it was developed as a *tool* to assist the user in considering all environmental factors and the ways they may be affected by an Army action. Meeting the second goal of adequate and useful impact documentation requires more than just the computer output, attribute descriptors, and BAAP definitions, however. It is not intended, for instance, that the Ramification Remarks be inserted word-for-word into the impacts section of the EIA/EIS. Instead, after completing the preliminary output analysis of EICS output, the project team should be ready to begin planning the remainder of the work in information acquisition, impact analysis, and document preparation.

NOTE: As a response to Executive Order 11991 (24 May 1977), development of draft regulations to implement NEPA was begun by CEQ in December of 1977. As this report was finalized, comments by Federal agencies on the first draft of these regulations had been received by CEQ. After revisions based on these comments, the regulations will be released for public comment. The regulations will go into effect no later than 6 months after publication of the final revised version in the Federal Register. The contents of this report cannot now address specific points of any new EIS format; however, it is expected that the main points of the earlier CEQ Guidelines (as specified in the 14 Nov 75 AR 200-1) with which EICS can assist, will still need to be addressed during the production of preliminary environmental information. The new regulations change the *emphasis* placed on these various items, and will not require specific listing of non-relevant or minimally important information in the Environmental Impact Statement itself. Nonetheless, the same types of information will need to be available before the "scoping" decision-makers and/or the assessment team can decide which part is not important. Therefore, this chapter continues to discuss the main points of the early EIS outline, including such factors as long-term versus short-term effects and irreversible/irretrievable commitment of resources.

Making an Outline (Figure 7, Item 5)

The current basic outline for the EIA/EIS is that given in Figure 13. At the outset of the project, the environmental assessor should prepare a working outline which expands the basic one by listing items requiring specific consideration for that particular project. These could include specific functions, organizations, facilities, test ranges, environment (attribute) categories, etc., that are pertinent to the site(s) being considered for the project and to the project scope.

For example, the user might make extensive notes about what should be considered under just one item, "Water," for the Environmental Setting section of the document, as shown in Figure 14, after the preliminary analysis discussed above. The user can develop the information in such an outline by consulting the *Attribute Descriptor Package* and user manuals from EICS, as well as mission and function statements, base maps, and other installation information available from the Facilities Engineer. The questions raised in the preliminary analysis will help indicate what areas should be emphasized in the project description and environmental setting sections, and what kinds of impacts will

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1. PROJECT DESCRIPTION
   a. Purpose of action
   b. Description of action
      (1) Name
      (2) Summary of activities
   c. Environmental setting
      (1) Environment prior to proposed action
      (2) Other related Federal activities
2. LAND-USE RELATIONSHIPS
   a. Conformity or conflict with other land-use plans, policies, and procedures
      (1) Federal, state, and local
      (2) Clean Air Act and Federal Water Pollution Control Act Amendments of 1972
   b. Conflicts and/or inconsistent land-use plans
      (1) Extent of reconciliation
      (2) Reasons for proceeding with action
3. PROBABLE IMPACT OF THE PROPOSED ACTION ON THE ENVIRONMENT
   a. Positive and negative effects
      (1) National and international environment
      (2) Environmental factors
      (3) Impact of proposed action
   b. Direct and indirect consequences
      (1) Primary effects
      (2) Secondary effects
4. ALTERNATIVES TO THE PROPOSED ACTION
   a. Reasonable alternative actions
      (1) Those that might enhance environmental quality
      (2) Those that might avoid some or all adverse effects
   b. Analysis of alternatives
      (1) Benefits
      (2) Costs
      (3) Risks
5. PROBABLE ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED
   a. Adverse and unavoidable effects
   b. How avoidable adverse impacts will be mitigated
6. RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY
   a. Trade-off between short-term environmental gains at expense of long-term losses
   b. Trade-off between long-term environmental gains at expense of short-term losses
   c. Extent to which proposed action forecloses future options
7. IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES
   a. Unavoidable impacts irreversibly curtailing the range of potential uses of the environment
      (1) Labor
      (2) Materials
      (3) Natural
      (4) Cultural
8. OTHER INTERESTS AND CONSIDERATIONS OF FEDERAL POLICY THAT OFFSET THE ADVERSE ENVIRONMENTAL EFFECTS OF THE PROPOSED ACTION
   a. Countervailing benefits of proposed action
   b. Countervailing benefits of alternatives

Figure 13. Outline for CEQ-prescribed EIS content. (From AR 200-1, 14 November 1975, Figure 2-4.)

EXISTING ENVIRONMENT

A. Natural Environment

(2) Water

a. Surface Water

1. Natural waters – Locations (maps), descriptions

a. Streams
b. Rivers
c. Lakes & Ponds

2. Man-made – Locations, descriptions

a. Holding ponds (maps)
b. Drainage systems

b. Groundwater – Locations, descriptions

1. Aquifers – on- and off-base
2. Wells (map)

c. Current Water Quality

1. Treatment Systems – Locations, descriptions

a. Drinking water
b. Wastewater

1. Sewage treatment plants
2. Vehicle washracks
3. Aircraft cleaning
4. Laboratory chemical waste (sources, types, amounts, etc.)

c. Petroleum, oil & lubricants waste

1. Contingency plans
2. Recent spills of stored fuel
3. Fuel dumping by aircraft

2. Standards

a. EPA region
b. NPDES permits
c. Compliance record
d. Recent water quality tests (data in an appendix)
e. Planned treatment system upgrading

Figure 14. Example section of expanded EIA/EIS outline.

require listing on the outline for discussion after they are evaluated.

The entire analysis procedure which follows, including evaluation of impact presence, degree, and significance, can be conducted with this working outline in mind. Then as specific information is obtained during analysis, it can be labeled according to its location in the outline and future location in an EIA or EIS.

Information Acquisition

Information acquisition (Figure 7, items 4 and 4a through 4c) for impact analysis has two general forms: reviewing existing sources (4b) and collection in the field. Existing sources, which include reports, studies, personal interviews, etc., should always be searched first.

Information requirements can vary considerably. It might be sufficient to establish an attribute's presence; on the other hand, detailed information about its location and condition might be required. Requirements can be determined (as suggested for section 3 of Worksheet #1) before acquisition begins.

Another factor to be considered during information acquisition is the completeness of descriptions available to the assessors of any current, ongoing activities. The user needs to obtain baseline information which answers such questions as:

- What activities (BAAPs) are actually being performed by the facilities, organizations, or test groups being considered in this environmental assessment?
- How is the activity being performed?
- How often is it performed?
- If any waste is being produced, what is it and what quantities are produced? What, if any, treatment procedures are in effect?
- Are any mitigation procedures already being performed? If so, what are they?

The answers to all but the last question are needed for use in the environmental assessment in the descriptions of the existing activities and environments (before the project). This simplifies considerably the later consideration of actual project impacts. The answers to the last question would be used in sections of the EIA/EIS where avoidance of impacts is discussed.

Verifying Attribute/BAAP Existence (Figure 7, Item 4a)

When known nonexistent attributes and BAAPs have been filtered out, a preliminary site visit and/or discussion with *knowledgeable* base personnel (those who have themselves recently been at the site in question) can be made to verify the existence of each remaining attribute or BAAP. Impacts resulting because an attribute is present can then be analyzed, as can all impacts which may result automatically because a BAAP is performed. The presence, location, and condition of attributes will determine the extent of further analysis. Preliminary determination of the presence of impacts on attributes can be started at this stage; determination of degree and significance of the impacts may require consultation with various in-house and out-of-house experts. In some cases, it may be desirable to obtain field surveys or investigations of certain attributes. Such investigations may be obtained at little or no cost from government agencies, at minimal cost from professors or graduate students at local colleges or universities, or at fairly reasonable cost from professional consultants. If the assessment process is in a stage where field surveys are still in the future, attribute and BAAP presence can be assumed for early evaluations and eliminated later where appropriate.

Outlining Consultant Requirements (Figure 7, Item 4c)

The user should by now have compiled a list of information which must be obtained by consultants. The key to obtaining professional (or amateur) consultant services, at a cost which can reasonably be borne by the sponsoring organization, is to use the previously performed output analysis, plus the no-cost in-house and out-of-house expertise available, to narrow down the scope of work for the paid consultant. The consultant should obtain *only* that *specific* information which is not otherwise available. In some cases, after reading the Ramifications, Mitigations, and attribute descriptors, the user may be able to perform adequate impact analysis by asking questions of his various information sources and consultants rather than by assigning work to them.

Impact Analysis

Impact analysis (Figure 7, item 6) includes determining the nature, scope, and significance of environmental impacts resulting from a program or project. Ramification Remarks and attribute descriptors can provide information helpful in the analysis. After completing a matrix analysis by some systematic means, such as using Worksheet #1, the information acquired

from existing sources (documents and records of personal interviews), as well as that acquired in any field investigations (conducted by Army personnel or by informal or contracted consultants), should have been cataloged according to the categories listed for potential impacts on p 30, column one. Each occurring impact should now be categorized according to its degree (intensity) and significance (importance). Suggestions in Ramification Remarks, observable problems in the field, results of field studies, and contacts with experts knowledgeable about particular environmental areas (such as those listed in the appendices, contracted consultants, etc.) can all be used to help determine the degree and significance of impacts.

Mitigation techniques should be categorized according to whether they are being used, may be used, or are unlikely to be used. The latter can be considered for possible inclusion as management alternatives in the EIA/EIS.

Information Organization

During the preliminary EICS output analysis, the user will have developed several types of information (see item 3, p 26) which he/she originally noted on Worksheet #1 or on some similar summary sheet. As mentioned previously, this information can be inserted into an expanded outline as it becomes available. However, since details regarding impacts may need to be placed in different portions of the EIA/EIS document, a second worksheet (Figure 15) was developed to aid in organizing the results of the impact analysis investigation according to the points of the basic EIA/EIS outline.* As before, the worksheet could be used to organize information in several ways:

1. One sheet could be used to summarize impacts for each area or project being assessed.

2. One sheet could be used for each problem discovered during the analysis process. This is the method used in the example, Figure 16, in which the impacts of operating an unlined landfill were summarized. Items followed by a question mark were those the user was still unsure of at the time the sheet was filled out. As field studies were completed, and personal conversations with nearby residents, city officials, and civil engineers were conducted, these items could be crossed off or expanded, whichever was appropriate.

3. One sheet could be used to summarize impacts on a particular attribute, such as "Rare and Endangered Species," or even for a single species.

4. One sheet could be used for each Technical Specialty.

Completing the Report

After the impact analysis is complete and impacts have been summarized in some way convenient to the writer(s), all that remains is for the actual text to be written (Figure 7, item 7). If sufficient planning has gone into the analysis and summary work, each writer will be able to produce his/her portion of the report by inserting the appropriate information (already collected) while proceeding through the expanded outline. A few points follow which may be helpful to remember.

1. Large quantities of data, for baseline information or for impact evaluation, should be placed in appendices whenever possible. This reduces the need for decision-makers and other readers of the document to skip pages constantly to follow the text.

2. Often, specific details of a project are not known at the time an environmental assessment is begun; this makes impact evaluation rather difficult. Nonetheless, the EIA/EIS writer should make every effort to discuss those impacts that may occur. In fact, the Army is obligated to do so. If project information is at a very general stage, then the discussion of impacts will have to be general as well.

3. The same problem is particularly true for evaluation of long-range impacts of an RDT&E project or program. For instance, a research project at one of the early stages of the acquistion cycle is only a small portion of an overall program whose goal may be to develop a new tank. The short-term impacts of that research project may be very different from and significantly more limited than those of finally putting the new tank into production and use. Still, the writer of a project-level assessment should make an attempt to make some general predictions about the long-range effects that might occur if the project were successful. The "Plan/Design," "Forecast," and "Manage" sections of the RDT&E Functional Area were developed to help the EICS user think about these long-range effects.

*As indicated in AR 200-1, 14 November 1975. A similar worksheet can be developed in the future for use with upcoming CEQ regulations and associated AR revisions.

TYPE OF IMPACTS		CEQ POINTS*		REMARKS
POSITIVE	DIRECT	3b		
	INDIRECT	3b		
	LONG TERM BENEFITS	6		
	SHORT TERM BENEFITS	6		
NEGATIVE	DIRECT, AVOIDABLE	3b 5b		
	DIRECT, UNAVOIDABLE	3b 5a		
	INDIRECT, AVOIDABLE	3b 5b		
	INDIRECT, UNAVOIDABLE	3b 5a		
	SHORT TERM LOSSES	6		
	LONG TERM LOSSES	6		
LAND USE RELATIONSHIPS		2, 3		
COMMITMENT OF RESOURCES		7		
CONTROVERSIAL				

*As listed in AR 200-1, 14 Nov 75. See Figure 13.

Figure 15. Worksheet #2: impact organization.

TYPE OF IMPACTS		CEQ POINTS*		PROBLEM: SOLID WASTE DISPOSAL -- Unlined landfill, possible groundwater contamination suspected REMARKS
POSITIVE	DIRECT	3b		Generally - sanitary and safe disposal of waste reclaim waste land?
	INDIRECT	3b		Jobs; salvage; mosquito control
	LONG TERM BENEFITS	6		Land reclamation resulting in recreation?
	SHORT TERM BENEFITS	6		Waste disposal
NEGATIVE	DIRECT, AVOIDABLE	3b 5b		Erosion due to equipment (reduce by seeding ASAP); Noise. Odor. Fire hazard.
	DIRECT, UNAVOIDABLE	3b 5a		Loose trash (visual impact. Leaching into groundwater? Energy use (refuse transport). Reduction in land value. Commitment of land.
	INDIRECT, AVOIDABLE	3b 5b		Health hazard to nearby wells, streams, until lined? Safety of workers.
	INDIRECT, UNAVOIDABLE	3b 5a		Weeds encouraged, undesirable birds and mammals attracted. Loss of recycleable materials. Loss of real property value. Decreased land values nearby?
	SHORT TERM LOSSES	6		Vegetation and wildlife, land, labor, recreation, nearby land values.
	LONG TERM LOSSES	6		Soil loss, soil productivity. Land use. Energy and equipment. Loss of recyclable materials.
LAND USE RELATIONSHIPS		2,3		Decreased land values nearby? Limits land usage Utilities must be diverted Zoning effects? (burning) Decrease in site stability (affects future uses)
COMMITMENT OF RESOURCES		7		Energy Labor Land Use Equipment Money Recycleable materials not used Water use (if leachate causes contamination or contains toxic materials)?
CONTROVERSIAL				Aesthetics -- loose trash Noise Archaeological sites? Non-recycling Health hazards related to water (wells, stream)? Nearby land relationships?

Figure 16. Example for Worksheet #2.

Relationship of EICS to the Parts of an EIS

The EIA/EIS format used in Figure 13 is that given in AR 200-1[16]; when preparing an EIS, it has been mandatory. (Using a format for an EIA similar to that used for an EIS can save time and trouble if an EIS is necessary later.) Various Army commands have provided more detailed variations of this outline. As mentioned on p 30, the new CEQ regulations required by Executive Order 11991[17] should not materially affect EICS use. Order and emphasis may be modified, but the topics of the EICS discussion which follows will still need to be addressed.

The latest guidelines emphasize that environmental considerations should be taken into account from the *beginning of the decision-making process*. Initial environmental studies should be conducted along with initial technical and economic studies. Too often, assessments and statements have been written to justify decisions long since made. If environmental assessments were made when a project began, environmental information could be integrated into, rather than tacked onto, the decision-making process and, in many cases, delays could be avoided. Present guidelines as well as the upcoming regulations require that draft impact statements (and thus the required prior assessments) be prepared and circulated during the earliest possible stage of the decision-making process.

The following section describes how EICS output can assist the preparer in responding to certain parts of an EIS. Each assessor must tailor his/her responses to each case, and the detail necessary depends on the particular circumstances. It is conceivable that, in some cases, the anticipated environmental impact of an Army program or project would be negligible in many of the Technical Specialty areas. In other cases, considering these same Technical Specialty areas would be the most significant part of evaluating a potential environmental impact.

The EICS was developed to assist the user in responding to the original CEQ Points 3, 4, 5, 6, and 7. It can also be of assistance in indicating items which should be included under Points 1 and 2. For example, past users of EICS have found the Functional Area concept useful in helping organize the project description, and the same has been true with the Technical Specialties for the environmental setting. Specific BAAPs which cause significant impacts, or attributes which are impacted often or significantly, can also be elaborated on in the project description and environmental setting sections respectively. In this way the impacts sections can be reserved for discussing impacts specifically, rather than padded with extraneous baseline information.

The following paragraphs explain how to relate the information in EICS output to the requirements of the impacts sections of an EIA or EIS.

Probable Environmental Impacts

Potential impacts are identified in the matrices (Figure 9). Although both positive and negative impacts will be described in an EIA/EIS, the matrices usually identify only potential detrimental impacts. Ramification Remarks describe the nature and scale of potential negative impacts. The *actual* negative impacts are determined during impact analysis, as described earlier in this chapter.

It is probable that many positive aspects of a proposed action will have been firmly established during its conception. Within EICS, the Mitigation Statements may indicate some positive impacts. The environment may benefit during mitigation of a particular impact if it or a similar impact was present before the project began. Specifically, activities performed for the new project that are *less environmentally damaging than the methods formerly used* could be said to be beneficial when the new project occurs in an area where military activities have occurred previously.

Both direct and indirect impacts will be considered. Direct impacts are shown in the matrices and discussed in the Ramification Remarks; indirect impacts are also considered but are not scored separately. Chains of impacts may occur and can be shown in more than one Technical Specialty. For example, erosion can affect water quality, and poor water quality can affect floral and faunal communities, human health, and economics. Possible secondary effects of impacts are described for each attribute in the *Attribute Descriptor Package*.

Again, note that the project activities listed as impactors on the natural and human environment should already be thoroughly described so their effects can be understood. Similarly, the "normal" state (before the project) of the various natural and human factors,

[16] *Environmental Protection and Enhancement*, AR 200-1 (Department of the Army, 14 November 1975).

[17] *Executive Order 11991* (24 May 1977).

including ongoing installation operations, if applicable, should have been detailed in the environmental setting section. (Large amounts of relevant environmental baseline data or lengthy activities descriptions can be placed in supporting appendices.) The impacts sections of the EIS can then be left to describe specific *changes* in the environment (impacts) resulting from the proposed action. These changes may be new, or they may be ongoing impacts which have a relationship to the project (or to current military activities at the site) and which the project will allow to continue.

The attributes of each Technical Specialty include those parameters considered particularly prone to intense public concern. These "Controversial Attributes" can be identified in the *Attribute Descriptor Package* or by the asterisks in the Technical Specialty attribute lists of the computer output (Figure 9). The attribute descriptors and identified impacts for these attributes, plus the related Ramification/Mitigation statements, will assist the user in identifying and resolving issues of controversy.

The user should note that there are several site categories in the area of land use impacts that should be specifically addressed. Two of these are (1) archaeological and historical sites, and (2) prime and unique farmlands. These two site categories are addressed in general terms in the Land Use Technical Specialty of EICS under such attributes as "Interference Off-Post," "Incompatibility On-Post," "Induced Land Use Changes," "Access to Environmental Resources," "Suitability of Land," "Consumption of Fragile Land," and "Consumption of Land." Appendix D contains specific procedures for addressing these sites during environmental evaluations.

Alternatives to the Proposed Action

The EICS is an excellent tool for evaluating alternatives and can be used most effectively during the project's early planning. Several acceptable courses of action can be evaluated to determine which alternative will have the least environmental impact. As shown in Figure 7, final selection of the preferred site(s) or alternative for a particular project should be postponed until after impact analysis.

Alternatives discussed in this section may be alternative *projects*, alternative *sites* for the project, or alternative *methods* by which a particular project may be accomplished. To evaluate alternatives involving different *projects* or *sites*, the preparer should obtain review-level EICS output for each alternative and examine the matrices to identify the environmental costs of each. Information about advantages and disadvantages of each alternative can be used in this procedure. Analysis of benefits, costs, and risks will help indicate the best choice.

Evaluation of alternative *methods* of accomplishing a project will involve reviewing suitable methods of mitigating the project's impacts. These management alternatives may be alternatives which would require changes in Army policy at the installation level or higher.

Probable Adverse Environmental Effects Which Cannot Be Avoided

The EICS Mitigation Statements help identify ways to avoid, eliminate, or reduce adverse impacts. Those mitigation procedures which can and will be implemented during the life of the project (or which are already in effect) can be discussed in the EIS; the impacts remaining in spite of any mitigation are the unavoidable ones.

Relationship Between Short-Term Uses and Long-Term Productivity

Ramification Remarks and attribute descriptors can help the writer of an environmental assessment distinguish short- and long-term benefits (of the project) from short- and long-term impacts on the environment. Short-term impacts are often associated with the term "direct impacts"; however, some of these may be repeated over the long term (as long as the project continues). Other long-term impacts can arise from cumulative effects due to continuous or repeated activities. The significance of long-term effects can be evaluated by the extent to which future options are foreclosed.

Irreversible and Irretrievable Commitment of Resources

The Energy and Resource Conservation Technical Specialty was developed to assist in addressing this point. Resources such as labor, materials, and fuels are described by attribute descriptors. The Technical Specialty matrix identifies impacts, and Ramification Remarks describe the effects on resources.

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The EIA/EIS format used in Figure 13 is that given in AR 200-1[16]; when preparing an EIS, it has been mandatory. (Using a format for an EIA similar to that used for an EIS can save time and trouble if an EIS is necessary later.) Various Army commands have provided more detailed variations of this outline. As mentioned on p 30, the new CEQ regulations required by Executive Order 11991[17] should not materially affect EICS use. Order and emphasis may be modified, but the topics of the EICS discussion which follows will still need to be addressed.

The latest guidelines emphasize that environmental considerations should be taken into account from the *beginning of the decision-making process*. Initial environmental studies should be conducted along with initial technical and economic studies. Too often, assessments and statements have been written to justify decisions long since made. If environmental assessments were made when a project began, environmental information could be integrated into, rather than tacked onto, the decision-making process and, in many cases, delays could be avoided. Present guidelines as well as the upcoming regulations require that draft impact statements (and thus the required prior assessments) be prepared and circulated during the earliest possible stage of the decision-making process.

The following section describes how EICS output can assist the preparer in responding to certain parts of an EIS. Each assessor must tailor his/her responses to each case, and the detail necessary depends on the particular circumstances. It is conceivable that, in some cases, the anticipated environmental impact of an Army program or project would be negligible in many of the Technical Specialty areas. In other cases, considering these same Technical Specialty areas would be the most significant part of evaluating a potential environmental impact.

The EICS was developed to assist the user in responding to the original CEQ Points 3, 4, 5, 6, and 7. It can also be of assistance in indicating items which should be included under Points 1 and 2. For example, past users of EICS have found the Functional Area concept useful in helping organize the project description, and the same has been true with the Technical Specialties for the environmental setting. Specific BAAPs which cause significant impacts, or attributes which are impacted often or significantly, can also be elaborated on in the project description and environmental setting sections respectively. In this way the impacts sections can be reserved for discussing impacts specifically, rather than padded with extraneous baseline information.

The following paragraphs explain how to relate the information in EICS output to the requirements of the impacts sections of an EIA or EIS.

Probable Environmental Impacts

Potential impacts are identified in the matrices (Figure 9). Although both positive and negative impacts will be described in an EIA/EIS, the matrices usually identify only potential detrimental impacts. Ramification Remarks describe the nature and scale of potential negative impacts. The *actual* negative impacts are determined during impact analysis, as described earlier in this chapter.

It is probable that many positive aspects of a proposed action will have been firmly established during its conception. Within EICS, the Mitigation Statements may indicate some positive impacts. The environment may benefit during mitigation of a particular impact if it or a similar impact was present before the project began. Specifically, activities performed for the new project that are *less environmentally damaging than the methods formerly used* could be said to be beneficial when the new project occurs in an area where military activities have occurred previously.

Both direct and indirect impacts will be considered. Direct impacts are shown in the matrices and discussed in the Ramification Remarks; indirect impacts are also considered but are not scored separately. Chains of impacts may occur and can be shown in more than one Technical Specialty. For example, erosion can affect water quality, and poor water quality can affect floral and faunal communities, human health, and economics. Possible secondary effects of impacts are described for each attribute in the *Attribute Descriptor Package*.

Again, note that the project activities listed as impactors on the natural and human environment should already be thoroughly described so their effects can be understood. Similarly, the "normal" state (before the project) of the various natural and human factors,

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[16] *Environmental Protection and Enhancement*, AR 200-1 (Department of the Army, 14 November 1975).

[17] *Executive Order 11991* (24 May 1977).

5 CONCLUSIONS AND RECOMMENDATIONS

This manual provides the guidance for using the Environmental Impact Computer System (EICS) developed in response to NEPA and CEQ requirements; it covers Industrial, Procurement, and RDT&E Army Functional Areas. Chapter 4 provides a step by step procedure for using EICS and this manual. After reviewing the entire manual, the user would use Chapter 4 primarily; other chapters and appendices would be used for reference purposes. The appendices would also be used for preparing input requests for EICS use.

It is recommended that the EICS be used in conjunction with DA Pamphlet 200-1, *Handbook for Environmental Impact Analysis*, and other Army command guidance. For minor projects DA Pamphlet 200-1 may be all that is needed. For major Army projects or actions the EICS should provide a comprehensive and cost-effective technique for addressing the NEPA and CEQ requirements.

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APPENDIX A:
THE INDUSTRIAL ACTIVITIES FUNCTIONAL AREA

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APPENDIX A: THE INDUSTRIAL ACTIVITIES FUNCTIONAL AREA

Introduction

This Functional Area was developed to aid in the preparation of EIA/EISs for Army industrial activities. To use EICS effectively in this area, it is imperative that the user become familiar with the BAAP definitions beginning on p 48. In addition, the user must complete Input Form No. 5 (detachable copies begin on p 175; a sample is shown on p 52), including answering the filter questions.

The environmental assessment of industrial activities should be undertaken prior to beginning new production and as soon as possible for on-going industrial activities. Alternative methods of production should be considered, not only for new production but for possible incorporation into existing production facilities.

Functional Area Development

The BAAPs for this Functional Area were developed in very general terms since the complexity of industrial activities does not lend itself to breakdown into simple, noninclusive terms. It is felt that the industrial user will be familiar with the processes involved and will draw upon this background when working with the filter questions.

Activity Descriptions

This section contains a list of BAAPs (Table A1), their definitions, and a list of alternative methods of accomplishing the BAAPs (Table A2).

Table A1
Industrial BAAP List

- 10 Pack
- 20 Unpack
- 30 Loading and unloading
- 40 Storage
- 50 Clean
- 60 Preservation
  - 61 Painting
  - 62 Heavy metal coatings
  - 63 Vitreous coatings
  - 64 Plastic or plastic-like coatings
  - 65 Miscellaneous insulation materials and coatings
- 70 Drying
  - 71 Evaporation
  - 72 Excess liquid
  - 73 Absorption
- 80 Repair Operations
  - 81 Disassemble
  - 82 Disposal of waste petroleum products
  - 83 Detread and retread tires and tank road wheels
  - 84 Repair electronic circuits
  - 85 Storage battery disposal
  - 86 Reassemble
- 90 Machine shop operations
- 100 Metal finishing
- 110 Change physical characteristics of metals
  - 111 Heat treat
  - 112 Cold work
  - 113 Shot peening
- 120 Forging Operations
- 130 Foundry Operations
- 140 Metal part formation by powder metallurgy
- 150 Demilitarize Munitions
- 160 Inspection and testing
- 170 Load, assemble, pack
- 180 Nitration
  - 181 Nitrate to produce noninitiating high explosives
- 190 Reduce fiber size
- 200 Solid-liquid separation
- 210 Liquid-Liquid separation
- 220 Mix/agitate
- 230 Purify
- 240 Waste material processing
- 250 Management - Increase Level of Activity
  - 251 Increase personnel
  - 252 Hire/train specialized labor force
  - 253 Hire general labor (no specialized skill)
  - 254 Operate one shift
  - 255 Operate two shifts
  - 256 Operate three shifts
  - 257 Increase local procurement of goods
  - 258 Increase local procurement of services
- 260 Management - Decrease Level of Activity
  - 261 Decrease personnel
  - 262 Decrease operations by one shift
  - 263 Decrease operations by two shifts
  - 264 Decrease local procurement of goods
  - 265 Decrease local procurement of services

Table A2
Alternative Methods of Performing the BAAPs

	BAAP Name	Alternate Method(s)	
10	Pack	In Containers	
		Open	
20	Unpack		
30	Loading and Unloading	Manual	Conveyor Belt
		Fork Lift	Auger
		Dump	Pipeline
		End Loader	Gravity
		Drive	
40	Storage	Uncovered Site	
		Covered Site	
		Climate Controlled Building	
		Tanks	
		Underground	
50	Clean	Air Vacuum	
		Barrel Tumbling	
		Impact Tool	
		Ultrasonic Energy	
		Wire Brushing	
		Iron/Steel Shot Blasting	
		Lava Blasting	
		Quartz Sand	
		Silica Sand	
		Soft Abrasives	
		Acids	
		Alkaline Solutions	
		Solvents	
		Detergents	
60	Preservation		
61	Painting	Varnishes	
		Metallic Pigment Oil Base	
		Nonmetallic Pigment Oil Base	
		Metallic Pigment Rubber Base	
		Nonmetallic Pigment Rubber Base	
		Metallic Pigment Water Emulsion	
		Enamels	
		Alkylide Base	
		Lacquer	
62	Heavy Metal Coatings	Phosphate Coatings	
		Chromate Coatings	
63	Vitreous Coatings		
64	Plastic or Plastic-Like Coatings	Polyethylene	
		Styrene Copolymer	
		Vinyl Chloride	
		Vinyl Acetate	
		Polyvinyl Butyrate	
		Saran	
		Polyester/Styrene Resins	
		Phenolic	
		Epoxy	
		Chlorosulfonated Polyethylene	
		Chlorinated Rubber Coatings	
		Chloroprene	
		Nylon	

Table A2 (cont'd)
Alternative Methods of Performing the BAAPs

	BAAP Name	Alternate Method(s)
65	Misc. Preservation Materials and Coatings	Leather Preservatives Textile Preservatives Linseed Oil Castor Oil Asphaltic-Cutback Temporary Coating Oil-Miscible Temporary Coating Water-Displacing Temporary Coatings Petroleum Jelly Rust Inhibiting Oils Waxes Volatile Corrosion Inhibitors Trifluorine Chloride Phosphate Ester Brake System Preservative Cosmolene
70	Drying	
71	Evaporation	Air Compressed Air Ovens Infrared Lamps
72	Excess Liquid Removal	Wiping Draining
73	Absorption	Chemicals
80	Repair operations	
81	Disassemble	
82	Disposal of Waste Petroleum Products	Recycle Dispose
83	Detread and Retread Tires and Tank Road Wheels	
84	Repair Electronic Circuits	
85	Storage Battery Disposal	
86	Reassemble	Small Assembly Line Item-by-Item
90	Machine Shop Operations	Turning (Lathes) — Broaching Milling — Boring Surface Grinding — Rifling Reaming — Honing Lapping — Buffing
100	Metal Finishing	Surface Grinding — Lapping Reaming — Buffing Honing — Electropolishing Cadmium Plating (CN Bath) Zinc Plating (CN Bath) Copper Plating (CN or PO_4 Bath) Nickel Plating Chromium Plating (Fluoride Bath) Tin Plating Galvanizing
110	Change Physical Characteristics of Metals	
111	Heat Treat	
112	Cold Work	

Table A2 (cont'd)
Alternative Methods of Performing the BAAPs

	BAAP Name	Alternate Method(s)	
113	Shot Peening		
120	Forging Operations		
130	Foundry Operations		
140	Metal Part Formation By Powder Metallurgy		
150	Demilitarize Munitions	Explode Burn Bury	Sink Underwater Disassemble
160	Inspection and Testing		
170	Load, Assemble, Pack		
180	Nitration		
181	Nitrate to Produce Noninitiating High Explosives	Toluene Sulfuric Acid (82%) Nitric Acid (23%) Glycerin Sulfuric Acid (59.5%) Nitric Acid (40%) Cellulose Pentaerithrital Nitric Acid (96%) Dimethylaniline Dissolved in Concentrated Sulfuric Acid Nitric Acid (66%) Sulfuric Acid (15.8%) Diphenylmethylamine Hexanethylenetetramine Dissolved in Anhydrous Acetic Acid Ammonium Nitrate-Nitric Acid Tetryl Pentaerithrite Tetranitrate Nitrocellulose Nitroglycerin TNT	
190	Reduce Fiber Size	Beaters Knives Grinders	
200	Solid-Liquid Separation	Filter Tank Vacuum Lance Centrifugation Evaporation Spray Drying Flaking Cyclone Separation Sublimation (Freeze Drying) Membrane Filtration Filter Aid (Diatomaceous Earth) Leaching	
210	Liquid-Liquid Separation	Centrifugation Gravity Settling and Decantation Azeotropic Distallation Extractive Distallation Extraction	

Table A2 (cont'd)
Alternative Methods of Performing the BAAPs

	BAAP Name	Alternate Method(s)
220	Mix/Agitate	Propeller Mixer Turbine Mixer Recirculation Pumps Paddle Stirrers Compressed Air Sponge Eductor Tube Mechanical Tumbling Drum
230	Purify	Washing Distillation Recrystallization Filtration Boiling
240	Waste Material Processing	Recover Recycle Treat and Discharge Discharge
250	Management-Increase Level of Activity	
251	Increase Personnel	Hire from Local Labor Pool Hire from Outside Local Area and Move into Region
252	Hire/Train Specialized Labor Force	
253	Hire General Labor (No Specialized Skill)	
254	Operate One Shift	
255	Operate Two Shifts	
256	Operate Three Shifts	
257	Increase Local Procurement of Goods	
258	Increase Local Procurement of Services	
260	Management-Decrease Level of Activity	
261	Decrease Personnel	Discharge from Employment Relocate to Another Area
262	Decrease Operations by One Shift	
263	Decrease Operations by Two Shifts	
264	Decrease Local Procurement of Goods	
265	Decrease Local Procurement of Services	

BAAP Definitions

10	Pack	The act of preparing material for transport so as to lessen or eliminate damage during transport. Packing includes the construction of shipping containers if required. During the packing process, the item(s) to be shipped are braced and blocked and dunnage added as needed.
20	Unpack	The removal of a material or item from its shipping container. After material is removed, the shipping container may either be reused, returned to shipper, or disposed of in an appropriate manner. The excess dunnage may either be recycled or destroyed.
30	Loading and Unloading	Self-Explanatory
40	Storage	The retention of material for future use, including maintenance so that the material is suitable for use when retrieved. The method of storage will depend upon the type and physical form of the item being stored. Depots most often will store finished products, while manufacturing facilities will store raw materials and some finished items.
50	Clean	The removal of unwanted material from the item or material under consideration. Included is the cleaning of chemical solutions via standard chemical process means.
60	Preservation	Treatment or protection of an item or material in order to retard or prevent the natural decay process.
61	Painting	Paint may be applied by fogging, brushing, spraying, dipping, or other methods. Paints, when dispersed through the air, represent a potential health and aesthetic problem. Wastewater from spray booths as well as drag from paint dip tanks can represent potential problems.
62	Heavy metal coatings	Heavy metal coatings are often applied in a manner similar to paint and, as with paint, the waste from these operations should be controlled. The same is true for vitreous coatings (clays).
63	Vitreous coatings	
64	Plastic or Plastic-Like Coatings	Fumes from plastic may pose a serious health threat; however, often the plastic is already manufactured and the manufactured item is enclosed in the plastic material. When plastics are used in a liquid state and then hardened, a potential human health hazard exists. Plastics are often nonbiodegradable; the disposal of such plastics requires care and proper methodology.
65	Misc. Insulation Materials and Coatings	The miscellaneous preservatives, like the preceding materials, must be handled with care, especially when excess is to be disposed of or waste materials must be discarded. Many of these materials are petroleum based; therefore, care must be used in disposal because of potentially negative impacts upon the environment.
70	Drying	Self-Explanatory
80	Repair Operations	Restoration of damaged or worn equipment. Repair operations begin with the disassembly of the piece of equipment to be repaired, refitted, or modified. Power tools such as impact wrenches may be used for disassembly. Prior to and during disassembly, the equipment may require cleaning and possibly decontamination.
81	Disassembly	

82	Disposal of Waste Petroleum Products	Petroleum products such as lubricants, fuels, etc., are normally drained from the item being repaired. The quantity of the petroleum products to be dealt with varies. The petroleum products may be reused, recycled, or disposed of. Improper disposal of large quantities of petroleum products can have significant negative impact on the environment.
83	Detread and Retread Tires and Tank Road Wheels	Tires and tank road wheels are detreaded prior to retreading. Tire tread can be removed by abrasion, while tank wheels can be detreaded by immersion in a molten salt bath. Rubber or metal parts can be removed by inductive heating of the part from which the rubber is to be removed. Retreading of tires and tank road wheels requires the processing of rubber (natural or synthetic) into a form which can be molded around the part needing the additional rubber. Once molded, the excess rubber (flashing) is removed and the tire or road wheel is ready for reuse.
84	Repair Electronic Circuits	Electronic circuit repair may require the use of flux and solder. If the equipment is battery powered, the batteries may need to be repaired or replaced. Great care must be exercised in disposing of old batteries because they may contain acid and heavy metals (lead) which may adversely affect the environment.
85	Storage Battery Disposal	
86	Reassemble	Reassembly operations may be carried out on a one-item basis or in a small assembly line. Power tools may be used, and paint or other preservatives may be applied.
90	Machine Shop Operations	Machine shop operations are defined as metal shaping operations in which metal is removed from the part.
100	Metal Finishing Operations	Metal finishing is the act of creating the desired surface on the metal part. This is done in two basic ways: material removal, or deposition of materials.
110	Change Physical Characteristics of Metals	See 111, 112, 113
111	Heat Treat	Heat Treating is treating (metals) by heating and cooling in such a way as to produce desired properties (such as hardness or ductility). The metal is heated to the desired temperature and then cooled by quenching. Quenching is a method of cooling metal at a controlled rate in order to achieve a uniform microstructure and thus maintain the desired physical characteristics.
112	Cold Work	Cold working is the working of metals in the absence of heat to impart the desired characteristics.
113	Shot Peening	Shot peening involves bombardment of the metal surface with pellets to induce a permanent compressive stress in the surface and thus increase the endurance limit.
120	Forging Operations	An ingot is heated in a furnace to assure a uniform temperature throughout. Forging the heated ingot consists of hammering the malleable metal into one or a series of dies to achieve the desired shape. The completed forged part is then annealed (held at an elevated temperature for some time) to relieve internal stress.

130	Foundry Operations	Foundry operations take place when metal is melted and cast into parts. Casting foundries may be integrated with other metal processing facilities such as a steel mill or machine shop. A model of the part to be cast is made to be used in the molding process. The mold is prepared by packing sand (quartz or silica clay) around the model. The model is removed and cores are inserted. The mold is now ready to be poured. The metal or alloy to be cast is heated until it reaches the liquid state or the point at which it can be poured. The metal is heated in a furnace which may be electric, natural gas, charcoal, or coke. While the metal is in the liquid state, volatile metals or alloys can be added. The molten metal is then transferred from the furnace to the mold. In centrifugal casting, the mold is rotated so that impurities migrate to the center, where they can be removed by boring. In continuous casting, castings are continuously poured from the hopper. After the casting cools, the cores must be removed and the sand knocked away, either manually or by machine. The sand can now be sent to be recycled and the excess material is cut or ground from the castings. The cast object is then cleaned, inspected, and repaired. The most common method of repair is by welding.
140	Metal Part Formation by Powder Metallurgy	The manufacture of metal parts from powder metal. The process consists of two basic steps: (1) briquetting, which is the act of compacting the metal powder into the shape desired, and (2) heating the compacted metal to a temperature well below the melting point of the metal to effect bonding (sintering).
150	Demilitarize Munitions	Demilitarizing munitions renders them ineffective for military use. This can be accomplished in several ways. If munitions are found to be defective at the plant, they may be disassembled and off-spec components replaced. In the field, natural deterioration of munitions may sensitize the explosive, rendering them extremely hazardous.
160	Inspection and Testing	Self-Explanatory
170	Load, Assemble, Pack	Ammunition casings are loaded with powder, then assembled with propellant explosives and other parts, and packed for shipment.
180	Nitration	Treatment or combination with nitric acid and/or a nitrate; especially, conversion of an organic compound into a nitro compound or nitrate.
190	Reduce Fiber Size	Nitrocellulose fibers are physically broken to release excess acid, thus increasing the stability of the nitrocellulose.
200	Solid-Liquid Separation	Self-Explanatory
210	Liquid-Liquid Separation	Self-Explanatory
220	Mix/Agitate	To combine and blend materials.

