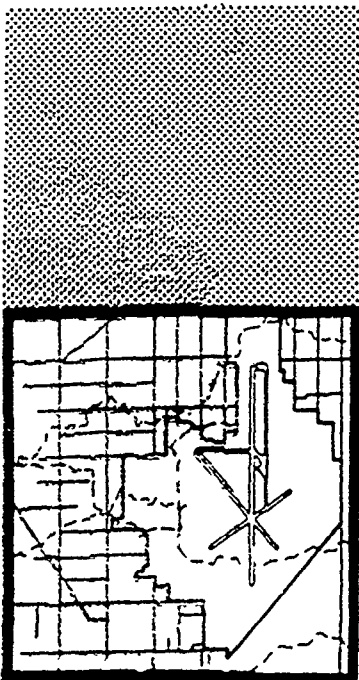


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**INSTALLATION RESTORATION PROGRAM (IRP)
STAGE 5**

McCLELLAN AIR FORCE BASE

PREPARED BY:
Radian Corporation
10395 Old Placerville Road
Sacramento, California 95827

AUGUST 1990

**Comprehensive
CERCLA Workplan**

FINAL

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PREPARED FOR:
McCLELLAN AFB/EM
McCLELLAN AFB, CALIFORNIA 95827-5990

United States Air Force
Human Systems Division (AFSC)
IRP Program Office (HSD/YAQI)
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INSTALLATION RESTORATION PROGRAM (IRP)
STAGE 5

REMEDIAL INVESTIGATION/FEASIBILITY STUDY
COMPREHENSIVE CERCLA WORKPLAN

FINAL

FOR

McCLELLAN AFB/EM
McCLELLAN AFB, CA 95652-5990

AUGUST 1990

PREPARED BY:

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This report has been prepared for the Air Force by Radian Corporation for the purpose of aiding in the implementation of a final remedial action plan under the Air Force Installation Restoration Program (IRP). As the report relates to actual or possible releases of potentially hazardous substances, its release prior to an Air Force final decision on remedial action may be in the public's interest. The limited objectives of this report and the ongoing nature of the IRP, along with the evolving knowledge of site conditions and chemical effects on the environment and health, must be considered when evaluating this report, since subsequent facts may become known which may make this report premature or inaccurate. Acceptance of this report in performance of the contract under which it is prepared does not mean that the Air Force adopts the conclusions, recommendations, or other views expressed herein, which are those of the contractor only and do not necessarily reflect the official position of the Air Force.

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PREFACE

Radian Corporation is the contractor for the RI/FS program at McClellan AFB, California. This work was performed for the Human Systems Division (AFSC), Installation Restoration Program Office (HSD/YAQ) under Air Force Contract No. F33615-87-D-4023, Delivery Order 0008.

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Radian would like to acknowledge the cooperation of the McClellan AFB Office of Environmental Management. In particular, Radian acknowledges the assistance of Mr. Mario Ierardi, Mr. Bud Hoda, and Mr. Gerald Robbins.

The work presented herein was accomplished between September 1989 and July 1990. Mr. Patrick Haas/Capt. Henry Thompson, Human Systems Division (AFSC), Installation Restoration Program Office (HSD/YAQ), was the Contracting Officer's Technical Representatives.

Approved:



Nelson H. Lund, P.E.

Contract Program Manager

TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
1.0 INTRODUCTION	1-1
1.1 Site Background	1-2
1.1.1 Location and History	1-2
1.1.2 Physical Setting and Contaminant Sources	1-4
1.2 Parties to the Interagency Agreement	1-5
2.0 OVERVIEW OF THE McCLELLAN AFB REMEDIAL RESPONSE PROGRAM	2-1
2.1 CERCLA Process	2-1
2.2 Comprehensive CERCLA Workplan Rationale	2-4
3.0 REMEDIAL RESPONSE PROGRAM DESCRIPTION	3-1
3.1 Identification Phase	3-1
3.1.1 Preliminary Assessments/Site Inspection	3-3
3.2 Remedial Investigation/Feasibility Study	3-6
3.2.1 RI/FS Scoping	3-6
3.2.2 Site Characterization	3-21
3.2.3 Initial Screening and Development of Alternatives	3-27
3.2.4 Treatability Investigations	3-29
3.2.5 Detailed Analysis of Alternatives	3-31
3.2.6 Remedial Investigation/Feasibility Study Report	3-34
3.2.7 Selection of Remedy	3-36
3.3 Implementation of Remedial Alternatives	3-39
3.3.1 Remedial Design	3-39
3.3.2 Remedial Action	3-41
3.3.3 Expedited Response Actions	3-43
3.3.4 Additional Removal Programs	3-51
3.3.5 Post-Remedial Action Activities	3-52
3.4 Risk Assessment	3-55

TABLE OF CONTENTS (Continued)

<u>Section</u>	<u>Page</u>
4.0 SCHEDULE	4-1
4.1 Introduction	4-1
4.2 McClellan AFB Priorities	4-5
4.3 Operable Units	4-6
4.3.1 Preliminary Assessments, Current Operating Facility Assessments, and Historical Reviews	4-7
4.3.2 Summary Report	4-7
4.3.3 Remedial Investigation Sampling and Analysis Plan ...	4-8
4.3.4 Remedial Investigation Field Program	4-8
4.3.5 Remedial Investigation/Feasibility Study Reports	4-9
4.3.6 Proposed Plan	4-9
4.3.7 Record of Decision	4-9
4.3.8 Expedited Response Actions	4-9
4.3.9 Basewide Soil Treatability Study	4-10
4.4 Groundwater Investigations	4-10
4.4.1 Operable Unit B	4-10
4.4.2 Operable Units C & D	4-11
4.4.3 Basewide	4-11
5.0 REFERENCES	5-1

APPENDICES

- APPENDIX A: Sites and Potential Release Locations
APPENDIX B: Soils Management Program

LIST OF TABLES

<u>Table</u>	<u>Page</u>
3-1 Current Site Characterization Investigations	3-23
4-1 McClellan AFB IAG Deliverable Schedule	4-13

LIST OF FIGURES

<u>Figure</u>		<u>Page</u>
1-1	Location of McClellan AFB	1-3
1-2	Approximate Boundaries of Confirmed Sites, Potential Release Locations, and Groundwater Operable Units	1-6
2-1	CERCLA Process	2-2
2-2	Schematic Representation of Groundwater Contaminant Migration	2-5
3-1	CERCLA Process	3-2
3-2	Preliminary Assessment/Site Inspection	3-4
3-3	Remedial Investigation/Feasibility Study (RI/FS) Scoping	3-8
3-4	Site Characterization	3-22
3-5	Components of Site Characterization at McClellan AFB	3-25
3-6	Initial Screening and Development of Alternatives	3-28
3-7	Treatability Investigation	3-30
3-8	Detailed Analysis of Alternatives	3-32
3-9	RI/FS Reports.	3-35
3-10	Selection of Remedy	3-37
3-11	Remedial Design	3-40
3-12	Remedial Action	3-42
3-13	Relationship of Expedited Response Actions (ERAs) to the CERCLA Remedial Response Process, and List of ERAs Already Implemented or Currently Underway at McClellan AFB	3-44
3-14	Post-Remedial Action Activities	3-53
4-1	McClellan AFB CERCLA Program	4-3

LIST OF ACRONYMS

ABGOURI	Area B Groundwater Operable Unit Remedial Investigation
AFLC	Air Force Logistics Command
AFOEHL	Air Force Occupational and Environmental Health Laboratories
AR	Administrative Record
ARARs	Applicable or Relevant and Appropriate Requirements
ATSDR	Agency for Toxic Substances and Disease Registry
BGS	Below ground surface
BW	Base water supply well
CCW	Comprehensive CERCLA Workplan
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLP	Contract Laboratory Program
CRP	Community Relations Plan
CS	Confirmed Site
CSI	Contaminant Source Investigation
DEQPPM	Defense Environmental Quality Program Policy Memorandum
DHS	Department of Health Services
DOD	Department of Defense
DQOs	Data Quality Objectives
EG&G	EG&G Idaho, Incorporated
ERA	Expedited Response Action
ES	Engineering-Science Incorporated
FS	Feasibility Study
GTP	Groundwater Treatment Plant
HRS	Hazard Ranking System
IAG	Interagency Agreement
IRP	Installation Restoration Program
IWCS	Industrial Wastewater Collection System
IWL	Industrial Wastewater Line
IWTP	Industrial Wastewater Treatment Plant
McLaren	McLaren Environmental Engineering
mg/L	Milligrams per liter
msl	Mean sea level
MW	Monitoring well
NCP	National Contingency Plan
NPDES	National Pollutant Discharge Elimination System

NPL	National Priority List
NRDA	National Resources Damage Assessment
PA	Preliminary Assessment
PA/SF	Preliminary Assessment/Site File
PA/SI	Preliminary Assessment/Site Investigation
PGOURI	Preliminary Groundwater Operable Unit Remedial Investigation
PRL	Potential Release Location
QAPP	Quality Assurance Project Plan
RA	Remedial Action
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RI	Remedial Investigation
ROD	Record of Decision
RWQCB	Regional Water Quality Control Board
SAP	Sampling and Analysis Plan
SARA	Superfund Amendments and Reauthorization Act
SCHD	Sacramento County Health Department
SWAT	Solid Waste Assessment Testing
TCE	Trichloroethene
ug/L	Micrograms per liter
UST	Underground Storage Tank
U.S. EPA	United States Environmental Protection Agency
USAF	United States Air Force

1.0 INTRODUCTION

In 1979, officials at McClellan Air Force Base (AFB) began to suspect that past waste disposal practices may be contaminating the groundwater in the area. Being proactive, McClellan AFB voluntarily created a groundwater contamination committee, which identified at least four areas of potential groundwater contamination needing further investigation. Subsequent investigations confirmed contamination, and McClellan AFB developed a comprehensive program to maintain drinking water quality and to remediate the contamination. In 1981, the United States Department of Defense (DOD) developed the Installation Restoration Program (IRP) to investigate hazardous material disposal sites on DOD facilities; McClellan AFB's comprehensive program was revised to conform with the IRP. Since then, numerous investigations and studies have been performed under the IRP.

On 22 July 1987, McClellan AFB was listed on the United States Environmental Protection Agency's (U.S. EPA) National Priorities List (NPL). After being included on the NPL, McClellan AFB integrated the ongoing IRP with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, Superfund Amendments and Reauthorization Act of 1986 (SARA); National Oil and Hazardous Substances Contingency Plan (NCP); pertinent provisions of the Resource Conservation and Recovery Act (RCRA) statutes; Executive Order 12580; and all applicable state laws and regulations.

Following McClellan AFB's listing on the NPL, the Air Force (AF) began negotiating an Interagency Agreement (IAG) with the U.S. EPA and the California Department of Health Services (DHS). On 21 July 1989, all parties signed the IAG, which establishes the process for involving federal and state regulatory agencies, and the public in the McClellan AFB remedial response process. The IAG sets schedules for completing specific program tasks including:

- Remedial Investigations (RI);
- Feasibility Studies (FS);
- Response actions; and
- Operation and maintenance activities related to response actions.

While the 21 July 1989 version of the IAG was signed by the three parties to the agreement, it was not made effective. While responses to public comments received on the IAG were being prepared, an earthquake in October 1989 damaged the offices

and operations of the U.S. EPA Region IX, delaying the effective date of this agreement. During this interim period, technical work proceeded as originally planned prior to the earthquake. Responses to public comments have now been completed. The IAG has been signed by all parties and became effective 2 May 1990.

McClellan AFB agreed to undertake, where applicable, cleanup actions at McClellan AFB in accordance with the IAG, to protect the public health, welfare, and the environment. This document, the Comprehensive CERCLA Workplan (CCW), is a primary document deliverable under the IAG. It describes the long-range objectives, technical approach, status of ongoing tasks, and future tasks of McClellan AFB to remediate or cleanup contaminated areas. The CCW will be updated annually as new data are obtained during field investigations, as the scope of additional tasks are defined, and as new priorities are established by McClellan AFB mission requirements in coordination with participating regulatory agencies, and the public. Updates to the CCW will reflect the dynamics of the CERCLA process at McClellan AFB and reflect revised priorities and tasks. The annual updates of this CCW will communicate revised strategies and management issues to the regulatory agencies and the public.