230	Purify	Purification is the act of removing unwanted substances from the desired product. Ammunition products can be purified in three ways: washing, recrystallizing, and boiling. The usual chemical-related environmental problems are found in all these basic methods. Typical chemicals used include sodium sulfite solution, water, sodium carbonate, acetone, benzene, cyclohexanol, and weak sulfuric acid.
240	Waste Material Handling	Handling of waste (spent) materials from the industrial process.
250	Management	Increase Level of Activity: BAAP names within this group are self-explanatory. (See Table A1.)
260	Management	Decrease Level of Activity: BAAP names within this group are self-explanatory. (See Table A1.)

User Input Requirements

To obtain EICS output for the Industrial Activities Functional Area, the user must complete the Industrial Area Input Form and send it to CERL. Detachable copies of blank input forms are provided beginning on p 175; a sample is shown in Figure A1. Items must be supplied by the user in order to make the EICS output more specific to user needs. The items required for input are listed below.

(1) **Project name.**

(2) **Name of the installation and date input form was filed.**

(3) **Respondent's name, address, and telephone number.**

(4) **Site Number.** Input forms should be completed for each site being considered. In the blank provided, list an arbitrary number (for your information only) to label the site.

(5) **Detailed or Review Level.** These terms refer to the depth of the information desired. The answer chosen will apply to the entire output for this site. Designate your request by writing "Detailed" or "Review" in the space provided. The detailed level of output is normally used for the actual preparation of an EIA or EIS, while the review level of output is intended to be used by a person reviewing a previously prepared EIA or EIS. If you wish to examine output at both levels for the same site and project, write "Both" in the space provided.

(6) **Output Selection.** Find the Industrial Types (Table A3) and corresponding codes which most accurately represent the major industrial operations to be performed, and write appropriate code numbers in the blank boxes across the top of the matrix.

For each facility code chosen, scan the matrix vertically and place an "X" in boxes across from the Technical Specialties for which you are requesting output. Each column to which a facility class code has been assigned must have at least one Technical Specialty checked. You may also elect to retrieve the Ramification and Mitigation text by placing an "X" in the boxes across from these terms and beneath the appropriate Industrial Type code.

(7) **Answers to Filter Questions for this site.** This section allows for specification of information pertaining only to the site being examined. Filter questions and instructions for answering them begin on p 54. To answer questions on use of EICS, or to obtain direct computer access to the system, call Dr. E. W. Novak, U. S. Army CERL, Champaign, IL, (217) 352-6511 or FTS 958-7011.

Table A3
Industrial Types

Subprogram Numbers	Industrial Types
100	Depot Supply Operations
110	Depot Repair Operations
120	Arsenal Activities
130	Mfg. Noninitiating High Explosives
140	Mfg. Priming Compositions
150	Mfg. Initial Detonating Agents
160	Mfg. Propellants
170	Mfg. Shell Casings and Projectiles
180	Mfg. Chemical Agents
190	Mfg. Chemicals for Explosive Manufacture

*See pp 53 and 54 for definition of Industrial Types

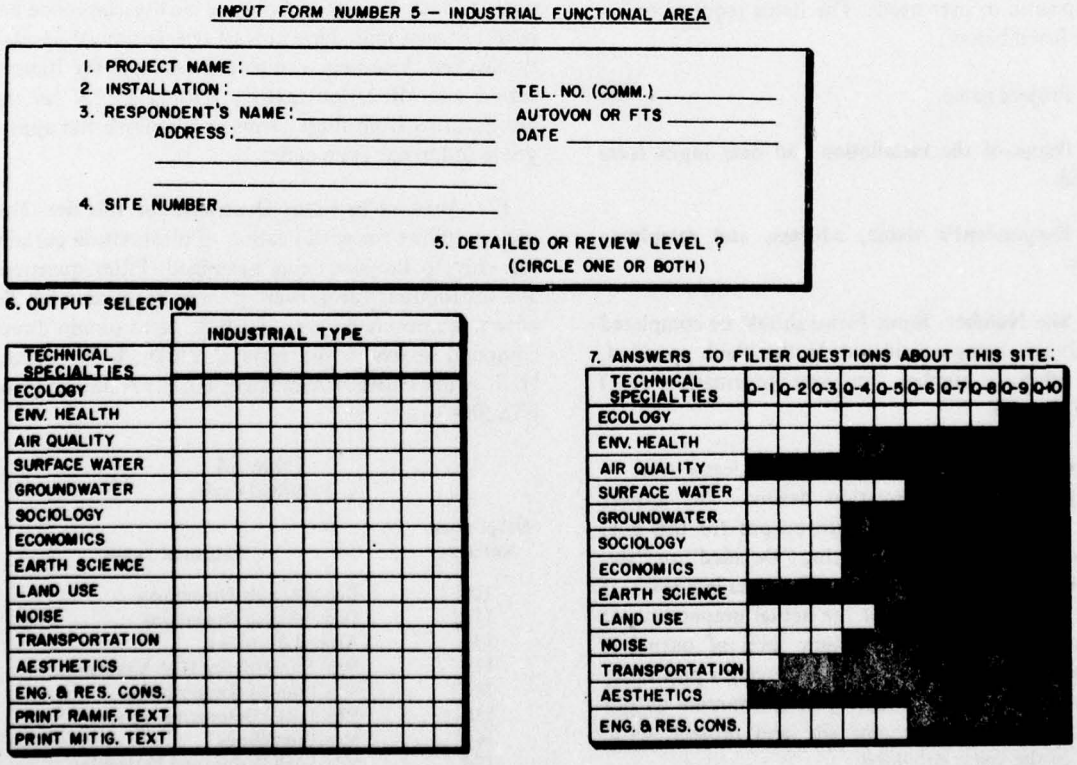

Figure A1. Sample Industrial FA input form.

Industrial Types Definitions

100. **Depot Supply Operations** – Keeping on hand and in operational condition materials and supplies. Items in storage may require upgrading and periodic, routine maintenance.

110. **Depot Repair Operation** – Repair of damaged equipment and upgrading of equipment as required.

120. **Arsenal Activities (except R & D)** – Building, repair and modification of weapons and materials. Metal working is often done.

130. **Manufacture Noninitiating High Explosives** – Included in this category is the manufacture of TNT, ammonium nitrate, nitroglycerin, nitrocellulose, PETN, tetryl, RDX, NMX, and composition B. Many chemicals and chemical processes are used, nitration being the most common process.

Chemicals used include:

- Toluene
- Sulfuric Acid
- Nitric Acid
- Sodium Sulfite Solution
- Ammonium Nitrate
- Aqueous Ammonia Solution
- Pentaerithrite Tetranitrate (PETN)
- Pentaerithritol
- Dimethylaniline
- Dinitrophenyl-methylamine
- Diphenyl-methylamine
- NMX
- Anhydrous Acetic Acid
- Cyclohexanone
- Glycerin
- Sodium Carbonate
- Pyroxylin
- Pyrocellulose
- Gun Cotton
- Cellulose
- Acetone
- Tetryl
- Benzene
- Dichloro-benzene
- RDX
- Hexaethylene-tetramine
- Acetic Anhydride

140. **Manufacture Priming Compositions** – Priming compositions usually consist of an initial detonating agent which is mixed with oxidants, fuels, sensitizers, and binding agents. Typical oxidizers include potassium chlorate and barium nitrate. Lead thiocyanate and carbon black are used as fuels. Sensitizers are classed into two categories: frictional sensitizers and fuel sensitizers. Typical frictional sensitizers are carborundum and ground glass while typical fuel sensitizers are antimony sulfide and calcium silicide. Fuel binding agents used include gum arabic, gum tragacanth, and shellac.

150. **Manufacture Initial Detonating Agents** The manufacture of almost any type of explosive or combustible material should be considered as hazardous. The chemicals used in manufacture may represent a potential impact before, as well as after, being used in the manufacturing process.

The end product of manufacturing an initial detonating agent is lead azide. The chemicals used in manufacture are lead nitrate, dextrin, sodium azide, and sodium hydroxide.

160. **Manufacture Propellants** – Several types of propellants are manufactured, including pyrocellulose powder, single base propellant; E. C. powder, single base propellent; flashless and smokeless powder, single base propellant; cannon, double base propellant; mortar powder, double base propellant; small arms powder, double base propellant; ball powder, double base propellant; and rocket propellant, double base.

Chemicals used include:

- Pyrocellulose
- Nitrocellulose
- Potassium Nitrate
- Arcine Dye
- Nitroguanidine
- Trinitrotoluene
- Dibutyl Phthalate
- Potassium Sulfate
- Cryolite
- Graphite
- Calcium Carbonate
- Carbon Black
- Ether-ethanol solvent
- Barium Nitrate
- Starch
- Diphenylamine
- Dinitrotoluine
- Nitroglycerin
- Triacetin
- Tin
- Ethyl Centralite
- Sodium Sulfate
- Potassium Perchlorate
- Lead Stearate

170. **Manufacture Shell Casings and Projectiles** – These operations primarily involve machining and/or casting operations.

180. **Manufacture of Chemical Agents** – The manufacture of chemical agents has, in the past few years, been a controversial undertaking. Many of the chemical agents listed here are no longer produced. Chemical agents are divided into the following general categories: choking agents, nerve agents, blood agents, blister agents, vomiting agents, and tear agents.

Chemicals produced are listed below:

Choking Agents	Phosgene ($COCl_3$)
	Diphosgene ($ClCOOCCl_3$)
Nerve Agents	Tabun (Dimethylaminoethoxy-cyanophosphine oxide)
	Soman (Methylpinacolyloxyfluoro-phosphine oxide)
	Sarin (Methylisopropoxyfluoro-phosphine oxide)
	Vx
Blood Agents	Hydrogen Cyanide (HCN)
	Cyanogen Chloride (CNCl)
	Arsine (AsH_3)
Blister Agents	Distilled Mustard
	Nitrogen Mustard
	Phosgene Oxine
	Lewisite
	Phenyldichloroarsine
	Ethyldichloroarsine
	Methyldichloroarsine
Vomiting Agents	Diphenylchloroarsine
	Diphenylcyanoarsine
Tear Agents	Chloroacetophenone
	Bromobenzyl Cyanide
	0-Chlorobenzylmalowonitrite
	Chloroacetophenone in chloroform
	Chloroacetophenone and chloro-picrin in chloroform
	Chloroacetrophenone in Benzene and Carbon Tetrachloride

190. **Manufacture Chemicals for Use in Explosive Manufacture**

–Manufacture Nitric Acid. Nitric acid can be manufactured by burning ammonia in air over a platinum catalyst to produce nitrogen oxides, which are then absorbed in water to form nitric acid. The nitric acid is concentrated using either magnesium nitrate or sulfuric acid.

–Manufacture Sulfuric Acid. Sulfuric acid is manufactured by the multiple oxidation of elemental sulfur to produce sulfur trioxide. The sulfur trioxide is absorbed in water to produce sulfuric acid.

–Manufacture Acetic Anhydride. This chemical can be manufactured by thermally cracking acetic acid to produce ketanegas, which is absorbed in a weak anhydride solution. The anhydride is concentrated by distillation.

Technical Specialty Introductions and Filter Questions

To accurately assess the total environmental impact of an industrial activity, a user must be aware of potential conflicts between the industrial activity and local environment. The user must develop or have access to someone having a working knowledge of what goes on in the facility as far as industrial activities are concerned. Maps and plans of the industrial site are useful for answering the filter questions. In addition, contact with professionals from various technical areas may be valuable. Honest answers to these questions will provide a matrix of potential impacts tailored to the given site and industrial operations and will eliminate many extraneous considerations.

Filter questions for each Technical Specialty, along with an introduction and lists of data pertinent to that specialty, follow. Users should record answers on Input Form No. 5 in the matrix under point 7, or as directed by the computer program instructions if using the interactive input mode.

ECOLOGY/INDUSTRIAL ACTIVITIES

Introduction

The impacts of industrial activities on ecological attributes of the environment are caused mainly by the following:

1. Waste production
   a. gaseous or particulate emissions, liquid effluents
   b. large-quantity process waste (solids, liquids)
2. Fire hazards

Item 1a may create the greatest ongoing impacts since wastes are constantly being produced. Because of the deficiencies of their pollution controls, either from inadequate present technology or from economic

restrictions, many military industrial plants continue to pollute local and regional air and water resources. Often the exact constituents of pollutants from various industrial processes have not been determined. Impact prediction in such cases, as in any case where concentrations are not known, is extremely difficult without extensive effluent sampling.

Damaging effects of pollutants released into the environment from an industrial plant or final disposal point occur when the chemicals concentrate in food chains, becoming toxic in higher levels of the chain (birds and mammals). Toxicity to plants and animals is evidenced by reduced ability to compete for food or space, reduced reproductive success, or death. Pollution-induced changes in animals or plant populations can have indirect effects on other animals not directly harmed by the chemicals themselves.

A consideration of importance in the assessment of Army industrial plant impacts on ecology is the fact that much military industrial waste may contain explosive chemicals, adding the danger of explosion during storage or disposal to any chemical pollution effects which may occur. Fires produced by such accidental explosions, if they escaped from containment in warehouses or paved areas, would be dangerous to vegetation and wildlife in the vicinity of the plant.

Reduction of impacts depends on installation of the latest pollution control devices, monitoring effluent pollution levels to determine effectiveness of these controls, recycling waste products when possible, and using waste disposal methods which minimize hazards to clean air and water or to human safety. More so than many other Functional Areas, adequate assessment of Industrial Activities impacts on the Ecology Technical Specialty will require the user to first examine impacts on Surface Water, Groundwater, and Air Quality, since water and air are the media through which chemical pollutants reach biological communities.

For references helpful in assessing ecological impacts or providing baseline data, refer to Table A4.

Table A4
References Helpful in Assessing
Ecological Impacts or Answering Filter Questions

Sources of Information	Information Supplied
Site visits	Site information
Facility and county maps	Site information
Provost Marshall or State Fish and Game Commission	Extent of hunting and fishing
DFAE or plant engineer	Pollution control measures
Washington, D. C., office and Regional Directors of the U. S. Department of Interior, Fish and Wildlife Service	Lists of animals/plants classified as rare or endangered. Possible presence of threatened plant or animal species.
Chief of Environmental Simulation Branch, Mobility and Environmental Systems Division, USACOE, Waterways Experiment Station (WES), Vicksburg, Mississippi	Computer-aided retrieval of data about possible presence of threatened animal species.
State departments of conservation, fish and game, or other similar departments.	Data about quality of local and regional hunting and fishing resources, and information about local occurrence of threatened species, as well as species protected by the particular state.
Facilities and Protective Technology Division Manufacturing Technology Directorate Picatinny Arsenal Dover, NJ	Explosives manufacturing: pollution control methods.
Medical Bioengineering Research and Development Laboratory Ft. Dietrich, MD	Information on toxicology of explosives in wastewater.

Filter Questions

1. In measuring distances downstream via the drainage network, is the edge of the facility less than 8,000 meters (about 5 miles) from any body of water known to support trout or salmon at any time of the year, OR is such a water body present on the facility?

(1) Yes

(2) No

2. In measuring distances downstream via the drainage network, is the edge of the facility less than 8,000 meters (about 5 miles) from any large, deep, freshwater lake having a surface area of more than 50 sq. km. (about 12,000 acres) and a depth of more than 50 meters (about 160 ft.), OR is such a water body present on the facility?

(1) Yes

(2) No

3. In measuring distances downstream via the drainage network, is the edge of the facility less than 8,000 meters (about 5 miles) from any ocean beach, estuary, salt marsh, or tidal flat, OR are any of these present on the facility?

(1) Yes

(2) No

4. Is hunting upland game (birds and mammals) permitted by law at any time in any area which touches the perimeter of the facility, OR is hunting these species permitted anywhere on the facility?

(1) Yes

(2) No

5. Is hunting big game (deer, bear, elk, etc.) permitted in any area within 2,500 meters (about 1.5 miles) of the facility's perimeter, OR is hunting these species allowed anywhere on the facility?

(1) Yes

(2) No

6. Are migratory waterfowl (ducks or geese) hunted in any area within 2,500 meters (about 1.5 miles) of the facility perimeter, OR may they be hunted at any time on the facility, OR are they known to congregate in groups of more than a dozen at any time of the year within the area described here?

(1) Yes

(2) No

7. Is the facility located in a largely industrialized and/or urban land use area?

(1) Yes

(2) No

8. Are state-of-the-art air and water pollution control devices being used at the facility or plant? (Exclude routine sanitary waste from consideration.)

(1) Yes

(2) No, pollution control is rudimentary or not up to current standards

(3) No pollution-control devices are used

(4) Don't know

(5) The facility is of a type that has no gas or liquid effluents (e.g., a storage facility or transfer facility).

HEALTH SCIENCE/INDUSTRIAL

Introduction

Environmental health is concerned with man's physical and mental well being and covers effects ranging from chemical and psychological stress to unsafe environs. The various pathways by which the cause of stress reaches the population are also of concern.

Environmental health concerns regarding Army industrial operations are primarily safety hazards, exposures to radiation and harmful chemicals, and release of pollutants to the air and water which present a major health hazard to workers and the nearby community.

Army industrial activities encompass a variety of operations ranging from depot operations to manufacture of chemicals and explosives. These processes may use hazardous raw chemicals and produce intermediate and end products which are toxic, carcinogenic and potentially dangerous. The manufacture and processing of munitions, explosives, propellants, etc., should especially be considered hazardous due to release of pollutants, particularly nitric acid and/or nitrogen oxides, presence of dangerous acids and combustible material, and danger of explosion.

Health hazard to workers and the nearby community can be reduced considerably by adhering to applicable EPA,* OSHA,** and NIOSH*** regulations and guidelines in the manufacture and disposal of plastics, explosives, and other munitory items.

The user should note that, because of the wide range of industrial activities many impacts are difficult to predict or assess and have not been scored on the Health Science impact matrix. The user should consult an expert during EIA/EIS preparation; some are listed in Table A5.

Filter Questions

1. Are any shipping containers or dunnage burned?

   (1) Yes

   (2) No

   (3) Unknown

2. Are materials involved potentially explosive, hazardous, or toxic?

   (1) Yes

   (2) No

   (3) Unknown

3. Are existing or potential liquid waste discharge points (including accidental discharges such as spills

*Environmental Protection Agency.
**Occupational Safety and Health Administration.
***National Institute of Occupational Safety and Health.

Table A5
References Helpful in Assessing Health Science Impacts or Answering Filter Questions

Sources of Information	Information Supplied
Installation preventive medicine officer	This is the first person to contact regarding potential environmental health impacts.
Local and state health departments	These contacts are best coordinated through the installation surgeon.
Army Environmental Hygiene Agency	The Army's in-house source of environmental health expertise. Contact best coordinated through installation surgeon. This organization can often supply help better and cheaper than an outside consultant.
Registry of Toxic Effects of Chemical Substances, Herbert E. Christiansen and Edward J. Fairchild, Eds. (US Dept. HEW, Public Health Service, Center for Disease control, National Institute for Occupational Safety and Health, Rockville, MD 20852, June, 1976.) Available as HE 20.7112:976 from Superintendent of Documents US Government Printing Office Washington, DC 20402	Contains information on toxic dose levels and safety standards for over 100,000 chemical substances.

from waste lagoons) located within 1,000 meters of a stream which is a source for a public water supply, or are public or private drinking water supply wells less than 15 meters deep located within 1,000 meters of the site?

(1) Yes

(2) No

(3) Unknown

AIR QUALITY/INDUSTRIAL INTRODUCTION

To assess the impact of Army industrial activities on air quality, one must first ascertain the industrial projects currently in operation on the installation. An emissions inventory should then be carried out to estimate the emissions from each identified process using the emission factors and to compile all applicable Federal, state, and local air pollution regulations. If the estimated emissions are found to exceed allowable limits in the applicable regulations, actual on-site emission measurements should be requested for those processes in question. If the resultant data confirm that a process is violating the emission standards, an abatement plan should be formulated and implemented in consultation with experts in the field of air pollution.

Pertinent information can be obtained by contacting the persons or organizations listed in Table A6.

There are no filter questions in the Air Quality Technical Specialty.

SURFACE WATER/INDUSTRIAL

Introduction

The potential effects of many military activities upon surface waters are subtle and indirect. In contrast, potential impacts of military industrial activities often may be direct and dramatic. Appreciable care is warranted in assessing potential surface water impacts from military industrial activities, for the impacts from many activities can be very severe. Metal finishing and munitions manufacture are examples of common military industrial activities with particular potential for causing surface water impacts.

A wide variety of industrial activities exist, and a similarly wide variety of surface water impacts may occur. Detailed information on each particular process involved at a particular installation would be required to allow precise estimation of possible surface water impacts. Such detail is not compatible with the objectives of the systematic procedure to screen possible impacts of military activities. Industrial BAAPs such as "Pack," "Unpack," "Load," and "Unload" illustrate the problem. With many industrial operations, these activities have trivial potential impact, but in some cases impact would be probable and very serious.

Consideration of potential surface water impacts from military industrial activities is inexorably linked to consideration of regulations governing discharge of wastewaters from industrial activities. Applicable Federal regulations originate from implementation of PL 92 500, the 1972 Amendments to the Water Pollution Control Act, and its further amendments in PL

Table A6
References Helpful in Assessing Air Quality Impacts

Sources of Information	Information Supplied
Facility Engineer	Information regarding the industrial-type processes on the base
Facility Engineer	Emission inventory information
Local or State Air Pollution Control Official and/or CERL	Emission regulations for the region
Engineering consulting firms specializing in air pollution abatement programs and/or CERL	Formulation of an air pollution abatement program
AEHA	Make on-site emission measurements

95-217 (Clean Water Act of 1977). Military industries may need to discharge effluents to surface waters; criteria for issuance of a permit would be based on effluent guidelines developed for each type of industry. Military industries discharging to municipal sewers would need to comply with pretreatment guidelines.

In assessing potential surface water impacts associated with military industrial activities, no consideration was given to secondary and tertiary impacts caused, for example, by suppliers of equipment or basic raw materials. Also, impacts caused by human wastes from personnel associated with military industrial activities have not been included.

The major information needed to aid in assessing the possible surface water impact of military industrial activities is a precise description of the specific activities involved and an evaluation of possible discharges from the activities which are water borne or which ultimately may reach surface waters. Additionally, background information on conditions at the site regarding water pollution control is necessary.

Table A7 lists some useful sources of information about water quality impacts.

Table A7
References Helpful in Assessing
Surface Water/Industrial Impacts or Answering Filter Questions

Sources of Information	Information Supplied
Appropriate military authority	Specific item(s) to be produced
	Processes to be used in production
	Characteristics of materials being handled
	Nature of cleaning agents and techniques
	Type of coating materials being used
	Nature of drainage liquid from drying operation
	Specific practices and materials associated with repair activities
	Type of metal finishing operation
	Type of munitions being demilitarized and procedures to be followed
	Type of materials involved in load-assemble-pack operations
	Type of munitions being produced and production used
Military or consultant toxicologist	Toxicity in aquatic environments of materials being handled
	Characteristics of cleaning agents and the products formed by their interaction with the materials being cleaned
	Characteristics of coating materials being used
	Toxicological characteristics of warfare agents
Facility operations personnel	Nature and capacity of wastewater treatment facilities
Appropriate State water pollution control authority	Applicable surface water quality standards
	Historical and current quality of receiving waters
Military or consultant water pollution control authority	Possible surface water impacts of materials being handled
	Appropriate precautions in handling of materials to avoid surface water impact

Table A7 (cont'd)
References Helpful in Assessing
Surface Water/Industrial Impacts or Answering Filter Questions

Sources of Information	Information Supplied
	Influence of cleaning agents and products of cleaning activities on surface water and wastewater treatment plants
	Appropriate wastewater treatment techniques for various industrial activities
	Influence of coating materials on surface waters and wastewater treatment plants, and appropriate separate waste management practices for coating operations
	Type of recycling and treatment practices appropriate to the metal finishing operations required
	Procedures for management of wastes from load-assemble-pack operations
	Effects of military industrial wastewaters on military or municipal wastewater treatment plant
	Comparison of wastewaters produced by alternative industrial practices
Local public works official	Nature and capacity of municipal wastewater treatment facilities to which military wastes are discharged
U. S. Environmental Protection Agency	Effluent guidelines for the industrial process involved
	Pretreatment guidelines for the industrial process involved
Appropriate civic service groups	Attitudes concerning the military activity involved
Local Planning Agency	Land use plans, regional solid waste management plans, regional wastewater management plans, regional water supply plans, regional plans developed under Section 208 of PL 92 500 (the Water Pollution Control Act Amendments of 1972), as amended by the Clean Water Act of 1977

Filter Questions

The number of indicated impacts on the surface water environmental matrix can be reduced somewhat by use of the following filter questions:

1. Are nickel-cadmium batteries included in any storage disposal activity?

(1) Yes

(2) No

2. Does heat treatment of metals involve use of molten cyanide salt bath?

(1) Yes

(2) No

3. Does heat treatment of metals involve use of oil quenching?

(1) Yes

(2) No

4. Is cleaning accomplished only by physical means (such as blasting, brushing, etc.) without the use of chemical cleaning agents and with dry handling of residues produced by the cleaning activity?

(1) Yes

(2) No

5. Is metal finishing accomplished only by physical means (grinding, reaming, etc.) with dry handling of the residues produced?

(1) Yes

(2) No

GROUNDWATER/INDUSTRIAL

Introduction

Both the quality and the quantity of groundwater may be impacted as a result of industrial activity. Removal of large quantities of groundwater has the potential of lowering the water table. In certain geologic strata, vigorous pumping may enable intrusion of undesirable water.

Disposal of wastewater and other industrial wastes, if not done with extreme care, may result in groundwater contamination. Groundwater movement is on the order of 1 to 5 feet (.3 to 1.5 m) per day or less; thus, groundwaters are slow to respond to external change. Because of this, contamination may not be recognized for several years.

See Table A8 for information sources useful in assessing impacts on groundwater.

Filter Questions

1. Which of the following best describes the industrial complex?

(1) The complex is primarily above grade and covers less than 4,000 square meters.

(2) The complex is primarily above grade and covers more than 4,000 square meters but less than 20,000 square meters.

(3) The complex is above grade and covers more than 20,000 square meters or is below grade and penetrates the water table.

2. Which is the following best characterizes the location of the industrial complex?

(1) The area surrounding the complex is completely built up and the action is one which has been sustained for greater than 5 years at its current level without untoward results. The projected future level is the same as the current level.

(2) The area surrounding the complex is completely built up. The action is one which has not been sustained for greater than 5 years at its current level, or is projected to change levels in the future.

(3) The area surrounding the complex is rural. The activity has been sustained for greater than 5

Table A8
References Helpful in Assessing Groundwater/Industrial Impacts or Answering Filter Questions

Sources of Information	Information Supplied
Site visits	Surface conditions at site of activities
Topographic maps	
State water development agencies	Subsurface and aquifer conditions at site of activities
Water supply offices	

years at its current level. The projected future level is the same as the current level.

(4) The area surrounding the complex is rural. The activity has not been sustained for 5 years at its current level or it is projected to change levels.

(5) The area surrounding the complex is suburban.

3. Reading from top to bottom, select the first statement which characterizes conditions at the locale of the industrial complex.

(1) Liquid wastes are disposed by well injection.

(2) Confined aquifer and either (a) recharge area less than 1,000 meters from the activity or receiving point, or (b) wells are in use.

(3) Characterized by fissures and/or solution channels extending to within 20 meters of the surface.

(4) An unconfined aquifer with the water table less than 20 meters below the surface.

(5) An unconfined aquifer with the water table more than 20 meters below the surface.

(6) Confined aquifer with recharge area more than 1,000 meters from the activity or receiving point. No wells are in use.

(7) No significant aquifer exists.

SOCIOLOGY/INDUSTRIAL

Introduction

Industrial activities affect the social base of local communities in several ways. They attract a population which provides a labor force of young and middle-aged adults in the prime child-bearing years. They stratify the population in terms of relative degrees of affluence and power or authority. A community that is totally dependent on a single industry will be much more affected by changes in the volume of industrial output than a community with a more diversified industrial base. Consequently, dismissed workers in a multiple-industry community would have a greater range of re-employment opportunities than similar workers in a single industry community. Some industries may *create environmental hazards of greater consequence* than others, such as explosion hazard in ammunition manufacture or latent carcinogenic conditions associated with plastic fabrication.

Table A9 lists sources of sociological information which may be helpful during impact analysis.

Table A9
References Helpful in Assessing
Sociology/Industrial Impacts or Answering Filter Questions

Sources of Information	Information Supplied
Installation: the Personnel Office	Statistical data on personnel characteristics, *records of comparative absenteeism by shift*
Community:	
Chamber of Commerce	Impact on local community
Public safety and welfare agencies	Problems of traffic and security
Employment services: public or private	Skill inventory of the local population
Newspapers	Public opinion Legal notification Notification of community events

Filter Questions

1. Is any hazardous material stored on the installation?

   (1) Yes

   (2) No

   (3) Don't know

2. Can any present or future increases in personnel needs be met from local work force sources?

   (1) Yes

   (2) No

   (3) Don't know

3. Will any increased level of activity alter the existing social structure and economic activity in the community?

   (1) Yes

   (2) No

   (3) Don't know

ECONOMICS/INDUSTRIAL

Introduction

Most of the Industrial Functional Area covers Army industrial activities related to the production of military weapons or ammunition. As a general rule, private industry does not actively seek to produce these items in their own plants because of the extreme fluctuations in production levels. The Army does order items, i.e., uniforms, autos, etc., from private industry. Except in times of extremely high production of military products (general mobilization) there is little conflict between the production of consumer goods and military goods.

Most economic effects of a military industrial activity stem from the procurement of input requirements from the private sector. A sudden change in these requirements can cause great problems for a local economy. If local purchases increase rapidly, shortages may ensue and local prices may be raised. On the other hand, a sudden decrease in local purchases can cause unemployment and a glut on the local market.

Army industrial activities can affect local property values because of incompatible land uses. A potential source of conflict may emerge, if an industrial plant goes from one-shift operation to two or more shifts, because of increased noise, traffic, etc.

A large change in levels of operation, up or down, will affect the local economy. These changes must be evaluated very carefully. Mitigations are often difficult to implement because decisions affecting industrial operations come from higher levels.

See Table A10 for sources of economic baseline information.

Table A10
References Helpful in Assessing
Economic/Industrial Impacts or Answering Filter Questions

Sources of Information	Information Supplied
Local State Employment Offices	Number unemployed Percent unemployed Skills of those available for work
Local Planning Commissions	Employment data Employment development plans Land use plans Income and employment trends
State Planning Commissions	see above
Local Industrial Development Agencies	Industrial development and plans supporting industry in the area
Local Labor Unions	Skills available Training programs in the area
Publications of the United States Department of Commerce, Bureau of Census, including Census of Population and Census of Manufacturing	Population data Work force data Local skills Size of local business and industry

Filter Questions

1. Do local purchases of goods and services used in manufacturing by the facility exceed 1 percent of the local business volume per year?

(1) Yes

(2) No

(3) Don't know

2. Will local purchases of goods and services increase or decrease by 10 percent or more in the coming year?

(1) Yes

(2) No

(3) Don't know

3. At the installation, employment will be increased or decreased in the coming year by:

(1) Less than 5 percent

(2) 5 percent to 10 percent

(3) Greater than 10 percent

EARTH SCIENCE/INDUSTRIAL INTRODUCTION

The impacts of industrial activities upon the attributes of earth science are largely the result of chains of events, i.e., secondary or tertiary impacts. Industrial processes often create a demand for fuels and raw materials which are mined or extracted in other states or even other countries. The physical disturbance and aesthetic damage caused by such demands are impossible to quantify, and usually beyond the ability of installation personnel to identify with any specificity. They should, however, be mentioned as generalized impacts whenever an assessment of the environmental impact of industrial operations is undertaken.

Other impacts are somewhat more localized, but are also indirect in action. Accidental discharge of toxic gases or liquids may destroy vegetative cover on adjacent lands, eventually resulting in increased erosion by wind and water. Routine emission of gases such as sulfur dioxide has, in the past, led to many such problems, but compliance with air quality standards generally precludes such effects except by accident.

More direct in their action, but still nonspecific compared to most impacts, are problems caused by the need to clear areas for storage, construction, and parking. The increased runoff from paved and roofed sites increases water erosion, and the bared soil in unimproved storage areas increases rates of wind and water erosion within the site. The need for disposal areas for waste or hazardous material implies earth disturbance in most cases. In these cases, it is the suitability of the site for use as a disposal area that affects related attributes in ecology and water quality, rather than the direct impact of use on earth science attributes, which poses a problem to the Army.

The Soil Conservation Service (SCS) of the U. S. Department of Agriculture provides both general and specific guidance on the intrinsic suitability of a site for use as a disposal area, or for many other types of uses. Suitability guidance has already been prepared for most of the urban and intensive agricultural land in the U. S., and local and regional offices of the SCS are usually able to undertake surveys of small, previously unmapped areas upon request. Examination of the inherent capability of the soils in a facility should always be a part of the planning process.

State or Federal geological survey organizations should also be consulted for assistance in the development or management of disposal areas. Their advice, especially in the area of possible contamination of groundwater resources, is invaluable, and may be required by law for some types of proposed actions.

There are no filter questions for the Earth Science Technical Specialty.

LAND USE/INDUSTRIAL

Introduction

Land use impacts associated with the Army Industrial Functional Area are both numerous and varied. These impacts, both direct and indirect, include:*

*Direct impacts are impacts that have a direct cause-and-effect relationship; for example, storing equipment on a heretofore untouched, natural area. Indirect impacts are impacts that are at least once removed from the actual activity being assessed. For example, if the Army was manufacturing a product that created noise problems, this could, in turn, interfere with certain land uses, e.g., housing.

- Restricting access to natural resources/minerals
- Interfering with off-post activities and land uses
- Creating incompatible uses on post
- Inducing land use changes
- Restricting access to environmental resources
- Modifying land use suitability
- Consuming fragile land
- Destroying existing land uses.

Army activities associated with the Industrial Functional Area that are most likely to cause these land use impacts are:

1. Accidents occurring during the manufacture of hazardous materials
2. Aesthetic problems and pollution associated with manufacturing or processing activities.

Land areas that may be sensitive to industrial impacts are:

- Civilian controlled/owned areas adjacent to Army industrial activities
- Land areas that have been previously undisturbed
- Wetland areas
- Coastal areas
- Publicly owned lands, e.g., parks adjacent to industrial activities
- Land areas that contain natural resources (resources that have commercial/recreational/aesthetic value)
- Wildlife preserves adjacent to industrial activities
- Land areas that are designated by Federal or state government as "wild scenic areas" or "critical areas."

Table A11 provides sources of information on land use impacts; these sources can also assist in determining consistencies/conflicts with local, state, regional, or Federal land use plans.

Table A11
References Helpful in Assessing
Land Use/Industrial Impacts or Answering Filter Questions

Sources of Information	Information Supplied
City Planning Department	City land use plan Zoning map Capital improvement plan Transportation plan Demographic information Tax information Housing information Recreation information
Regional Planning Commission	Regional land use plan Transportation plan Water and sewer plan Capital improvement plan A-95 review process* Demographic information

*U. S. Office of Management and Budget Circular A-95 delineates prodecures for implementing Federal laws concerning projects using Federal funds. A review process must occur by which affected Federal, state, and local agencies determine the consistency of the proposed project or policy with relevant land use and land use-related plans, policies, and programs.

Table A11 (cont'd)
References Helpful in Assessing Land Use/Industrial Impacts or Answering Filter Questions

Sources of Information	Information Supplied
Regional Planning Commission (continued)	Federal and state laws Housing information 208 plans** Recreation and open space plan
County Engineering Department	Highway maps Zoning maps Transportation plans
City/County Tax Assessor's Office	Tax information
State Agencies, e.g., Natural Resources, Planning, Water Pollution Control, Environmental Protection, Highway Commission, etc.	State transportation plan State land use plan A-95 review Highway maps Recreation and open space plan Highway capacity statistics Demographic information Historic information Housing information Ecology: Wildlife information Vegetation information State and Federal laws Critical areas information Air quality information Geologic information Capital improvement plan
Soil Conservation Service	Soil information, e.g., productivity and erodibility Land use plans (watershed development plans) Air photos
U. S. Geological Survey	USGS maps (maps identifying topographic, vegetation, and physical features) Geological information, e.g., water availability and mineral deposits Air photos Seismic areas Aquifer recharge areas
U. S. Army Corps of Engineers	Water quality Discharge limitations Flooding information Flood plain information Transportation (water) Ecology: Wildlife information Vegetation information Federal water laws Maps A-95 review Recreation and open space plan Demographic information Urban studies (land use and wastewater treatment data) Point and non-point water pollution

**Federal Water Pollution Control Act of 1972 (Public Law 92-500), Section 208, enables drainage basin studies to support the 208 planning process for areawide waste treatment management for water pollution control.

Table A11 (cont'd)
References Helpful in Assessing
Land Use/Industrial Impacts or Answering Filter Questions

Sources of Information	Information Supplied
U. S. Forest Service	Recreation and open space plan Vegetation information Fish and wildlife information Land use plan Aerial photos
U. S. Department of the Interior, e.g., Bureau of Outdoor Recreation, Fish and Wildlife Service	Recreation and open space plan Vegetation information Fish and wildlife information Land use information Mineral deposits Federal laws and regulations A-95 review
U. S. Department of Transportation	Transportation plans Transportation statistics Transportation maps A-95 review
HUD, HEW	Housing information Capital improvements Health information Education Demographic information A-95 review
Office of Management and Budget	A-95 review

Filter Questions

1. Are there residential areas or activity centers (e.g., shopping centers, sports complexes) adjacent to or near the industrial activity from which people will be able to hear, smell, or see the industrial operations?

(1) Yes

(2) No

2. Will adjacent land use activities be disrupted or prevented because the health and/or safety of the participants in these land use activities will be endangered (i.e., the potential for accidents or health problems will increase)?

(1) Yes

(2) No

3. Will there be increases or decreases in the regional employment structure as a result of the facility or activity?

(1) Increase

(2) Decrease

(3) No change

4. Within the past 20 years, has the employment within the facility fluctuated more than 30 percent per year?

(1) Yes

(2) No

(3) New Facility

NOISE/INDUSTRIAL

Introduction

Industrial operations can be expected to generate varying levels of noise depending upon the type of industrial process. The following nine characteristic

sources of noise generation can be associated with an industrial or manufacturing facility:

1. Heating, Ventilating, and Air Conditioning

The displacement of air associated with air movement systems is a typical industrial noise problem impacting communities. Frequently, noise of this type is a greater problem outside the industrial plant than inside. Accessory or residual HVAC equipment is an additional noise problem, particularly when it is situated outside the plant, near a property line or boundary.

2. Outdoor Fabrication

Industrial processes that necessitate fabrication out of doors because of physical requirements may be a potential noise source. Wood- and metal-related activities involving powered equipment are common noise sources, particularly when sanding, grinding, cutting, and chipping occur.

3. Explosives and Construction

Community noise impact may occur, especially with outdoor industrial activities involving construction or mineral extraction. This problem becomes more acute when blasting is necessary

4. Outdoor Materials Handling

The outdoor handling of materials requiring heavy duty equipment can be a potential noise problem. This problem can be more severe when continuous handling is necessary, including nighttime operations.

5. Outdoor Process Equipment

Certain industrial activities require the use of outdoor equipment in certain phases of processing. Equipment related to processing construction materials is a major noise source. Rock crushers, conveyor systems, and materials feeding operations are some of the potential noise generators.

6. Indoor Impulsive Noise

Indoor industrial activities frequently produce impulsive noise. If they are of sufficient intensity, which can also be influenced by the type of structural attenuation, outdoor propagation may occur. Frequently, the primary cause is vibration.

7. Indoor Steady-State Noise

Usually indoor-related nonimpulsive-type noise sources are contained within the structure, therefore the problem is classified as an occupational problem. However, if the sound is not contained within the building, because of building acoustics or the type of plant configuration, outdoor propagation may occur.

8. Testing

Product testing occasionally generates a potential community noise impact. Outdoor static testing of engine-related systems without acoustically designed suppressors can be a significant problem. The problem becomes more severe when continuous nighttime operations are required.

9. Product Transportation

Every industry generates a certain amount of transit activity on site. The extent of transportation activity is highly dependent upon level and type of production involved.

The siting of the manufacturing or industrial operation and its noise-causing activities relative to sensitive land uses is also a major concern. Many of these facilities are situated within urbanized areas and consequently are close to potentially incompatible community land uses.

Table A12 lists some persons and agencies that can provide assistance in noise impact analysis.

Filter Questions

1. There are Federal, state, and local noise emission regulations in existence which apply to the industrial activity being assessed, and the activity is in compliance with all of them outside the installation boundary.

(1) True

(2) False

(3) Don't know

2. Are areas of outdoor activity geographically isolated (1 mile [1.6 km] for steady-state noise, 3 miles [4.8 km] for impulsive noise or explosions) from sensitive land uses?

(1) Yes, or no outdoor activity.

(2) No

3. Are all indoor activities and machinery acoustically isolated, so that outdoor propagation of noise or vibration is eliminated?

(1) Yes, or no indoor activity.

(2) No

Table A12
References Helpful in Assessing Noise/Industrial Impacts or Answering Filter Questions

Sources of Information	Information Supplied
Army Installation	
Preventive Medicine Office	Acoustical survey of noise-causing material and installation activities
Facilities Engineer	Siting of facilities and activities, including base map and aerial photographic information
Training Officer	Information on scheduling, program of instruction, and location
Transportation Officer	Routing, distribution of transportation equipment
Testing Officer	Information on scheduling, sources to be tested, method of test and location
U. S. Army Level	
U. S. Army Environmental Hygiene Agency Bio-Acoustics Division Aberdeen Proving Ground, MD	Information on military-related noise sources, including weapons, aircraft, and construction equipment Hearing conservation survey, community noise impact survey
Construction Engineering Research Laboratory Corps of Engineers Champaign, IL	Acoustical survey information on military-related sources Acoustical survey of installation area, including noise control solutions
Municipal Level	
Executive Office/City Clerk	Noise legislation information, including existing or proposed ordinances
Planning Department	Land use, social and geographic information for subject area; may include aerial data
Environmental agency	Noise legislation requirements, general resource information
State Level	
Office of the Governor	Noise legislation, including existing or proposed laws
Environmental agency	Noise legislation requirements, general resource information
Federal Level	
U. S. Environmental Protection Agency Office of Noise Abatement and Control Washington, D. C.	Federal noise legislation and guidelines, general resource information

TRANSPORTATION/INDUSTRIAL

Introduction

Transportation impacts from industrial activities will in most cases be directly associated with the shipping or delivery of parts and services used in the production process. In particular, the movement of the large volumes of cargo into and out of an industrial facility could cause a number of impacts on the community transportation system. Tractor-trailers or other large freight handling equipment can damage roadway surfaces because of their size and weight and may also create a serious driving hazard on public roads. They sometimes require special pavement design criteria, or special access roads to industrial areas. Traffic flow may be impeded wherever slower moving vehicles are involved (e.g., trucks on a steep grade or sharp turns, the use of fork-lifts or other freight handling equipment on public rights of way, loading and unloading operations, etc.). In some cases special signs or traffic controls may be required. Further, any major change in the service demands on a transportation network will result in impacts. For example, the need for additional rail service or air freight to an industrial facility may cause scheduling readjustments by local terminals and carriers and could even necessitate expansion of existing transportation facilities, thus causing construction activities and impacts. The movement of explosives or highly volatile chemicals could be hazardous.

It is important that the transportation requirements be identified for each phase in the industrial process—beginning with the delivery of raw materials and labor to assemble the parts, on through the packing, shipping, unpacking, storage, and use phases of the product. State, regional and city transportation planning agencies should be advised of transportation requirements, and these requirements should be coordinated with traffic plans of official agencies as well as private transportation agencies.

See Table A13 for data sources in the transportation area.

Table A13
References Helpful in Assessing
Transportation/Industrial Impacts or Answering Filter Questions

Sources of Information	Information Supplied
Defense Supply Agency Manuals 4145.1, 4145.2, 4145.3, 4145.4, DOD 5220.22-M; Army regulations AR 700-15, DOD instruction 4100.14; DOT-7HWA Highway regulations; American Association of Railroads regulations; Trucking Association regulations; Commercial Air Carrier regulations; Federal Code of Regulations, title 49 for surface land; Federal Code of Regulations, title 49 for surface water; Air Force Manual 71-4 for shipping by air, and so on	Packing requirements
City, county, or regional planning department	Availability of public transportation services (commuter trains, buses, etc.)
Military Traffic Management Command (MTMC); Eastern Command: Bayonne, NJ; Western Command: Oakland, CA	Information on management of DOD freight traffic, CONUS ocean terminals, and non-temporary storage
Military Traffic Management Command (MTMC), Transportation Engineering Agency (TEA), Newport, VA	Traffic and safety engineering studies, transportability studies, transportability guidance
City, County, Regional, State or Federal Department of Transportation, Transportation Engineer	Existing and projected traffic flow around the industrial site; highway and pavement design criteria. Office contacted depends on classification of roadway (state or Federal highway, for example)

Filter Questions

1. Is traffic congestion or parking now a problem on or around the facility or installation?

(1) Yes

(2) No

AESTHETICS/INDUSTRIAL INTRODUCTION

Direct aesthetic impacts from industrial activities typically result from a failure to consider the appearance of the facility during its initial layout and from poor maintenance of the property. Unsightly areas such as loading and packing sites, open storage, incinerators and waste collection containers should be hidden from public view. Plantings and natural vegetation should be included as a part of industrial site design. Architectural design of structures (e.g., storage buildings or test sites) should include careful selection of materials and style that will complement the existing landscape.

Whenever an industrial activity is likely to be controversial (e.g., a waste recovery plant or a forging operation) community planning agencies should be advised of development plans and consulted for site selection. Cooperative efforts will help mitigate impacts and maintain effective comprehensive planning.

Indirect aesthetic impacts from industrial activities may be much more visible to the general public, and therefore potentially controversial. These impacts include smoke and soot from industrial operation, noise, odors, and so on. Indirect aesthetic impacts are identified by other technical specialties such as Air Quality, Noise, and Earth Sciences. Since most indirect aesthetic impacts will affect environmental amenities, they are usually cited as an impact under that attribute.

There are no filter questions for the Aesthetic Technical Specialty.

For information about aesthetic impact analysis, review the sources listed in Table A14.

ENERGY AND RESOURCE CONSERVATION/INDUSTRIAL

Introduction

Industrial activities impact energy and resource conservation attributes primarily through energy and material use requirements, but also through waste products which can potentially threaten natural resources. Many industrial operations are energy-intensive. Fuel requirements and fuel efficiency should be reviewed and measures to conserve fuel developed. Similarly, raw materials consumed by production facilities should be reviewed to assess their availability in local, national, and world markets. Materials in critical supply are of particular concern and their consumption should be noted in the analysis.

Certain of the minerals listed as attributes for energy and resource conservation are considered to be

Table A14
References Helpful in Assessing Aesthetic/Industrial Impacts

Sources of Information	Information Supplied
Marilyn D. Bagley, *Aesthetics and Environmental Planning*, EPA 600/5-73-009 (Nov., 1973) (Available through Government Printing Office).	Methodologies for assessing aesthetics for environmental impact assessment. Discussion of criteria, definitions of environmental terminology.
Marilyn D. Bagley, "Aesthetic Assessment Methodology," in L. Edwin Coate and Patricia Bonner, *Regional and Environmental Management* (J. Wiley & Sons, 1975).	Definition of aesthetic attributes, including scale, color, variety and harmony; evaluation criteria for these.

in critical supply. The known world reserves of some minerals will be exhausted in a period of years. The minerals with a proved world reserve (in 1975) of 10 to 15 years are mercury and silver; from 15 to 20 years, copper, graphite, lead, tin, tungsten, zinc and barite (listed as a minor metal); from 26 to 50 years, aluminum, antimony, manganese, platinum, sulfer, and titanium; from 51 to 100 years, asbestos, chromite, cobalt, gold, iron ore, molybdenum, nickel, and vanadium (a minor metal); and for more than 100 years, magnesium, phosphorus, potash, and columbium (a minor metal). In addition, proved reserves of natural gas, natural gas liquids and helium extend to 25 years, and petroleum and anthracite to over 50 years. Foreign trade conditions or a national emergency could cause a resource to become in critical supply. For additional information, see *Special Report: Critical Imported Materials*, (Council on International Economic Policy, Washington, D. C.: December, 1974).

In order to verify matrix predictions of impacts on energy and resources, it may be necessary to ask the following types of questions:

- What kinds and quantities of materials are required for the industrial process?
- Are materials in limited supply (U. S. or worldwide) involved?
- What are the energy requirements for this industrial process or for the manufacture of components used in the process?
- Is resource recovery from industrial waste materials recycling practical in this industrial activity? Have such programs been instituted?
- Are there opportunities to increase energy and resource conservation efforts? Is a conservation program now in effect?

The answers to these questions will vary greatly for different types of industrial processes and activities. However, they will provide the kind of information necessary to identify the role of industrial activities in energy and resource conservation environmental impact assessments.

Further assistance may be provided by sources listed in Table A15.

Table A15
References Helpful in Assessing
Energy and Resource Conservation/Industrial Impacts or Answering Filter Questions

Sources of Information	Information Supplied
On-Post	
Facilities Engineer	Details of existing facilities, capacities, requirements, etc.
Utilities Engineer	Heating, cooling, energy and other requirements. Waste disposal.
Process Engineer, Operators	Details of specific industrial operations and material requirements.
Procurement Officer	Material requirements, records, suppliers, etc.
Off-Post	
U. S. EPA	Recycle/reuse potential. Effects of waste on natural environment. Discharge/emission requirements.
Colleges and Universities	Records, data, and assistance on specific industrial operations' waste production and pollution control.
U.S. Department of Energy	Research development of topics relating to energy production and use. Records, data and assistance on energy related topics.
State Energy and Conservation Office	Not available for every state. This type of agency generally acts as an advisory board to the state's executive department. Information on regulatory requirements of that state.

Filter Questions

1. Are air pollution controls in operation, or will they be used to reduce air emissions to levels required by Federal, state or local standards?

(1) Yes

(2) No or don't know

2. Are treatment systems in use or planned for use to reduce all liquid waste discharges to quality levels acceptable to Federal, state, or local regulatory agencies?

(1) Yes

(2) No or don't know

3. Is a resource reuse/recovery system in effect to minimize raw material requirements and maximize recycling of all waste products produced by the industrial operation in question?

(1) Yes

(2) No or don't know

4. Are hazardous materials (munitions, batteries, etc.) presently being disposed of in a manner acceptable to Federal, state, or local regulatory agencies?

(1) Yes

(2) No or don't know

5. Has any proposed increase or decrease in industrial operations been coordinated with local officials to minimize effects on local procurement, services, utilities, etc., during the next year?

(1) Yes, or no increase or decrease is proposed.

(2) No

APPENDIX B:
THE PROCUREMENT FUNCTIONAL AREA

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APPENDIX B: THE PROCUREMENT FUNCTIONAL AREA

Introduction

Procurement is a unique Functional Area in that many of the potential environmental impacts from procurement activities are indirect. The act of purchasing causes direct economic impacts. However, the purchase of goods and services is often the first of a series of activities which lead to potential physical as well as socioeconomic impacts.

In Figure B1, procurement is shown in relation to other activities which are more direct causes of environmental impacts. An order placed for services may not result in impacts (other than economic) until the services are performed. An order for goods can result in impacts caused by the resources required for production or from pollution generated during production. The use of procured items can result in impacts as can final disposition of the item.

In general, potential impacts from procurement activities stem from what is procured and from whom it is procured. Impacts result from how services are performed, what resources are required during production, pollutant emissions during production, how procured items are used and the final disposition of the items. The responsible procurement officer should consider these factors when selecting from alternate items and producers.

The Procurement Functional Area may need to be employed concurrently with other Functional Areas. For example, evaluation of impacts associated with use of procured hardware may require use of the Training or RDT&E Functional Areas. Evaluation of the environmental impacts associated with production of procured items will require use of the Industrial Activities Functional Area.

Attributes differ in how they are impacted by procurement activities. Some are more directly affected than others. Some are impacted directly by production activities and others by use of procured items. The Technical Specialty introductions, beginning on p 83, elaborate on how attributes are likely to be affected.

Description of Procurement Actions

Equipping, provisioning, and resupplying the modern Army is a monumental task. Hardware procurement budgets run approximately 3 to 4 billion dollars per year; an additional billion is spent on foodstuffs, common consumables (e.g., petroleum, oil, and lubricants), and reparable spare parts.

Procurement is accomplished over four categories: (1) principal items (e.g., aircraft, missiles, etc.); (2) secondary items (e.g., parts, supplies, food for mess halls); (3) utilities and services; and (4) nonappropriated funds procurement (e.g., purchases for service clubs, commissaries, post exchanges, etc.). Principal and secondary items procurement is shown graphically in Figure B2.

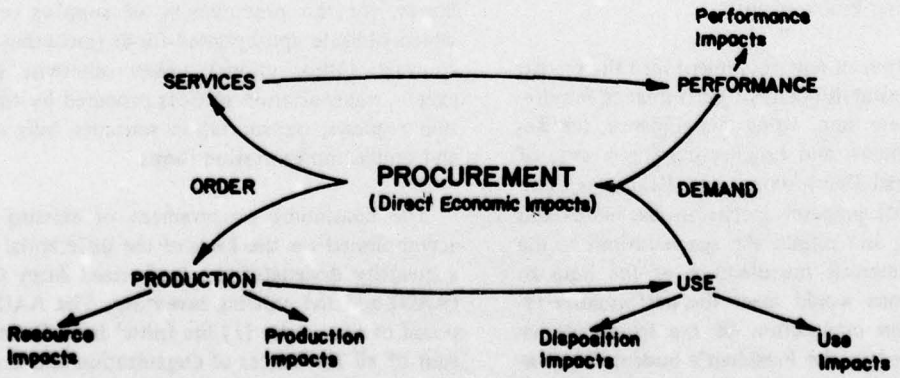

Figure B1. Relations between procurement and potential environmental impacts.

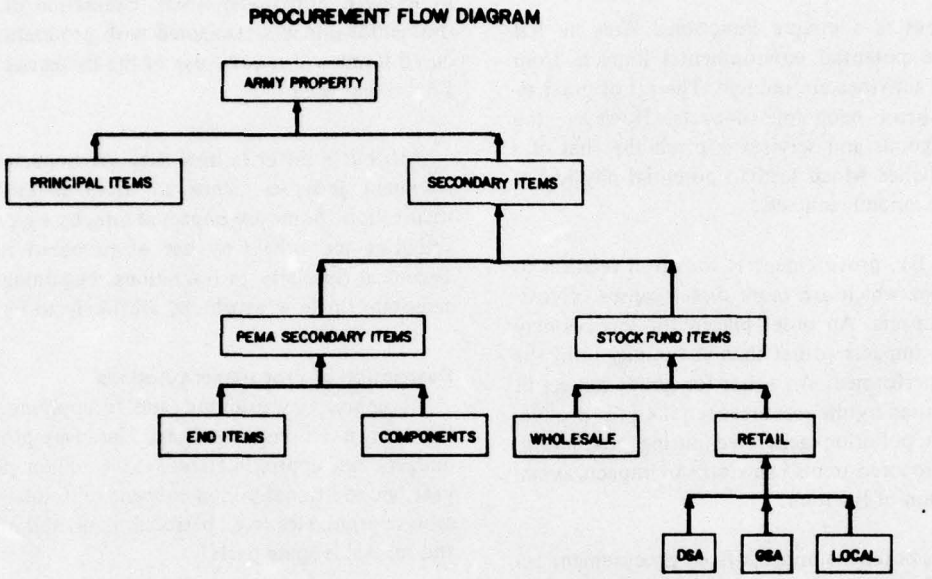

Figure B2. Relationship of principal and secondary items procurement in the Army.

Principal item procurement can be subdivided into two parts: (1) the introduction of new equipment into the system, and (2) the continued procurement of existing authorized items. These funds come from an appropriation designated Procurement of Equipment and Missiles, Army (PEMA).

Procurement for hardware is provided for through five PEMA procurement appropriations: Missiles, Aircraft, Ammunition, Weapons and Tracked Combat Vehicles, and Other Procurement.

The introduction of new equipment into the system begins with the establishment of performance requirements for the new item. Using this guidance, the Research, Development, and Engineering Directorate of the Army Materiel Development and Readiness Command (DARCOM) prepares specifications, builds and tests prototypes, and refines the specifications to the point that commercial manufacture of the item to these specifications would meet the performance requirements. Upon completion of the specifications, the item is placed in the President's budget for Congressional approval and funding. After Congressional approval is received, the funds are released to the appropriate DARCOM command for procurement of the item. All procurement is accomplished in accordance with the Armed Services Procurement Regulations (ASPR). ASPR establishes for the Department of Defense uniform policies and procedures relating to the procurement of supplies and services under the authority of Chapter 137, Title 10, of the United States Code, or under other statutory authority. ASPR applies to all purchases and contracts made by the Department of Defense, within or outside the United States, for the procurement of supplies or services which obligate appropriated funds (including available contract authorizations), unless otherwise specified, except transportation services procured by transportation requests, transportation warrants, bills of lading, and similar transportation forms.

The continuing procurement of existing items is accomplished on the basis of the differential between a quantity designated the Authorized Army Objective (AAO) and the existing inventory. The AAO is composed of two parts: (1) the Initial Issue Quantity [the sum of all the Tables of Organization and Equipment (TOE) and Tables of Distribution and Allowances (TDA) requirements, the maintenance float and the

pipeline or in-transit materials], and (2) the war reserves–the reserve quantities of each of the approved items which have been specified. The difference between the AAO and the existing inventory is the quantity for which Congressional procurement authorization is requested.

Procurement of PEMA secondary items include the following categories:

1. End items greater than $1000 not classified elsewhere

2. Components.

End items are defined as items which can function by themselves without being attached to anything else. Components are those portions of end items which are nonexpendable and repairable at the depot maintenance level.

The Army Stock Fund is a revolving fund operation capitalized in excess of $2 billion. The stock fund is used to purchase expendable spare parts, clothing, textiles, food, petroleum, and office supplies, either in wholesale quantities, or from other government agencies. These items are then sold to various installations.

Utilities and services such as power, water, refuse collection and disposal, and custodial services are procured under the provisions of ASPR.

Nonappropriated fund activities (open mess, welfare fund, chaplain's fund, etc.) are not required to follow ASPR in their procurement activities. In all decisions determining whether procurement is by bid or by negotiation, the best interest of the fund must be served by the chosen method.

Post exchange activities are not covered by ASPR. A separate Exchange Manual, reflecting many similarities to ASPR, is used as a guide. All procurement is accomplished by negotiating open-ended, fixed-unit price contracts with name brand manufacturers. Individual exchanges then levy against these contracts for the quantities they desire.

Commissaries (grocery stores for military personnel) usually follow ASPR whenever possible, but they are technically exempt from the ASPR. The Defense Personnel Support Agency negotiates open-ended, fixed-unit costs contracts with name brand suppliers to provide for the desires of the commissaries' clientele.

Problems

In most instances, under the provisions of ASPR, the low bidder who has the capability to perform the terms of the contract gets the contract. This basic principle of the ASPR can be modified to allow direction of contracts to labor surplus areas or to exclude big business and allow contract competition among small businesses (small business set-aside). The Army can insist that the contractor and his subcontractors meet existing pollution regulations only when they are performing some service on post; and enforcement procedures are at the discretion of the Procurement Office, which may have no means to determine whether violations have occurred. Additionally, the low bidder concept may favor the manufacturer located in an area whose pollution laws are inadequate or indifferently enforced.

Requirements for individual or group environmental assessments or statements associated with hardware procurement are weakened by several factors. At the time of submission for the annual procurement appropriation, the ultimate manufacturer and the plant location are unknown, and assessment of the potential environmental impact of procuring the hardware is thus very difficult.

Executive Order 11602, dated 9 June 1971, prescribes a program to assure that each Federal agency empowered to enter into contracts for procurement of goods, materials, or services, shall undertake this procurement such that effective enforcement of the Clean Air Act results.

The Procurement BAAPs for EICS are defined on the following pages. Table B1 lists various items which may be procured under each of the BAAPs.

Procurement BAAPs: Definitions

10 Procurement Policy

11 Lowest Qualified Bidder. Procurement of goods will normally be from the lowest qualified bidder whose performance capabilities have been verified.

12 Not from Polluters. No procurement is permitted from contractors convicted of violations of pollution laws (Executive Order 11602).

13 Compliance With Clean Air Act. Procurement will be promulgated in a manner that will insure

compliance with the Clean Air Act (Executive Order 11602).

20 Principal Items. Principal item procurement can be subdivided into two parts: (1) the introduction of new equipment into the system and (2) the continued procurement of existing authorized items. Funds come from an appropriation designated Procurement of Equipment and Missiles, Army (PEMA).

30 PEMA Secondary Items. End items can function without attachment to other items, cost greater than $1,000, and are not covered elsewhere. Components are those portions of end items which are non-expendable and repairable at the depot maintenance level.

40 Stock Fund Secondary Items. The stock fund is used to purchase expendable spare parts, clothing, textiles, food, petroleum, and office supplies, either in wholesale quantities or from other government agencies (General Services Administration, Defense Logistics Agency, National Inventory Control Point); these items are sold to various installations.

50 Utilities and Services; 51 Utilities: Installation Level; and 52 Services: Installation Level. The procurement of utilities and services such as power, water, refuse collection and disposal, and custodial services is accomplished under the provisions of ASPR.

53 Utilities: Command Level; and 54 Services: Command Level. Policy decisions in regard to Army procurement of utilities and services are made at the command level or higher. Such policy sets the proportion of utilities/services which may be procured (rather than provided by the installation itself). It also affects the types of utilities/services which the installation itself may engage in or provide.

55 Construction and Maintenance Supplies. Items used on an installation for day-to-day building maintenance or for small construction projects (less than $50,000 per project) which, because of their character or quantity, are not economically supplied by GSA or DLA and which are not otherwise obtained through service contracts.

56 Miscellaneous Installation Operation Supplies. Supplies and materials required for support of an installation's mission, not obtainable from government supply sources, and not otherwise applicable to any other Procurement BAAPs. This BAAP is particularly applicable to special projects supplies (including R&D projects) and to perishable troop mess supplies (fresh dairy products, meat, and produce).

60 Nonappropriated Funds Activities. Nonappropriated fund activities are not required to follow ASPR in their procurement activities. In all decisions determining whether procurement is by bid or by negotiation, the best interest of the fund must be served by the chosen method.

61 Personnel Suport: Installation Level. Procurement for service clubs (officer, NCO, enlisted), post library, welfare funds (purchase, emergency loans to Army personnel), and morale maintenance (unit funds).

62 Commissary: Installation Level. Commissaries (grocery stores for military personnel) usually follow ASPR whenever possible, but they are technically exempt from the ASPR. The Defense Personnel Support Agency negotiates open-ended, fixed-unit cost contracts with name brand suppliers to provide for the desires of the commissaries' clientele.

63 Post Exchange: Installation Level. Post exchange activities are not covered by ASPR. A separate Exchange Manual, reflecting many similarities to ASPR, is used as a guide. All procurement is accomplished by negotiating open-ended, fixed-unit price contracts with name brand manufacturers. Individual exchanges then levy against these contracts for the quantities they desire.

64 Personnel Support: Command Level; 65 Commissary: Command Level; 66 Post Exchange: Command Level. Policy decisions made at the command level or higher regarding items of personnel support and stocking of items for commissary and post exchange.

Table B1
Procurement BAAPS and Procured Items

BAAPS	Procured Items
10 Procurement Policy	
11 Lowest Qualified Bidder	
12 Not from Polluters	
13 Compliance with Clean Air Act	
20 Principal Items	Aircraft: Fixed & Rotary Winged Weapons: Crew-Served, Individual, Artillery; Tracked Vehicles Missiles: Anti-Tank, Anti-Aircraft, Surface-to-Surface, ABM Ammunition: Small-Arms, Artillery, Bombs, Mines, Rockets, Grenades, Explosives, Pyrotechnics, Nuclear and Chemical Agents Other: Commercial Vehicles, Vehicle Modification, Telecommunications, Electronics, Combat Support, Construction Equipment, Floating Equipment, Generator Sets, Materials Handling Equipment, Medical Support Equipment
30 PEMA Secondary Items	End Items, Components of End Items
40 Stock Fund Secondary Items	Supplies, Tools, etc., from GSA; Clothing, Oil, Canned Goods, etc., from DLA; Expendable Spare Parts, Batteries, etc., from National Inventory Control Point
50 Utilities, Services, and Supplies	
51 Utilities: Installation Level	Water, Power, Water Treatment, Solid Waste Collection and Disposal
52 Services: Installation Level	Custodial, Laundry, and Personal Services; Food Service; Grounds Maintenance; Equipment Maintenance Services; AE Services
53 Utilities: Command Level	Command Policy Regarding Purchases of Utilities
54 Services: Command Level	Command Policy Regarding Purchases of Services
55 Construction and Maintenance Supplies	Small Amounts of Lumber, Millwork, and Related Supplies; Small Quantities of Building Maintenance Supplies; Ready-Mix Concrete for Repairs or Minor Construction; Paving Materials; Fill; Aggregate (Crushed Rock or Gravel); etc.
56 Miscellaneous Installation Operations Supplies	
60 Nonappropriated Fund Activities	
61 Personnel Support: Installation Level	Service Clubs, Library, Welfare Funds, Morale Maintenance Procurement
62 Commissary: Installation Level	Canned Goods, Household Consumables, Tobacco Products, Fresh Meat, Fresh Dairy Products, Produce
63 Post Exchange: Installation Level	Consumer Goods
64 Personnel Support: Command Level	Command Policy Regarding Personnel Support Items
65 Commissary: Command Level	Command Policy Regarding Stocking of Commissary Items
66 Post Exchange: Command Level	Command Policy Regarding Stocking of Post Exchange Items

Using the Procurement Functional Area

Because a Procurement Office at an Army installation or for an entire command is a somewhat self-contained unit and is the agency with responsibility for making actual purchases, it may at first appear that such an office should be responsible for addressing environmental impacts of procurement actions. This could include using EICS or other computer systems such as EIFS. However, the point of decision for large or small procurements is not the Procurement group. Instead, many procurement commitments are made at the command level or higher (up to DA HQ), particularly those which obligate production for Army-wide use of PEMA primary and secondary items. Decisions on purchases for installation support are made locally by installation offices other than Procurement. For instance, Facilities Engineering is usually responsible for off-base purchases of utilities and services, subject to certain command or higher-level restrictions.

CERL therefore suggests that the group which actually decides on funding a particular procurement will

be the group responsible for assessing the environmental impacts of such a procurement. Accordingly, the Procurement Functional Area has been separated into two subprograms: Installation Level and Command (or other) Level. The Installation Level would be requested (Item 6 on the Input Form) when the procurement is a local one, affecting only a particular installation and decided upon by some organization within the installation hierarchy. The Command Level would be requested for procurement decisions at higher levels (Command HQ, DA HQ, or even higher on some occasions) or by other agencies, such as GSA or DLA, which may affect more than one installation, or which concern policy toward installation-level procurement actions, or which are decision milestones within the acquisition management cycle. (For further elaboration of the latter, see the Planning Section, BAAPs 110 through 145, and the Support Section, BAAPs 240 through 299, of the RDT&E Functional Area. Impacts of the use of procured items will be found in the Training, Operations & Maintenance [O&M], RDT&E, and Industrial Functional Areas.)

Assessment of environmental impacts of procurement actions presents a special problem relative to requirements for life-cycle assessment of weapons systems or special items of equipment. Decisions made at early phases of the acquisition cycle (the "research" phases) may limit the choices available to those deciding whether to authorize full-scale production and deployment of a weapons system or item. In the Army, such production decisions are made by the Commodity Command of DARCOM. To assure that environmental impact assessment occurs throughout the acquisition cycle, the early-phase decisions, even at the project level, should consider the impacts which would occur if items being tested were finally adopted for Armywide use. Thus a project-level RDT&E assessment might also request the Command Level subprogram from Procurement. On the other hand, the command level decision-makers may need to request RDT&E, Industrial, and/or Training output, as applicable, to expand on the Procurement Functional Area output.

User Input Requirements

To obtain EICS output for the Procurement Functional Area, the user may complete Input Form #6 and send it to CERL or may enter the EICS responses on an interactive computer terminal. Detachable copies of blank input forms are provided beginning on p 175; a sample for the Procurement FA is shown in Figure B3. Seven items must be supplied by the user.

1. Project Name

You may designate any name or description that does not exceed 75 characters. (Each letter, space, number, or punctuation mark is one character.)

2. Installation and Date

Write your installation's name and date of submittal.

3. Respondent's Name, Address, and Telephone Number

Be sure to supply your complete mailing address, including office and/or organization symbols. Specify commercial number; specify FTS number, if applicable.

4. Request Number

A separate request should be made for each procurement activity for which filter questions would be answered differently.

5. Detailed or Review Level

These terms refer to the depth of the information desired. The answer chosen will apply to the entire output for this site. Designate your request by writing "Detailed" or "Review" in the space provided. If you wish to examine output at both levels for a particular site, write "Both" in the space provided. Controversial attributes will be presented at both levels.

6. Subprogram Number

Specify whether the procurement actions being assessed are at the Command Level (1), the Installation Level (2), or both (3).

7. Output Selection and Answers to Filter Questions

Place an "X" in the boxes under the "Matrix" heading for those Technical Specialty matrices desired. Place an "X" in the boxes under the "R-M" heading if a set of Ramification Remarks and Mitigation Statements is desired. Ramifications and Mitigations are provided in complete sets and are not filtered. Thus, a user who has already received one set need not request another. In rare circumstances, a user may need additional sets if he/she cannot obtain local reproduction. In such a case, the user should make special arrangements with CERL to obtain multiple sets of Ramification Remarks and Mitigation Statements.

The section of the input form called "Answers to Filter Questions" allows specification of information

INPUT FORM NO. 6 — PROCUREMENT FUNCTIONAL AREA

1. PROJECT NAME: _____
2. INSTALLATION: _____ TEL. NO. (COMM.) _____
3. RESPONDENT'S NAME: _____ (FTS) _____
ADDRESS: _____ DATE _____
_____
_____
4. REQUEST NO. _____
5. DETAILED OR REVIEW LEVEL ? _____
6. SUBPROGRAM NO. _____

7. OUTPUT SELECTION

MATRIX	R-M	TECHNICAL SPECIALTIES	ANSWERS TO FILTER QUESTIONS Q-1	Q-2	Q-3	Q-4	Q-5	Q-6	Q-7	Q-8	Q-9	Q-10
		ECOLOGY										
		ENV. HEALTH										
		AIR QUALITY										
		SURFACE WATER										
		GROUNDWATER										
		SOCIOLOGY										
		ECONOMICS										
		EARTH SCIENCE										
		LAND USE										
		NOISE										
		TRANSPORTATION										
		AESTHETICS										
		ENERGY/RES. CONS.										

Figure B3. Sample Procurement FA input form.

pertaining only to the request being examined. Answer filter questions for only those Technical Specialties for which output is desired.

Questions on use of EICS or on obtaining direct computer access to the system should be referred to Dr. E. W. Novak at (Commercial) 217/352-6511, or FTS 958-7011.

Technical Specialty Introductions and Filter Questions

Filter Questions for each Technical Specialty, along with an introduction and lists of data sources pertinent to that specialty, follow. Users should record answers on Input Form No. 6 in the matrix on the right hand side under point 7, or as directed by the computer program instructions if using the interactive input mode.

ECOLOGY/PROCUREMENT

Introduction

The effects of Procurement policy, Army-wide or at an installation, on ecological aspects of the environment are rather indirect in almost all cases. In general, procurement of an item whose acquisition or use can directly affect some ecological attribute (see Construction, O&M, Training, and Industrial Functional Areas

for uses of items) can be considered to have an indirect impact on that attribute. Services which would directly affect the environment if they were improperly performed would also cause *indirect* effects at the Procurement level. In other words, when items are being procured at the installation level, or when procurement policy is being developed and implemented at the command level, the procurement activity is once, twice, or even three times removed, in location and time, from the impact on the attribute. Thus, ecological impact assessment for procurement of items is likely to be highly generalized. The best mitigation procedure for these impacts is to favor contractors and suppliers having ecologically sound policies and pollution-control practices.

There are two cases in which procurement impacts may be more immediate: (1) procurement of items made from fur or leather of wild (not domestic) animals, and (2) local procurement of grounds maintenance services to perform tree thinning, fertilizing, seeding, maintaining fire lanes, seedbed preparation, or tree planting in areas outside the cantonment. For elaboration of the reason for control of such maintenance at the procurement level (i.e., specification of the methods in contracts for services), the user should see the Forest/Wildlife Management impacts (BAAPs 230 through 254) via an access of the Operations and Maintenance Functional Area of EICS.

See Table B2 for sources of baseline ecological information or assistance in evaluating environmental impacts in locations where procured items are manufactured, supplied, or used.

Filter Questions

1. Which of the following statements is true for the location(s) covered by the Procurement policy being assessed?

   (1) Federal or state-designated threatened or endangered plants and/or animals are or may be present.

   (2) No such plants and/or animals are present.

   (3) No determination has yet been made of the presence of such organisms.

2. *Grounds maintenance crews may be involved in tree thinning, fertilizing, seeding, tree planting, or other similar operations. These crews, when civilian and/or operating under contract, may be induced to perform such activities with adequate regard for environmental considerations by one or both of two methods: contract specification and prescription of methods to be used, and on-site supervision to monitor their compliance with such prescriptions.*

To what extent does the Building and Grounds Division of the Facilities Engineer's Office control, by the methods mentioned above, the activities of contractual grounds maintenance crews in installation areas outside the cantonment?

Table B2
References Helpful in Assessing Ecological Impacts or Answering Filter Questions

Sources of Information	Information Supplied
DFAE Building and Grounds Division	Presence (and relevant training) or absence of Wildlife Officer, Forester, or Agronomist
	Extent of contractual grounds maintenance outside the cantonment; extent DFAE exercises control over maintenance contracts and crews
Product manufacturers	Supply area for wild animal-derived clothing (furs, leather)
Fish and Wildlife Service, U. S. Dept. Interior	Likelihood of presence of threatened plants or animals on installation or in supply area; likelihood of interference in supply area

(1) Active prescription and monitoring by trained Agronomist, Forester, or Wildlife Officer.

(2) Such officers, although present, are either not trained in some area of the biological sciences, OR do not exercise active prescription and monitoring of such activities.

(3) Grounds maintenance activities outside the cantonment are not performed by outside contractors or are not performed at all (excluding timber harvest by outlease or sale).

(4) Don't know.

(5) This assessment does not apply to a specific installation.

(6) No areas other than the cantonment are present on the installation.

HEALTH SCIENCE/PROCUREMENT INTRODUCTION

Environmental Health is concerned with both the physical and mental well-being of man. Thus, it covers a wide range of effects from physical and chemical to psychological stress. The various pathways by which stressors reach the population are also of importance in estimating environmental health impact.

Procurement activities, in themselves, have no significant health impacts. Therefore, an effects matrix for the Health Science Technical Specialty is not scored in the Procurement Functional Area.

The military procurement program, however, has the potential for very large indirect health impacts in the decision of which items to purchase and where and from whom to purchase them. Consideration should be given to the life-cycle environmental impact of purchased items relative to potential alternatives. This can include effects from the initial gathering and processing of the materials to their manufacture, assembly and shipment, through the use by the military, to ultimate disposal.

There are no filter questions for the Health Science Technical Specialty in the Procurement Functional Area.

Table B3 provides a list of sources of information for the Health Science area.

AIR QUALITY/PROCUREMENT INTRODUCTION

In assessing the impact of the Army's procurement policy on air quality, one should first contact the responsible procurement office or agency to determine who the vendors are for the various procurement categories. Once a list of vendors is available, the local and/or state air pollution control officials should be contacted to determine the quality of the air pollution programs for each vendor. If the vendor is a national organization, the Federal EPA offices can be contacted for information.

Table B3
References Helpful in Assessing Health Science Impacts

Sources of Information	Information Supplied
Registry of Toxic Effects of Chemical Substances, Herbert E. Christiansen and Edward J. Fairchild, Eds. (U. S. Dept. HEW, Public Health Service, Center for Disease Control, National Institute for Occupational Safety and Health, Rockville, MD 20852, June, 1976) Available as HE 20.7112:976 from Superintendent of Documents U. S. Government Printing Office Washington, DC 20402	Contains information on toxic dose levels and safety standards for over 100,000 chemical substances.

Table B4
References Helpful in Assessing Air Quality Impacts

Sources of Information	Information Supplied
State EPA Federal EPA	Information on the air pollution abatement programs of vendors
Procurement Office or Agency	*List of vendors and items procured*

Without question, the procurement practices of the Army can affect regional and local air quality. Procurement items that have inadequate pollution controls will allow degradation of air quality, whereas an active procurement policy of selecting the items with lowest possible emission levels will allow air quality to improve.

There are no filter questions for the Air Quality Technical Specialty in the Procurement Functional Area.

Table B4 provides sources of baseline information about air quality.

SURFACE WATER/PROCUREMENT

Introduction

The surface water impact of the actual act of buying (procurement) is trivial. However, the secondary effects may be far-reaching. Indeed, the opportunity for controlling the overall impact of military activities on the surface water environment during the procurement process is appreciable.

Clearly, the nature of the product procured has a significant effect on its potential surface water impact. For example, the relative toxicity and biodegradability of products influence the water quality impact resulting from their use. Such product properties can be specified at the time of procurement.

Additionally, significant differences may exist in the nature or amount of wastewater produced in creating alternative products. Likewise, significant differences may exist in the potential surface water impact of alternative means of producing the same product. These, too, are matters which may be specified at the procurement stage.

Current Federal water pollution control legislation (PL 92 500, the 1972 Amendments to the Water Pollution Control Act and its further amendments in PL 95-217, the Clean Water Act of 1977) contains provisions which relate to the water pollution control activities of the industries which would be involved in supplying military needs. Similar requirements are imposed on municipalities. The extent to which these requirements may be realized remains to be seen, but they are the current national goals. In accordance with these requirements, the U.S. Environmental Protection Agency has issued, or will issue, guidelines concerning the extent of treatment required by various types of industries. These requirements exist (or will soon exist) both for industries which discharge treated wastewater directly to receiving waters (effluent guidelines) and for those which discharge to municipal sewers (pretreatment guidelines). Those involved in significant military procurement activities should be familiar with the nature and implications of these Federal requirements.