1.1 Site Background

1.1.1 Location and History

McClellan AFB is located approximately seven miles northeast of downtown Sacramento, California, as shown in Figure 1-1. The main base facility includes 2,952 contiguous acres, which are bounded by the City of Sacramento to the west and southwest, the unincorporated areas of Rio Linda/Elverta to the northwest, and North Highlands to the east.

McClellan AFB was established in 1936 when the U.S. Congress authorized the construction of a new air repair depot and supply base for the War Department (predecessor to the Department of Defense). Initially named the Sacramento Air Depot, the facility was dedicated in 1939. In the early 1950s, McClellan AFB changed from a bomber depot to a jet fighter maintenance depot. McClellan AFB currently operates as an Air Force Logistics Command Base, employing approximately 18,000 military and civilian personnel with the primary mission of management, maintenance, and repair of aircraft, electronics, and communication equipment.

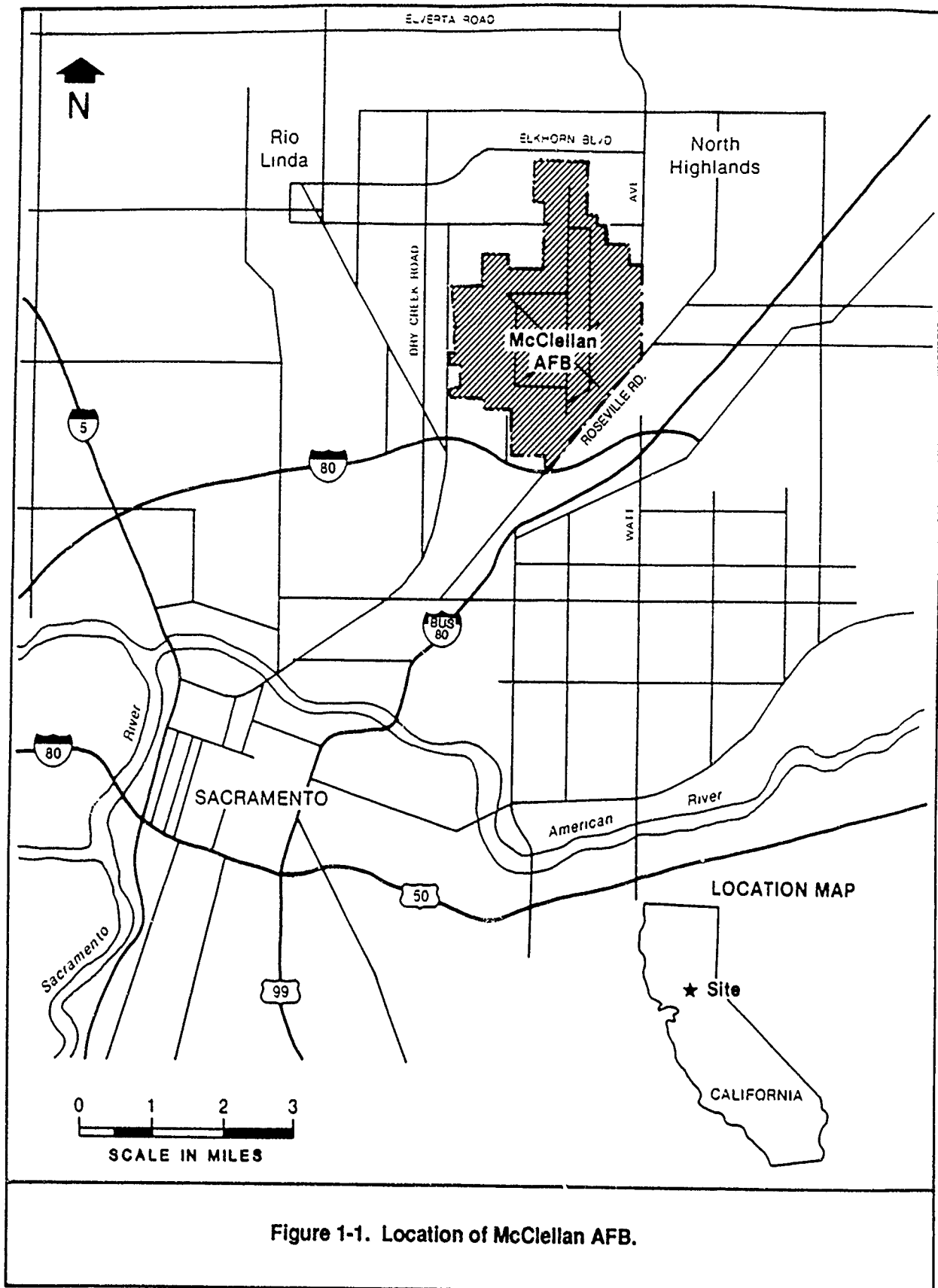


Figure 1-1. Location of McClellan AFB.

Units existing within the Air Logistics Command Center include: the 2852nd Air Base Group, which is responsible for all support and housekeeping functions at McClellan AFB; the 2951st Combat Logistics Support Squadron, which provides mobile supply and maintenance support to USAF forces worldwide; Detachment 5, 3025th Management Engineering Squadron, which provides manpower authorization and management engineering support; and the USAF Clinic, which provides McClellan AFB with medical services.

Tenant units at McClellan AFB include: Air Force Systems Command; Air Training Command; Tactical Air Command; Air Force Communications Command; Military Airlift Command; the Fourth Air Force Reserve; the Coast Guard Air Station Sacramento; Detachment 1905, 17th District, Air Force Office of Special Investigations; Canadian Forces Liaison Detachment; Royal Air Force Liaison Office; Air Force Commissary Complex Service; American Red Cross Field Office; General Accounting Office; and Defense Logistics Agency activities.

In fulfilling its past and current mission to defend the United States through the operation and maintenance of aircraft, McClellan AFB has been engaged in a wide variety of operations that involve the use, storage, and disposal of hazardous materials including: industrial solvents, caustic cleaners, electroplating chemicals, heavy metals, polychlorinated biphenyls (PCBs), low-level radioactive wastes, and a variety of fuel oils and lubricants.