Each of the Procurement BAAPs concerning purchase of materials involves a wide spectrum of possible industrial activities. Industries from numerous Standard Industrial Classifications[18] are contained within each of the Procurement BAAPs, but indication of specific probable surface water impacts from these industrial activities is not possible (indeed, with most of the individual Standard Industrial Classifications, the scope of industrial activity is so broad as to preclude a sensitive analysis of probable specific surface water impact). Thus, the absence of an indication on the environmental matrix of impact by Procurement BAAPs on specific surface water attributes must **not** be construed to mean that no impact should be expected. Rather, in the case of the Procurement BAAPs, the

[18] *Standard Industrial Classification Manual* (Statistical Policy Division, Office of Management and Budget, Executive Office of the President, 1972).

absence of an indicated impact means that the scope of possible industrial activities stimulated by the procurement activity is so broad that specific surface water impacts cannot be anticipated with a reasonable degree of accuracy. If all **conceivable** surface water impacts from individual Procurement BAAPs were indicated on the environmental matrix, a large number of the impacts irrelevant to any particular act of procurement would need to be indicated. In some cases, it may be possible to obtain an indication of the specific effects of a particular procurement activity by referring to the Industrial Functional Area for the surface water impact of the specific industrial activity involved.

Procurement of services and utilities is of special concern with regard to the potential impact on surface waters. The provision of a water supply or energy supply or the acceptance of wastewater or solid waste involve appreciable opportunities for surface water impact. Most commonly, such services are not available in the open marketplace, but rather may only be available from a single purveyor in the proximity of a military installation. Under such conditions, special attention to the need for close coordination with the utility and for careful evaluation of contractual provisions is warranted. The capacity and condition of the facility offered, the demand on the facilities by nonmilitary users, and the competence of managerial, technical, and operational personnel are among the factors deserving extensive evaluation prior to consummation of the procurement process. A normal option to contracting for utilities would be to provide separate services for the military installation.

Desired site-specific information for military procurement activities concerns details about the nature of material to be procured, the procedures used in producing the materials, the nature of residues created in producing the items, data about the location(s) which might be affected by the activities, and other matters. Additionally, when utilities and services are to be procured, appreciable information is desirable about the exact service to be performed. Because many of the potential impacts caused by activities in this Functional Area are secondary to the actual act of procurement, much of the information desired may not be available at the location at which procurement activities take place.

Table B5 lists some useful sources of information about water quality impacts.

Table B5
References Helpful in Assessing
Surface Water/Procurement Impacts or Answering Filter Questions

Sources of Information	Information Supplied
Procurement Officer, DFAE	Characteristics of items to be procured.
	Nature of the utilities or services to be procured.
	Characteristics of solid wastes to be handled by contractor.
	Characteristics of wastewater to be handled by contractor.
Military or consultant toxicologist	Relative toxicity of alternative items which could fulfill product requirements.
	Relative toxicity of wastewaters produced by alternative manufacturing procedures.
U. S. Environmental Protection Agency	Effluent guidelines for the industries producing the items being procured.
	Pretreatment guidelines for the industries producing the items being procured.
Appropriate state water pollution control authority	Applicable surface water quality standards.
	Historical and current quality of receiving waters.
	Compliance of industry, utility, or service group with National Pollution Discharge Elimination System permit provisions.

Table B5 (cont'd)
References Helpful in Assessing
Surface Water/Procurement Impacts or Answering Filter Questions

Sources of Information	Information Supplied
Authority on water quality control and industrial and municipal water pollution control	Possible surface water impacts of alternative products.
	Possible surface water impacts of alternative means of producing alternative products.
	Relative biological degradability of alternative products.
	Relative biological degradability of wastes produced by alternative means of producing alternative products.
	Pollution control capabilities of those offering utilities or services.
U. S. Weather Bureau	Climatological conditions which might be expected to affect the procurement activity.
U. S. Geological Survey	Topographic maps of area involved in procurement activities.
U. S. Soil Conservation Service	Soil types in area involved in procurement activities.
Appropriate civil service group	Attitudes concerning the military activity involved.
Local planning agency	Land use plans, regional solid waste management plans, regional wastewater management plans, regional water supply plans, regional plans developed under Section 208 of PL 92 500 (the Water Pollution Control Act Amendments of 1972), as amended by the Clean Water Act of 1977.

Filter Questions

Answer the following questions if the action being assessed involves procurement at the installation level. If not, enter zero for all questions.

1. Do the utilities and services procured relate only to the disposal (or collection and disposal) of refuse?

(1) Yes

(2) No

2. Do the utilities and services procured relate only to the provision of electricity, hot water, or steam?

(1) Yes

(2) No

3. Do the utilities and services procured relate only to the provision of a potable supply of water?

(1) Yes

(2) No

4. Do the utilities and services procured relate only to the treatment (or collection and treatment) of ordinary domestic wastewater (wastewater of the quality expected from an ordinary residential community)?

(1) Yes

(2) No

5. Do the utilities and services procured relate to treatment (or collection and treatment) of wastewaters in part (or entirely) from nondomestic activities (activities which ordinarily would not be expected to take place in a residential community)?

(1) Yes

(2) No

GROUNDWATER/PROCUREMENT

Introduction

Procurement activities will have both primary and secondary impacts on groundwater quality. The primary impacts result when a large procurement requires that extensive areas be developed to handle the procured items; these areas will be covered by warehouses, storage piles, delivery terminals, transportation nets, packaging disposal areas, etc. These can directly affect the amount of water available for recharge to aquifers. From a water quality point of view, if contaminated runoff from these operations or from use or disposal of procured items can make its way to an aquifer, serious degradation can occur.

The secondary impacts of procurement relate to the activities of the suppliers of goods. If, in the production of equipment for the government, the supplier affects the quantity or quality of the groundwater, the government is indirectly responsible. These impacts may be even more severe than the primary impacts of procurement.

See Table B6 for information sources useful in assessing impacts on groundwater.

Filter Questions

1. Which of the following best characterizes the conditions at the locale of production or use of the procured items, or the locale where procured services are performed?

(1) No significant aquifer exists.

(2) Confined aquifer with recharge area more than 1000 meters from the activity or receiving point. No wells are in use.

(3) Confined aquifer and either (a) recharge area less than 1000 meters from the activity or receiving point, or (b) wells are in use.

(4) Subsurface characterized by fissures and/or solution channels extending to within 20 meters of the surface.

(5) An unconfined aquifer with the water table more than 20 meters below the surface.

(6) An unconfined aquifer with the water table less than 20 meters below the surface.

2. Which of the following best characterizes the location of production or use of the procured items, or the locale where procured services are performed?

(1) The area surrounding the locale or receiving point is completely built up. The activity has been sustained for greater than 5 years at its current level without untoward results. The projected future level is the same as the current level.

(2) The area surrounding the locale or receiving point is completely built up. The activity has been sustained for fewer than 5 years. The projected future level is the same as the current level. No new roads or other transport facilities are required.

(3) The area surrounding the site is rural. The activity has been sustained for more than 5 years at its current level and is not projected to change levels.

Table B6
References Helpful in Assessing Groundwater Impacts or Answering Filter Questions

Sources of Information	Information Supplied
Site visits	Surface conditions at site of storage, transportation, production, or disposal
Topographic maps	
State water development agencies	Subsurface and aquifer conditions at site of storage, transportation, production, or disposal
Water supply offices	

(4) The area surrounding the locale is rural. The activity has been sustained for fewer than 5 years at its current level or it is projected to change levels.

(5) The area surrounding the activity is suburban.

(6) New roads or other transport facilities are required.

3. Which of the following best describes the conditions at the locale of production or use of the procured items, or the locale where procured services are performed?

(1) The area is primarily above grade and covers less than 4,000 square meters.

(2) The area is primarily above grade and covers more than 4,000 square meters but less than 20,000 square meters.

(3) The area is above grade and covers more than 20,000 square meters or is below grade and penetrates the water table.

SOCIOLOGY/PROCUREMENT

Introduction

Procurement programs are either (1) continuous (only requiring inventory replacement) or (2) episodic ("crash programs" of unusual one-time demand). Continuous programs have little effect on communities because the associated activities have been incorporated in the predictable routines of the community. Episodic programs may exceed the locally available supply of industrial resources (labor, plants, and raw materials). Population composition may be altered by the in-migration of persons with additional work skills, and the development of additional community facilities such as schools, hospitals, and housing. Procurement policies may also affect the creditability of national environmental policies: conformity will validate and reinforce such policies; deviation by procurement from polluting sources will correspondingly discredit and vitiate these policies.

Filter Questions

1. Does the procurement program use available local industrial resources (those located in a predefined* economic region)?

(1) Yes

(2) No

(3) Don't know

2. Do the procurement sources comply with all applicable regulations of environmental monitoring agencies, and are they considered environmentally compatible by citizens' groups?

(1) Yes

(2) No

(3) Don't know

*By the user. Basically, the region discussed here is that in which the procurement action has some significant effect on that region's economy. Contact CERL for assistance.

Table B7
References Helpful in Assessing Sociological Impacts or Answering Filter Questions

Sources of Information	Information Supplied
Chamber of Commerce and trade associations	Available local resources (labor, plant, and raw materials)
Environmental monitoring agencies and civic action groups	Records of compliance with regulations
Procurement Command DOD, Office of Contract Compliance	Experience with specific procurement sources, e.g., contract compliance
Construction Engineering Research Laboratory, Environmental Systems Team	Assistance in defining economic region of influence for the installation or the procurement activity

ECONOMICS/PROCUREMENT

Introduction

The very nature of procurement activities implies the acquisition of goods and services from outside the military system of installations. Because of this it is almost inevitable that all procurement activities are going to have some effect on the economy. In general, the emphasis in economic analysis for a specific military activity is on the local economy, with little or no emphasis on the effect on the national economy. This also is true for the Procurement Functional Area.

As a general rule, the Ramification Statements indicate to the user the extent to which various impacts will affect the economy. There are no Mitigation Statements provided for the Procurement Functional Area, because most of the impacts generated by procurement in a local economy are positive.

NOTE: Users of this manual should request *separate output* for procurements outside any predefined* local area in excess of $1,000,000 annually.

*By the user. Basically, the region discussed here is that in which the procurement action has some significant effect on that region's economy. Contact CERL for assistance.

See Table B8 for sources of economic baseline information.

Filter Questions

1. Does this procurement exceed $500,000 annually within any predefined local economy?

   (1) Yes

   (2) No

2. Is the region in which any local procurement occurs an area of 1,000,000 people or more?

   (1) Yes

   (2) No

3. Is the procurement equivalent to greater than 5 percent of any local business volume?

   (1) Yes

   (2) No

   (3) Don't know

Table B8
References Helpful in Assessing Economic Impacts or Answering Filter Questions

Sources of Information	Information Supplied
Local, state employment offices	Number unemployed Percent unemployed Skills of those available for work
Local and state planning commissions	Employment data Employment development plans Land use plans Income and employment trends
Publications of the United States Department of Commerce, Bureau of Census, including Census of Population and Census of Manufacturing	Population data Work force data Local skills Sizes of local business and industry Types of local business and industry
Economic Impact Forecast System (EIFS) Construction Engineering Research Laboratory, Environmental Division, Champaign, IL	Baseline economic data for any U. S. county or counties, predictions of changes resulting from base realignments, construction, etc.

4. Does the monetary scope of the procurement vary more than 10 percent from year to year?

(1) Yes

(2) No

(3) Don't know

EARTH SCIENCE/PROCUREMENT INTRODUCTION

Virtually every procurement for any type of material or product creates indirect impacts on Earth Science attributes. The extraction of all raw materials leads to changes in soils or rock strata, and to infiltration in the vicinity of the activity. Detailed examination of these tertiary and quaternary impacts is beyond the scope of most assessments of environmental impact. It should, however, always be discussed as an ultimate, unquantifiable impact of most procurements.

Further, the procurement of any item assumes that, eventually, a mode must be found for its disposal when its useful life is over. Thus, procurement of disposable beverage containers–to name an issue which is still unresolved–obligates the Army to consider their contribution to the solid waste stream of an installation. This waste disposal impacts Earth Science attributes, and associated problems are, in turn, influenced by certain attributes, such as the presence of permeable subsurface strata.

Some other examples: A decision to procure new types of batteries should involve weighing any advantages against possible problems resulting from the disposal of exotic chemicals used in their manufacture and present as they are landfilled. If refuse collection services are contracted, a direct obligation exists to determine that eventual disposal is in accordance with all appropriate laws and regulations. Landfills must meet EPA requirements in siting and operation, and acceptable written documentation of compliance should be required of all refuse disposal contractors.

On a smaller, but more direct, scale is the association between certain local procurements and Earth Science impacts. If aggregates or fill materials are procured locally in any quantity, the manner in which they are mined or quarried may affect several Earth Science attributes. Subsidence, vibration, soil mixing, mass wasting, and many other erosional processes may be induced by Army procurement of large quantities of such materials. Direct procurement by the installation or activity may occasionally be followed by severe, though usually small-scale, impacts of this nature. This is especially likely in remote areas where the aggregate industry is small or demand-oriented, and operates intermittently, largely in response to occasional large procurements.

Such secondary impacts are common during large construction projects. Unplanned, and often unregulated, quarries and pits may be the ultimate source of material used for an Army project. The only reasonable precaution which may easily be exercised by the procuring office in such cases is to determine if the actual source meets applicable state standards for such extraction. Strip mining or dredging permits are required in most areas, and it is usually the site, not the operator, which should be licensed and inspected.

There are no filter questions for the Earth Science Technical Specialty.

LAND USE/PROCUREMENT

Introduction

Land use impacts associated with Army procurement are both numerous and varied. These impacts, both direct and indirect,* are associated with installation actions and include:

- Interfering with off-post activities and land uses
- Creating incompatible uses on post
- Inducing land use changes
- Restricting access to environmental resources
- Consuming fragile land
- Destroying existing land uses

*Direct impacts are impacts that have a direct cause-and-effect relationship; for example, cutting a right-of-way through an untouched, natural area. Indirect impacts are impacts that are at least once removed from the actual activity being assessed. For example, if the Army was procuring a service that created a shortage within the community, this could, in turn, interfere with land use development.

The Army activity associated with procurement that will cause these land use impacts is the purchase of utilities and services, because of their indirect land use implications.

Land areas that may be sensitive to utilities or services procured are:

- Civilian controlled/owned areas adjacent to procured activities
- Land areas that have been previously undisturbed
- Wetland areas
- Coastal areas
- Publicly owned lands, e.g., parks adjacent to procured activities
- Land that is highly populated or heavily used
- Land areas that contain natural resources (resources that have commercial/recreational/aesthetic value)
- Wildlife preserves adjacent to procured activities
- Land areas that are designated by Federal or state government as "wild scenic areas" or "critical areas".

Table B9 provides sources of information on land use impacts, as well as assistance in determining consistencies/conflicts with local, state, regional, or Federal land use plans.

Table B9
References Helpful in Assessing
Land Use Impacts or Answering Filter Questions

Sources of Information	Information Supplied
City Planning Department	City land use plan Zoning map Capital improvement plan Transportation plan Demographic information Tax information Housing information Recreation and open space plan
Public Utility Company	Easements Rights-of-way Underground utility information
Regional Planning Commission	Regional land use plan Transportation plan Water and sewer plan Capital improvement plan A-95 review process* Demographic information Federal and state laws Housing information 208 plan(s)** Recreation and open space plan
County Engineering Department	Highway maps Zoning map Transportation plans

*U. S. Office of Management and Budget Circular A-95 delineates procedures for implementing Federal laws concerning projects using Federal funds. A review process must occur by which affected Federal, state, and local agencies determine the consistency of the proposed project or policy with relevant land use and land use related plans, policies and programs.

**Federal Water Pollution Control Act of 1972 (Public Law 92-500), Section 208, enables drainage basin studies to support the 208 planning process for areawide waste treatment management for water pollution control.

Table B9 (cont'd)
References Helpful in Assessing Land Use Impacts or Answering Filter Questions

Sources of Information	Information Supplied
City/County Tax Assessor's Office	Tax information
State Agencies, e.g., Natural Resources, Planning, Water Pollution Control, Environmental Protection, Highway Commission, etc.	State transportation plan State land use plan A-95 review Highway maps Recreation and open space plan Highway capacity statistics Demographic information Historic information Housing information State and Federal laws Ecology: Wildlife information Vegetation information Critical areas information Air quality information Geologic information Water and oil well boring logs Capital improvement plan
U. S. Department of Agriculture, Soil Conservation Service	Soil information, e.g., productivity and erodibility Land use plans (watershed development plans) Aerial photos
U. S. Geological Survey	USGS maps (maps identifying topographic, vegetation, and physical features) Geological information, e.g., water availability and mineral deposits Aerial photos Seismic areas Aquifer recharge areas
U. S. Army Corps of Engineers	Water quality Discharge limitations Flooding information Flood plain information Transportation (water) Ecology: Wildlife information Vegetative information Federal water laws Maps A-95 review Recreation and open space plan Demographic information Urban studies (land use and wastewater treatment data) Point and nonpoint water pollution
U S. Forest Service	Recreation and open space plans Vegetation information Fish and wildlife information Land use plan Aerial photos

AD-A056 997 CONSTRUCTION ENGINEERING RESEARCH LAB (ARMY) CHAMPAI--ETC F/G 15/5
COMPUTER-AIDED ENVIRONMENTAL IMPACT ANALYSIS FOR INDUSTRIAL, PR--ETC(U)
JUN 78 S E THOMAS, R A MITCHELL, R E RIGGINS

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Table B9 (cont'd)
References Helpful in Assessing
Land Use Impacts or Answering Filter Questions

Sources of Information	Information Supplied
U. S. Department of the Interior, e.g., Bureau of Outdoor Recreation, Fish and Wildlife Service, etc.	Recreation and open space plans Vegetation information Fish and wildlife information Land use information Mineral deposits Federal laws and regulations A-95 review
U. S. Department of Transportation	Transportation plans Transportation statistics Transportation maps A-95 review
HUD, HEW	Housing information Capital improvements Health information Education information Demographic information A-95 review
Office of Management and Budget	A-95 review

Filter Questions

1. Will any purchase of services, e.g., electricity, water, or sewage treatment, overburden the utility suppliers' capacity to provide these services?

(1) Yes

(2) No

(3) Don't know

(4) No services are being procured

2. Will the employment structure within the region change (increase or decrease) as a result of the purchase of services?

(1) Increase

(2) Decrease

(3) No change

(4) No services are being procured

NOISE/PROCUREMENT INTRODUCTION

Many items procured by the military can potentially generate a noise level that can adversely impact a community. The most effective means for controlling noise is directly at the source. The solution consequently is applied directly to the product.

If the military procurement policy-makers should adopt the following preventive noise control policy on a universal basis, subsequent problems of community impact may be avoided. As part of the procurement process, noise emission performance requirements/standards should be specified. Several Department of the Army guidelines exist in this area, including TB MED 251, *Hearing Conservation*, and Military Standard 1474A (MI), *Noise Limits for Army Materiel* (3 March 1975). In addition, various government agencies at the Federal, state, and local levels have developed noise source emission requirements for certain products.

Although the Army may initially pay more for the item procured, there is usually a long-term benefit. An effectively noise-abated item will:

1. Minimize personnel (military) exposure, thereby maintaining efficiency and minimizing liability and its associated costs.

2. Minimize community noise impact, thus insuring compatible activity and avoiding undesirable encroachment on nearby communities. It will also reduce the possibility of litigation which could result in a modification of the military mission.

3. Often result in improved operational efficiency and extension of the life cycle of redesigned or engineered items.

It is difficult to determine, individually or by class, the items that will be predominant noise sources. This is highly dependent upon their uses, location, etc. However, aircraft, weapons, missiles, and vehicles are some of the major potential noise generators.

There are no filter questions for the Noise Technical Specialty in the area of Procurement.

Table B10 lists some persons and agencies which can assist in noise impact analysis.

Table B10
References Helpful in Assessing Noise Impacts

Sources of Information	Information Supplied
Army Installation	
Procurement Office	Installation procurement policy, methods; addresses of manufacturers and businesses which have provided goods or services.
Preventive Medicine Office	Acoustical survey of noise-producing materiel and installation activities; specifications for noise impact reduction.
Facilities Engineer	Locations of known noise-producing materiel and activities; specifications for noise impact reduction.
U. S. Army Level	
U. S. Army Environmental Hygiene Agency Bio-Acoustics Division Aberdeen Proving Ground, MD	Information on military-related noise sources, including weapons, aircraft, and construction equipment; specifications and siting recommendations.
	Hearing conservation survey; community noise impact survey.
Construction Engineering Research Laboratory Corps of Engineers Champaign, IL	Acoustical survey information on military-related sources.
	Acoustical survey of installation area, including noise control solutions.
Research, Development, and Engineering Directorate Army Materiel Development and Readiness Command Alexandria, VA	Current performance specifications and design standards for Army materiel manufactured commercially.
Armed Services Procurement Regulations (ASPR)	Current Army-wide procurement policy.
Municipal Level	
Executive Office/City Clerk	Noise legislation information, including existing or proposed ordinances.
Planning Department	Land use, social and geographic information for subject area; may include aerial data.
Environmental agency	Noise legislation requirements, general resource information.

Table B10 (cont'd)
References Helpful in Assessing Noise Impacts

Sources of Information	Information Supplied
State Level	
Office of the Governor	Noise legislation information, including existing or proposed laws.
Environmental agency	Noise legislation requirements, general resource information.
Federal Level	
U. S. Environmental Protection Agency Office of Noise Abatement and Control Washington, D. C.	Federal noise legislation and guidelines, general resource information. Noise emission limits (for trucks, compressors, trains, and snowmobiles) for the low-noise product emission provision of the Noise Control Act of 1972. Under this provision, additional money may be spent to procure items which meet the low-emission limits.
Office of the Surgeon General Washington, D. C.	Specification and siting recommendations.
Private Level	
Individual product manufacturers	Noise levels produced by particular equipment.
Trade Associations:	Voluntary noise standards for members; list of member manufacturers whose products meet these standards.
Air Conditioning and Refrigeration Institute 1815 N. Ft. Meyer Drive Arlington, VA 22209	
Motor Vehicle Manufacturers' Association of the U. S. 320 New Center Building Detroit, MI 48202	
Association of Home Appliance Manufacturers 20 N. Wacker Drive Chicago, IL 60606	
International Snowmobile Industry Association 5205 Leesburg Pike Falls Church, VA 22041	

TRANSPORTATION/PROCUREMENT

Introduction

Primary impacts on transportation result from the use of procured items rather than actual procurement actions. These impacts are discussed in other Functional Areas (i.e., Training, O&M, Construction). For example, the use of tracked vehicles across paved roadways might result in surface impacts on the roadway, or the use of a fleet of Army vehicles on a public roadway might impact traffic flow, but the original procurement action would not be able to anticipate impacts on specific local transportation systems. Procurement actions would, however, result in transportation impacts if the volume was such that it created a shortage of parts or raw materials used in the commercial market for transportation (for example, rubber for tires, oil, spare parts).

See Table B11 for data sources in the transportation area.

Table B11
References Helpful in Assessing Transportation Impacts or Answering Filter Questions

Sources of Information	Information Supplied
"Energy Primer-Selected Transportation Topics" (Transportation Systems Center, US DOT, 1975). Available through the Government Printing Office (602-085/63) or from Chief, Office of Program Development, U. S. Dept. of Transportation, Transportation Systems Center, Kendall Square, Code 151, Cambridge, MA 02142.	Nontechnical discussion of transportation issues.
R. S. Berry and M. F. Fels, "The Production and Consumption of Automobiles," Report to the Illinois Institute of Environmental Quality (July 1972).	Materials used in the manufacture and operation of automobiles and automotive components.
"Environmental Impacts, Efficiency and Costs of Energy Supply and End Use," Vol. I, Report No. HIT-56 (Hittman and Associates, Inc., Columbia, MD, November 1974).	Energy use of various transportation modes, kinds of materials used in manufacture and operation of various modes.

Filter Questions

1. Is there a shortage or expected shortage of raw materials (e.g., steel, rubber, copper, etc.) used in the production of procured items, or of parts themselves, that might limit the immediate availability of that item for commercial transportation systems?

(1) Yes

(2) No shortage known at this time

AESTHETICS/PROCUREMENT

Introduction

Procurement decisions can effectively determine the aesthetic quality of military facilities. The specifications and evaluation criteria used in the procurement process will either stimulate good design or serve to constrain design creativity. Items to be procured, other than those used exclusively for combat or combat training, should incorporate professional design standards. Every effort should be made to maintain variety of color and texture in office and living environments. Professional interior design services available through GSA and CERL should be used when planning large-scale renovations or new space design to ensure the best possible combinations of government schedule items. Every procurement office or agency should be made aware of habitability criteria and human factors literature in order to educate persons responsible for purchasing decisions to the importance of good design.

For information about aesthetic impact analysis, review the sources listed in Tables B12 and B13.

Table B12
References Helpful in Assessing Aesthetic Impacts or Answering Filter Questions

Sources of Information	Information Supplied
CERL Architectural Branch PO Box 4005 Champaign, IL 61820	Human habitability criteria.
General Services Administration Interior Design Staff Special Projects Division 19th and F Streets Washington, D. C. 20405	Professional interior design services.
National Furniture Center, GSA Crystal Square, Building 5 Washington, D. C. 20405	Industrial design services and new schedules.
National Endowment for the Arts Federal Design Improvement Program 2401 E. Street Columbia Plaza Washington, D. C. 20506 ATTN: Director for Federal Activities	General Federal government design information. This is a relatively new agency, and responsibilities are still being defined. Publications and research reports will change over time.

Table B13
Published Sources Helpful in Assessing Aesthetic Impacts

M. Bagley, "Federal Interiors," for the Special Task Force Committee on Federal Architecture (Stanford Research Institute, Menlo Park, CA, August 1973).

"The Design Reality," *Design Quarterly* 94/95 (1975).

Niels Diffrient, Allvin Tilley, and Joan Bardgig, *Human Scale 1/2/3* (Henry Dreyfus Associates, New York, NY, 1974).

Federal Architecture - A Framework for Debate. Three volumes (National Endowment for the Arts, April 1974).

F. J. Langdon, "Human Sciences and the Environment in Buildings - An Appraisal and Critique," *Build International*, Vol 6 (Applied Science Publishers Ltd., England, 1973).

Harold M. Proshansky, William Ittelson and Leanne Rivlin, eds., *Environmental Psychology - Man and His Physical Setting* (Holt, Rinehart and Winston, New York, NY, 1970).

Wolfgang Prieser, ed., *Programming for Habitability*, Symposium Proceedings (Department of Architecture, University of Illinois, Urbana, IL, September 1974).

Wolfgang F. E. Prieser, *Research on Architecture and Human Behavior*, No. 673 (Council of Planning Librarians, Monticello, IL, October 1974).

Richard G. Brittain and Robert L. Porter, *Decor Guide for Commissary Store Facilities*, Technical Report D-58/ADA023972 (CERL, December 1975).

U. S. Forest Service, *National Forest Landscape Management*, Vol 2, Ch. 2, "Utilities" (USDA Agriculture Handbook, 478).

Filter Questions

1. Is any item or group of items being procured to be used primarily for combat operations?

   (1) Yes

   (2) No

   (3) The procurement action involves services rather than items

2. Are any stock fund items being procured disposable or perishable (for example, oil, paper products, office supplies, canned goods)?

   (1) Yes

   (2) No

   (3) No stock fund items are being procured

ENERGY AND RESOURCE CONSERVATION/ PROCUREMENT

Introduction

The primary effect of the procurement of goods and services is economic. The processes necessary to produce goods and services, while only secondary effects of procurement activities, have the main impact on energy and resources. The extent and severity of the impacts will vary with the type and magnitude of the procurement, and may further depend on other factors, such as seasonal availability, geographical location, and short- or long-term availability. (For a discussion of critical supplies, see Industrial Activities Functional Area.)

To verify potential impacts, it is necessary to develop a clear understanding of the many ramifications of a particular procurement action. In the case of the procurement of a specific item, it may be necessary to answer the following questions before reviewing matrix results:

- What materials (resources) go into the production of this item?
- Are these materials in local or national critical supply?
- Where and how is the item produced?
- What quantities of the item (and the basic materials required for its production) are being requested?
- Are there alternative items to the item planned for procurement?
- Are recycling/reuse or other forms of resource conservation available to accompany this procurement action?

After these questions are answered (and any others that may arise during the course of the assessment), the relative impact of the procurement can be more easily estimated. In addition, areas for potential resource and energy conservation may be identified and programs to capitalize on these opportunities can be developed to provide significant benefits in this critical area.

Further assistance may be provided during impact analysis by sources listed in Table B14.

Table B14
References Helpful in Assessing Energy/Resources Impacts or Answering Filter Questions

Sources of Information	Information Supplied
On-Post	
Procurement officer	Data on materiel requirements for specific operations and supply needs.
Utilities engineer	Heating, cooling, electrical and other utilities requirements. Waste disposal methods. Identification of conservation potentials.
Operations officers	Details of specific materiel requirements.
Off-Post	
Local utilities engineers	Data on usage requirements for water, electricity, fuel, etc.
GSA	Information on material availability, costs, and conservation potential.
US EPA	Recycle/reuse potential. Effects of wastes on natural environment. Discharge/emission requirements.
Colleges and universities	Critical materials availability, recycle potential, material alternatives, etc.
U. S. Department of Energy	Research development of topics relating to energy production and use. Records, data, and assistance on energy related topics.
State Energy Conservation Office	Not available for every state. This type of agency generally acts as an advisory board to the state's executive department. Information on regulatory requirements of that state.

Filter Questions

ANSWER THE FOLLOWING QUESTIONS *ONLY* FOR INSTALLATION-LEVEL ASSESSMENTS. OTHERWISE, ENTER ZEROES FOR ALL QUESTIONS.

1. Which of the following is used to provide the greatest percentage of electrical energy to the installation?

(1) Coal

(2) Gas

(3) Oil

(4) Hydroelectric

(5) Other

2. Are controls maintained to alleviate unnecessary requests for secondary items?

(1) Yes

(2) No or don't know

3. Is a program in effect on the installation for paper, metal, and glass recycling or salvage?

(1) Yes

(2) No, or recycling and salvage programs do not include all three.

APPENDIX C:
THE RESEARCH, DEVELOPMENT, TEST, AND EVALUATION FUNCTIONAL AREA

CONTENTS

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APPENDIX C: THE RESEARCH, DEVELOPMENT, TEST, AND EVALUATION FUNCTIONAL AREA

Introduction

The Research, Development, Test, and Evaluation (RDT&E) Functional Area (FA) is designed to cover all Army research activities from basic research in development of new technologies to applied research in evaluation of final products (materiel or methods) prior to their adoption for regular combat or support use. Because Army research programs are so varied, no attempt has been made to list all possible procedures which might be used by researchers. Instead, RDT&E BAAPs are often general descriptions of **kinds** or groups of activities, such as BAAP No. 178, Physical and Mechanical Tests.

For an assessment of environmental impacts at an installation, the RDT&E FA, like the other FAs, will seldom be sufficient alone. At a large research-oriented installation or facility, the O&M FA would almost always be required, in addition to RDT&E, to help in assessing the day-to-day activities not directly connected with research. Other FAs that might also be called for, depending on the extent of additional activity at the installation, would be Construction, Procurement, or Training.

Conversely, some small test projects **may** not require the use of the RDT&E FA at all. For example, at an installation whose major mission is infantry training, field tests of improved weapons may produce impacts differing little from the impact of use of similar weapons during regular training exercises. If testing the improved weapons in such a case constitutes only a minor proportion of the weapon firings and is not being done in separate locations, the installation could seek a complete description of impacts in the Training FA. Consultation with CERL is recommended in such instances to assure that no impacts would be overlooked by failing to request a needed Functional Area.

Besides its applicability to full-scale installation or organization impact assessments or statements, for installations or facilities which have R&D or T&E as a major mission, the RDT&E FA may also be used for program or project (life cycle) environmental assessments. Table C1 shows how the various sections of the FA may apply to the phases of the acquisition management cycle.[19] The more limited the scope of a particular assessment becomes, of course, the more filtering (removal of inapplicable BAAPs) the user will need to do by hand after receiving the EICS output.

The remainder of this chapter includes a hierarchical list (Table C2) of the RDT&E BAAPs, and some of the specific tests which may be considered under each BAAP (Table C3). A more detailed discussion of the RDT&E FA and its development begins on p 114, followed by definitions of special terms used throughout, definitions of the RDT&E BAAPs, and a description of the input requirements to be used in filling out Input Form #7 for RDT&E.

[19] *Life Cycle System Management Model for Army Systems*, DA PAM 11-25 (Department of the Army, May 1975) provides explanations of phases of the research life cycle.

Table C1
Applicability of RDT&E FA to the Acquisition Management Cycle

	Phase				
	Conceptual	Validation	Full-Scale Development	Production	Deployment
RESEARCH TYPE	basic exploratory	exploratory advanced (basic)	engineering (advanced)	engineering (production validation)	engineering, on-site validation, production validation
RDT&E FA USE	X	X	X	X	limited
Applicable sections:					
Planning	X	X	X	X	limited
Prototype Validation/ Test Preparation	X	X	X	limited	limited
Obtain/Analyze Data (including lab and field tests)	X	X	X	limited	limited
Accidents	X	X	X	X	limited
Support Functions	X	X	X	X	X

Table C2
RDT&E BAAP List

100 Research

110 Planning

111 Plan/design

112 Plan/design equipment prototypes: hardware
113 Plan/design *materials and *materials use
114 Plan/design weapons and weapons systems
115 Plan/design fuels, ammunition, explosives
117 Plan/design CW or BW material protective methods
118 Plan/design biological/social experiments/tests
119 Plan/design engineering systems/methods or tests
121 Plan/design communications systems: software
122 Plan/design information systems/analysis
123 Plan/design for increased personnel efficiency
124 Plan/design structures
125 Plan/design structure interiors
126 Plan/design support functions
127 Plan/design management methods

128 Forecast

129 Defense weaponry and warfare predictions
131 *Materials/equipment predictions
132 Environment/land use predictions
133 Biological/medical science predictions
134 Behavioral/social science predictions
135 Energy needs predictions
136 Engineering/scientific technology predictions

137 Manage

138 Manage weapons/defense research
141 Manage *materials/equipment research
142 Manage research in environment and land use
143 Manage biological or medical research
144 Manage behavioral/social research
145 Manage engineering/scientific technology research

150 Prototype development/test preparation

151 Construction of models/test structures on site

152 Construct mechanical models
153 Construct model electronic systems
154 Construct structural models/test structures
155 Construct organization systems/procedures
156 Construct sample populations

157 Manufacture prototypes

158 Manufacture *materials prototypes
159 Manufacture equipment prototypes
161 Manufacture support and tactical vehicle prototypes
162 Manufacture missile/rocket prototypes
163 Manufacture ammunition/explosives/incendiaries for test
164 Manufacture fuels and other POL for test
165 Manufacture CW or BW materials for protectives tests
166 Manufacture other chemicals for test

170 Obtain/analyze data

171 Collect available information

172 *Information source data collection*
173 Conduct opinion or attitude surveys
174 Field demographic survey

175 Conduct tests

176 *Materials/equipment tests
177 Electrical/electronic tests
178 Physical and mechanical tests
179 Chemistry tests
180 Radiation tests
181 Full-scale manufacturing process tests
182 Firing tests
183 Ground or bench test engines indoors

184 Behavioral, social, and medical research analysis

185 Learning and knowledge tests
186 Performance tests
187 Endurance tests
188 Physiological tests
189 Psychological and personality tests/evaluation

190 Field tests

191 Field test electronic transmitters
192 Field test explosives
193 Test fire weapons hardware
194 Test fire nondestructive rockets or their fuels
195 Test fire missile/rocket engines or their fuels
196 Road test vehicles or their fuels
197 Flight test aircraft or their fuels
198 Field test watercraft or their fuels
199 Drop tests outdoors
200 Field test general equipment
201 Load tests outdoors
202 Nuclear tests
203 Shock tests

*See p 115 for a complete definition of "*materials".

Table C2 (cont'd)
RDT&E BAAP List

204 Battle operations tests
205 Field sampling/testing

206 Field biological sampling/testing
207 Field water sampling/testing
208 Field air sampling/testing
209 Meteorologic data collection/testing
211 Field noise sampling/testing
212 Field soil sampling/testing
213 Field geologic sampling/testing

215 Survey land
216 Field test biological control agents
217 Field test CW or BW protectives
218 Field test other chemicals

219 Analyze data

220 Accidents

221 Minor chemical spills
222 Catastrophic chemical spills or leakage
223 Equipment damage
224 Explosion
225 Fire
226 Intrusion by disease vectors
227 Escape of biological test agents
228 Escape by test animals or absence of human test subjects
229 Bite by test animals
231 Radiation exposure
232 Nuclear accident
233 Sabotage
234 Unexpected climatic change
235 Unexpected secondary effects
236 Intrusion by non-test humans/animals
237 Contamination by toxic residues
238 Noise overexposure

240 Support Functions

250 Obtain Supplies

251 Obtain equipment/materials
252 Obtain ammunition/explosives
253 Obtain test fuels and other POL
254 Obtain CW or BW materials
255 Obtain other chemicals
256 Obtain test animals/plants
257 Obtain human test subjects
258 Obtain microbial cultures other than BW materials
259 Obtain radiation sources

260 Transport supplies

261 Transport equipment/materials
262 Transport ammunition/explosives
263 Transport test fuels and other POL
264 Transport CW or BW materials
265 Transport other chemicals
266 Transport test animals/plants
267 Transport human test subjects
268 Transport microbial cultures other than BW materials
269 Transport radiation sources

270 Store/maintain supplies

271 Store/maintain equipment/materials
272 Store/maintain ammunition/explosives
273 Store/maintain fuels and other POL
274 Store/maintain CW or BW materials
275 Store/maintain other chemicals
276 House/maintain test animals/plants
277 House human test subjects
278 Store/maintain radiation sources
279 Store/maintain microbial cultures other than BW materials
281 Operate radiation decontamination rooms/procedures
282 Operate laundry for radiologic decontamination room or clean room
283 Operate pathologic clean rooms/decontamination procedures
284 Operate laundry for pathologic clean room/decontamination room
285 Range preparation/rehabilitation

290 Waste disposal

291 Disposal of radiation wastes
292 Disposal of pathological waste
293 Disposal of chemicals, fuels, POL
294 Disposal of off-specification or scrap materials

Table C3
RDT&E: Alternate Methods or Tests

100 Research

110 Planning

111 Plan/design

112 Plan/design equipment prototypes: hardware

- parts
- support vehicles
- transport vehicles
- electronic equipment
- *mechanical equipment*
- sensors and detectors
- lasers
- rockets
- satellites
- communications systems hardware–including tracking systems, computer hardware, etc.