1.1.2 Physical Setting and Contaminant Sources

Groundwater beneath McClellan AFB occurs under confined and unconfined conditions. Hazardous substances have percolated into the aquifer underlying the facility at various locations on base. In 1979, groundwater testing by McClellan AFB, state, and local agencies identified the presence of volatile organic compounds (VOCs) in on- and off-base wells that led to the closure of two McClellan AFB wells and three off-base wells. Groundwater and soil samples collected on and in the vicinity of McClellan AFB have shown the presence of a variety of contaminants, principally VOCs and metals.

The watershed in the vicinity of McClellan AFB flows southwesterly. Surface water drainage on and around McClellan AFB includes Magpie, Second, Dry, and Arcade creeks. The primary recipient of on-base drainage is Magpie Creek, which enters McClellan AFB from the east, merges with several tributaries, and exits to the west.

The soil and groundwater contamination which currently exists at McClellan AFB are primarily the result of chemical releases from:

- Land disposal facilities. Disposal occurred via burial of hazardous substances in unlined pits primarily along the western edge of the base. This practice has been discontinued, and wastes are now disposed of at an approved California Class I facility or discharged to the on-base Industrial Wastewater Treatment Plant (IWTP).
- Spills and discharges. In the course of various industrial activities, accidental discharges of hazardous substances onto the ground have occurred.
- Leaks. Leakage from sumps, underground storage tanks, the Industrial Wastewater Line (IWL), and disposal ponds have occurred.

To date, McClellan AFB has identified 170 waste sites and potential release locations (PRLs) that warrant investigation. These sites and PRLs, identified in Appendix A, occur within 12 preliminary groundwater operable units (OUs) that have been designated for the purpose of managing subsequent investigations and appropriate response actions. These OUs are shown in Figure 1-2. The Operable Unit designation has now replaced the earlier "Area" designation when referring to specific portions of the base.

A more detailed discussion of the environmental conditions of McClellan AFB, equivalent to a Conceptual Site Model for McClellan AFB, can be found in Sections 2.0 and 3.0 of the Preliminary Groundwater Operable Unit Remedial Investigation Sampling and Analysis Plan (Radian, 1989).

1.2 Parties to the Interagency Agreement

The parties to the IAG are the U.S. EPA, the Air Force, and the State of California. The terms of the IAG apply to and are binding upon all three parties.

McClellan AFB is a facility under the jurisdiction, custody, and control of the Department of Defense, the lead agency in this action. The Department of the Air

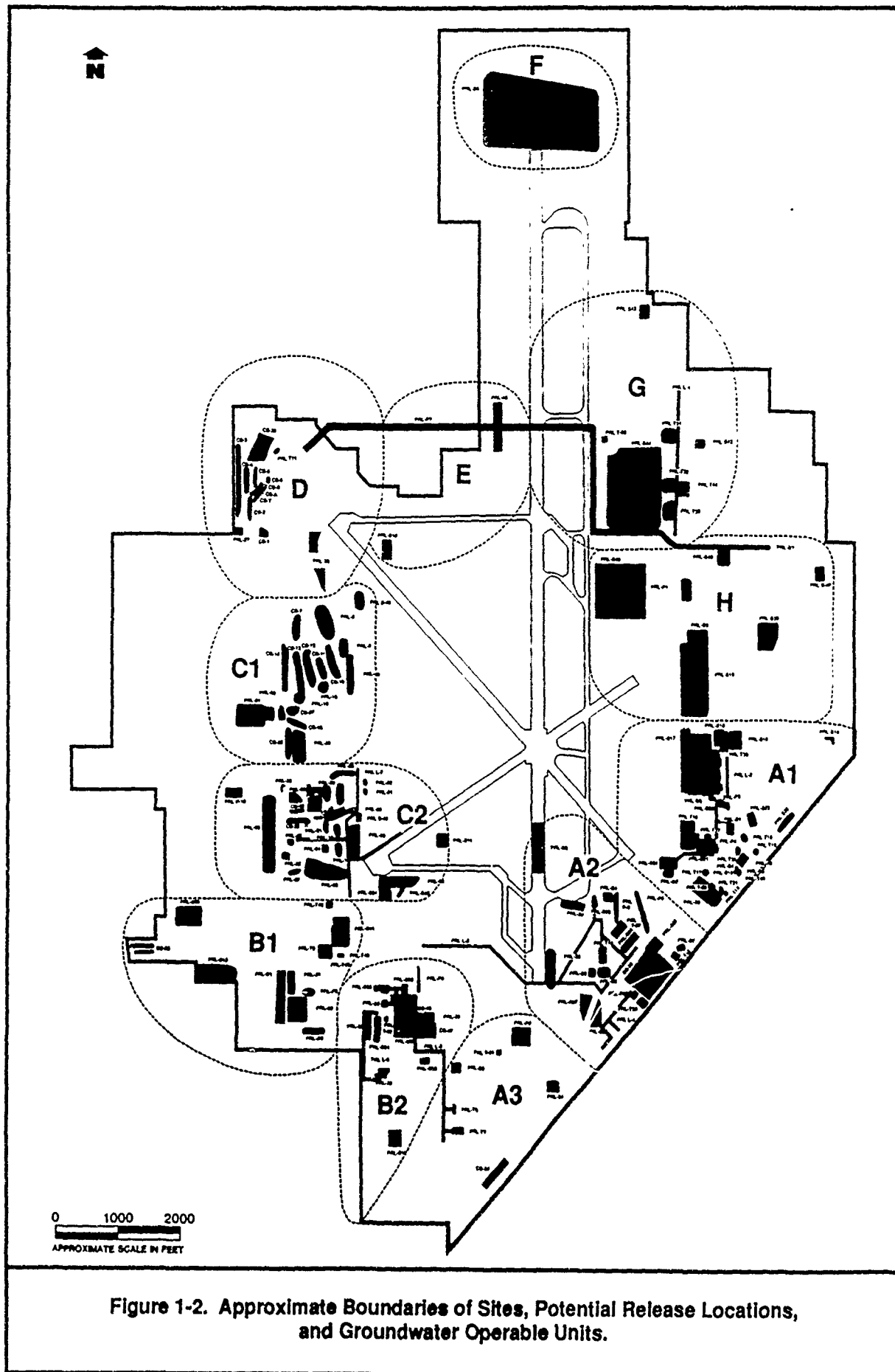


Figure 1-2. Approximate Boundaries of Sites, Potential Release Locations, and Groundwater Operable Units.

Force is authorized to act in behalf of the Secretary of Defense for all functions that are relevant to the IAG and subject to the Defense Environmental Restoration Program (DERP).

The U.S. EPA is responsible for evaluating the McClellan AFB Remedial Response Program to ensure compliance with CERCLA as amended by SARA. This law defines the process by which federal facilities, such as McClellan AFB, are to undertake remedial actions and provides for joint selection of remedies among the U.S. EPA, the State of California, and the Air Force. However, specific response actions at McClellan AFB will be conducted according to the terms of the IAG.

The DHS is the designated state agency, in accordance with California Government Code section 12018 and Health and Safety Code section 25159.7, responsible for the federal programs to be carried out under the IAG and the lead agency for the State of California. As the lead state agency, DHS is involved in the initiation, development, selection, and enforcement of remedial actions to be undertaken at McClellan AFB, including the review of all applicable program activities and the development of studies, reports, and action plans.

Cooperation among all three parties is a key element in meeting the primary goals of the IAG. It is also important that all parties recognize public concerns in decision making; therefore, the public will be kept informed of all activities of the remedial response program by procedures outlined in the McClellan AFB Community Relations Plan. Proactive involvement by all concerned parties in the initial planning of investigations and through the eventual cleanup process will be a key to the efficient implementation of this program.

2.0 OVERVIEW OF THE McCLELLAN AFB REMEDIAL RESPONSE PROGRAM

This section presents an overview of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process for the investigation and remediation of hazardous waste sites. It also summarizes the strategies to be applied by McClellan Air Force Base (AFB) in the implementation of the CERCLA process. The actual implementation steps are discussed in more detail in Section 3.1 through Section 3.4 of this report. Additionally, major technical activities are described in Section 4.0.

2.1 CERCLA Process

The three main phases of the CERCLA process are identification, investigation, and cleanup. These three main phases, as well as details of each phase, are shown on Figure 2-1.

Identification is the first phase, and involves locating sites where past activities have led or may lead to the release of hazardous substances to the environment. After identifying locations of sites, relevant information is collected and analyzed to prioritize the sites that pose a threat to human health, welfare, and/or the environment, and may require further investigation. Specific tasks to accomplish these objectives are discussed in Section 3.1.

Investigation is the second phase of the CERCLA process, where sampling and analysis plans are developed and implemented, and remedial alternatives are evaluated. As shown in Figure 2-1, there are seven steps to this phase. These steps involve:

- RI/FS scoping and planning for field investigations;
- Gathering data to determine the areal and vertical extent of contamination in a given area (site characterization);
- Conducting treatability studies to support the evaluation of cleanup alternatives;
- Screening and conducting detailed analyses of cleanup alternatives for the contaminated area; and

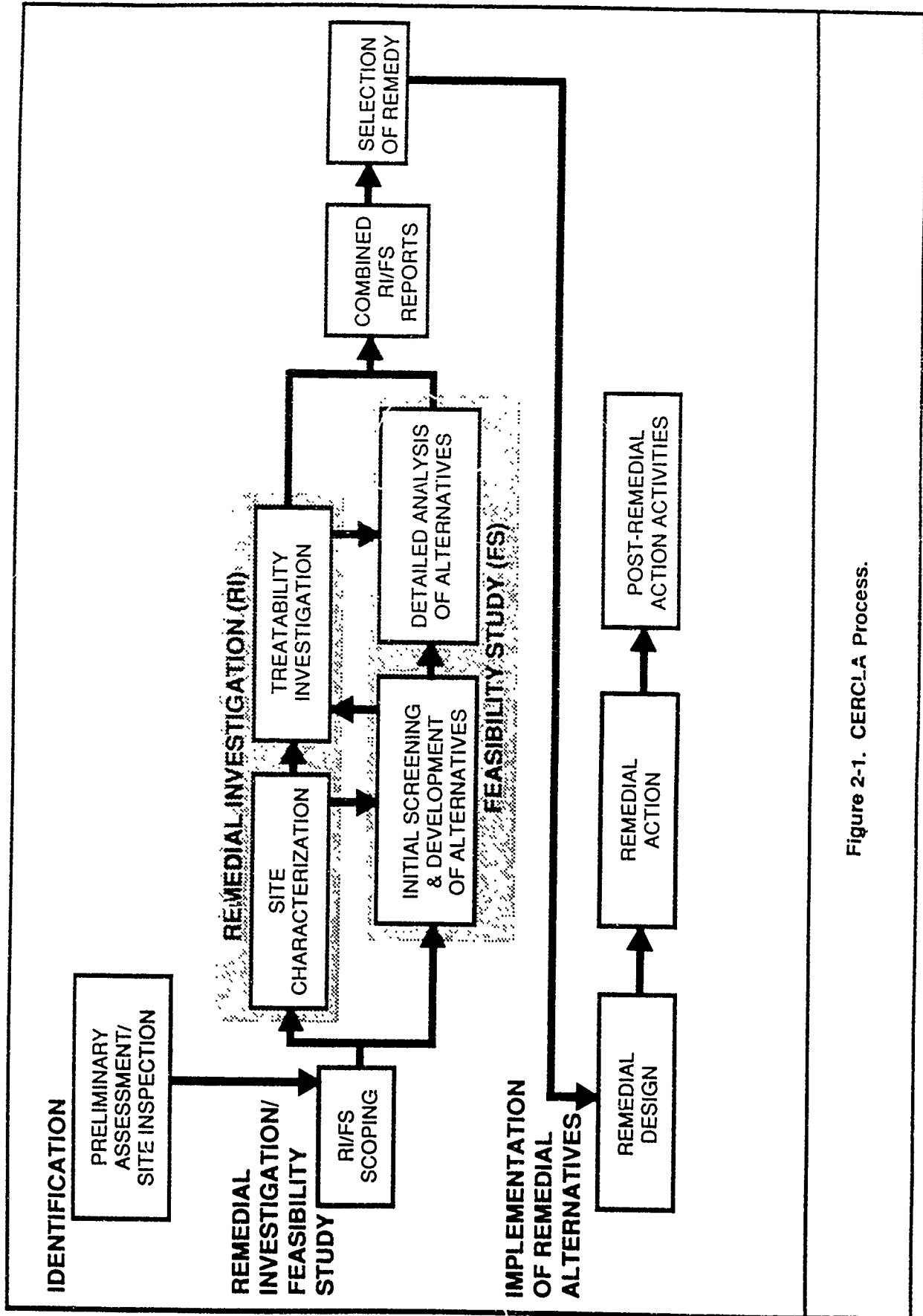


Figure 2-1. CERCLA Process.