113 Plan/design *materials and *materials use

- adhesives and seals
- ceramics, refractories, and glasses
- coatings, colorants, and finishes
- composite materials, cement
- fibers and textiles; clothing; parachutes
- metals
- oils, lubricants, and hydraulic fluids
- plastics
- rubber
- solvents, cleaners, and abrasives
- *wood and paper products*

114 Plan/design weapons and weapon systems

- aircraft
- rockets and missiles
- cannons
- launchers
- hand guns
- rifles
- machine guns
- lasers
- tanks
- mortars
- howitzers
- ballistics
- mobility
- operator efficiency
- energy efficiency

115 Plan/design fuels, ammunition, explosives

- new/improved fuels
- bullets
- grenades
- shells and projectiles
- mines
- plastic and chemical explosives
- nuclear devices

116 Plan/design tests of military materiel

117 Plan/design CW or BW material protective methods

- CW antidotes and detoxifiers
- BW antidotes
- delivery interference

118 Plan/design biological/social experiments or tests

- biological sciences
- environmental sciences
- medical sciences
- behavioral sciences
- social sciences
- experimental test programs
- experimental testing methods
- standard test or monitoring methods

119 Plan/design engineering systems/methods or tests

- construction
- electrical systems
- sanitary facilities or systems
- hydrologic systems
- hydraulic systems
- energy production or conversion facilities
- pollution control systems
- industrial chemicals or *materials production systems

121 Plan/design communications systems: software

- radio
- audio-visual
- other
- radar
- SONAR
- laser

122 Plan/design information systems/analysis

- information storage and retrieval
- computer methods
- noncomputer methods
- program design
- information analysis systems
- intelligence analysis systems
- data gathering and analysis methods

123 Plan/design for increased personnel efficiency

- improve training/indoctrination methods
- develop new training methods
- develop or upgrade personnel training requirements
- develop/improve organizational systems

124 Plan/design structures

- buildings
- roads and pavements
- bridges
- dams
- earthworks
- tunnels
- towers
- silos
- storage structures
- facilities and installations

*See p 115 for a complete definition of "*materials".

Table C3 (cont'd)
RDT&E: Alternate Methods or Tests

125 Plan/design structure interiors

- plumbing
- lighting
- heating
- cooling
- materials use
- space utilization and design
- habitability design

126 Plan/design support functions

- feeding
- housing
- health care
- recreation
- transportation

127 Plan/design management methods

128 Forecast

- research program costs
- development costs
- implementation costs
- manpower requirements
- technology requirements
- research directions

129 Defense weaponry and warfare predictions
131 *Materials/equipment predictions
132 Environment/land use predictions
133 Biological/medical science predictions
134 Behavioral/social science predictions
135 Energy needs predictions
136 Engineering/scientific technology predictions

137 Manage

- develop research programs
- accept/reject items or programs
- obtain funding
- evaluate priorities

138 Manage weapons/defense research
141 Manage *materials/equipment research
142 Manage research in environment and land use
143 Manage biological or medical research
144 Manage behavioral/social research
145 Manage engineering/scientific technology research

150 Prototype development/test preparation

151 Construct models/test structures on site

152 Construct mechanical models

- engines
- other machinery
- measuring devices
- small-scale
- full sized

153 Construct model electronic systems

154 Construct test structures or structural models

- mock-ups and models
- full sized structures or models
- test structures
- test facilities
  - buildings
  - roads
  - dams
  - bridges
  - earthworks
  - on-base
  - off-base

155 Construct organization systems/procedures

156 Construct sample populations

157 Manufacture prototypes

158 Manufacture *materials prototypes

159 Manufacture equipment prototypes

- electrical and electronic
- mechanical
- parts

161 Manufacture support and tactical vehicle prototypes

- land vehicles
- watercraft
- aircraft

162 Manufacture missile/rocket prototypes

163 Manufacture ammunition/explosives/incendiaries for test

164 Manufacture fuels and other POL for test

165 Manufacture CW or BW materials for protectives tests

166 Manufacture other chemicals for test

170 Obtain/analyze data

171 Collect available information

172 Information source data collection

- libraries
- public information agencies
- government offices
- computer systems

173 Conduct opinion or attitude surveys

- interviews
- questionnaires
- panels
- delphi techniques
- data analysis programs/systems
- experts
- employees
- public

*See p 115 for a complete definition of "*materials".

Table C3 (cont'd)
RDT&E: Alternate Methods or Tests

174 Field demographic survey

175 Conduct tests

176 Materials/equipment tests

- electronic measurement
- physical measurement (microscopes, scales, calipers, tape measures, etc.)
- chemical measurement
- item or system checklist analysis
- calibration
- observation
- safety evaluation

177 Electrical/electronic tests

- acoustical analysis
- damping tests
- electrical ground tests
- electrical load tests
- magnetic core tests
- magnetic tests
- resonance tests
- spark tests
- static tests
- system checkouts
- ultrasonic tests
- X-ray inspection
- electronic detection
- electric/electronic hardware tests
- electronic equipment software tests

178 Physical and mechanical tests

- abrasion tests
- acceleration tests
- adhesion tests
- aging tests
- bearing tests
- certification
- compression tests
- corrosive tests
- environmental tests
- fatigue tests
- fire tests
- flow measurements and tests
- hardness tests
- high altitude tests
- high pressure tests
- low pressure tests
- high temperature tests
- low temperature tests
- inspections
- impact or drop tests
- liquid immersion tests
- load tests
- boiler or pump load tests
- lubricants tests
- moisture content tests
- notch tests
- nondestructive tests
- road construction tests
- shock tests
- specific gravity tests
- soil particle gradation
- spin tests
- stability tests
- strain tests
- test engine compression
- thermal cycling tests
- vacuum tests
- vibration tests
- wear tests
- weightlessness tests
- weld tests

179 Chemistry tests

- chemical analysis
- chemical tests
- explosives tests
- propellant tests

180 Radiation tests

Force field tests

- electromagnetic fields
- atomic fields
- nucleonic fields
- gravity

Thermal radiation tests

Nonionizing radiation tests

- radio
- radar
- microwave
- light
- lasers
- infrared
- characterize
- measure

Ionizing radiation tests

- alpha
- beta
- protons
- other atomic particles
- X-rays
- gamma waves
- characterize
- measure

181 Full scale manufacturing process tests

- Conduct industrial process test runs
- Conduct machine/equipment manufacturing test runs

182 Firing tests

- hand weapons
- explosives
- projectiles
- projectile ballistics
- armor penetrability

183 Ground or bench test engines indoors

- conventional internal combustion
- stratified charge
- jet
- turbine
- rotary

Table C3 (cont'd)
RDT&E: Alternate Methods or Tests

184 Behavioral, social, and medical research analysis

- electronic measurement
- physical measurement
- observation
- humans
- test animals
- test insects
- test plants
- microbes
- wildlife
- natural vegetation

185 Learning and knowledge tests

- achievement tests
- aptitude tests
- intelligence tests
- written
- oral

186 Performance tests

- flight
- navigation
- equipment operation
- strength
- underwater
- space conditions

187 Endurance tests

- physical stress reactions
- mental stress reactions
- emotional stress reactions
- physiological stress reactions
- battlefield stress reactions
- chemical/biological toxicant reactions

188 Physiological tests

- stress reactions (basic research)
- chemical or biological toxicants
- medical treatment agents or methods

189 Psychological and personality tests/ evaluation

- performance prediction
- test methods development

190 Field Tests

- proving grounds
- developed lands
- undeveloped lands
- public lands
- private lands

191 Field test electronic transmitters

- radio
- laser
- other microwave
- SONAR
- radar

192 Field test explosives

- shells
- projectiles
- plastics and other high explosives
- grenades
- incendiaries
- nonnuclear warheads

193 Test fire weapons hardware

- cannon
- hand guns
- rifles
- missiles/rockets; launchers
- grenade launchers
- mortars
- howitzers

armor penetrability

(For test firing of airborne weapons on the aircraft, see also BAAP 197.)

194 Test fire non-destructive rockets or their fuels

- space or surveillance rockets
- missiles without weapons payloads

195 Test fire missile/rocket engines or their fuels

196 Road test vehicles or their fuels

- support
- tactical
- wheeled
- tracked

197 Flight test aircraft or their fuels

- fixed winged
- rotary winged
- one-man air cushion
- unmanned
- low altitude
- high altitude

198 Field test watercraft or their fuels

- ships and boats
- amphibious craft
- submarines
- hovercraft
- drone recovery

199 Drop tests outdoors

200 Field test general equipment

- clothing
- food
- rations
- individual soldiers' equipment
- laundry items
- bakery items
- POL-handling equipment
- tools
- machinery
- engineer construction equipment

201 Load test outdoors

- roads
- bridges
- vehicles
- hardened facilities
- dams
- pilings
- towers
- antennas
- airfields
- buildings
- wharfs

Table C3 (cont'd)
RDT&E: Alternate Methods or Tests

202 Nuclear tests

underground
underwater
extraterrestrial

HIGH- AND LOW-ALTITUDE NUCLEAR BLAST TESTS ARE SUSPENDED UNDER THE SALT BILATERAL AGREEMENT.

203 Shock tests

wave analysis
*materials and structural resistance analysis
vibration tests
earthquake simulation
nuclear blast
nuclear blast simulation
simulate other explosions

204 Battle operations tests

on-base war games
off-base war games
war games at sea
logistics exercises
security exercises

205 Field sampling/testing

206 Field biological sampling/testing
207 Field water sampling/testing
208 Field air sampling/testing
209 Meteorologic data collection/testing
211 Field noise sampling/testing
212 Field soil sampling/testing
213 Field geologic sampling/testing

215 Survey land

physical measurement
electronic measurement
satellites

216 Field test biological control agents

cutting
mowing
chemicals
pesticides
herbicides
natural controls (introduction of a predator of the pest)
aural or visual disturbance

217 Field test CW or BW protectives

lethal chemicals anti-agents
nonlethal chemicals anti-agents
riot control chemicals
biological materials anti-agents
herbicides

218 Field test other chemicals

paints and other coatings
other chemical *materials
smoke bombs

219 Analyze data

tabulation
mapping
graphing
photointerpretation
mathematical analysis
simulations
statistical tests and analysis
mathematical modeling
cryptography
subjective analysis
computer use

220 Accidents

221 Minor chemical spills

standard lab
toxics
POL products
lab
semiworks
field

222 Catastrophic chemical spills or leakage

standard lab
toxics
POL products
lab
semiworks
field

223 Equipment damage

breakage
corrosion
deformation

224 Explosion

major
minor
lab
semiworks
field

225 Fire

major
minor
lab
semiworks
field

226 Intrusion by disease vectors

human
test animals
test plants
major
minor
lab
field

227 Escape of biological test agents

pathogenic
highly pathogenic
within lab
within field test site
from lab
from field test site

228 Escape by test animals or unauthorized absence of human test subjects

within lab
within field test site
from lab
from field test site

229 Bite by test animals

research personnel
support personnel
public

*See p 115 for a complete definition of "*materials".

Table C3 (cont'd)
RDT&E: Alternate Methods or Tests

231 Radiation exposure

humans	research personnel	long-term low dosage
test animals	support personnel	short-term high dosage
test plants	public	
wildlife		
natural vegetation		

232 Nuclear accident

accidental detonation	capture of weapon
capture of radioactive substances	loss of weapon
loss of radioactive substances	

233 Sabotage

CW or BW protectives test	capture of test item
weapons test	covert test interference
other test	

234 Unexpected climatic change

235 Unexpected secondary effects

vegetation	test animals
wildlife	humans
domestic animals	

236 Intrusion by nontest humans/animals

chemicals test	weapons test
CW or BW protectives test	other test

237 Contamination by toxic residues

rapidly biodegradable	long-lasting

238 Noise overexposure

property damage	human health effects

240 Support Functions

250 Obtain Supplies

251 Obtain equipment/materials

sensors and detectors	parts
electronic equipment	*materials
mechanical equipment	
vehicles	
weapons	

252 Obtain ammunition/explosives

bullets	nuclear devices
grenades	chemical and plastic explosives
shells and projectiles	

253 Obtain test fuels and other POL

254 Obtain CW or BW materials

lethal chemicals	anti-agents (protectives)
nonlethal chemicals	
riot control chemicals	
biocides	

255 Obtain other chemicals

standard lab chemicals	pesticides
industrial chemicals	herbicides

256 Obtain test animals/plants

257 Obtain human test subjects

258 Obtain microbial cultures

bacteria	fungi
viruses	protozoans

259 Obtain radiation sources

α, β, λ	X-ray
electromagnetic waves	

260 Transport supplies

fixed-wing aircraft	military
rotary-wing aircraft	public
watercraft	commercial freight
rail car	
truck bus	

261 Transport equipment/materials
262 Transport ammunition/explosives
263 Transport test fuels and other POL
264 Transport CW or BW materials
265 Transport other chemicals
266 Transport test animals/plants
267 Transport human test subjects
268 Transport microbial cultures
269 Transport radiation sources

270 Store/maintain supplies

271 Store/maintain equipment/materials

outdoor	laboratory
warehouse	cold rooms

272 Store/maintain ammunition/explosives

outdoor	underground
warehouse	cold rooms

273 Store/maintain fuels and other POL

outdoor	cans
warehouse	hardened facilities
underground	cold rooms
	tanks

274 Store/maintain CW or BW materials

laboratory	cold rooms
quarantine or clean room	refrigerator

275 Store/maintain other chemicals

outdoor	laboratory
warehouse	cold rooms

*See p 115 for a complete definition of "*materials".

Table C3 (cont'd)
RDT&E: Alternate Methods or Tests

276 House/maintain test animals/plants

- outdoor cages
- indoor cages
- outdoor pens
- ranges
- greenhouse
- field plots
- controlled environment rooms

277 House human test subjects

- military housing
- special housing
- commercial housing

278 Store/maintain radiation sources

- outdoor
- warehouse
- refrigerator
- laboratory
- cold rooms
- radiologic clean rooms

279 Store/maintain microbial cultures

- laboratory
- quarantine or clean room
- cold rooms
- refrigerator

281 Operate radiation decontamination rooms/procedures

282 Operate laundry for radiologic decontamination room or clean room

283 Operate pathologic clean rooms/decontamination procedures

284 Operate laundry for pathologic clean room/decontamination room

285 Range preparation/rehabilitation

- clearing
- grading
- seeding
- mowing
- spraying
- burning

290 Waste disposal

- incineration
- burial
- dumping
- dumping at sea
- sanitary landfill
- chemical detoxification (DEMIL)
- thermal detoxification (DEMIL)

291 Disposal of radioactive wastes

- underground containers
- underground injection
- storage bunker
- dumping
- sewage treatment
- incineration

292 Disposal of pathological waste

- incineration
- pathological incineration
- autoclaving
- burial
- sanitary landfill

293 Disposal of chemicals

- POL items
- adhesives
- paints and other coatings
- standard laboratory
- spent metals
- chemical agents and toxics
- public sewage treatment
- chemical or thermal detoxification
- air vent
- incineration
- sanitary landfill
- dumping
- dumping at sea
- system recycle
- salvage for resale
- permanent storage

294 Disposal of off-specification or scrap materials

- burial
- sanitary landfill
- dumping
- detonation
- incineration
- chemical detoxification
- system recycle
- salvage for resale
- permanent storage

Functional Area Development

The BAAPs for the RDT&E Functional Area have been separated into three main activity types. The first—Research (BAAPs 100 through 219)—contains the significant activities specifically involved in research and testing during all phases of the materiel acquisition cycle. The second activity type is Accidents (BAAPs 220 through 238). Even though accidents can occur in many types of research and in many locations (laboratory, test production lines, field), it was felt that likelihood of accidents (which may occur more easily or be more dangerous in a research program because of the unique, unusual or hazardous items used in tests) could be more easily assessed if considered separately. The third activity type falls under the category of Support Functions (BAAPs 240 through 294). These are support activities which would not ordinarily be considered in other Functional Areas or which would create greater hazards to the environment when connected with research efforts.

The first of the above activity types—Research—is further subdivided. "Planning" (BAAPs 110 through 145) refers generally to the project design, organization, and subjective evaluation that goes on before, during, and after any actual physical research. Impacts of planning will often be indirect, since decisions made early in a research program occur some time before the

resulting physical research activities, economic drains, or changes in materiel production can directly affect the local or national environment. Therefore, these planning activities are those through which such indirect effect may be evaluated.

"Prototype Development/Test Preparation" (BAAPs 150 through 166) are the stages in all types of research between the planning of a test or research activity and the actual test itself. These BAAPs are mostly concerned with construction of models, construction of test structures, or small-scale manufacturing of items to be tested. For permanent large-scale test structures or facilities, the Construction or Industrial Activities Functional Areas, respectively, should be consulted. Often, however, RDT&E impacts will be less significant than those of the Construction or Industrial Activities FAs. For example, test structures may not be full-sized models; test models of new equipment may sometimes be used only in a laboratory; and test runs of manufacturing processes will usually not produce impacts significantly different from the manufacture of any final product. Exceptions would be radical changes in the normal industrial process or production of controversial items.

The subdivision "Obtain/Analyze Data" (BAAPs 170 through 219), includes both laboratory and field research. Field tests are more likely to impact environmental attributes directly simply because of proximity, whereas an intervening medium (air or water) may be required for toxic wastes produced in laboratories to affect environmental attributes.

NOTE: Development of Military Standards could involve all three of the above subdivisions of the Research activity type.

Special Terminology for the RDT&E Functional Area

Materiel: Military weapons, equipment, etc.

*Material: When used in a BAAP name, alternate method or test, or definition, an asterisk before the word "material" will be used to indicate any or all of the following:

Adhesives and seals
Ceramics, refractories, and glasses
Coatings, colorants, and finishes
Composite materials; cement
Fibers and textiles; clothing; parachutes
Metals
Oils, lubricants, and hydraulic fuels
Plastics
Rubber
Solvents, cleaners, and abrasives
Wood and paper products.

Software: The totality of programs and methods used in computing or data-processing systems, together with documentation such as manuals, diagrams, and operating instructions. (In this FA, this term is used in reference to communication and sensor/detector systems as well as computer systems.)

Hardware:

A. Physical equipment and devices forming computer (or communication or sensor/detector) systems and peripheral equipment.

B. Items of metal such as equipment, munitions, tools, fittings, trimmings, fasteners, appliances, parts of machinery, etc.

Field tests: Tests conducted outdoors or on equipment (or equipment parts) being used outdoors.

Prototype: An operational model suitable for evaluation of design, performance, or production potential. For EICS, this term applies to such models produced in all stages of research, including basic research not directly related to development of a specific item of Army materiel. Breadboard, brassboard and advanced prototypes are included.

BAAP Definitions

100 Research

110 Planning. RDT&E activities which include paperwork and idea formation and execution in the areas of planning and design, forecasting, and decision-making.

111 Plan/design. Development on paper of ongoing and future research activities. This category includes activities requiring mental effort by researchers. Actual products will generally be in the form of studies, test plans or methods, or reports concerning new methods, materials, design of equipment, etc. Also see BAAP 171.

112 Plan/design equipment prototypes: hardware. Planning and design research aimed at production of new or improved equipment to assist the Army mission. Specifically refers to hardward (see definition above), the equipment itself, rather than to methods of use (although methods design may occur simultaneously).

113 Plan/design *materials and *materials use. Refers to planning for creation or improvement of the products listed on p 115, or planning for their use.

114 Plan/design weapons and weapons systems. Refers to design of new or improved equipment used to deliver destructive agents in warfare.

115 Plan/design fuels, ammunition, explosives. Design of actual destructive agents used in warfare. Planning new fuels and explosive chemicals and their methods of production.

116 Plan/design tests of military materiel. Preparation of test methods for conduct of design, engineering, developmental, production, and surveillance testing of materiel/military equipment. Covers BAAPs 111 through 121 as applied to items with strictly military application.

117 Plan/design CW or BW material protective methods. Plan methods for use and delivery of chemical/biological material protectives (antidotes and detoxifiers). Design methods for interfering with delivery of toxic or lethal agents. Design formulation of antidotes and detoxifiers.

118 Plan/design biological/social experiments or tests. Plan and design methods of executing experiments in the biological, environmental, medical, behavioral, or social sciences. Also includes design of monitoring methods.

119 Plan/design engineering systems/methods or tests. Planning and design of large-scale equipment, such as boilers, pumps, electrical generators, etc. (engineering hardware), as well as the methods by which it is set up, methods for choosing one type of equipment over another, etc. (software).

121 Plan/design communications systems: software. Planning and design of methods of using communication systems in military-related (tracking or directing missiles, for example) or other actions. This software design process is related to design of the equipment (hardware) itself, covered under BAAP 112.

122 Plan/design information systems/analysis. Design methods for gathering, storing, retrieving, or analyzing information, with or without computers.

123 Plan/design for increased personnel efficiency. Plan methods by which personnel can be trained more efficiently, be chosen more effectively, or work together more effectively. May involve efficiency of individuals or groups.

124 Plan/design structures. Plan individual structures or the facilities (airfields, for example) in which they are used.

125 Plan/design structure interiors. Plan and design both the visible (furniture, work area arrangement, lighting, colors) and the concealed (utilities supply) portions of structure interiors (including vehicles).

126 Plan/design support functions. Planning of logistics, health care, recreation, and utilities supply for field, installation, or Army-wide activities and personnel.

127 Plan/design management methods. Design methods for controlling employees, money, materials, and facilities use to accomplish missions and tasks.

128 Forecast. Development of predictions or models of present and future RDT&E requirements, including those for national defense, in terms of manpower, equipment, costs, and research directions. Forecasting occurs at all stages of RDT&E: field and laboratory workers, their supervisors and project directors, and administrative planners not directly involved in research are all involved in predictive activities at one time or another in the life cycle of a research program, project or proposal.

129 Defense weaponry and warfare predictions. Forecasting national defense needs based on knowledge of present and projected capabilities of possible adversaries of the United States, as related to U. S. protective/reactive capacity. Affects procurement and RDT&E directions.

131 Materials/equipment predictions. Forecasting needs for equipment or *materials necessary to accomplish Army missions in peacetime and war. Affects procurement and RDT&E directions.

132 Environment/land use predictions. Forecasting the Army's need for land or property as compared to national or local requirements in land use or environmental protection. Includes forecasting the impacts that particular activities may have on the environment.

133 Biological/medical science predictions. Forecasting probable developments or future needs in biological

(human, animal, plant) or medical (anatomy, pathology, toxicology, physiology, psychology, etc.) research.

134 Behavioral/social science predictions. Forecasting behavioral or social characteristics of Army military or civilian personnel, or of the general public or portions thereof, in relation to Army policy or actions. Predictions of behavioral or social characteristics or sample populations during research.

135 Energy needs predictions. Forecasting local, regional, or national requirements for energy or resources, as well as the possibilities for ensuring that supplies are able to meet the most critical demands. Prediction of Army effects on supply.

136 Engineering/scientific technology predictions. Forecasting in the areas of engineering methods; information gathering, analysis, and dissemination; space and weapons technologies, etc. May involve short-term or long-term predictions. May affect procurement, real estate disposal or acquisition, facilities development, and RDT&E directions.

137 Manage. Administrative decision-making as it specifically applies to RDT&E operations and program development. Includes supervision by persons in positions not classified or titled as managerial.

138-145 Management subcategories: Management and decision-making in regard to programs, projects, or tasks in the research areas which were defined above in BAAPs 129 through 136.

138 Manage weapons/defense research
141 Manage *materials/equipment research
142 Manage research in environment/land use
143 Manage biological or medical research
144 Manage behavioral/social research
145 Manage engineering/scientific technology research

150 Prototype development/test preparation. Construction or production of model machines, electronic systems, structures, *materials, materiel, chemicals, or biological materials, for the purpose of testing the usability of the model or the production method.

151 Construct models/test structures on site. Construction of mechanical, electronic, or structural models, either small scale or full sized, in order to test their design characteristics, efficiency, or utility. Also, construction, including site preparation, of test structures or facilities.

152 Construct mechanical models. Construct models of vehicles, industrial process equipment, hydraulic systems, etc. These models, even when full sized, are generally used solely for testing.

153 Construct model electrical/electronic system. Construct prototype radio, telecommunications, computer, sensor, and detector systems or electrical devices. Although constructed for testing, such systems may be converted to actual use if found adequate to meet particular current needs.

154 Construct test structures or structural models. Construct bridges, road sections, dams, hydrologic systems, or buildings for test outdoors. Such structures will be built in sizes large enough for testing, although they need not be as large as the eventual planned structure. For example, an insulation method which eventually may be used in multi-story buildings may be tested in a one-room model house. The structure will almost always be built on the installation. (Very small-scale models used indoors for demonstration purposes are not considered environmentally significant.) The BAAP excludes construction of laboratories or structures that will normally continue in use after testing is completed; for these, see the Construction Functional Area.

155 Construct organization systems/procedures. Produce methods by which particular organizations can be structured and operated effectively. Includes the step at which a planned organizational structure or method is adopted or implemented.

156 Construct sample populations. Obtain information concerning the location and availablity of persons to be surveyed (see BAAPs 173, 174) by personal contact, letter, or other means. Includes selection of test subjects or participants. Subjects selected may then be brought together (BAAPs 257, 267, 277) or sampled while still dispersed (BAAPs 173, 174).

157 Manufacture prototypes. Produce prototype items at machine shops, government-owned or private manufacturing facilities, etc. See p 115 for definition of special use of the term "prototype."

In general, impacts of prototype production will be minimal when occurring at a manufacturing facility, compared to the total impact of the manufacturing process. See the Industrial Activities Functional Area for more detail. However, impact specifically resulting from the manufacture of the prototype may occur if its production requires a change in the normally occur-

ring industrial process resulting in different or additional effluents; if the prototype is of a controversial nature; or if production at an Army installation or facility is at a small plant designed specifically for production of test items.

170 Obtain/analyze data. Collection and analysis of data, either by experiment or by use of information sources from which previously collected data are available.

171 Collect available information. Obtain data by collection from government or public information sources, or by attitude or opinion surveys.

172 Information source data collection. Gathering information from knowledgeable persons or from stored sources (books, articles, regulations, manuals, computers) to ascertain state-of-the-art and/or current findings and activities in a particular research area.

173 Conduct opinion or attitude surveys. Determine public opinion, or the opinion of experts in a research field, on an issue or Army activity. Determine attitudes of civilian or military personnel on matters of Army policy affecting their work, home life, or Army-provided or -prohibited facilities or opportunities.

174 Field demographic survey. Similar to BAAP 173, except the information collected is factual (age, sex, and education of family members, for example) rather than attitudinal.

175 Conduct tests. Perform experiments in order to obtain data.

176 Materials/equipment tests. Tests performed with or on materials or mechanical or electronic equipment. Such tests are usually but not exclusively performed in laboratories or within buildings. See Field Tests (BAAPs 190 through 218) for most impacts of outdoor testing, or for outdoor performance of some tests listed for BAAPs 176 through 180.

177 Electrical/electronic tests. Tests performed with or on electric or electronic equipment.

The following are only some of the many such tests that may be performed.

Acoustical analysis. Noise or sound measurement and analysis using electronic equipment.

Damping tests. Determination of the progressive reduction in amplitude of oscillations.

Electrical ground test. Determination of the effectiveness of a particular ground for electricity.

Electrical load tests. Tests of the ability of a circuit to carry a particular current; tests of the amount of current carried.

Magnetic core tests. Tests of a ferro-magnetic material placed in a coil which serves to increase the external magnetic field.

Magnetic tests. (1) Determination of a material's magnetic properties. (2) Determination of a component's or system's effectiveness while operating in a magnetic field.

Resonance tests. Determination of the reinforcement and prolongation of oscillating waves by a body or circuit. In structures, used to determine harmonics for earthquake evaluation. Includes laboratory determination of the characteristics of shock waves.

Spark test. Determination of the acceptability of rubber, plastic, or paint linings in steel process vessels. A high-voltage, low-energy current is used.

Static tests. Determine the presence of static (electromagnetic) pulses and/or their effect on the serviceability of components or systems.

System checkouts. Tests of functional operability of an entire electrical or electronic system by several of the alternate tests listed for this BAAP, or by testing its ability to perform its desired function.

Ultrasonic tests. Determination of discontinuities in a material. Commonly used in weld testing.

X-ray inspection. Determination of material's properties through analysis of the reflection/refraction patterns of nonluminous radiation of extremely short wave length (X-rays).

Electronic detection. Use of electronic sensing devices such as radar, SONAR, lasers, etc., to monitor test operations. Also see BAAP 191.

Electric equipment tests. Determination of the reliability, heating losses, power output, and power

consumption of electrical equipment (switches, wires, motors, transformers, generators).

Electronic hardware tests. Determination of the input/output characteristics and reliability of electronic equipment (radios, computers, telephones, switching circuits, tracking equipment, etc.).

Electronic software tests. Performance tests of radio, computer, telecommunication, tracking, or switching methods, systems, and processes.

178 **Physical and mechanical tests.** Tests with or on mechanical equipment and materials, specifically excluding such tests performed in the field (see Field Tests).

The following are only some of the many such tests which may be performed.

Abrasion test. Determination of a material's resistance to abrasive wear under specified conditions.

Acceleration tests. (1) Determination of a component's ability to function under and after an accelerating force. (2) Laboratory determination of the acceleration characteristics of an engine.

Adhesive tests. Determination of the strength of the union (bond) between two entities.

Aging tests. Determination of the change in material properties with time.

Bearing tests. Determination of the acceptability of those parts of a machine which bear the friction when parts are in contact and have relative motion.

Certification. Determination that an item of equipment or a *material is usable, according to some standard, by application of several of the alternate tests listed for this BAAP.

Compression tests. A test in which specimens are subjected to a compressive force, either increasing or static. If resistance to increasing force is being tested, the material or part may be tested to its destructive point. (see BAAP 178, above, for engine compression tests.)

Corrosive tests. Determination of the wearing away of solids (especially metals) by chemical or electrolytic attack.

Environmental tests. Determination of a system's ability to withstand a variety of environmental conditions (arctic, desert, tropics, underwater, vacuum, etc.).

Fatigue tests. Determination of the range of alternating stress to which a material may be subjected without risk of ultimate failure.

Fire tests. (1) Determination of a material's kindling temperature. (2) Determination of fire ratings for physical systems and/or components for use in a structure. (3) Determination of a material's support of or resistance to combustion.

Flow measurement and tests. Tests of the flow characteristics of air, gas, or hydraulic or hydrologic liquids or systems in a laboratory or enclosed environment, or of the flow characteristics in such systems created by obstructions.

Hardness tests. Determination of a material's rigidity, lack of plasticity, or strength.

High altitude tests. Determination of a system's effectiveness at high altitudes.

High pressure tests. Determination of a material's, component's, or system's properties at high pressures.

Low pressure tests. See "high altitude tests."

High temperature tests. Determination of a material's, component's, system's, or material item's properties at high temperatures.

Low temperature tests. Determination of a material's properties under cryogenic temperatures.

Inspections. Self-explanatory.

Impact or drop test. A test in which the stress or strain is suddenly applied. See also "notch test."

Liquid immersion tests. Determination of a component's or system's performance during and after immersion in the laboratory. (See also "environmental tests.")

Load tests. Indoor tests of the ability of equipment, structures, or *materials to withstand loads applied mechanically by special laboratory or shop equipment (unlike BAAP 201, which refers to loads applied in field situations).

Boiler or pump load tests. Tests of (1) the ability of boilers, pumps, or other large-scale equipment to perform at various load capacities, and (2) the efficiencies with which they perform.

Lubricants tests. Determination of a material's effectiveness for reducing friction between two particular sliding surfaces.

Moisture content tests. Measurement of the percent hydration of *materials, chemicals, or soil samples.

Notch test. The measurement of energy absorbed in breaking a notched bar which is given a sudden blow.

Road construction tests. Determination of road construction parameters by physical testing (not involving any actual construction in the field) of soils, concrete, materials, etc.

Shock tests. The determination of a component's or system's serviceability and reliability after being subjected to a nearly instantaneous acceleration or deceleration. Also see "resonance test" (BAAP 177) and "impact test" (this BAAP).

Specific gravity tests. Measurement of the specific gravity (mass relative to an equal volume of water or air) of a *material, chemical, or piece of equipment.

Soil particle gradation. Separation of sized soil particles using a graded series of fine mesh sieves. Used in soil analysis.

Spin tests. Determination by application of centrifugal force of a component's or system's ability to operate under acceleration forces for a prolonged period.

Stability test. Determination of a cable's stability by subjecting it to a working voltage (or higher) while it is alternately heated and cooled. If the power factor increases, it is unstable.

Strain tests. Determination of material's properties by subjecting it to a change in size. Includes tension tests.

Test engine compression. A test to determine the pressure in, and therefore the efficiency of, a cylinder or chamber of a gasoline or diesel engine.

Thermal cycling tests. Subjecting a substance to a number of successive temperature cycles.

Vacuum tests. Tests using equipment which creates extremely low air pressures in an enclosed environment. Tests of the reliability of seals and adhesives under vacuum.

Vibration tests. Determination of a component's or system's reliability under and after being subjected to prolonged vibrational stresses. (For impacts of vibration, also see BAAPs 192, 203).

Wear tests. Determination of the serviceable life of a component or system subjected to friction or abrasion.

Weightlessness tests. Tests of the ability of equipment, test animals, or personnel to perform expected functions under conditions of low or no gravity. When performed in aircraft, see BAAP 197.

Weld tests. Determination of the continuity of welds by visual observation, ultrasonic testing, or X-ray inspection.

179 Chemistry tests. Tests involving chemical measurement.

Chemical analysis. Splitting up a material into its component parts or constituents by chemical methods to determine the composition of the material.

Chemical tests. Determination of a chemical's effectiveness for a particular function. Note: chemical-biological control agents have already been separated from this group.

Explosive tests. Laboratory tests of chemicals or compounds which are or will be used as explosives. Includes tests of the physics of explosives.

Propellant tests. Chemical tests for determining a material's effectiveness for and characteristics in use as a shell or missile propellant.

180 Radiation tests. Tests involving force fields or wave or particulate radiation.

Force field tests. Determination of the field strength or effects of gravity, electro-magnetic, atomic, or nucleonic force fields.

Thermal radiation tests. Determination of characteristics or effects of heat transfer from a source to a receiver without heating the intervening medium.

Nonionizing radiation tests. Determination of presence, characteristics, and/or effects of nonionizing electromagnetic waves (radio, light, lasers, infrared, etc.).

Ionizing radiation tests. Determination of presence, characteristics, and/or effects of radiation in the form of emitted particles or waves (α, β, protons, mesons, X-rays, gamma waves, etc.).

181 Full scale manufacturing process tests. Determination of a production system's operational effectiveness.

Conduct industrial process test runs. Test operational effectiveness of a new or improved industrial process for production of materials or chemicals.

Conduct machine/equipment manufacturing test runs. Test operational effectiveness of a new or improved manufacturing process for production of machinery or equipment, either prototypes or final production models.

182 Firing tests. Determination of characteristics of weapons, explosives, or projectiles (including projectile ballistics) and suitability for use by firing in closed, or "laboratory" (as opposed to field) test ranges.

183 Ground or bench test engines indoors. Test the operating characteristics of conventional internal combustion, stratified charge, rotary, turbine, or jet engines.

184 Behavioral, social, and medical research analysis. Testing of humans, animals, plants, or microbial organisms by electronic measurement, physical measurement, or observation. The purpose of such tests (including BAAPs 185 through 189) may be to examine subject (human or animal) response or to evaluate the safety of or utility of equipment, methods, etc.

185 Learning and knowledge tests. Written or verbal tests of mental achievement, aptitude, or intelligence. These tests are at the theoretical level.

186 Performance tests. Tests, at the practical level, of a person's or animal's physical and mental performance under "normal" conditions: flight tests, navigation tests, tests of equipment operation ability, tests of strength, determination of performance in actual or simulated underwater or space conditions. Includes psychomotor tests, which determine the motor effects of mental processes. For performance tests of materiel, see BAAPs 175 through 183 and 190 through 218).

187 Endurance tests. Tests of a person's or animal's physical and mental performance during conditions of stress (physical, mental, emotional, physiological, battlefield conditions, or chemical/biological toxicants stress). For endurance tests of materiel, see BAAPs 175 through 183 and 190 through 218).

188 Physiological tests. Tests which examine the functions and vital processes of living organisms or their parts and organs. Especially in RDT&E, physiological tests would examine functional reactions to stress (primarily in basic research programs), chemical/biological toxicants and anti-toxicants, and medical treatment agents and methods. Surgery on test animals would be included under this BAAP.

189 Psychological and personality tests/evaluation. In RDT&E, the use of psychological and personality tests to predict personnel performance under specified conditions, or to evaluate the effectiveness of such test methods so as to determine possibilities for their future use. Specific definitions are:

Psychological tests. The determination of human behavior, including observations, investigations, and recordings of the mind and its functions.

Personality tests. Determination of the integrated organization of the psychological, intellectual, emotional, and physical characteristics of an individual as presented to other people.

190 Field tests. Tests which, because of the nature of the item being tested or the testing method itself, must be conducted in a "field" situation—outdoors. Field test areas may be proving grounds; public, government-owned, or private lands in developed areas; or public, government-owned, or private lands in undeveloped areas.

For field tests of equipment which is regularly used in training, reference is made in the following definition to applicable BAAPs in the Training FA of EICS, which may discuss impacts in considerably more detail.

191 Field test electronic transmitters. Test operations outdoors using electronic, microwave, or laser transmitters.

192 Field test explosives. Test firing of explosive chemicals, projectiles, or shells under field conditions. (See Training BAAPs 191, 192, 197, 223, 253.) Also, perform field tests using such explosives.

193 Test fire weapons hardware. Field testing of hand guns, rifles, howitzers, missiles, rockets, cannons, grenades, mortars, mines, incendiaries, gas, smoke bombs, etc. (See Training BAAPs 221 through 227, 251, 252.) Includes tests of armor penetrability. For firing tests using weapons-carrying aircraft, also see RDT&E BAAP 197.

194 Test fire nondestructive rockets or their fuels. Field testing of rockets with nondestructive payloads (manned or unmanned space vehicles, satellites) or missiles without their normal weapons payloads (1) to determine the ballistic, navigability, or tracking systems characteristics of the missiles or various operational characteristics of their nondestructive payloads, or (2) to determine the performance characteristics of new fuels.

195 Test fire missile/rocket engines or their fuels. Conducting rocket engine firing tests of power, acceleration ability, combustion efficiency, etc., at ground level or in underground test stands.

196 Road test vehicles or their fuels. Testing operational characteristics, mobility, or fuel performance of support or tactical vehicles on paved roads, unpaved roads, or cross country. (See Training BAAPs 124 through 132.) Also, performing field tests using such vehicles.

197 Flight test aircraft or their fuels. Testing operations or performance of fixed-winged, rotary-winged, unmanned, or one-man air-cushion aircraft or their fuels at low or high altitudes. (See Training BAAPs 135, 136.) Also, performing field tests using such aircraft.

198 Field test watercraft or their fuels. Testing operation or performance of ships, boats, submarines, marine landing vehicles, amphibious vehicles, or hovercraft, or their fuels, on inland or coastal waters or at sea. (See Training BAAPs 133, 134.) Also, performing field tests using such watercraft.

199 Drop tests outdoors. The military's determination of a component's and/or machine's ability to withstand an air drop for airborne operations. (See Training BAAP 137.)

200 Field test general equipment. Military testing of general commodities not specifically covered in other categories, such as clothing, food, rations, individual soldiers' equipment, quartermaster items (laundry, bakery, POL-handling equipment), tools, machinery, engineer construction equipment, etc.

201 Load tests outdoors. Determination of a material's or system's structural load carrying properties.

202 Nuclear tests. Blast tests of nuclear weapons. (See BAAPs 180, 191, 192, and 203 for simulation of nuclear explosions or their effects.) ABOVEGROUND NUCLEAR TESTS ARE SUSPENDED UNDER THE SALT BILATERAL AGREEMENT.

203 Shock tests. Analysis of wave characteristics or structural resistance characteristics during actual or simulated (using explosives) earthquakes or nuclear blasts. (This BAAP may be used for any activities causing severe vibration.)

204 Battle operations tests. Conduct war games or logistics exercises on- or off-base or at sea (during joint operations) to determine the overall efficiency of field military tactics, operations, logistics, etc. (See Training BAAPs 111, 121 through 139, 141, 150 through 155, 160 through 164, 183, 190 through 199, 221 through 227, 231, 240 through 247, 250 through 253.)

205 Field sampling/testing. Obtaining data in the field by observation, tabulation, measurement, and/or collection.

206 Field biological sampling/testing. Sampling of animal or plant populations by observation, tabulation, measurement, or collection. Animal collection may be by live capture methods or the animals may be killed during or after capture. Plant collection is by removal of all or part of the plant. For collection of microorganisms or aquatic or soil macroinvertebrates, see field water, air, and soil sampling BAAPs. Testing includes any artificial manipulation of such populations, including introduction of plants or animals not previously present.

207 Field water sampling/testing. Measurement of water quality at a field site (pH, temperature, BOD, COD, CO) by use of monitoring equipment or by collection of small water samples followed by laboratory chemical and/or biological analysis.

208 Field air sampling/testing. Measurement of ambient or source air quality by (1) using electronic or chemical techniques at a field site, or by (2) field collecting samples, followed by laboratory analysis, to determine presence and concentrations of particulates, gases, biocides, radioactive substances, allergens, etc.

209 Meteorologic data collection/testing. Measurement of weather conditions by observation and instrumentation. Primarily refers to passive sampling at ground level, on buildings, in aircraft, or by satellite, although testing may include active intervention such as cloud seeding.

211 Field noise sampling/testing. Collection of outdoor noise level data at various locations using electronic equipment.

212 Field soil sampling/testing. Collection of data about soils by observation of road cuts or eroded soil profiles, or by surface or core sampling of the soil followed by physical and chemical laboratory analysis. Includes testing soil bearing strength (the ability of a soil to support the passage of vehicles) using a soil penetrometer.

213 Field geologic sampling/testing. Analysis of geologic conditions and presence of particulate rocks or minerals, at surface, in mines, or underground; sample collection may require drilling or blasting. Some chemical and physical analysis may follow in a laboratory. Also includes analysis of terrain characteristics.

215 Survey land. Determining the topographic characteristics of land (terrestrial or underwater) using physical measurements, electronic instrumentation (particularly in oceanography), or satellites.

216 Field test biological control agents. Determine the field effectiveness of biological control agents (other than CW-BW materials) by spraying, physical removal, or soil incorporation. See Table C3.

217 Field test CW or BW protectives. Determining the effectiveness of protectives (against CW or BW materials) applied in the field by spraying, incorporation into water, air, or food supplies, or shelling. *Protectives research requires that small amounts of CW or BW materials be used for defensive weapons testing. Research on BW materials used as offensive weapons has been suspended. CW-BW materials may include lethal or nonlethal chemicals, riot control agents, biological agents, or herbicides.*

218 Field test other chemical agents. Determining field effectiveness of chemicals whose primary purpose is direct protection of personnel or equipment, such as camouflage, smoke bombs, paints, etc.

219 Analyze data. Determining experimental or test results and importance of collected raw data by tabulation, mapping, graphing, photo-interpretation, mathematical analysis and modeling, statistical tests and analysis, simulations, cryptographic techniques, computer use, or subjective analysis by the researcher.

220 Accidents. Accidents may occur during many types of RDT&E research in laboratories, on test production lines (semiworks), or under field conditions. BAAPs 221 through 238 refer specifically to accidents connected with an RDT&E program. Rather than requiring their consideration for each type of research, they receive separate listing here according to type of accident.

221 Minor chemical spills. Minor spills of laboratory and industrial chemicals, CW materials, POL products, etc.

222 Catastrophic chemical spills or leakage. Major, usually outdoor, chemical or oil spills or leakage into water supplies or drainage systems. May occur once or over an extended period.

223 Equipment damage. Ranges from minor damage to total destruction of test or support equipment. May be corollary to several other types of accidents.

224 Explosion. Unplanned detonation of test explosives (including ammunition prematures), or explosion caused by ignition of superfine dust or leaking gases, fumes, or vapors.

225 Fire. Fire caused by carelessness or hazardous conditions during tests or at test locations.

226 Intrusion by disease vectors. Unexpected influence on test results when test humans, animals, or

plants contract some disease before, during, or after a test.

227 Escape of biological test agents. Unexpected release of test microorganisms, such that they may have some effect on researchers, support personnel, the general public, or local ecology.

228 Escape by test animals or unauthorized absence of human test subjects. Temporary or permanent escape of animals or unauthorized absence of humans involved in tests.

229 Bite by test animals. Biting of research or support personnel or member(s) of general public by test animals.

231 Radiation exposure. Unexpected or undetected exposure of test organisms or humans (research or support personnel, or general public) to radiation. Exposure may be internal or external, and could be short-term at high dosage levels or long-term at low dosage levels.

232 Nuclear accident. An accident involving a nuclear weapon or radioactive material, including such possibilities as accidental detonation, hijacking of weapon, hijacking of radioactive substances, or loss of weapon or radioactive substances.

233 Sabotage. Action by enemy agents to prevent proper performance of tests, prevent timely execution of tests, or invalidate, steal, or destroy results. This BAAP excludes sabotage using methods defined by any of the other "Accidents" BAAPs (221 through 238).

234 Unexpected climatic change. Climate change which affects the performance, results, or applicability of tests.

235 Unexpected secondary effects. Unexpected detrimental side effects to vegetation, local domestic or wild animals, test animals, or humans for which emergency countermeasures had not been prepared or were not available in time.

236 Intrusion by nontest humans/animals. Intrusion into a test area by nontest humans or animals which voids results, precludes performing the test, precludes secrecy, or endangers the intruder(s).

237 Contamination by toxic residues. Contamination of test site, equipment, or test organisms by toxic chemicals or biological materials.

238 Noise overexposure. Accidental damage to property or human health as a result of blast overpressures or other excessive noise effects, including chronic exposure.

240 Support Functions. Activities which may be categorized as operations but which here are specifically restricted to operations dealing with RDT&E programs or projects.

250 Obtain supplies. Obtaining items which are to be tested or used during tests. Any actions necessary to originally obtain or produce the items should be considered when use of items for testing will be different from using them for any other reason. An example would be obtaining domestic animals (e.g., dogs) for testing purposes—an action likely to be controversial. In many cases, however, merely obtaining the items for test will not create impacts greater than obtaining them for regular use, in which case the user may refer to the Procurement Functional Area.

260 Transport supplies. Transporting by either military or public means items which are to be tested or used during tests in an RDT&E program or project. Transport may be by fixed or rotary-winged aircraft, watercraft, railroad, car, truck, bus, MHE (materials-handling equipment), or cargo containers, or any combination of the above.

270 Store/maintain supplies. Storing and maintaining supplies before, during, and after their use in tests in an RDT&E program. Includes housing test animals and plants and operating decontamination rooms, procedures, and laundries. Also includes preparation and periodic rehabilitation of field test ranges.

290 Waste disposal. Disposal of waste, including POL, specifically produced during operation of an RDT&E program or project.

291 Disposal of radioactive wastes. Disposal of radioactive materials or equipment, in small or large amounts, by underground storage in containers, underground injection, storage in bunkers, incineration, or dumping at sea (in containers or not).

292 Disposal of pathological waste. Disposal of pathologically contaminated waste from medical or biological research by incineration, pathological incineration, burial, sanitary landfill, or autoclaving.

293 Disposal of chemicals, fuels, POL. Disposal of toxics and other chemicals, including heavy metals

and their compounds, POL items, and biocidal chemicals by system recycling, salvage for resale, or by disposal via any of the following methods: public sewage systems, detoxification, air venting, incineration, burial, sanitary landfill, dumping, dumping at sea.

294 Disposal of off-specification or scrap materials. Disposal of prototypes, models, and off-specification ammunition, equipment, materials, or materiel produced in RDT&E programs or projects which will not be reused as is (or will not be reused by researchers at all), by burial, dumping, detonation, incineration, sanitary landfill, chemical detoxification, system recycle, or salvage for resale.

User Input Requirements

To obtain EICS output for the RDT&E Functional Area, the user may complete Input Form #7 and send it to CERL, or may enter the EICS responses on an interactive computer terminal. Detachable copies of blank input forms are provided beginning on p 175; a sample for the RDT&E FA is shown in Figure C1. The following instructions are numbered to correspond with the items on the input form.

1. Project Name

Designate any name or description that does not exceed 75 characters. (Each letter, space, number, or punctuation mark is one character.)

2. Installation

Write your installation's name.

3. Respondent's name, address, and telephone number

The user should supply his/her *complete* military mailing address, including office or organization symbols, stating commercial telephone number, and then adding Autovon or FTS telephone number (indicate by circling).

4. Site number

One input form should be completed for each site, test course, facility, etc., being used for RDT&E activities. Site designation should include consideration of topography, vegetation, usage of the area, and geopolitical features. Degree of detail required for the

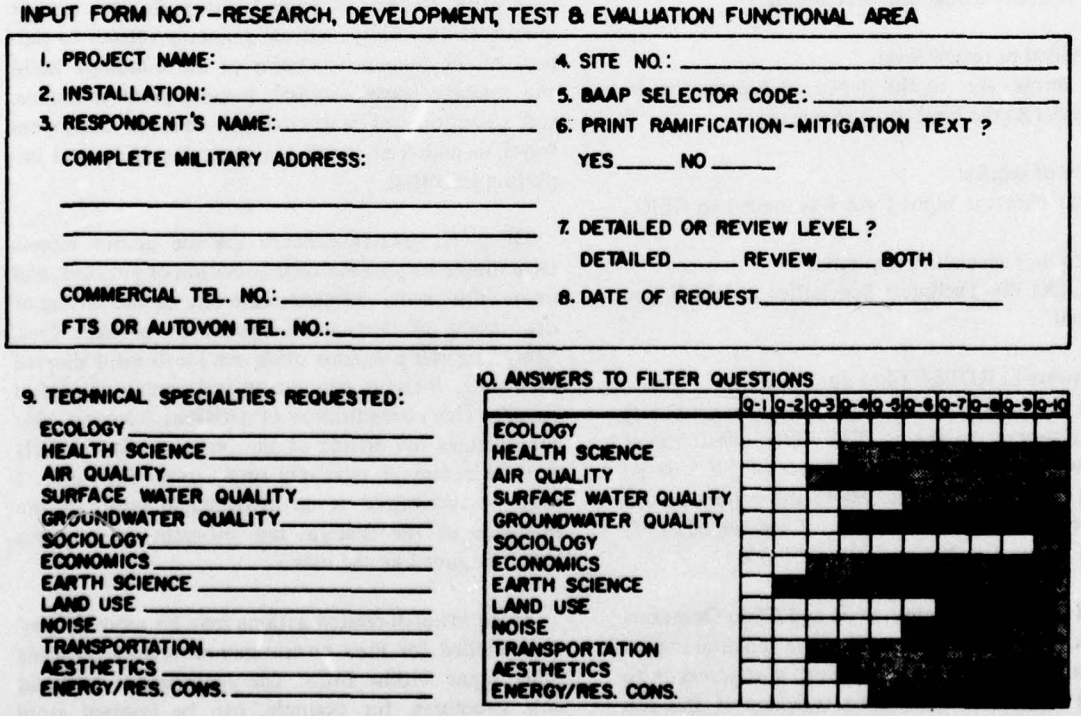

Figure C1. Sample RDT&E FA input form.

assessment should be considered when deciding how many different sites to designate. In the blank provided, list an arbitrary one-digit number (for your information only) to label the site.

5. Preliminary BAAP Selector

In the blank provided, list the letter corresponding to *one* of the following responses describing the RDT&E activities to be assessed.

A. Activities restricted to "planning and design": research involving no physical laboratory or field work.

B. Research involving physical laboratory (indoor) work as well as planning and project design.

C. Activities involving physical field (outdoor) research, tests, etc., as well as planning and project design.

D. Research involving planning and design, laboratory work, and field work.

6. Ramifications-Mitigations texts

Check (X) if you wish to receive texts of Ramification Remarks and Mitigation Statements.

7. Detailed or review level

These terms refer to the depth of information desired. Check (X) the level being requested.

8. Date of request

Indicate date the input form was mailed to CERL.

9. Technical specialties requested

Check (X) the Technical Specialties in which you wish output.

10. Answers to RDT&E filter questions

Fill in this matrix with the numbers corresponding to your responses to the RDT&E filter questions on the following pages. Questions on use of EICS or on obtaining direct computer access to the system should be referred to Dr. E. W. Novak at (Commercial) 217/352-6511, extension 382, or (FTS) 958-0011.

Technical Specialty Introductions and Filter Questions

To accurately assess the total environmental impact of a research installation or program, it is necessary to be aware of critical data to be collected at and surrounding the area of operations. On the following pages, filter questions for each Technical Specialty are presented separately, along with an introduction and a list of information sources pertinent to that specialty. The questions can be answered using a few simple tools (rulers, installation maps, and plans, or in some cases a site visit) and the assistance of professionals in the various environmental Technical Specialties, who have already compiled most of the necessary baseline information. Honest answers to these questions will eliminate many extraneous considerations in the matrix of potential impacts. After reading the introductory paragraphs for each Technical Specialty, record the answers to the filter questions on Input Form #7 in the block under Point 10, or record answers as requested on the computer terminal.

ECOLOGY/RDT&E

Introduction

The impacts of RDT&E activities in the Army vary so widely that it is difficult to anticipate every interaction these activities might have with ecological attributes. Much research is primarily paper planning and desk work. Impacts associated with such work are not unique to the Army and are generally related to support of the human occupants of the buildings. Solid and sanitary waste disposal, heating plant emissions, and generation of traffic-related noise as employees travel to and from work are examples of typical impacting activities.

Of much greater concern are the unique effects attributable to possible contamination of air, land, and water with exotic chemical materials, or the testing of large items of destructive equipment or explosives. Army research programs often use locations dedicated to testing, thereby minimizing widespread ecological impact. This concentration of activities, however, also concentrates the effects of the tests, so that impacts may be severe in relatively small areas. Such effects must be recognized as an unavoidable result of the existence of the specific test program or programs being examined by the user.

Some research-related actions may be more properly examined for their environmental impact by using other areas within EICS. The requirement to build new structures, for example, can be assessed more fully through the Construction FA. These construction

impacts should then be added to the impacts determined when the EICS system is used for evaluating RDT&E activities.

It is recognized that RDT&E-related activities may take place within or adjacent to buildings, as well as at remote test sites which are surrounded, for reasons of safety or security, by large tracts of uninhabited land. (The ecological impacts resulting from the actions are obviously more critical if such a natural habitat is the test site.) The filter questions which follow this introduction request that the user indicate the nature of the site to be used. If, as is common in many types of programs, several different laboratories and remote field test sites are used, then a separate input form *must* be prepared for each location in order to fully use the EICS capabilities.

Question 2 asks (in part) if the research involves exotic species. An exotic species is any plant, animal, bacterium, protozoan, virus, or other organism not found free-living in the surrounding environment. Thus, primate colonies, tropical insectaria, and cultures of mutated bacteria are clearly exotic in the Continental United States. Native species may effectively be exotic, as well, as for example in a case where a colony of animals native to Florida is maintained in a California laboratory. The state Department of Conservation or Fish and Game will usually be able to provide information about whether a species is exotic.

Question 3 asks if toxic substances are handled during the RDT&E activity. The level of toxicity is defined as one having an acute oral LD_{50}* of less than 500 mg per kilogram of body weight. Commercial products of this toxicity are required to have the words "Warning, may be fatal if swallowed" on the label. If development of chemical products or substances is an inherent part of the research, determination of potential toxicity of new compounds should be an integral part of the program.

In Question 5, the user is asked to measure the sound levels at the edge of the test site while tests are in progress. This response assumes the availability of a small, hand-held noise meter of the type used for measuring industrial noise levels for employee safety and health. An ANSI type II meter reading in dBA is specified, and should be available for use from the safety officer or audiologist or through the Facilities Engineer. For this question, the edge of the site is defined as either the perimeter fence or wall around the test location *or* the closest zone of more or less natural vegetation (habitat), whichever is closer to the test site.

In Question 7, the user is asked to compare the field test site to its surrounding area. For these purposes, the field test site is defined as any area from which unprotected personnel are excluded for safety reasons during testing. For example, an explosives test may take place on a test pad of a few square meters, in a clearing only 100 meters across. Safety requirements, however, may not permit unprotected personnel to approach closer than 1000 meters to the center during the tests. For answering Question 7, the "field test site" would be a circle having a 1000-meter radius, whose center would be the test pad itself. Similarly, when weapons are fired, the entire safety fan would constitute the field test site.

To answer the questions, the user should consult a good map of the site; it may help to make a personal visit to each location being considered. The safety officer or project manager should be able to indicate the safety zone, if any, on the map. The installation land management personnel, from the office of the Facilities Engineer, will be able to assist in answering Questions 9 and 10. If such persons are not available, the state Department of Conservation or Fish and Game should be able to delineate areas where the different types of hunting and/or fishing are not permitted.

Filter Questions

1. Which of the following best describes the environment within which the RDT&E activities under consideration take place? (NOTE: A separate input form should be submitted for each separate office/lab or field test site used for this project.)

(1) Activity takes place entirely within a building and/or adjacent enclosed grounds where no naturally occuring wildlife is found.

(2) Activity takes place on a field test site removed from continuously occupied offices and/or laboratories. At least some natural vegetation or wildlife is present on or adjacent to the site.

*LD_{50} is a dosage fatal to 50 percent of the treated animals.

(REMINDER: Questions 2 through 10 should be answered separately for each test site.)

(3) The site contains both office/lab buildings and an adjacent test site. At least some natural vegetation or wildlife is adjacent to the building or test area.

2. Does the RDT&E activity involve maintenance or use of cultures or test populations of pathogenic, exotic, or potentially pestiferous organisms?

(1) Yes, or don't know

(2) No

3. Does the RDT&E activity involve the handling or application of any hazardous or toxic compounds (toxic here defined as $LD_{50} < 500$ mg/kg)?

(1) Yes, or don't know

(2) No

4. Does the RDT&E activity involve the handling of radioactive materials in quantities sufficient to require a license or permit under either Army or Nuclear Regulatory Commission (NRC) regulations?

(1) Yes, or don't know

(2) No

5. Which of the following descriptions best characterizes the noise environment at the edge of the laboratory or test site while testing is in progress?

(1) Sound pressure levels are lower than any of the following descriptions:

level 105 dBA - testing takes 1 sec or less
level 85 dBA - testing takes 2 min or less
level 65 dBA - testing takes 3 hr or less

(2) Sound pressure levels are greater than any one of the above categories, but lower than any of the following descriptions:

level 115 dBA - testing takes 1 sec or less
level 95 dBA - testing takes 2 min or less
level 75 dBA - testing takes 3 min or less
level 65 dBA - testing is 24 hr per day

(3) Sound pressure levels are greater than any one of the above categories, but lower than any of the following descriptions:

level 125 dBA - testing takes 1 sec or less
level 105 dBA - testing takes 2 min or less
level 85 dBA - testing takes 3 hr or less
level 75 dBA - testing is 24 hr per day

(4) Sound pressure levels are greater than any one of the above levels.

(5) Noise produced by this testing is impulsive (blast) noise not measurable by simple meters.

(6) Sound pressure levels are not known at this time.

6. Which of the following best describes any areas of naturally occurring habitat adjacent to the research building or present on or near the test site?

(1) Tundra-type grasses, sedges, mosses and dwarf shrubs

(2) Desert-type shrubs and grasses

(3) Marsh-type shrubs and grasses

(4) Ground cover is mostly grasses and weeds

(5) Continuous cover of shrubs or larger trees (less than 10 cm or 4 in. in diameter)

(6) Continuous cover of shrubs or larger trees (more than 10 cm or 4 in. in diameter)

(7) Landscaped and regularly mowed.

7. Taking the field test site and all adjacent naturally vegetated areas as a whole (equal to 100 percent), what proportion of this whole is involved in active testing on any one day?

(1) < 10 percent

(2) 10-25 percent

(3) 25-65 percent

(4) > 65 percent

(5) No field tests are considered for this site.

8. Which of the following typifies the frequency of use of the field test area?

(1) Used for this or similar purpose more than 100 days per year.

(2) Used for this or similar purpose 50 to 100 days per year.

(3) Used for this or similar purpose 10 to 50 days per year.

(4) Used for this or similar purpose for fewer than 10 days per year.

(5) No field tests are conducted.

9. Which of the following characterizes use made of any water bodies or wetlands on or adjacent to the test site? (Enter a zero if none are present.)

(1) Neither fishing nor waterfowl hunting is permitted.

(2) Fishing is permitted, but waterfowl hunting is not.

(3) Waterfowl hunting is permitted, but fishing is not.

(4) Both fishing and waterfowl hunting are permitted.

10. Which of the following best characterizes the use of the test site or immediately adjacent areas for hunting?

(1) No hunting is permitted.

(2) Big game hunting is prohibited, but small game may be hunted.

(3) Big game may be hunted, but small game may not.

(4) Both big and small game may be hunted.

HEALTH SCIENCE/RDT&E

Introduction

Health science is concerned with both the physical and mental well-being of man. Thus, it covers a variety of effects, ranging from physical, chemical, and psychological stress, to the creation of unsafe environs. The various pathways by which stressors reach the population are also of importance in estimating health impacts.

In addressing human health impacts, primary considerations are the distance from the site to occupied areas, and the routes potential stressors may follow in covering that distance. Site visits and maps are the major sources of this type of information. Much related material is developed in other Technical Specialties (e.g., Air Quality, Surface Water, and Groundwater).

While direct impacts of RDT&E activities can be important, particularly in case of accidents, the major health science impact of research and development results from the later effects of developed products. The life cycle impact of an item—everything from initial R&D to ultimate disposal—should be considered. Characteristics of an item that are fixed in the R&D stage can substantially determine the life cycle health impact. Similarly, if a given level of health impact is to be maintained, it can be accomplished in a much more cost-effective manner during development of the item. It is almost always less efficient and more costly to add on environmental control measures after the product itself has been developed. This is why planning, designing, and managing research are indicated as having substantial potential health impact. While these activities in themselves produce essentially no direct health impacts, decisions made at this stage can have great influence over the eventual impact of developed systems on human health.

The wide diversity of possible RDT&E activities and the range of possibilities that might actually be involved in any single BAAP make it difficult to pin down any specific potential effect. In many cases, the review level provides the best level of approach. Impact statements for RDT&E activities will undoubtedly require much more individual consideration than for more standardized activities.

Some general guidelines can be provided. Particular care must be taken when testing involves human subjects. Tests may introduce changes in the subjects themselves, their families and even their community. Possibly more important, later implementation of the program in larger populations may involve substantial health impacts. The lack of experience with new materials and processes being developed, and the possible production of waste products for which adequate treatment methods are not available, are cautionary areas.

Table C4 lists sources of information for the Health Science area.

Table C4
References Helpful in Assessing Impacts and Answering Filter Questions for Health Science

Sources of Information	*Information Supplied*
Installation Preventive Medicine Officer	This is the first person to contact regarding potential environmental health impacts.
Local and state health departments	These contacts are best coordinated through the installation surgeon.
Army Environmental Hygiene Agency	The Army's in-house source of environmental health expertise. Contact is best coordinated through installation surgeon. This organization can often supply help better and cheaper than an outside consultant.
Registry of Toxic Effects of Chemical Substances, Herbert E. Christiansen and Edward J. Fairchild, Eds. (US Dept. HEW, Public Health Service, Center for Disease Control, National Institute for Occupational Safety and Health, Rockville, MD 20852, June, 1976.) Available as HE 20.7112:976 from Superintendent of Documents U.S. Government Printing Office Washington, DC 20402	Contains information on toxic dose levels and safety standards for over 100,000 chemical substances.

Filter Questions

1. Are any toxic chemicals (excluding pesticides or herbicides) being used or to be used in the RDT&E program or project?

   (1) Yes, or don't know
   (2) No

2. Does the activity or program produce or involve any (biological) organisms considered pathogenic or pests?

   (1) Yes, or don't know
   (2) No

3. Does the activity or program produce or involve any type of radiation (ionizing, laser, microwave, other) or radioactive substances?

   (1) Yes, or don't know
   (2) No

AIR QUALITY/RDT&E

Introduction

To assess the impact of RDT&E activities on air quality, information about the number of construction projects currently underway and/or planned, as well as the extent of usage of chemical, biological, and radioactive agents in current and proposed projects must be obtained. For all projects using chemical, biological and radioactive agents, the manner in which they are stored, transported and disposed of after the completion of the tests must be ascertained. The incineration practices of the installation should also be reviewed. Information needed includes the kinds of materials burned, when they are burned, and the nature of the effluents from the combustion chamber.

Accidents occurring during the performance of RDT&E activities could cause major impacts on air quality. Therefore, the safety record of the installation should be examined.

Air pollution caused from incineration of materials associated with RDT&E activities should be examined.

Table C5 provides sources of baseline information about air quality.

Table C5
References Helpful in Assessing Impacts and Answering Filter Questions for Air Quality

Sources of Information	Information Supplied
Principal Investigators	Information on how dangerous agents are stored, transported and disposed of.
Preventive Medicine Officer	Information on incineration practices on the installation.
Safety Officer	Safety record of installation.
Test directors	General information on vehicle/weapon emissions, smoke generation, dust clouds, etc.
U.S. Weather Bureau	Climatological conditions which might be expected during RDT&E activities.
U.S. Soil Conservation Service	Susceptibility to dust generation of soil types in areas of outdoor RDT&E activities.

Filter Questions

1. Are there any toxic chemical or biological materials associated with the project or installation?

   (1) Yes

   (2) No, or don't know

2. Is there an operating incinerator or burning facility on the base?

   (1) Yes

   (2) No, or don't know

SURFACE WATER/RDT&E

Introduction

RDT&E activities of military organizations introduce few new general types of potential impacts on surface waters not found in other Functional Areas, but these impacts can be severe and complex.

The nature of virtually all RDT&E activities is similar to that of other nonresearch-related military activities since most tests involve improving present operations or equipment. However, it is possible that the effects of certain RDT&E activities could be far more severe than those of comparable nonresearch-related military activities. The three reasons for this are that (1) new and untried products, compounds, dosages, and techniques are associated with RDT&E activities; (2) while proven techniques for avoiding impacts on surface water may be available for established military activities, there is less opportunity for such procedures to become established for RDT&E activities; and (3) the uncertain nature of research activities increases the possibility that the consequences of activities will not be adequately anticipated or that accidents will occur.

There are appreciable possibilities for minimizing the impact of military activities associated with RDT&E on the environment, since there is potential for selecting military alternatives which minimize water quality impacts at the time that RDT&E activities are carried out. For example, selection of products with preferred characteristics related to biodegradability, toxicity, and leachability is possible and should be implemented in RDT&E decisions.

The stage of RDT&E activity which most profoundly influences the overall impact of these military activities on surface water is the planning phase (BAAPs 110 through 145). Decisions reached during this phase influence not only the impact of RDT&E activities, but also the long-term effects of overall military activities on the environment. The indicated interactions of RDT&E planning activities on the environmental matrix are actually inadequate to show the importance of the planning function. It is the long-range implications of the RDT&E planning activity which are most likely to significantly affect water quality. For this reason, indications of the actual potential effects of planning RDT&E activities can best be sought by consulting the

specific RDT&E activity influenced by the planning as well as the nonresearch-related military activity most closely associated with the research program.

It should be noted that, as with other military functions, RDT&E activities must be carried out in accordance with pollution control laws. Provisions of some existing regulations are specifically oriented toward the types of water quality degradation which could accompany military research activities. For example, regulations developed in accordance with the 1972 Marine Protection, Research, and Sanctuaries Act and the 1972 Amendments to the Federal Water Pollution Control Act specifically forbid ocean dumping of radioactive materials and chemical or biological materials.

Site-specific information needed for evaluating the impact of RDT&E activities, as listed in Table C6, concerns details about the nature of RDT&E materials and procedures, and data about the location at which the activities are to be carried out. Gathering information about the nature of RDT&E materials is of great importance because of the possible disastrous effects of some such materials on surface waters.

Table C6
References Helpful in Assessing Impacts and Answering Filter Questions for Surface Water

Sources of Information	Information Supplied
RDT&E organization	Type of equipment to be tested.
	Type of material to be tested or used.
	Type of weapons to be tested.
	Type of fuel, ammunition, and explosives to be tested.
	Nature of chemical, biological, or radiological materials involved.
Corps of Engineers; Army Environmental Hygiene Agency	Appropriate surface water quality control practices for chemical, biological or radiological materials involved. Dredging and piling information.
Appropriate military contractor	Specific characteristics of materials, chemicals, or equipment.
Water quality control expert	Potential water quality effects of specific alternative materials or agents.
	Potential water quality effects of specific alternate construction or testing procedures.
	Possible effects of RDT&E practices on performance of wastewater treatment plant.
	Possibility of removal of waterborne material in a wastewater treatment plant.
	Appropriate treatment and/or disposal practices for chemical, biological, and/or radiological agents involved.
Appropriate civic service groups	Attitudes concerning the military activity involved.
Appropriate state water pollution control authority	Applicable surface water quality standards.
	Historical and current quality of receiving waters.
U.S. Weather Bureau	Climatological conditions which might be expected to prevail at time of RDT&E activities.
U.S. Geological Survey	Topographic maps of area involved in RDT&E activities.
U.S. Soil Conservation Service	Soil types in area involved in RDT&E activities.

Filter Questions

1. Do electrical components being tested or being used in tests contain polychlorinated biphenyls?

   (1) Yes

   (2) No, or no electrical/electronic equipment involved.

2. Do radiation testing procedures involve the use of ionizing radiation?

   (1) Yes

   (2) No, or no radiation testing involved.

3. Are nuclear or shock tests to be conducted underwater?

   (1) Yes

   (2) No

4. Do shock tests involve nuclear explosives?

   (1) Yes

   (2) No, or no shock testing.

5. Does field testing of biological control agents (BAAP 216) involve only techniques which control pest plants/animals by introducing their natural predators, parasites, or diseases, as opposed to use of chemical control agents?

   (1) Yes

   (2) No, or no field testing of biological control agents.

GROUNDWATER/RDT&E

Introduction

The severity of RDT&E impacts on groundwater depends largely on the nature of the activity and its areal extent. Groundwater velocities are approximately 1 to 5 feet (0.3 to 1.5 m) per day or less; thus, groundwater responds very slowly to either adverse or positive impacts. Because of this slow response time, extreme care must be taken in examining potential impacts. Obviously, groundwaters near the surface are highly susceptible to degradation by surface application of any material.

Only those RDT&E activities of a relatively large areal extent or involving highly toxic materials seriously affect the quality of the groundwater. Impacts are most likely to result from storage and use of chemicals as well as disposal of solid and liquid wastes.

See Table C7 for information sources useful in assessing impacts on groundwater.

Filter Questions

1. Which of the following best characterizes conditions at the locale of the RDT&E activity?

   (1) No defined aquifer exists.

   (2) Confined aquifer with recharge area more than 1,000 meters from the activity. No wells are in use.

Table C7
References Helpful in Assessing Impacts and Answering Filter Questions for Groundwater

Sources of Information	Information Supplied
Site visits	Surface conditions at site of activities
Topographic maps	
State water survey agencies	Subsurface and aquifer conditions at site of activities
Water supply offices	

(3) Confined aquifer with either (1) recharge area less than 1,000 meters from the activity; *or,* (2) wells are in use.

(4) Characterized by fissures and/or solution channels extending to within 20 meters of the surface.

(5) An unconfined aquifer with the water table more than 20 meters below the surface.

(6) An unconfined aquifer with the water table less than 20 meters below the surface.

2. Which of the following best characterizes the location of the RDT&E activity?

(1) The area around the activity is completely built up. The action is a continuation of an existing program.

(2) The area around the activity is completely built up. The activity is new or at an increased level.

(3) The area around the activity is rural. The action is a continuation of an existing program.

(4) The area around the activity is rural. The action is a new one or an increase in current levels of activity.

(5) The area around the activity is suburban.

3. Which of the following best describes the RDT&E activity?

(1) The activity is primarily above grade and covers less than 4,000 square meters.

(2) The activity is primarily above grade and covers more than 4,000 square meters but less than 20,000 square meters.

(3) The activity is above grade and covers more than 20,000 square meters or is below grade and penetrates the water table.

SOCIOLOGY/RDT&E

Introduction

Residents of communities adjacent to RDT&E activities will be concerned about what is going on, and their concern is increased by the secrecy usually associated with such activities. Concern is less in communities with a tradition of research, such as in a university community, and greatest in those areas which are almost predominantly residential. The most specific questions to be asked by the EICS user are: "What has been the reaction of the community to prior RDT&E events?", and, "Who are the community leaders who influence public opinion?"

Table C8 lists sources of sociological data which may help in assessing impacts.

Table C8
References Helpful in Assessing Impacts and Answering Filter Questions for Sociology

Sources of Information	Information Supplied
Installation	
Public Information Officer	Analysis of "clipping file" for reports of community reactions to prior events.
Staff Judge Advocate	Information on community complaints.
Community	
Media representatives	Informal expressions of concern for activities and implications for the community opinion process.
Educational officials	
Clergymen	
Other organizational leaders	

Filter Questions

1. Are any weapons, destructive agents, or their delivery systems being tested which could affect the local community if an accident should occur?

(1) Yes

(2) No

(3) Don't know

2. Are any experiments planned or in progress which involve the use of human test subjects?

(1) Yes

(2) No

(3) Don't know

Answer filter questions 3, 4, and 5 if any human populations are being sampled during research or testing. If not, go on to Question 6 and enter zero on the input form for questions 3 to 5.

3. Does the construction of any sample populations accurately represent the racial and ethnic composition of the total population in question?

(1) Yes

(2) No

(3) Don't know

4. Are surveys being conducted which involve personal interviews with respondents?

(1) Yes

(2) No

(3) Don't know

5. Are the tests designed to demonstrate differences between or among socially significant groups of the population, such as racial or ethnic minorities?

(1) Yes

(2) No

(3) Don't know

6. Are any medical, biological, or fitness tests being performed on human test subjects which may possibly induce deviant physiological or psychological conditions, such as stupors, eccentric behavior, erratic judgment, genetic damage, etc.?

(1) Yes

(2) No

(3) Don't know

If the answer to Question 6 is (1) yes, answer questions 7, 8, and 9; if not, enter zero for each.

7. Will any human subjects be exposed to public view while being transported to or from the test location?

(1) Yes

(2) No

(3) Don't know

8. Will any human subjects be exposed to public view at any time during the course of the experiment?

(1) Yes

(2) No

(3) Don't know

9. Have the U.S. Department of Health, Education, and Welfare guidelines for human subject participation been followed in the selection of all test subjects?

(1) Yes

(2) No

(3) Don't know

ECONOMICS/RDT&E

Introduction

Almost all RDT&E activities are conducted within the bounds of a military installation or facility. Therefore, the impact of specific BAAPs on various attributes of the region are expected to be relatively minor.

Generally, purchases from the local economy, employment of personnel (especially civilians) who are local residents, and performance of activities which affect adjacent land values will be the only important economic impactors caused by research organizations. The value of land for residential or possibly commercial purposes by the non-military public would be reduced to the extent that experiments or tests affected it through noise, dust or undesirable effluents.

See Table C9 for sources of economic baseline information.

Filter Questions

1. Do local purchases of goods and services exceed $100,000 yearly?

(1) Yes

(2) No

2. Is the installation in a county with a population of 50,000 or more?

(1) Yes

(2) No

EARTH SCIENCE/RDT&E

Introduction

The attributes of the Earth Science Technical Specialty are of two basic types: **characteristics** of the earth, such as slope and bedrock, and **processes** that shape landforms, such as erosion and mass wasting. Human activities might have primary effects on the characteristics of the earth, but the activities would have to have severe or catastrophic consequences to affect major landforms. The geomorphologic processes, on the other hand, have been going on since before man's time, and will continue to do so; however, human activities might alter the rate of frequency at which these processes occur. Also, these processes may be the means of transmission of environmental effects.

Table C9
References Helpful in Assessing Impacts and Answering Filter Questions for Economics

Sources of Information	Information Supplied
Local, state employment offices	Number unemployed Percent unemployed Skills of those available for work
Local and state planning commissions	Employment data Employment development plans Land use plans Income and employment trends
Publications of the U.S. Department of Commerce, Bureau of Census, including Census of Population and Census of Manufacturing	Population data Work force data Local skills Size of local business and industry Types of local business and industry
Economic Impact Forecast System (EIFS), CERL	Baseline economic data for any U.S. county or counties; predictions of changes resulting from major Army actions.

For example, the process of erosion may be accelerated by the activity of removing vegetative cover, causing increased siltation or turbidity of a stream, and thus impacting on water quality attributes. In this case, the Surface Water and Groundwater Technical Specialties would discuss these types of indirect impacts.

RDT&E may involve actions that could change the rates or frequency of geomorphologic processes. These activities or techniques may be completely new and untried, having unpredictable consequences. Selection of suitable test sites, therefore, requires greater than usual attention to site characteristics, both in terms of primary effects to the site and secondary effects to technical areas such as air and water quality. Since test results may be unknown, waste products from testing may be unusual or have unknown side effects. Again, these waste products may either affect Earth Science attributes or use these attributes as media to affect other Technical Specialty attributes. This unknown aspect of test results or waste products may cause RDT&E activities to be highly controversial.

One result of an RDT&E effort is the generation of ideas—an intangible yet important product. The development of a prototype or testing of a new process may have limited environmental consequences, but the potential for future impacts may be tremendous. For example, development of improved hardware for nuclear devices may (or may not) produce limited environmental impacts, but the use of these devices underground on a widespread scale or in an uncontrollable manner could affect Earth Science attributes. Also, the development of an entirely new product could preclude development of improvements to current products, thus shaping future avenues of product development.

The Army must coordinate any test and/or disposal activities which may have off-installation impacts with appropriate state and Federal pollution control agencies. These requirements are explained in the air quality and water quality technical areas. Information on pertinent legislation may be obtained from the Computerized Environmental Legislative Data System (CELDS).

Other agencies and organizations which may be able to assist Army planners with Earth Science information are:

State geological and water surveys
American Institute of Professional Geologists
Universities
U.S. or state EPA

Filter Questions

1. Does the project being assessed involve any disruption, excavation, movement, or use of soils, gravel, rock or other geologic materials, or any vibration which could disturb surface or subsurface geologic features?

   (1) Yes

   (2) No

   (3) Don't know

LAND USE/RDT&E

Introduction

Land use impacts associated with Army RDT&E are numerous and varied. These impacts, both direct and indirect, include:*

- Restricting access to natural resources/minerals
- Interfering with off-post activities and land uses
- Creating incompatible uses on post
- Inducing land use changes
- Restricting access to environmental resources
- Modifying land use suitability
- Consuming fragile land
- Destroying existing land uses

Army activities associated with RDT&E that are most likely to directly cause these land use impacts are:

1. Field testing of weapons, vehicles, or hazardous materials/substances.

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*Direct impacts are impacts that have a direct cause-and-effect relationship. For example, field testing bombs will destroy or alter land on site, interfering with future use of that land for other purposes. Indirect impacts are impacts that are at least once removed from the actual activity being assessed. For example, if the Army were conducting tests that created noise problems, this could, in turn, produce interference with certain land use activities, e.g., housing.

2. Accidents involving hazardous materials/substances.

Land areas that may be sensitive to RDT&E activities are:

- Civilian controlled/owned areas adjacent to Army test facilities
- Land areas that have been previously undisturbed
- Wetland areas
- Coastal areas
- Publicly owned lands, e.g., parks adjacent to test areas
- Land that is highly populated or heavily used
- Land areas that contain natural resources (resources that have commercial/recreational/aesthetic value)
- Wildlife preserves adjacent to test areas
- Land areas that are designated by Federal or state government as "wild scenic areas" or "critical areas."

Table C10 provides sources of information on land use impacts, as well as assistance in determining consistencies and/or conflicts with local, state, regional, or Federal land use plans.