- Presenting the investigation results and the recommended cleanup remedy in a Remedial Investigation/Feasibility Study (RI/FS) report for agency and public review.

Detailed discussions about each of these steps and their relationships to one another are presented in Section 3.2.

Cleanup is the third phase of the CERCLA process, where the selected remedy for cleanup of a contaminated area is implemented. As shown in Figure 2-1, there are three steps in this phase involving the design and implementation of the chosen cleanup method as well as post-cleanup monitoring activities. Detailed discussions about each of these steps and their relationships to one another are presented in Section 3.3.

In addition to remedial actions that would typically apply to an operable unit or a major subdivision thereof, expedited response actions will address a limited area, volume, or zone of potentially contaminated media. Such actions would be implemented at sites where justifying data exist which presents an imminent threat to human health and/or the environment. Actions also would be taken at those sites which rank at the top of a priority list on sites needed to support the base mission. An expedited response action implements a limited clean-up more quickly than the formal RI/FS process and can occur anytime during the CERCLA process. One of two actions will result from investigating possible removal action sites:

- An Expedited Response Action (ERA) would be recommended when there is a release or threat of release of hazardous substances into the environment.
- No response action would be taken and the investigated site would be considered under the RI/FS process if contamination is found during additional characterization, but no release or threat of release of hazardous substances exists.

A detailed discussion of interim and final response actions is presented in Section 3.3.

2.2 Comprehensive CERCLA Workplan Rationale

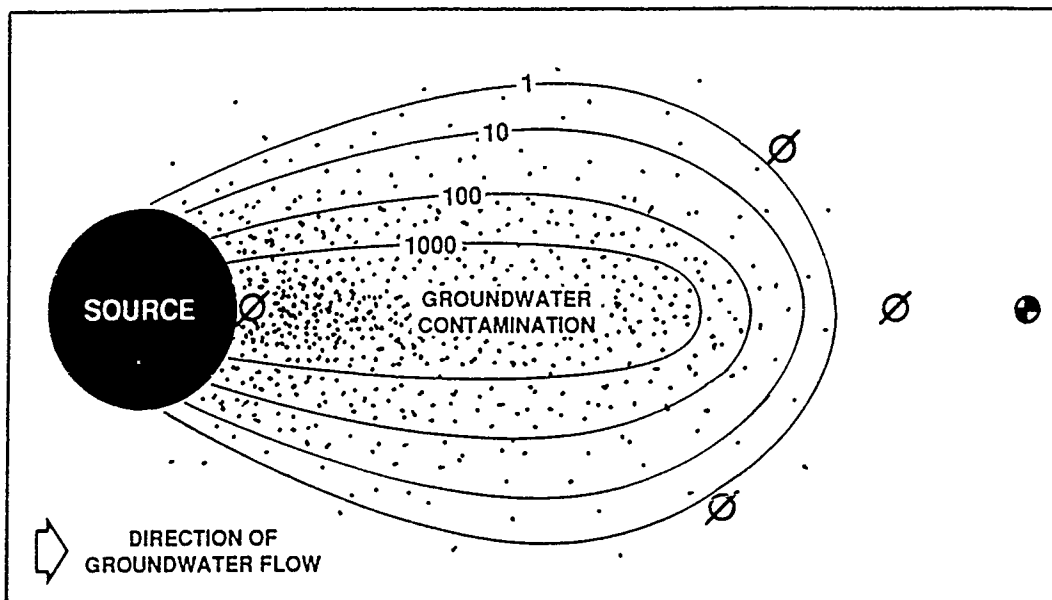
The McClellan AFB program, described in this workplan, is the mechanism for implementing the CERCLA process at McClellan AFB. The primary long-term goal of the program is to clean up groundwater and contaminated soil. By achieving this goal, potential threats to human health, welfare, and the environment will be removed. Methods developed to achieve this goal are discussed in the following paragraphs.

Consumption of contaminated groundwater poses a potential health risk to the public. Therefore, the first priority in the McClellan AFB cleanup remedial program is to identify the sources of contamination and develop plans to control the off-base migration of contaminants in the groundwater.

Complete cleanup of the groundwater cannot be achieved as long as contaminants continue to leach from on-base sources into the groundwater. Effective clean-up of the groundwater must include removal or immobilization of the contaminants present in soil and soil vapor, as well as extraction of groundwater. If contaminants in the soil column are not removed or immobilized, they will continue to slowly leach to the groundwater, making progress in cleaning up the groundwater difficult.

Groundwater extraction wells placed at the source, where the highest concentration of contaminants are normally present, are more practical and cost-effective than intercepting larger quantities of diluted contaminated groundwater at some distance away from the source. As contaminants migrate away from a source, they disperse horizontally and vertically reducing in concentration as the distance from the source increases. Extraction wells at the perimeter of groundwater contamination serve to control further migration, not to effectively clean up the groundwater. Groundwater cleanup measures implemented far away from the source require the installation of a large number of wells and the treatment of larger quantities of groundwater with diluted contaminant concentrations, thereby requiring greater time and cost. Figure 2-2 illustrates a scenario where a source area is contributing contaminants to groundwater. In this figure, extraction wells at the source, which clean up high contaminant concentrations, are combined with extraction wells at the perimeter of contamination, which control further migration of contaminants. The use of this method to control contamination in the groundwater combined with the removal or immobilization of contaminants in the soil and soil vapor, will provide for effective mitigation of the contamination problem.