Table C10
References Helpful in Assessing Impacts and Answering Filter Questions for Land Use

Sources of Information	Information Supplied
City Planning Department	City land use plan Zoning map Capital improvement plan Transportation plan Demographic information Tax information Housing information Recreation and open space plan
Public Utility Company	Easements Rights-of-way Underground utility information
Regional Planning Commission	Regional land use plan Transportation plan Water and sewer plan Capital improvement plan A-95 review process* Demographic information Federal and state laws Housing information 208 plan(s)** Recreation and open space plan
County Engineering Department	Highway maps Zoning map Transportation plans

*U.S. Office of Management and Budget Circular A-95 delineates procedures for implementing Federal laws concerning projects using Federal funds. A review process must occur by which affected Federal, state, and local agencies determine the consistency of the proposed project or policy with relevant land use and land use related plans, policies, and programs.

**Federal Water Pollution Control Act of 1972 (Public Law 92-500), Section 208, enables drainage basin studies to support the 208 planning process for areawide waste treatment management for water pollution control.

Table C10 (cont'd)
References Helpful in Assessing Impacts and Answering Filter Questions for Land Use

Sources of Information	Information Supplied
City/County Tax Assessor's Office	Tax information
State Agencies, e.g., Natural Resources, Planning, Water Pollution Control, Environmental Protection, Highway Commission, Historical Society, etc.	State transportation plan State land use plan A-95 review Highway maps Recreation and open space plan Highway capacity statistics Demographic information Historic information State and Federal laws Housing information Ecology: Wildlife information Vegetation information Critical areas information Air quality information Geologic information Water and oil well boring logs Capital improvement plan
U.S. Department of Agriculture, Soil Conservation Service	Soil information, e.g., productivity and erodibility Land use plans (watershed development plans) Aerial photos
U.S. Geological Survey	USGS maps (maps identifying topographic, vegetation, and physical features) Geological information, e.g., water availability and mineral deposits Aerial photos Seismic areas Aquifer recharge areas
U.S. Army Corps of Engineers	Water quality Discharge limitations Flooding information Flood plain information Transportation (water) Ecology: Wildlife information Vegetation information Federal water laws Maps A-95 review Recreation and open space plan Demographic information Urban studies (land use and wastewater treatment data) Point and nonpoint water pollution
U.S. Forest Service	Recreation and open space plan Vegetation information Fish and wildlife information Land use plan Aerial photos

Table C10 (cont'd)
References Helpful in Assessing Impacts and Answering Filter Questions for Land Use

Sources of Information	Information Supplied
U.S. Department of the Interior, e.g., Bureau of Outdoor Recreation, Fish and Wildlife Service, etc.	Recreation and open space plan Vegetation information Fish and wildlife information Land uses Mineral deposits Federal laws and regulations A-95 review
U.S. Department of Housing and Urban Development; U.S. Department of Health, Education, and Welfare	Housing information Capital improvements Health information Education information Demographic information A-95 review
Office of Management and Budget	A-95 review Nuclear, chemical and ordnance precaution regulations
AR 70-24	Special procedures pertaining to nuclear weapon system developments; coordination with the Nuclear Regulatory Commission
ARMY PAM 50-2	Nuclear weapons and nuclear material safety.
AR 50-4	Nuclear weapons safety studies, standards and reviews, procedures and responsibilities.
AR 70-18	Laboratory animals: procurement, transportation, use, care and publicity.
AR 75-15	Responsibilities and procedures for explosive ordnance disposal.
AR 385-2	Nuclear weapons fire-fighting procedures.
AR 385-14	Accident/incident report: shipments of conventional explosives and dangerous articles by commercial carriers.
AR 740-32	Responsibilities for technical escort of dangerous materials.
AR 385-80	Nuclear reactors, Health & Safety Program.
TM-3-250	Chemical agents and hazardous chemicals: storage, shipment and handling.

Filter Questions

1. Are you conducting or contracting field tests using ammunition/explosives, nuclear materials, or chemical or biological toxics?

(1) Yes

(2) No, or no field tests are being conducted.

2. Will any field test be conducted on nonmilitary land, or in unusual, fragile (wetlands, seismically active area, etc.), or scenic areas, or areas which have not been disturbed previously?

(1) Yes, if any of the above apply.

(2) No, or no field tests are being conducted.

3. Does the field test area contain any known or "likely to exist" mineral/cultural/historical resources?

(1) Yes

(2) No

(3) No field tests are being conducted.

4. Are there any residential areas or activity centers (e.g., shopping centers, Post Exchange, sports complex) adjacent to or near any test area from which persons can hear, smell, feel, or see testing operations?

(1) Yes

(2) No

5. Will land use activities adjacent to or near any test area be prevented or disrupted because of danger to health and/or safety considerations caused by the test activity?

(1) Yes

(2) No

6. Will tests using explosives, ammunition, nuclear materials, or chemical or biological toxics result in waste material which will be stored or disposed?

(1) Yes

(2) No

NOISE/RDT&E

Introduction

RDT&E is essential in implementing Army programs; it is divided into three main components in EICS: "Research," "Accidents," and "Support Functions." Noise generation is principally associated with the "Research" and "Accidents" sections. However, the primary emphasis should be placed upon research activities, since noises associated with accidents occur on an infrequent, random basis with few mitigating techniques available.

The most significant aspect of research concerns the step in which actual data is obtained; particularly, conducting field tests can potentially impact the environment. Impulsive noise sources associated with field tests of explosives, firing weapons hardware, test firing missiles and rockets, nuclear tests, and battle operations tests (war games) represent the primary problem area.

Several factors will influence the degree of community impact, in addition to the acoustical level of the activity. These factors include:

1. Site Location

Conducting these tests on military-owned property is preferred, followed by government-owned nonmilitary property. Off-installation testing, particularly where occurring infrequently, will generally be the most objectionable to a civilian population.

2. Occurrence

Time of day influences the degree of community response. Conducting field tests generally is most acceptable during daytime hours (0700-1800). Nighttime testing interferes with several essential residential activities (i.e., communication, relaxation, recreation, sleeping).

3. Pattern

The pattern of field tests may influence community response. Intermittent and random testing creates a greater impact than one which occurs nonrandomly. The latter requires a certain degree of community accommodation.

4. Awareness

Alerting or informing the affected community of the impending test program reduces potential community objections. The actual public information disseminated

to the community may depend upon the magnitude of noise impact, classification of the test, etc.

Other field testing involving transportation sources (vehicles, aircraft, and watercraft) may also potentially impact the civilian community. Vehicle testing (particularly of large vehicles operating under maximum load conditions) may generate very high noise levels. Ground or bench testing of engines, when done in an outdoor environment under maximum load conditions, is also a primary source of community impact. In-flight testing of aircraft involving low-altitude aircraft flyovers can be a major source of community impact.

The primary area of noise impact among the "Support Functions" BAAPs is transportation of supplies.

Table C11 lists some persons and agencies which can assist in noise impact analysis.

Table C11
References Helpful in Assessing Impacts and Answering Filter Questions for Noise

Sources of Information	Information Supplied
Army Installation	
Preventive Medicine Office	Acoustical survey of noise-producing material and installation activities.
Facilities Engineer	Siting of facilities and activities, including base map and aerial photographic information.
Base weather station	Local climatic conditions during noise producing activities.
Testing officer	Information on scheduling source(s) to be tested, method of test, and location.
U. S. Army Level	
U. S. Army Environmental Hygiene Agency Bio-Acoustics Division Aberdeen Proving Ground, MD	Noise repository of military-related sources, including weapons, aircraft, and construction equipment. Hearing conservation survey, community noise impact survey.
Construction Engineering Research Laboratory Corps of Engineers Champaign, IL	Acoustical survey information on military-related sources.
Municipal Level	
Executive Office/City Clerk	Noise legislation information, including existing or proposed ordinances.
Planning department	Land use, social and geographic information for subject data; may include aerial data.
State Level	
Office of the Governor	Noise legislation information, including existing or proposed laws.
Environmental agency	Noise legislation requirements, general resource information.
Federal Level	
U.S. Environmental Protection Agency Office of Noise Abatement and Control Washington, D.C.	Federal noise legislation and guidelines, general resource information.
U.S. Weather Bureau	Local climatic conditions during noise-producing activities.

Filter Questions

1. Are the existing or proposed testing activities in conflict with existing or proposed Federal, state, or local noise emission regulations?

(1) Yes

(2) No

(3) Don't know

2. Are the areas of outdoor activity geographically isolated from potentially sensitive (residential, institutional, recreational) land uses?

(1) Yes, or no outdoor RDT&E activity

(2) No

(3) Don't know

3. Are all indoor activities and machinery acoustically isolated, thereby eliminating or minimizing outdoor propagation?

(1) Yes, or no indoor activity

(2) No

(3) Don't know

4. Is outdoor testing (particularly involving impulsive noise sources) conducted with recognition of prevailing weather conditions so as to minimize adverse impact?

(1) Yes, or no outdoor testing

(2) No

(3) Don't know

5. Is a procedure established to advise the community of impending tests involving impulsive noise sources, particularly during nighttime hours?

(1) Yes

(2) No

(3) Don't know

(4) No impulsive noise is produced

TRANSPORTATION/RDT&E

Introduction

In most cases, RDT&E activities are closely aligned with BAAPs in other Functional Areas such as Training, O&M, and Construction. However, transportation impacts that occur in other Functional Area activities may be alleviated by RDT&E actions. For example, in planning or forecasting activities where equipment, energy, and land use needs can be identified at an early stage, accommodation in planning actions can serve to prevent an unnecessary burden on public facilities.

The most critical transportation impacts are likely to occur when traffic on public roadways is interrupted in some way (e.g., having to reroute traffic because of a field test or accident, or having to reschedule rail and air travel because of the need to transfer bulky, numerous, or dangerous test items or subjects to a test site via public transport systems).

Another potentially significant area of transportation impacts could occur as a result of further energy shortages or the depletion of a natural resource necessary in the manufacturing or maintenance of vehicles. If the military had to requisition a portion of a limited supply of resources or equipment in order to carry out its mission, the civilian transportation sector could be seriously impacted. Considering the national goal of reducing foreign energy dependency, the Army would be well advised to encourage the use of public transportation planning agencies in an effort to improve public transportation services or carpooling in military communities as a part of the energy conservation program. Army planners should begin to establish a working relationship with city and state transportation planning agencies in an effort to improve public transportation services to Army installations and provide a cooperative network for contingency planning.

A general familiarity with the transportation network in the community will be necessary to answer the filter questions. City and state planning agencies will provide most information; however, other sources may be used where more specific data are needed.

See Table C12 for data sources in the transportation area.

Table C12

References Helpful in Assessing Impacts and Answering Filter Questions for Transportation

Sources of Information	Information Supplied
Installation Master Planning Office	In the vicinity of the installation: location of military and civil airfields and heliports; low altitude airways, airport control zones, and restricted airspace; location of highways and harbor facilities. Airspace utilization map, flight hazard strip map, and airfield map for installations having airfields.
City, county, regional, state or Federal Department of Transportation; transportation engineer	Existing and projected traffic flow around the RDT&E site; highway and pavement design criteria. Planned highway extensions and construction schedules. Carpooling programs (funds available to initiate carpool matching program). Office contacted depends on classification of roadway (state or U.S. highway, for example).
City, county, or regional planning department	Availability of public transportation services (commuter trains, buses, etc.)
Military Traffic Management Command (MTMC), Eastern Command: Bayonne, N.J.; Western Command: Oakland, CA.	Information on management of DOD freight traffic. CONUS ocean terminals, and non-temporary storage.
Military Traffic Management Command (MTMC), Transportation Engineering Agency (TEA), Newport News, VA.	Traffic and safety engineering studies, transportability studies, transportability guidance.
Materiel Test Directorate Aberdeen Proving Ground, MD	Transportability testing and information.
Port authority	Number and size of berthing areas, type of cargo handling equipment and cargo handling capacity, schedule of operation of passenger and cargo freighters, depth of channel or dock area.
City, county or state Department of Recreation, or Army Corps of Engineers or National Park Service if national waterway is involved.	Maps of waterway or body of water, designated recreational use of water (power boats, canoeing, sailing, or swimming), restricted areas. Size, location, and managing authority of parks and picnic areas. Maps of access roads to recreation areas, docking and fueling areas, traffic loads, and seasonal information (if road or docking area is not open all year).
Airport authority	Flight schedules and traffic patterns, carrying capacity of runways, planned extensions and construction schedules. Location and use of private airfields.

Filter Questions

1. Is traffic congestion or parking now a problem on or around the installation?

   (1) Yes

   (2) No

2. Will any field tests involve the use of public transportation facilities (airfield or aircraft, railroad, waterway or cargo ships), or could field tests ever interrupt or interfere with public transportation facilities (for example, personnel or equipment crossing a highway or railway, or tests that might generate dust, smoke, or fog that would be a hazard to public roadways)?

   (1) Yes

   (2) No, or no field tests are being conducted.

AESTHETICS/RDT&E

Introduction

Potentially the most significant aesthetic impact in the RDT&E Functional Area is the lack of consideration of visual characteristics during project development, including even the smallest project or prototype product. Though many research projects are temporary in nature (e.g., the testing of a structural component for a building), the fact that they may eventually be adopted for Army use on a large scale makes the design quality of the initial development important. A trained designer or architect can, in most cases, offer attractive design alternatives that are cost effective to produce and could ultimately improve the overall appearance of Army installations and test sites. The design disciplines (architecture, landscape architecture, industrial design) should be included as regular participants in interdisciplinary RDT&E activities. Adopting design criteria at an early stage of development and planning can save the expense of trying to mitigate poor design later, and in some cases, as human factors and habitability studies show, good design can mean improved productivity and may strengthen personnel morale.

For further information about aesthetic impact analysis, review the sources listed in Table C13.

Filter Questions

1. If the activity involves the development and testing of a prototype structure, or construction or use of any test equipment, buildings, etc., will the item be constructed or used outdoors and be large enough to be visible to the general public?

(1) Yes

(2) No, or no such models or structures involved.

Table C13
References Helpful in Assessing Impacts and Answering Filter Questions for Aesthetics

Sources of Information	Information Supplied
U.S. Army Construction Engineering Research Laboratory Energy and Habitability Division PO Box 4005 Champaign, IL 61820	Human habitability criteria.
General Services Administration Interior Design Staff Special Projects Division 19th and F Streets Washington, D.C. 20405	Professional interior design services.
National Furniture Center, GSA Crystal Square, Building 5 Washington, D.C. 20405	Industrial design services and schedules.
National Endowment for the Arts Federal Design Improvement Program 2401 E Street Columbia Plaza Washington, D.C. 20506 ATTN: Director for Federal Activities	General Federal government design information. This is a relatively new agency, and responsibilities are still being defined. Publications and research reports will change over time.
Marilyn D. Bagley, *Aesthetics and Environmental Planning*, EPA 600/5-73-009 (Nov., 1973) (Available through Government Printing Office).	Methodologies for assessing aesthetics for environmental impact assessment. Discussion of criteria, definitions of environmental terminology.
Marilyn D. Bagley, "Aesthetic Assessment Methodology," in L. Edwin Coate and Patricia Bonner, *Regional and Environmental Management* (J. Wiley & Sons, 1975).	Evaluation criteria for aesthetic attributes.

2. If a storage facility for research or test items is needed, which is true?

(1) No additional storage building or areas will be required.

(2) A temporary structure (shelter) is required and will be constructed.

(3) A permanent structure is necessary and will be constructed.

3. Has there been professional aesthetic design input (architecture, landscape architecture, industrial design) in either the development of the product being researched or in the planning of research and testing facilities?

(1) Yes

(2) No, or don't know

ENERGY AND RESOURCE CONSERVATION/RDT&E

Introduction

Although many on-going RDT&E activities have relatively minor effects on Energy and Resource Conservation attributes, the application of research results to future material and energy requirements can produce potentially highly significant effects in this technical area. Research efforts which consume large quantities of materials will probably generate a significant amount of waste products. These could cause negative impacts on natural resources during their disposal; recycling of waste products may also impact natural resources. Other research efforts may consume fuels or energy resources at an intensive rate, which may impact on availability of critical supplies. (See Industrial Activities Functional Area for a discussion of critical supplies.)

To verify potential impacts on energy or resource conservation, each RDT&E program should be considered on the basis of the following types of questions when reviewing EICS matrix output:

- What are the kinds and quantities of materials consumed in the research effort, either directly or in terms of energy consumption?
- Is recycling a part of the overall program or any part of the research effort?
- What is done with waste products generated by the research program?
- What safeguards are in effect to protect natural resources during the testing phase?
- What are the potential resource or energy conservation benefits from the research? Can the results of the research be applied to other uses (e.g., an energy-efficient engine which could have many applications)?
- What type of pollutants are emitted? In what quantities?

Answers to these or similar questions can place the role of Energy and Resource Conservation considerations into perspective in environmental impact analysis of RDT&E programs and activities.

Further assistance may be provided by sources listed in Table C14.

Table C14
References Helpful in Assessing Impacts and Answering Filter Questions for Energy and Resource Conservation

Sources of Information	Information Supplied
On-Post	
Procurement Officer	Material quantities and requirements, records, sources of supplies.
Operational officers and research investigators	Details of on-going and proposed research programs, materiel requirements, environmental safeguards, contingency plans.
Utilities Engineer	Waste disposal programs, recycling efforts, energy needs.
Test director	Details on test programs.

Table C14 (cont'd)
References Helpful in Assessing Impacts and Answering Filter Questions for Energy and Resource Conservation

Sources of Information	Information Supplied
Off-Post	
U.S. Environmental Protection Agency	Recycle/reuse potential, effects of wastes on environment due to test programs, and waste production. Discharge/emission requirements.
Colleges and Universities	Critical materials availability, recycle/reuse potential, research needs, future projections. Records, data, and assistance on specific problems concerning waste production and pollution control.
U.S. Department of Energy	Research development of topics relating to energy production and use. Records, data and assistance on energy-related topics.
State Energy and Conservation Office	Not available for every state. This type of agency generally acts as an advisory board to the state's executive department and can provide information on regulatory requirements of that state.

Filter Questions

1. Is or was any consideration given to the substitution of other materials for critical materials in products under evaluation, and were energy conservation aspects considered in the planning and design of equipment (hardware, materials, weapons, etc.) under evaluation?

   (1) Yes

   (2) No, or don't know

2. Are energy/resource conservation considerations incorporated into the design of buildings or other structures being used for RDT&E efforts?

   (1) Yes

   (2) No, or don't know

3. Has a comprehensive environmental impact analysis been made for field testing programs, and has an environmental protection plan been formulated for the test plans?

   (1) Yes

   (2) No, or don't know

   (3) No field tests are included in the RDT&E program

4. Are contingency plans in effect to deal with environmental damage resulting from accidents (spills, contamination, nuclear or radiation accident, etc.)?

   (1) Yes

   (2) No, or don't know

APPENDIX D:
PROCEDURES FOR ADDRESSING ARCHAEOLOGICAL/HISTORICAL SITES AND PRIME AND UNIQUE FARMLANDS IN THE ENVIRONMENTAL ASSESSMENT PROCESS

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APPENDIX D: PROCEDURES FOR ADDRESSING ARCHAEOLOGICAL/HISTORICAL SITES AND PRIME AND UNIQUE FARMLANDS IN THE ENVIRONMENTAL ASSESSMENT PROCESS

Introduction

This appendix has been prepared to assist Army personnel involved in the environmental impact analysis process to more adequately address two issues of critical national concern: protection and enhancement of archaeological and historical sites, structures, and objects and prime and unique farmlands. This impact analysis process has evolved from the passage of the National Environmental Policy Act.

Paragraph 101 (B) (4) of this act establishes a Federal policy to preserve important historic, cultural and natural aspects of the national heritage and maintain, wherever possible, an environment which supports diversity and variety of individual choice. This policy should be understood to include prime and unique farmlands and archaeological/historical sites.

Archaeological/Historic (A/H) Analysis

Background

Concern for saving relics and monuments of the past developed in the United States late in the 19th century. The centennial observance of American Independence in 1876 stimulated national pride and stimulated development of private societies dedicated to saving and operating sites and buildings commemorating the formative years of the Republic. The Federal government, of course, owns and maintains many historic properties for utilitarian (White House, Capitol) as well as commemorative purposes (Gettysburg and Antietam battlefields).

The expanding body of historic preservation legislation[19] expresses a growing public awareness of the value of historic monuments. It also expresses a growing public concern over the sacrifices of landmarks of the past to the demands of the present.

In accordance with AR 200-1, *Environmental Protection and Enhancement*, the Army has set the goal to protect through preservation, restoration, or rehabilitation all sites, structures, and objects of historical, architectural, archaeological, or cultural significance located on Army controlled property. TM 5-801-1[20] addresses this goal.

Further, Army policy (AR 200-1 para. 8-4) requires that whenever plans, programs, procedures, and activities affect archaeological/historical sites, structures, and objects, coordination be initiated with other Federal, state or local historic organizations. (For more detail regarding coordination, see the section on addressing impacts on A/H and prime and unique farmlands [PUF] in an EIA/EIS.)

Assessment Procedure

A general outline for the entire A/H procedure is presented in Figure D1. The first major step is to determine if an A/H inventory has been prepared according to procedures set forth in TM 5-801-1. This document may be found in the Facility Engineer's office. If the inventory is complete, the user may supplement his/her EIA/EIS with it by following the procedures outlined in the section of this appendix entitled **Addressing Impacts on A/H Sites and Prime and Unique Farmlands in an EIA/EIS.** If an inventory has not been begun, or has not been completed, steps should be taken to complete the analysis as soon as possible.

If the user becomes involved in completion of the A/H inventory, procedures in TM 5-801-1 should be followed. A brief section outlining these procedures follows. Examples of the pertinent data sheets necessary for the analysis can be found in Annex 1.

1. Initiate an inventory of historic properties. The first step in undertaking the inventory is to become familiar with the history of the area and development of the installation. In order to do this, the following steps should be followed:

a. Obtain copies of Basic Information Maps showing all buildings, structures, topography, tree cover, and underground utilities.

b. Become familiar with the pedestrian and vehicular traffic pattern configuration and layout of the various groups of buildings and the location of topographical features, structures, and the general appearance of all areas of the installation.

[19] **Antiquities Act of 1906 (Stat. 225, 16 USC 431), Historic Sites Act of 1935 (49 Stat. 666, USC 461), National Historic Preservation Act of 1966 (80 Stat. 915, 16 USC 470), National Environmental Policy Act (83 Stat. 852, 42 USC 4321), Archaeological and Historic Preservation Act of 1974 (88 Stat. 174, 16 USC 469).**

[20] *Historical Preservation: Administrative Procedures*, **TM 5-801-1 (Department of the Army, November 1975).**

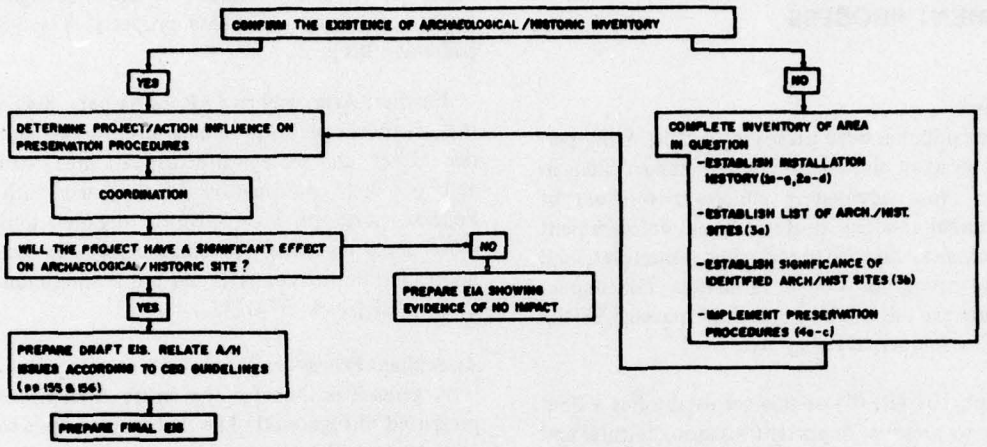

Figure D1. Archaeological/historic analysis.

c. Review existing data that may describe or list installation historic properties. A copy of the latest draft of the comprehensive State Plan for Historic Preservation, a current list of National Register properties within the state, and any state registers or inventories of such resources that may exist, as well as identified properties in a project area that might qualify for nomination to the National Register, may be obtained from the appropriate State Historic Preservation Officer. The catalogs of the Historic American Buildings Survey, the Historic American Engineering Record, or any similar surveys and published reports should be used to identify resources.

d. Obtain or prepare a general history of the installation that describes the physical development of the installation, the dates of construction of all the buildings, dates of acquisition of property, and other information necessary to interpret the history of the installation. (See AR 210-20.[21])

e. Prepare a list of all structures. (See Section 2-2-3, "Building Information Schedule," AR 210-20.)

f. Become familiar with personnel on the installation capable of assisting in the survey and knowledgeable about the resources in the community (Annex 2).

g. Contact a competent archaeologist (usually at an area university) and request information regarding known or potential archaeological sites on the installation. If archaeological field surveys are to be undertaken, application for a permit under the Historic Sites Act must be made. (See AR 405-80.[22])

2. Following the identification of potential historic properties and preparation of historical papers, perform a reconnaissance. The purpose of the reconnaissance is to identify properties to be included in the study. The reconnaissance team, which should include someone qualified to recognize architectural and aesthetic features, should perform the following tasks:

a. Locate and mark on the General Site Map in the Basic Information Map Series all property 50 or more years old (AR 210-20). Add all known or suspected archaeological sites. If specific archaeologically

[21] *Analysis of Existing Faculties*, AR 210-20 (Department of the Army, 26 January 1976).

[22] *Granting Use of Real Estate*, AR 405-80 (Department of the Army, 9 August 1965).

significant areas are not known at this time, indicate the general area, if any, where they are believed to be located.

b. Make a tour of the installation and note on the map the location of sites and structures that appear to be of a historic nature according to the Survey Criteria (Section 3.3, TM 5-801-1).

c. Note on the map the environment of historic properties, the location of archaeological sites (or potential archaeological sites), natural features (important trees, vistas, open space), landscaping, benches, lighting fixtures, and sidewalk and street paving that may contribute to the historic character of the installation.

d. Take photographs of each historic property. Be sure there is at least one view of the front, main facade, or most important part of the property. Additional photographs may be needed to record the appearance of the property and its significant parts or areas.

3. Perform analysis. The analysis phase of the survey consists of recording information necessary to make a *decision about the historic significance* of each surveyed property. There are two basic steps in carrying out this task:

a. From the reconnaissance information, *prepare a list of historic properties* on the installation. This list should include all historic districts, buildings, structures, objects, and sites, including archaeological or potential archaeological sites that may have any historic, architectural, aesthetic, visual, or prehistoric value.

b. Complete an *Inventory of Historic Property Form* for each property (Annex 1). In the case of districts or groups of objects, one form should be completed for each property; then a separate form should be completed describing the district or group in which the property should be evaluated. This form then becomes the cover to which forms for each individual property are attached.

4. Implement Preservation Procedures. Preservation requires prompt action to insure that sites and/or structures are not compromised.

a. Declare all known and potential archaeological sites *off limits to intensive activities.* Monitor maintenance practice for historic properties to insure freedom from damage or destruction.

b. Integrate historic preservation projects as an integral part of the installation construction and operations and maintenance programs.

c. Apply adaptive uses for historic properties in order to maintain them as usable structures on the installation.

See p 154 for a discussion of how, when, and where this information is used in the context of an EIA/EIS.

Prime and Unique Farmland Analysis

Major concern has emerged from several responsible Federal agencies regarding the identification and preservation of prime and unique agricultural lands. The Department of Agriculture in a June 1976[23] policy memorandum stated that "major consideration must be given to prime lands and the long range need to retain the productive capability and environmental values of American agriculture and forestry." This policy will be implemented through the EIA/EIS review process of major Federal activities.

The Council on Environmental Quality (CEQ) in August 1976 issued a memorandum entitled, "Analysis of Impact on Prime and Unique Farmland in Environmental Impact Statements,"[24] for heads of all Federal agencies. This memorandum interprets that the Federal policy of "preserving aspects of our national heritage and maintaining, wherever possible, an environment which supports diversity and variety of individual choice," as stated in the National Environmental Policy Act, paragraph 101 (B) (4), will also include "highly productive farmlands." CEQ further stressed that within the EIA/EIS process, direct threats to land through construction as well as induced change in land use must be discussed.

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[23] *Statement on Prime Farmland, Range and Forest Land*, Secretary's Memorandum No. 1827, Supplement 1 (U.S. Department of Agriculture, June 21, 1976).

[24] *Analysis of Impacts on Prime and Unique Farmland in Environmental Impact Statements*, Memorandum for Heads of Agencies (U.S. Council on Environmental Quality, August 30, 1976).

The overall procedure for assessing the impacts of an Army action on prime and unique farmlands can be found in Figure D2. If an inventory and map of prime and unique farmlands has not been made, obtain this information from the state/local United States Department of Agriculture (USDA) office and from the state office of the U.S. Soil Conservation Service (SCS). The point of contact for the state SCS can be found in Annex 3. These agencies were specifically recommended in the memorandum cited above as those tasked with supplying such information.

If the user identifies that prime and unique farmlands exist in the vicinity of the installation or the Army action being assessed, the EIA/EIS should address *threats to the continued use* and viability of these farmlands not only from *direct* construction activities, but also from *urbanization* or other changes in land use that might be induced by the Federal action.[25]

Coordination

In order to effectively determine the significance of environmental impact of Army actions on Archaeological/Historical sites, structures, and objects as well as on Prime and Unique Farmlands, coordination with Federal, state, and local agencies is both necessary and mandatory (AR 200-1, para. 8-4). Army policy requires that whatever Army actions affect archaeological/historical features, coordination be initiated with the following agencies:

1. State Historic Preservation Officer (SHPO) (see Annex 4)
2. Secretary of the Interior
3. Advisory Council on Historic Preservation
4. The National Trust for Historic Preservation
5. Smithsonian Institution

On actions affecting prime and unique farmlands, consult the state office of the Soil Conservation Service early in the assessment process.

An excellent source to assist coordination during the early development of an EIA/EIS is the *Compendium of Administrators of Land Use and Related Programs*, Technical Report N-40, Construction Engineering Research Laboratory, June 1978. Through proper coordination, opportunities exist within the EIA/EIS process for contacts and communication with several levels of government. These opportunities may (1) ultimately develop a better project through conflict avoidance; (2) discover a less expensive means (in terms of both time and money) to conduct an analysis; and (3) expedite and enhance compliance with numerous laws.

A discussion of how to address impacts on prime and unique farmlands and A/H sites is addressed in the following section.

Addressing Impacts on A/H Sites and Prime and Unique Farmlands in an EIA/EIS

An EIA/EIS is not a separate entity or concept but rather should be an integral part of the decision-making process. The objective in preparing the EIA/EIS in this context is to document possible effects of changing land uses *before* the change is made.

[25]Council on Environmental Quality, Interagency Memorandum, August 30, 1976.

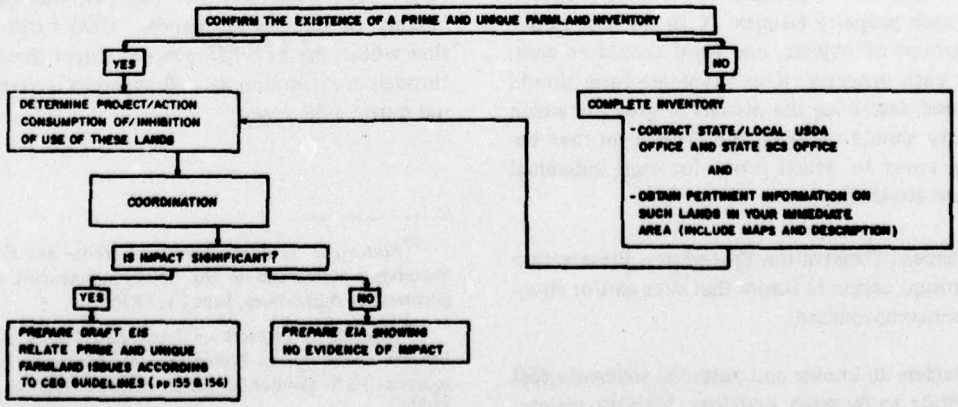

Figure D2. Prime and unique farmland analysis.

To satisfy this process, the EIA/EIS should be prepared concurrently with the planning process. If the planning process requires two principal steps–identification of the present conditions, and identification or development of feasible project alternatives–the logical point for preparing an EIS is immediately after completion of these two steps but before a decision is made to select a specific alternative. If done in this sequence, an EIS can become a planning tool rather than a position justification document.

The final paragraphs of this section will discuss how and where to include information on A/H sites and prime and unique farmlands according to the current guidelines in AR 200-1 (14 Nov. 1975). Hereafter, A/H sites and prime and unique farmlands will be referred to as "sites."

Environmental Setting and Description of the Action

Maps showing the environment under consideration should include all existing and proposed sites, and should be entered in the environmental setting, with a general discussion of their significance. Background information discussing the details of the significance of each site in question should be appended to the document.

Describe clearly in the proposed action how its various activities will modify or change the sites in question. Also, show on maps where the action will occur in relationship to the sites.

Land Use Relationships

Discuss whether the action will conform or conflict with existing or proposed plans to control access by civilians and military personnel to such sites. Have any of the known and potential sites been declared off limits to intensive activities? Will the activity occur on or inhibit the use of designated prime and unique farmlands for farming purposes, or modify their intended use in any way? Summarize this section with a paragraph explaining how the action can be reconciled in light of the land use conflicts described.

Probable Impacts of the Proposed Action

Describe both beneficial and detrimental aspects of the proposed changes to the sites. To what extent will any of the lands and sites in question be consumed by the action (e.g., construction activities)? Will the activity restrict site access and/or aesthetic or cultural appreciation of the site? For example, a training activity might inhibit use of site access roads by the public.

If the activity in question might cause secondary effects such as population and industrial growth, might such induced changes have an effect on the site? For example, might the activity induce a built-up area which will eventually surround a historic monument, site, or park, or might the secondary activities eventually consume or cause the destruction of the sites?

Alternatives to the Proposed Action

Discuss what other alternative actions would have less effect than the preferred action on the sites. USDA urges all agencies to adopt the policy that Federal activities should take prime agricultural land only when there are no suitable alternate areas to conduct the activity, and when the action is in response to an overriding public need. This policy position is also recommended for A/H sites, or in addition to any significantly impacted environmental factor.

Probable Adverse Environmental Effects Which Cannot be Avoided

Impacts of a consumptive or irreversible nature should be discussed in this category. If major, permanent construction takes place on an archaeological site or on prime and unique farmlands, this is an unavoidable impact. If a historic graveyard will be disturbed during construction or sited in a target area for heavy weapons, this is also an unavoidable impact.

A complete discussion of how avoidable impacts will be mitigated should also be included in this section. Several examples follow:

1. Discuss plans to move a historic monument or structure to a new location.

2. Tell how the architecture of a new construction project will conform with the architecture of the historic buildings in the vicinity.

3. Could plans be developed to construct a high-rise hospital rather than a highly land-consumptive, sprawling, single-story complex on highly valued farmlands?

Relationship Between Local Short-Term Uses of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

Total destruction of a historic or archaeological site or an irreversible commitment of a vast amount of farmland to construction of airfield pavements, roads, etc., definitely qualifies as a long-term loss. Also included in this category are restrictions on visitations of such sites and the ability of visitors to aesthetically

appreciate these areas as opposed to the built-up environment created directly or indirectly by the proposed action. Can the proposed action be justified against such losses on a long-term basis?

Irreversible and Irretrievable Commitments of Resources

Clearly, cultural, historic, and archaeological sites and prime and unique farmlands would rank high on a priority list of natural and cultural resources. In this section, the potential impact should be put in perspective. For example, will the Army consume the last 4000 acres of prime farmlands in the region; or will they be constructing an airfield pavement over the last remaining Indian burial grounds of a particular tribe?

In summary, this point is perhaps the most applicable and important section of the EIA/EIS to the considerations discussed herein. Therefore, a complete, in-depth discussion of such issues is of paramount importance to an adequate Environmental Impact Statement.

ANNEX 1:
DEPARTMENT OF THE ARMY FORMS REQUIRED IN THE EVALUATION AND INVENTORY OF A/H PROPERTIES

Historic Property: _____

Installation: _____

Researcher: _____ Date: _____

DEPARTMENT OF THE ARMY
MANUSCRIPT FORM

Use to abstract or record information from any (circle appropriate type) manuscript, paper, report, or other unpublished document. Not intended for abstracting legal instruments.

Title (or description): _____

_____

Author: _____

Date(s): _____

Type of document (e.g. official Army report, letter, memorandum, diary, etc.):

_____

Original: _____ Photocopy (e.g. microfilm): _____

Location: _____

Call No. (or Accession or Reference No.): _____

Abstract of information pertinent to historic property:

Page or Item No. Summary Notes

DA FORM 4451-R, 1 Dec 1975

DEPARTMENT OF THE ARMY
INVENTORY OF HISTORIC PROPERTY FORM

I. IDENTIFICATION

Name of Installation: _____ Historic Property: _____

Date: _____

Surveyed by: _____
Name

_____

_____
Rank

Office: _____

_____

_____

Address: _____

_____

_____

Telephone: _____

Photograph
Date: _____ Orientation: _____ Photographer: _____

II. HISTORIC PROPERTY

A. Name: _____
(common)

_____
(historic)

B. Location: _____
Bldg. No. street no. street installation city, county, state

C. Category: building _____, structure _____, object _____, site _____, district _____, archeol. _____

D. Present Use: _____

E. Accessible to the Public? Yes ____, No ____, Restricted ____, Explain _____

III. DESCRIPTION OF DISTRICT (historic or industrial) To be attached as cover to forms for individual properties within District.

A. Date of construction of major areas: _____

B. Acreage and dimensions: _____ units: _____

C. Boundaries: _____

D. Number and general arrangement of buildings, structures, open spaces and objects:

_____

_____

_____

DA FORM 4452-R, 1 Dec 1975

IV. DESCRIPTION OF BUILDING, STRUCTURE, OR OBJECT

A. Date of construction: _____ Original Use: _____

B. Alterations (list by date): _____

C. Condition: good ___, fair ___, deteriorated ___, other ___

D. Dimensions _____ (front) _____ side) architect/builder _____

E. Building material: _____ structural system: _____

F. Original Site? _____ moved? _____ when? _____

G. Description: _____

V. DESCRIPTION OF HISTORIC SITE OR ARCHEOLOGICAL SITE

A. Acreage or appropriate dimensions: _____

B. Date of events associated with site: _____

C. *Surface evidence of site*: *(check all appropriate descriptions and explain, if necessary, in Section VI).*

___ no visible evidence ___ ruins ___ surface traces visible
___ under cultivation ___ cellar hole ___ underwater
___ eroded ___ walls ___ other, explain in Section VI

D. Sources of Information: _____

_____ License or permit granted? _____ date _____
___ infra-red aerial photos, date _____, elevation _____ photographer _____
___ surface hunting date _____, by whom _____
___ testing date _____, by whom _____
___ excavation date _____, by whom _____
___ none. ___ other, explain _____

E. Present repository of excavated or salvaged materials: _____

VI. OTHER INFORMATION (Describe present condition, historical background, significance)

_____

VII. SOURCES OF INFORMATION (Attach research forms, if used)

_____

DA FORM 4452-R, 1 Dec 1975

DEPARTMENT OF THE ARMY
EVALUATION OF HISTORIC PROPERTY FORM

I. IDENTIFICATION

Name of Installation: _____ Historic Property: _____

Office: _____

Address: _____ Telephone: _____

Name of Historic Property: _____

Location: _____
bldg no street no street installation, city, county, state

II. BRIEF STATEMENT OF SIGNIFICANCE (describe those aspects of the historic property that are the most significant).

_____

_____

_____

_____

III. EVALUATION

A. _____ Category I B. _____ Category I' C _____ Category III D. _____ Category IV

IV. RELATIONSHIP TO INSTALLATION MASTER PLAN

A. Shown in Master Plan? Yes _____ No

B. Plan indicates:

_____ retention _____ relocation, where? _____

_____ restoration _____ salvage archeology, by whom? _____

_____ rehabilitation _____ demolition, why? _____

_____ preservation _____ new use, what? _____

C. If irreversible changes are planned, has Modification Form been filed? Yes _____ No
Or other documentation procedure? If so, describe:

_____

_____

_____

DA FORM 4453-R, 1 Dec 1975

V. NATIONAL REGISTER OF HISTORIC PLACES

A. Nominate to Register? Yes _____ No _____

B. If yes, complete the following:

1. _____ NR forms completed, date _____

2. _____ NR form submitted to SHPO, date _____

3. _____ NR form submitted to HQDA (DAEN-MCZ-E) Wash, D.C. 20314, date _____

4. _____ Notification property accepted for National Register, date _____

5. _____ Printed in Federal Register, date _____, vol. _____, no. _____, part _____

C. If no, describe action to be taken and review process: _____

VI. HISTORIC PROPERTY MODIFICATIONS (All Modification Forms shall be attached hereto)

A. Modification: _____

Date of Review: _____ Approved? Yes _____ No _____

B. Modification: _____

Date of Review: _____ Approved? Yes _____ No _____

C. Modification: _____

Date of Review: _____ Approved? Yes _____ No _____

VII. MEMBERS OF HISTORIC PRESERVATION COMMITTEE

	Voting		Nonvoting
Chairman:	_____	SHPO:	_____
	_____		_____
	_____		_____
	_____		_____
	_____		_____
	_____		_____

VIII. EVALUATION FORM PREPARED BY: _____

IX. SIGNATURE OF HISTORIC PRESERVATION COMMITTEE CHAIRMAN:

_____ Date: _____

DA FORM 4453-R, 1 Dec 1975

ANNEX 2:
A/H INFORMATION SOURCES

Personnel Resources on the Installation

1. The Army Historical Officer - should be able to assist in the location of background information about the installation. In addition, assistance should be sought from the Staff Historian of the appropriate major command of the Center of Military History in undertaking research on the history of the installation and on individual historic properties.

2. The Museum Curator - is charged with developing and preserving historical monuments and sites of the installation. The Curator can assist in the acquisition of background information, the selection of historic properties to be inventoried, and the research on individual properties.

3. The Public Information Officer - can assist in the location of pamphlets and descriptive information about historic sites on the installation.

Personnel Resources Off the Installation

Assistance may be requested from sources off the installation. In many cases, the installation can contract with an architectural historian, archaeologist, or historian for specific assignments. Assistance may also be requested from the offices listed below:

1. State Historic Preservation Officer (SHPO). The SHPO for each state shall be informed of all preservation activity[26] in order to advise the installation of the location of appropriate resources. Although the SHPO usually has a small staff, he/she can advise the installation on basic survey procedures. Also, the SHPO may help to determine if other types of assistance are needed and may suggest experts or groups in the area who might be able to assist in the survey.

2. National Trust for Historic Preservation, Department of Field Services. The Trust has a file of consultants in historic preservation with different areas of expertise who are available to undertake contract jobs. In addition, they have publications that may offer guidance on specific types of historic research and documentation.

3. The Department of the Interior's Office of Archaeology and Historic Preservation (OAHP) can offer consultation, procedures, and information on competent professionals in specialized fields. Their services should be particularly helpful in documenting an archaeological site.

State archives house all public documents considered historic and in most states have professional staffs that include historians.

5. State historical societies, usually private groups, often have historians working on their staffs or using their facilities.

6. Local and regional historical societies and historic preservation groups.

7. Colleges, universities, or other institutions of higher education and research may have staff or students with expertise in architectural history, historical research, archaeology, and other skills needed to undertake a survey of historic properties.

8. Individuals known to have an interest in the history of the installation or in that aspect of the history of the military in which the installation played its most significant historic role.

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[26] *Historical Preservation: Administrative Procedures*, TM 5-801-1 (Department of the Army, November 1975), Section 3-2.

ANNEX 3:
U.S. SOIL CONSERVATION SERVICE–STATE OFFICES

Wright Building
138 South Gay St.
P. O. Box 311
ALABAMA, Auburn 36830
Phone: 534-4535 (FTS)
205-821-8070 (CML)

204 East Fifth Avenue
Room 217
ALASKA, Anchorage 99501
Phone: 907-274-7626
(FTS & CML)

230 N. 1st Avenue
6029 Federal Building
ARIZONA, Phoenix 85025
Phone: 602-261-3271
(FTS & CML)

Federal Building, Rm. 5029
700 West Capitol St.
P. O. Box 2323
ARKANSAS, Little Rock 72203
Phone: 740-5445 (FTS)
501-378-5445 (CML)

2828 Chiles Road
CALIFORNIA, Davis 95616
Phone: 916-758-2200 ext. 210
(FTS & CML)

Room 313
2490 West 26th Ave.
P. O. Box 17107
COLORADO, Denver 80217
Phone: 327-4275 (FTS)
303-837-3947 (CML)

Mansfield Professional Park
Route 44A
CONNECTICUT, Storrs 06268
Phone: 244-2547/2548 (FTS)
203-429-9361/9362 (CML)

Treadway Towers, Suite 2-4
9 East Loockerman St.
DELAWARE, Dover 19901
Phone: 487-5148 (FTS)
302-678-0750 (CML)

Federal Building
P. O. Box 1208
FLORIDA, Gainesville 32601
Phone: 946-3871 ext. 100 (FTS)
904-377-8732 (CML)

Federal Building
355 E. Hancock Avenue
P. O. Box 832
GEORGIA, Athens 30601
Phone: 289-2275 (FTS)
404-546-2273 (CML)

P. O. Box 50004
HAWAII, Honolulu 96813
Phone: 808-546-3165 (FTS & CML)

Room 345
304 North 8th St.
IDAHO, Boise 83702
Phone: 588-2601 (FTS)
208-342-2711 ext. 2601 (CML)

Federal Building
200 W. Church St.
P. O. Box 678
ILLINOIS, Champaign 61820
Phone: 958-9147/9125 (FTS)
217-356-3785 (CML)

Atkinson Square-West
Suite 2200
5610 Crawfordsville Road
INDIANA, Indianapolis 46224
Phone: 331-6515 (FTS)
317-269-6515 (CML)

823 Federal Building
210 Walnut St.
IOWA, Des Moines 50309
Phone: 515-284-4260 (FTS & CML)

760 South Broadway
P. O. Box 600
KANSAS, Salina 67401
Phone: 752-9728 (FTS)
913-825-9535 (CML)

333 Waller Avenue
KENTUCKY, Lexington 40504
Phone: 355-2749 (FTS)
606-233-2749 ext. 2749 (CML)

3737 Government St.
P. O. Box 1630
LOUISIANA, Alexandria 71301
Phone: 497-6611 ext. 233 (FTS)
318-448-3421 (CML)

USDA Building
University of Maine
MAINE, Orono 04473
Phone: 833-7393 (FTS)
207-866-2132/2133 (CML)

Rm. 522, Hartwick Building
4321 Hartwick Road
MARYLAND, College Park 20740
Phone: 301-344-4180 (FTS & CML)

29 Cottage St.
MASSACHUSETTS, Amherst 01002
Phone: 413-549-0650 (FTS & CML)

1405 Harrison Road
MICHIGAN, East Lansing 48823
Phone: 374-4242 (FTS)
517-372-1910 ext. 242 (CML)

200 Federal Bldg. & US Courthouse
316 North Robert St.
MINNESOTA, St. Paul 55101
Phone: 612-725-7675 (FTS & CML)

Milner Building, Rm. 590
P. O. Box 610
MISSISSIPPI, Jackson 39205
Phone: 490-4335 (FTS)
601-969-4330 (CML)

Parkade Plaza Shopping Center
555 Vandiver Dr.
MISSOURI, Columbia 65201
Phone: 276-3145 (FTS)
314-442-2271 ext. 3145 (CML)

Federal Building
P. O. Box 970
MONTANA, Bozeman 59715
Phone: 585-4322 (FTS)
406-587-5271 ext. 4322 (CML)

Federal Bldg. - U.S. Courthouse
100 Centennial Mall, North
NEBRASKA, Lincoln 68508
Phone: 867-5301 (FTS)
402-471-5301 (CML)

U. S. Post Office Building
P. O. Box 4850
NEVADA, Reno 89505
Phone: 598-5304 (FTS)
702-784-5304 (CML)

Federal Building
NEW HAMPSHIRE, Durham 03824
Phone: 834-0505 (FTS)
603-868-7581 (CML)

1370 Hamilton St.
P. O. Box 219
NEW JERSEY, Somerset 08873
Phone: 342-5225 (FTS)
201-246-1205 ext. 20 (CML)

517 Gold Avenue, SW
P. O. Box 2007
NEW MEXICO, Albuquerque 87103
Phone: 474-2173 (FTS)
505-766-3277 (CML)

Midtown Plaza - Room 400
700 East Water Street
NEW YORK, Syracuse 13210
Phone: 950-5493 (FTS)
315-423-5493 (CML)

Federal Office Building
Fifth Floor - P. O. Box 27307
NORTH CAROLINA, Raleigh 27611
Phone: 672-4210 (FTS)
919-755-4210 (CML)

Federal Building
P. O. Box 1458
NORTH DAKOTA, Bismarck 58501
Phone: 783-4421 (FTS)
701-255-4011 ext. 421 (CML)

311 Old Federal Building
3rd & State Streets
OHIO, Columbus 43215
Phone: 943-6962 (FTS)
614-469-6962 (CML)

Agriculture Building
Farm Road & Brumley St.
OKLAHOMA, Stillwater 74074
Phone: 743-4204 (FTS)
405-624-4360 (CML)

Washington Building
1220 S. W. Washington St.
OREGON, Portland 77204
Phone: 423-2751 (FTS)
503-221-2751 (CML)

Federal Bldg. & Courthouse
Box 985 Federal Square Station
PENNSYLVANIA, Harrisburg 17108
Phone: 590-2297 (FTS)
717-782-4403 (CML)

Caribbean Area
1409 Ponce de Leon Ave. STOP 20
PUERTO RICO, Santurce 00907
Mailing Address: GPO Box 4868
PUERTO RICO, San Juan 00936
Phone: 809-725-8966 (FTS & CML)

222 Quaker Lane
RHODE ISLAND, West Warwick 02893
Phone: 401-828-1300 (FTS & CML)

Federal Building
901 Sumter St.
SOUTH CAROLINA, Columbia 29201
Phone: 677-5681 (FTS)
803-765-5681 (CML)

Federal Building
P. O. Box 1357
SOUTH DAKOTA, Huron 57350
Phone: 782-2333 (FTS)
605-352-6851 (CML)

561 U.S. Courthouse
TENNESSEE, Nashville 37203
Phone: 852-5471 (FTS)
615-251-5471 (CML)

16-20 South Main St.
P. O. Box 648
TEXAS, Temple 76501
Phone: 736-1214 (FTS)
817-773-1711 ext. 214 (CML)

4012 Federal Building
125 South State Street
UTAH, Salt Lake City 84138
Phone: 588-5050 (FTS)
801-524-5051 (CML)

Burlington Square, Suite 205
VERMONT, Burlington 05401
Phone: 832-6501 (FTS)
802-862-6501 ext. 6261 (CML)

Federal Bldg., Room 9201
400 N. 8th Street
P. O. Box 10026
VIRGINIA, Richmond 23240
Phone: 925-2457 (FTS)
804-782-2457 (CML)

360 U. S. Courthouse
W. 920 Riverside Avenue
WASHINGTON, Spokane 99201
Phone: 439-3711 (FTS)
509-456-3711 (CML)

75 High Street
P. O. Box 865
WEST VIRGINIA, Morgantown 26505
Phone: 923-7151 (FTS)
304-599-7151 (CML)

4601 Hammersley Road
P. O. Box 4248
WISCONSIN, Madison 53711
Phone: 364-5351 (FTS)
608-252-5351 (CML)

Federal Office Building
P. O. Box 2440
WYOMING, Casper 82602
Phone: 307-265-5550 ext. 5220 (CML)

ANNEX 4: STATE HISTORIC PRESERVATION OFFICERS

ALABAMA

Mr. Mile P. Howard, Jr.
Director, Alabama Department of Archives and History
Chairman, Alabama Historical Commission
Archives and History Building 36104

205-332-6510

ALASKA

Mr. Russell W. Cahill
Director, Alaska Division of Parks
619 Warehouse Avenue, Suite 210
Anchorage, Alaska 99501
206-583-0150 (ask for Anchorage–274-4676)

AMERICAN SAMOA

Mr. Ed Klein
Territorial Historic Preservation Officer
Department of Public Works
Government of American Samoa
Pago Pago, American Samoa 96799

ARIZONA

Ms. Dorothy H. Hall
Chief, Natural and Cultural Resource Conservation Section
Arizona State Parks
1688 West Adams
Phoenix, Arizona 85007

602-271-4174

ARKANSAS

Ms. Anne Bartley
Acting Director, Arkansas Historical Preservation Program
Suite 500, Continental Building
Markham and Main Streets
Little Rock, Arkansas 72201

501-371-1639

CALIFORNIA

Mr. Herbert Rhodes
Director, Department of Parks and Recreation
State Resources Agency
P. O. Box 2390
Sacramento, California 95811

916-445-2358

COLORADO

Mr. Stephen H. Hart
Chairman, State Historic Society
Colorado State Museum
200 - 14th Avenue
Denver, Colorado 80203

303-892-2136

CONNECTICUT

Mr. John W. Shannahan
Director, Connecticut Historical Commission
59 South Prospect Street
Hartford, Connecticut 06106

203-566-3005

DELAWARE

Mr. Lawrence C. Henry
Director, Division of Historical and Cultural Affairs
Hall of Records
Dover, Delaware 19901

302-678-5314

DISTRICT OF COLUMBIA

Mr. Lorenzo W. Jacobs, Jr.
Director, Department of Housing and Community Development
1325 G Street, NW
Washington, DC 20005

202-629-5033

FLORIDA

Mr. W. Robert Williams
Director, Division of Archives History
and Records Management
Department of State
401 East Gaines Street
Tallahassee, Florida 32304

904-488-1480

GEORGIA

Mr. David M. Sherman
Chief, Historic Preservation Section
Department of Natural Resources
270 Washington Street SW, Room 703 C
Atlanta, Georgia 30334

404-656-2840

GUAM

Mr. Robert G. P. Cruz
Director, Department of Parks and
Recreation
Government of Guam
P. O. Box 682
Agana, Guam 96910

(Overseas Operator - 646-1261)

HAWAII

Ms. Jane L. Silverman
State Historic Preservation Officer
Department of Land and Natural Resources
P. O. Box 682
Honolulu, Hawaii 96809

Ask for Honolulu 584-2211

IDAHO

Dr. Merle W. Wells
Historic Preservation Coordinator
Idaho State Historical Society
610 North Julia Davis Drive
Boise, Idaho 83706

308-384-2120

ILLINOIS

Mr. David Kenney
Director, Department of Conservation
602 State Office Building
400 South Spring Street
Springfield, Illinois 62706

217-782-6802

INDIANA

Mr. Joseph D. Cloud
Director, Department of Natural Resources
608 State Office Building
Indianapolis, Indiana 46204

317-633-6344

Mr. Reid Williamson
Historic Landmarks Foundation of Indiana
3402 Boulevard Place
Indianapolis, Indiana 46204

IOWA

Mr. Adrian Anderson
Director, State Historical Development
Division of Historic Preservation
B-13 MacLean Hall
Iowa City, Iowa 52242

319-353-6949

KANSAS

Mr. Nyle H. Miller
Executive Director, Kansas State
Historical Society
120 West 10th Street
Topeka, Kansas 66612

913-296-3251

KENTUCKY

Ms. Eldred W. Melton
Director, Kentucky Heritage Commission
104 Bridge Street
Frankfort, Kentucky 40601

502-564-4476

LOUISIANA

Ms. Sandra S. Thompson
Secretary, Department of Culture,
Recreation and Tourism
P. O. Box 44361
Baton Rouge, Louisiana 70804

504-389-5086

MAINE

Mr. Earle G. Shettleworth, Jr.
Director, Maine Historic Preservation
Commission
31 Western Avenue
Augusta, Maine 04330

207-289-2133

MARYLAND

Mr. John N. Pearce
State Historic Preservation Officer
The John Shaw House
21 State Circle
Annapolis, Maryland 21401

301-269-2440

MASSACHUSETTS

Ms. Elizabeth R. Amadon
Executive Director, Massachusetts
Historical Commission
294 Washington Street
Boston, Massachusetts 02108

617-727-8470

MICHIGAN

Dr. Martha M. Bigelow
Director, Michigan History Division
Department of State
Lansing, Michigan 48918

517-373-0510

MINNESOTA

Mr. Russell W. Fridley
Director, Minnesota Historical Society
690 Cedar Street
St. Paul, Minnesota 55101

612-296-2747

MISSISSIPPI

Mr. Filbert Milliard
Director, State of Mississippi
Department of Archives and History
P. O. Box 571
Jackson, Mississippi 39205

601-354-6218

MISSOURI

Mr. James L. Wilson
Director, Missouri Department of
Natural Resources
P. O. Box 176
1204 Jefferson Building
Jefferson City, Missouri 65101

314-751-4422

MONTANA

Mr. Kenneth L. Korte
Director, Montana Historical Society
225 North Roberts Street
Veterans' Memorial Building
Helena, Montana 59601

406-449-2535

NEBRASKA

Mr. Marvin F. Kivett
Director, The Nebraska State
Historical Society
1500 R Street
Lincoln, Nebraska 68508

402-432-2793

NEVADA

Mr. John L. Meder
Administrator, Division of State Parks
Room 221 Nye Building
Capitol Complex
Carson City, Nevada 89710

702-885-4370

NEW HAMPSHIRE

Mr. George Gilman
Commissioner, Department of Resources
and Economic Development
P. O. Box 856
Concord, New Hampshire 03301

603-271-2411

NEW JERSEY

Mr. David M. Bardin
Commissioner, Department of
Environmental Protection
P. O. Box 1420
Trenton, New Jersey 08625

609-292-2885

NEW MEXICO

Mr. Thomas W. Merlan
State Planning Office
505 Don Gaspar
Santa Fe, New Mexico 87503

505-827-2974

NEW YORK

Mr. Orin Lehman
Commissioner, Parks and Recreation
Agency Building #1
Empire State Plaza
Albany, New York 12238

518-474-0468

NORTH CAROLINA

Dr. Larry F. Tise
Director, Division of Archives and
History
State Historic Preservation Officer
Department of Cultural Resources
109 East Jones Street
Raleigh, North Carolina 27611

919-829-7305

NORTH DAKOTA

Mr. James E. Sperry
Superintendent, State Historical
Society of North Dakota
Liberty Memorial Building
Bismarck, North Dakota 58501

701-224-2667

OHIO

Dr. Thomas R. Smith
Director, The Ohio Historical Society
Interstate 71 at 17th Avenue
Columbus, Ohio 43211

614-466-3852

OKLAHOMA

Mr. George H. Shirk
State Historic Preservation Officer
1108 Colcord Building
Oklahoma City, Oklahoma 73105

405-236-3571

OREGON

Mr. David G. Talbot
State Parks and Recreation
525 Trade Street, SE
Salem, Oregon 97310

503-378-6305

PENNSYLVANIA

Mr. William J. Wewer
Executive Director, Pennsylvania
Historical and Museum Commission
Box 1026
Harrisburg, Pennsylvania 17120

712-787-2981

COMMONWEALTH OF PUERTO RICO

Mr. Luis Rodriguez-Morales
Institute of Puerto Rico Culture
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San Juan, Puerto Rico 00905

Commercial: 9-809-723-2115-Ext-232

RHODE ISLAND

Mr. Frederick C. Williamson
Director, Rhode Island Department of
Community Affairs
150 Washington Street
Providence, Rhode Island 02903

401-277-2850

SOUTH CAROLINA

Mr. Charles Lee
Director, State Archives Department
1430 Senate Street
Columbia, South Carolina 29211

803-758-5816

SOUTH DAKOTA

Mr. John J. Little
Historical Preservation Center
University of South Dakota-Alumni House
Vermillion, South Dakota 57069

605-677-5314

TENNESSEE

Mr. Herbert L. Harper
Executive Director, Tennessee
Historical Commission
170 Second Avenue North, Suite 100
Nashville, Tennessee 37201

615-741-2371

TEXAS

Mr. Truett Latimer
Executive Director
Texas Historical Commission
P. O. Box 12276, Capitol Station
Austin, Texas 78711

512-475-3092

TRUST TERRITORY OF THE PACIFIC ISLANDS

Mr. Neil Chase
Chief, Land Resources Branch
Department of Resources and Development
Trust Territory of the Pacific Islands
Saipan, Mariana Islands 96950

UTAH

Mr. Michael T. Miller
Executive Director, Department of
Development Services, Room 104
State Capitol
Salt Lake City, Utah 84114

801-533-5961

VERMONT

Mr. William B. Pinney
Director, Vermont Division of
Historic Preservation
Pavilion Office Building
Montpelier, Vermont 05602

802-828-3226

VIRGINIA

Dr. Junius R. Fishburne, Jr.
Executive Director, Virginia Historic
Landmarks Commissioner
221 Governor Street
Richmond, Virginia 23219

804-786-3143

VIRGIN ISLANDS

Mr. Thomas Blake
Planning Director, Virgin Islands
Planning Board
Charlotte Amalie
St. Thomas, Virgin Islands 00801

Commercial: 9-809-774-1726

WASHINGTON

Ms. Jeanne M. Welch
Acting Conservator
P. O. Box 1128
Olympia, Washington 98504

206-753-4011

WEST VIRGINIA

Dr. Leonard M. Davis
West Virginia Antiquities Commission
P. O. Box 630
Morgantown, West Virginia 26505

304-296-1791

WISCONSIN

Mr. Richard A. Erney
Acting Director, State Historical
Society of Wisconsin
816 State Street
Madison, Wisconsin 53706

608-262-9504

WYOMING

Mr. Paul H. Westedt
Director, Wyoming Recreation Commission
604 East 25th Street, Box 309
Cheyenne, Wyoming 82001

307-777-7695

NATIONAL TRUST FOR HISTORIC PRESERVATION

Mr. James Biddle
President, National Trust for
Historic Preservation
740 Jackson Place NW
Washington, DC 20006

202-638-5200

GLOSSARY

attribute – Characteristic or variable of the environment.

BAAP – Basic activity associated with implementation of an Army program. There are approximately 2000 BAAPs in EICS.

controversial attributes – Attributes that, when impacted by an Army activity, are likely to cause adverse public reaction or controversy. These attributes may or may not be environmentally significant.

cumulative (aggregate) impacts – The total environmental impacts resulting from different Army activities or repetition of an activity from one or more projects.

detailed-level attributes – Finest level of attribute separation within a Technical Specialty area, e.g., "Food Webs," "Small Mammals." There are approximately 500 detailed attributes in the EICS.

direct (primary) impacts – The net chain of impacts that follow from an activity. Two sources of impacts are distinguished for EICS:

first-order impacts – Changes in environmental attributes that follow directly from an activity (e.g., dredging a stream impacts aquatic life). This is the basic type of impact scored in the EICS matrix.

higher-order (interactive) impacts – The effect one impacted attribute has on other attributes (e.g., an impact on aquatic life can cause odors). Interactive impacts may now be identified in the EICS matrix and Ramification Remarks when they are considered important facets of BAAP/environment interaction. In the future interactive impacts will be separately identified.

EIA or EIS – Environmental Impact Assessment or Environmental Impact Statement.

EICS – Environmental Impact Computer System.

environmental impact – Change, either negative or positive, in an environmental attribute caused by an Army activity.

Functional Areas (FAs) – Broad categorization of Army activities under which BAAPs are organized (e.g., Construction, Mission Change, Industrial). There are nine FAs in the EICS.

indirect (secondary) impacts – Changes in the environment that result from induced activities. The activity can be induced either by the original activity (e.g., a new housing complex creates a need for support services, which in turn cause a secondary impact of air pollution) or by an impacted attribute (e.g., a new housing complex impacts water quality, which induces construction of a treatment plant that then impacts the natural environment). The current EICS matrix identifies direct impacts of either direct or induced *activities*, but the chains of induction among various activities must currently be identified by the user. Chains of induction among Army activities are being developed by CERL for future use in EICS.

mitigation – Minimization, abatement, or avoidance of environmental impacts.

Mitigation Statement – An explanation of possible strategies that can be followed to mitigate environmental impacts caused by BAAPs. Part of the EICS computer output.

Ramification Remark – An explanation of the impact of an activity (BAAP) on an attribute; part of the EICS computer output.

review-level attributes – Broad, inclusive attribute areas that give an overview of the detailed level attributes, e.g., "Pathogenic Organisms," "Rare and Endangered Species."

scores – Designations in the EICS matrix intersections which indicate the user's relative "need-to-consider" particular impacts. (Scores do *not* indicate the importance or significance of impacts; instead, they predict the *likelihood* that impacts will occur.) The scale used includes the following scores:

A = Definitely consider this factor as being impacted by the activity.

B = Possible effect, requires consideration.

C = Consider in special cases.

Blank = As far as we know, without knowing all the details of your project, you need not con-

sider this intersection; however, please check the Ramification/Mitigation texts.

Technical Specialty – Broad category of environmental attributes such as Ecology, Groundwater, etc. There are currently 13 environmental Technical Specialties.

ABBREVIATIONS

A/H – Archaeological/Historic

BAAP – Basic activity associated with implementation of an Army program

CELDS – Computer-Aided Environmental Legislative Data System

CEQ – Council on Environmental Quality

EIA – Environmental Impact Assessment

EICS – Environmental Impact Computer System

EIFS – Economic Impact Forecast System

EIS – Environmental Impact Statement

ETIS – Environmental Technical Information System

FA – (Army) Functional Area

NEPA – National Environmental Policy Act

POL – Petroleum, oil, and lubricants

PUF – Prime and unique farmlands

RDT&E – Research, Development, Test, and Evaluation

INPUT FORM NUMBER 5 – INDUSTRIAL FUNCTIONAL AREA

1. PROJECT NAME : _____
2. INSTALLATION : _____ TEL. NO. (COMM.) _____
3. RESPONDENT'S NAME: _____ AUTOVON OR FTS _____
   ADDRESS: _____ DATE _____
   _____
   _____
4. SITE NUMBER _____

5. DETAILED OR REVIEW LEVEL ?
   (CIRCLE ONE OR BOTH)

6. OUTPUT SELECTION

	INDUSTRIAL TYPE								
TECHNICAL SPECIALTIES									
ECOLOGY									
ENV. HEALTH									
AIR QUALITY									
SURFACE WATER									
GROUNDWATER									
SOCIOLOGY									
ECONOMICS									
EARTH SCIENCE									
LAND USE									
NOISE									
TRANSPORTATION									
AESTHETICS									
ENG. & RES. CONS.									
PRINT RAMIF. TEXT									
PRINT MITIG. TEXT									

7. ANSWERS TO FILTER QUESTIONS ABOUT THIS SITE:

TECHNICAL SPECIALTIES	Q-1	Q-2	Q-3	Q-4	Q-5	Q-6	Q-7	Q-8	Q-9	Q-10
ECOLOGY										
ENV. HEALTH										
AIR QUALITY										
SURFACE WATER										
GROUNDWATER										
SOCIOLOGY										
ECONOMICS										
EARTH SCIENCE										
LAND USE										
NOISE										
TRANSPORTATION										
AESTHETICS										
ENG. & RES. CONS.										

INPUT FORM NUMBER 5 — INDUSTRIAL FUNCTIONAL AREA

1. PROJECT NAME : _____
2. INSTALLATION : _____ TEL. NO. (COMM.) _____
3. RESPONDENT'S NAME: _____ AUTOVON OR FTS _____
   ADDRESS: _____ DATE _____
   _____
   _____
4. SITE NUMBER _____

5. DETAILED OR REVIEW LEVEL ?
   (CIRCLE ONE OR BOTH)

6. OUTPUT SELECTION

TECHNICAL SPECIALTIES	INDUSTRIAL TYPE								
ECOLOGY									
ENV. HEALTH									
AIR QUALITY									
SURFACE WATER									
GROUNDWATER									
SOCIOLOGY									
ECONOMICS									
EARTH SCIENCE									
LAND USE									
NOISE									
TRANSPORTATION									
AESTHETICS									
ENG. & RES. CONS.									
PRINT RAMIF. TEXT									
PRINT MITIG. TEXT									

7. ANSWERS TO FILTER QUESTIONS ABOUT THIS SITE:

TECHNICAL SPECIALTIES	Q-1	Q-2	Q-3	Q-4	Q-5	Q-6	Q-7	Q-8	Q-9	Q-10
ECOLOGY										
ENV. HEALTH										
AIR QUALITY										
SURFACE WATER										
GROUNDWATER										
SOCIOLOGY										
ECONOMICS										
EARTH SCIENCE										
LAND USE										
NOISE										
TRANSPORTATION										
AESTHETICS										
ENG. & RES. CONS.										

INPUT FORM NUMBER 5 — INDUSTRIAL FUNCTIONAL AREA

1. PROJECT NAME : _____
2. INSTALLATION : _____ TEL. NO. (COMM.) _____
3. RESPONDENT'S NAME: _____ AUTOVON OR FTS _____
   ADDRESS: _____ DATE _____
   _____
   _____
4. SITE NUMBER _____

5. DETAILED OR REVIEW LEVEL ?
   (CIRCLE ONE OR BOTH)

6. OUTPUT SELECTION

TECHNICAL SPECIALTIES	INDUSTRIAL TYPE								
ECOLOGY									
ENV. HEALTH									
AIR QUALITY									
SURFACE WATER									
GROUNDWATER									
SOCIOLOGY									
ECONOMICS									
EARTH SCIENCE									
LAND USE									
NOISE									
TRANSPORTATION									
AESTHETICS									
ENG. & RES. CONS.									
PRINT RAMIF. TEXT									
PRINT MITIG. TEXT									

7. ANSWERS TO FILTER QUESTIONS ABOUT THIS SITE:

TECHNICAL SPECIALTIES	Q-1	Q-2	Q-3	Q-4	Q-5	Q-6	Q-7	Q-8	Q-9	Q-10
ECOLOGY										
ENV. HEALTH										
AIR QUALITY										
SURFACE WATER										
GROUNDWATER										
SOCIOLOGY										
ECONOMICS										
EARTH SCIENCE										
LAND USE										
NOISE.										
TRANSPORTATION										
AESTHETICS										
ENG. & RES. CONS.										

INPUT FORM NO. 6 — PROCUREMENT FUNCTIONAL AREA

1. PROJECT NAME: _____
2. INSTALLATION: _____ TEL. NO. (COMM.) _____
3. RESPONDENT'S NAME: _____ (FTS) _____
   ADDRESS: _____ DATE _____
   _____
   _____
4. REQUEST NO. _____
5. DETAILED OR REVIEW LEVEL ? _____
6. SUBPROGRAM NO. _____

7. OUTPUT SELECTION

			ANSWERS TO FILTER QUESTIONS									
MATRIX	R-M	TECHNICAL SPECIALTIES	Q-1	Q-2	Q-3	Q-4	Q-5	Q-6	Q-7	Q-8	Q-9	Q-10
		ECOLOGY										
		ENV. HEALTH										
		AIR QUALITY										
		SURFACE WATER										
		GROUNDWATER										
		SOCIOLOGY										
		ECONOMICS										
		EARTH SCIENCE										
		LAND USE										
		NOISE										
		TRANSPORTATION										
		AESTHETICS										
		ENERGY/RES. CONS.										

INPUT FORM NO. 6 — PROCUREMENT FUNCTIONAL AREA

1. PROJECT NAME: _____
2. INSTALLATION: _____ TEL. NO. (COMM.) _____
3. RESPONDENT'S NAME: _____ (FTS) _____
   ADDRESS: _____ DATE _____
   _____
   _____
4. REQUEST NO. _____
5. DETAILED OR REVIEW LEVEL ? _____
6. SUBPROGRAM NO. _____

7. OUTPUT SELECTION

ANSWERS TO FILTER QUESTIONS

MATRIX	R-M	TECHNICAL SPECIALTIES	Q-1	Q-2	Q-3	Q-4	Q-5	Q-6	Q-7	Q-8	Q-9	Q-10
		ECOLOGY										
		ENV. HEALTH										
		AIR QUALITY										
		SURFACE WATER										
		GROUNDWATER										
		SOCIOLOGY										
		ECONOMICS										
		EARTH SCIENCE										
		LAND USE										
		NOISE										
		TRANSPORTATION										
		AESTHETICS										
		ENERGY/RES. CONS.										

INPUT FORM NO. 6 — PROCUREMENT FUNCTIONAL AREA

1. PROJECT NAME: _____
2. INSTALLATION: _____ TEL. NO. (COMM.) _____
3. RESPONDENT'S NAME: _____ (FTS) _____
   ADDRESS: _____ DATE _____
   _____
   _____
4. REQUEST NO. _____
5. DETAILED OR REVIEW LEVEL ? _____
6. SUBPROGRAM NO. _____

7. OUTPUT SELECTION

MATRIX	R-M	TECHNICAL SPECIALTIES	ANSWERS TO FILTER QUESTIONS									
			Q-1	Q-2	Q-3	Q-4	Q-5	Q-6	Q-7	Q-8	Q-9	Q-10
		ECOLOGY			■	■	■	■	■	■	■	■
■	■	ENV. HEALTH	■	■	■	■	■	■	■	■	■	■
		AIR QUALITY	■	■	■	■	■	■	■	■	■	■
		SURFACE WATER						■	■	■	■	■
		GROUNDWATER				■	■	■	■	■	■	■
		SOCIOLOGY			■	■	■	■	■	■	■	■
		ECONOMICS					■	■	■	■	■	■
		EARTH SCIENCE	■	■	■	■	■	■	■	■	■	■
		LAND USE			■	■	■	■	■	■	■	■
		NOISE	■	■	■	■	■	■	■	■	■	■
		TRANSPORTATION		■	■	■	■	■	■	■	■	■
		AESTHETICS			■	■	■	■	■	■	■	■
		ENERGY/RES. CONS.				■	■	■	■	■	■	■

INPUT FORM NO.7—RESEARCH, DEVELOPMENT, TEST & EVALUATION FUNCTIONAL AREA

1. PROJECT NAME: _____
2. INSTALLATION: _____
3. RESPONDENT'S NAME: _____

COMPLETE MILITARY ADDRESS:

_____
_____
_____

COMMERCIAL TEL. NO.: _____

FTS OR AUTOVON TEL. NO.: _____

4. SITE NO.: _____
5. BAAP SELECTOR CODE: _____
6. PRINT RAMIFICATION-MITIGATION TEXT ?

YES _____ NO _____

7. DETAILED OR REVIEW LEVEL ?

DETAILED _____ REVIEW _____ BOTH _____

8. DATE OF REQUEST _____

9. TECHNICAL SPECIALTIES REQUESTED:

ECOLOGY _____
HEALTH SCIENCE _____
AIR QUALITY _____
SURFACE WATER QUALITY _____
GROUNDWATER QUALITY _____
SOCIOLOGY _____
ECONOMICS _____
EARTH SCIENCE _____
LAND USE _____
NOISE _____
TRANSPORTATION _____
AESTHETICS _____
ENERGY/RES. CONS. _____

10. ANSWERS TO FILTER QUESTIONS

	Q-1	Q-2	Q-3	Q-4	Q-5	Q-6	Q-7	Q-8	Q-9	Q-10
ECOLOGY										
HEALTH SCIENCE										
AIR QUALITY										
SURFACE WATER QUALITY										
GROUNDWATER QUALITY										
SOCIOLOGY										
ECONOMICS										
EARTH SCIENCE										
LAND USE										
NOISE										
TRANSPORTATION										
AESTHETICS										
ENERGY/RES. CONS.										

INPUT FORM NO.7–RESEARCH, DEVELOPMENT, TEST & EVALUATION FUNCTIONAL AREA

1. PROJECT NAME: _____
2. INSTALLATION: _____
3. RESPONDENT'S NAME: _____

COMPLETE MILITARY ADDRESS:

_____
_____
_____

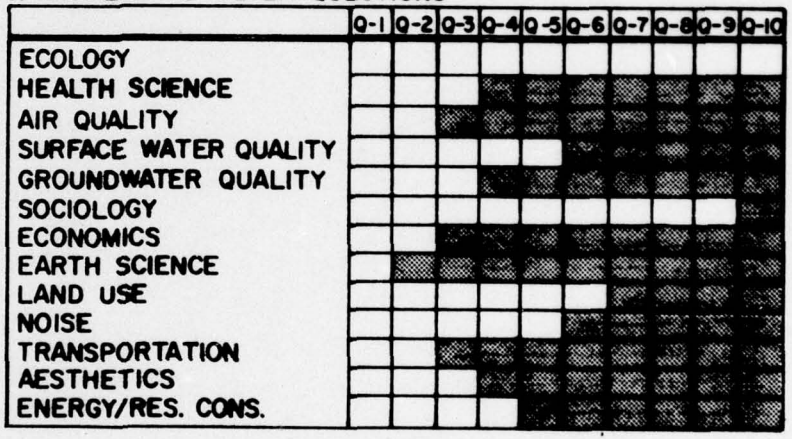
COMMERCIAL TEL. NO.: _____
FTS OR AUTOVON TEL. NO.: _____

4. SITE NO.: _____
5. BAAP SELECTOR CODE: _____
6. PRINT RAMIFICATION-MITIGATION TEXT ?
YES _____ NO _____
7. DETAILED OR REVIEW LEVEL ?
DETAILED _____ REVIEW _____ BOTH _____
8. DATE OF REQUEST _____

9. TECHNICAL SPECIALTIES REQUESTED:

ECOLOGY _____
HEALTH SCIENCE _____
AIR QUALITY _____
SURFACE WATER QUALITY _____
GROUNDWATER QUALITY _____
SOCIOLOGY _____
ECONOMICS _____
EARTH SCIENCE _____
LAND USE _____
NOISE _____
TRANSPORTATION _____
AESTHETICS _____
ENERGY/RES. CONS. _____

10. ANSWERS TO FILTER QUESTIONS



INPUT FORM NO.7–RESEARCH, DEVELOPMENT, TEST & EVALUATION FUNCTIONAL AREA

1. PROJECT NAME: _____
2. INSTALLATION: _____
3. RESPONDENT'S NAME: _____

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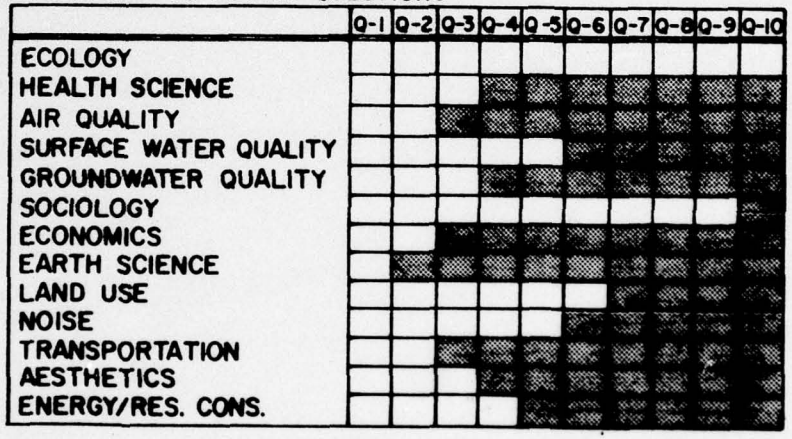

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174p. ; 27 cm. (Technical report - Construction Engineering Research Laboratory ; N-43)

1. Environmental impact statements. I. Mitchell, Ralph A. II. Riggins, Robert E. III. Fittipaldi, John J. IV. Novak, Edward W. V. Title. VI. Series : U.S. Construction Engineering Research Laboratory. Technical report ; N-43.