Plan View



Cross Section

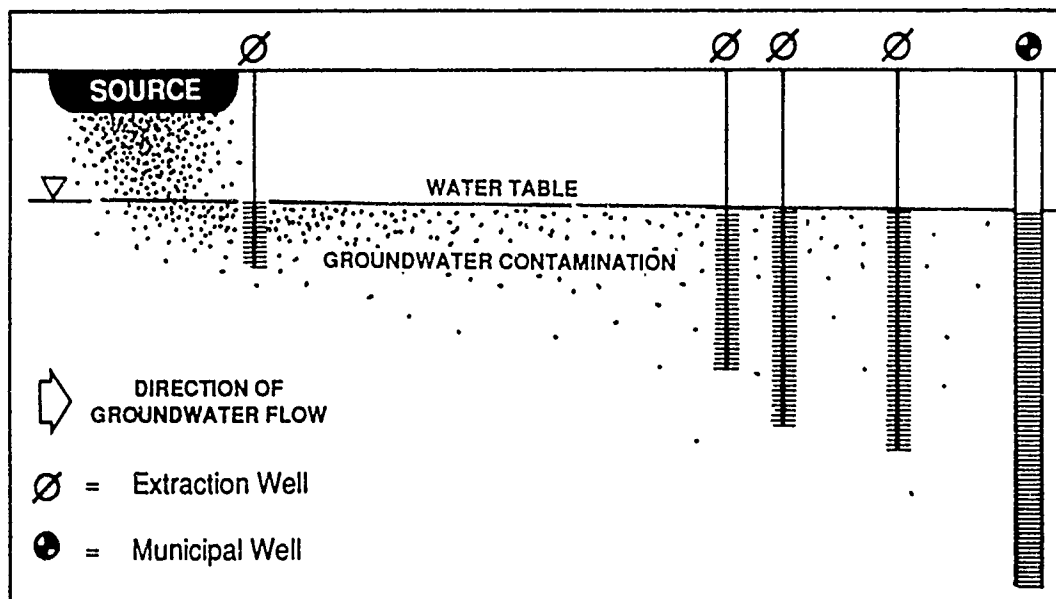


Figure 2-2. Schematic Representation of Groundwater Contaminant Migration.

Groundwater beneath McClellan AFB flows predominantly to the south and southwest. Several areas of contaminated groundwater have been identified, principally in the western and southern portions of the base, and off base to the west and southwest. Based on the groundwater flow directions, areas of identified groundwater contamination, and locations of potential contaminant source areas, McClellan AFB has been divided into 12 preliminary groundwater operable units (OUs) as shown previously (Figure 1-2). The first priority is to investigate the extent of contaminant concentrations and groundwater flow in those OUs located along the southern boundary of McClellan AFB, OUs B1 and B2, and A1, A2, and A3, because contaminated groundwater in this area has the greatest potential to flow off base. The size and boundaries of the groundwater OUs are preliminary and may be modified based on data obtained in Remedial Investigations.

In response to the concern regarding the potential for migration of groundwater contamination, McClellan AFB has implemented several response actions. These include:

- Implementing an OU B Groundwater Remedial Investigation (March 1989) to characterize contamination southwest of the base boundary;
- Implementing an ERA to characterize and control contaminated groundwater in the southwest area;
- Providing city drinking water to 548 residences to the west of the base, where areas of contaminated groundwater have been identified;
- Properly abandoning 135 residential wells;
- Construction of on-base groundwater extraction systems in OU D and OU C; and
- Construction of an on-base groundwater treatment plant.

Detailed discussions of these response actions are presented in Section 3.3.

Of importance in the mitigation of contaminated groundwater at McClellan AFB is the identification and cleanup and/or control of sources within the OUs that

may contribute to contamination of the groundwater. Therefore, contaminant sources within all groundwater OUs located along the southern boundary of the base will be investigated prior to the OUs located to the north.

The collection and assessment of soil and groundwater data for each of the OUs at McClellan AFB will be used to further characterize the areal and vertical extent of contamination and to prioritize sites for cleanup activities. If a site is found to present an immediate health or environmental risk, an ERA will be developed and implemented as quickly as possible. Expedited Response Actions are described in greater detail in Section 3.3.3.

To date, several response actions have been implemented to address contaminated sources at McClellan AFB. These include:

- Investigation of the Industrial Wastewater Line (IWL) and repair of mainline segments;
- Removal of contaminated soil at OU D;
- Installation of a synthetic liner and clay cap at OU D;
- Demolition of Building 666;
- Removal of underground storage tanks and contaminated soils in the Underground Storage Tank Program;
- Development and implementation of a McClellan AFB Soils Management Plan;
- Closure of surface impoundments in OU C; and
- Construction of new aboveground storage tanks.

These actions are discussed in detail in Section 3.3.

The data of the field investigations at each OU will result in subsequent analysis and reporting of the site characteristics, identification of contaminant sources and health risks, and assessment of contaminant migration pathways. Those results will

form the basis of the Feasibility Studies and will allow for the selection of the appropriate remedial action alternatives. Implementation of the selected remedial action alternatives, when combined with past and upcoming response actions, will provide for the comprehensive remediation of all CERCLA waste sites at McClellan AFB.

Additional detail on investigative activities and the sequencing of these activities is presented in Section 3.0 and Section 4.0, respectively.

3.0 REMEDIAL RESPONSE PROGRAM DESCRIPTION

The following section presents a more detailed description of the McClellan Air Force Base (AFB) Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) response program. The objective of this program is to identify, investigate, and cleanup contaminated areas at McClellan AFB, thereby fulfilling the requirements of the Interagency Agreement (IAG) and CERCLA. The overall CERCLA process was described in Section 2.1. The specific activities are further detailed in this section and are presented in a schedule format in Section 4.0. A general CERCLA process flow chart is shown in Figure 3-1. The number above and to the left of each step in the chart refers to the specific section that provides a more detailed description of the steps.

The order in which the Operable Units will be identified and investigated has been agreed upon by the parties to the IAG. The CERCLA process will be followed sequentially at each one of the Operable Units or groups of Operable Units as reflected in project schedule shown in Section 4.0. For example, the Summary Reports, which contain PA/SI information, will be completed in the order of the Operable Unit(s) priority cited below. The accepted priority is:

- Operable Unit B;
- Operable Unit A;
- Operable Unit C;
- Operable Unit D; and
- Operable Units E, F, G, and H.

3.1 Identification Phase

The identification phase for the remedial activities will consist of tasks to compile and review all available information regarding use, storage, and disposal of hazardous materials at McClellan AFB. The objectives of the identification phase are to:

- Identify possible sources of soil and/or groundwater contamination;
- Collect and summarize available information for potential contaminant sources to determine if historic or current operations have affected the environment;

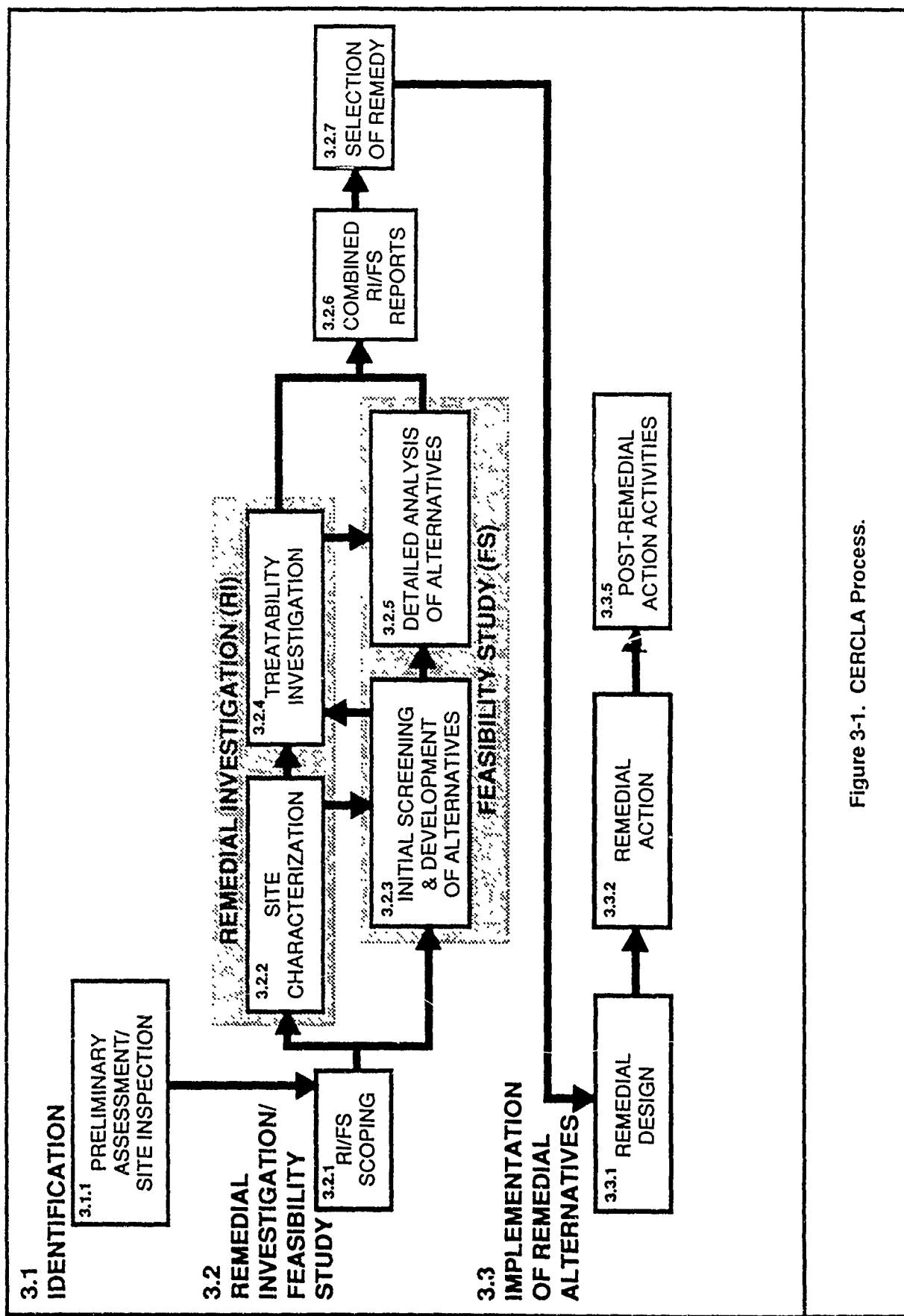


Figure 3-1. CERCLA Process.

- Provide recommendations for further investigations at sites and potential release locations (PRLs);
- Identify any immediate response needs including removal actions; and
- Provide data to support site and PRL prioritization and grouping.

An overview of the objectives, tasks, strategies, and deliverables associated with this activity is presented in Figure 3-2.

3.1.1 Preliminary Assessments/Site Inspection

Preliminary assessments (PAs) and site inspections (SIs) are currently being done to identify sites and PRLs at McClellan AFB. A list of these PRLs and sites, along with an update of their status, is presented in Appendix A.

The term "site" refers to a location that has been previously investigated and contamination has been found. Potential release locations have received little or no previous investigation, and are being reviewed to determine if further investigation is warranted. Potential release locations were formerly divided into two categories, Unstudied PRLs (UPRLs) and Partially Studied PRLs (PSPRLs). These designations have now been combined into the general category of PRLs. The sites and PRLs currently being assessed were initially identified during record searches and investigations conducted by McClellan AFB and previous Air Force contractors (CH2M Hill, 1981; McLaren Environmental Engineering, 1986).

Tasks performed as part of the PA/SIs include record searches, aerial photograph interpretation, interviews with base personnel, site visits, compilation and evaluation of past analytical data collected by McClellan AFB and its contractors, and preparation of summary reports and site files. Any PRLs which are identified from information obtained in PA/SI will also be investigated as part of this task.

In addition to the sites and PRLs listed in Appendix A, currently operating facilities will be assessed for compliance with substantive provisions of the Resource Conservation and Recovery Act (RCRA) as they relate to the release of hazardous substances, wastes, pollutants, or contaminants. The RCRA is considered an applicable or relevant and appropriate requirement (ARAR) under CERCLA and the IAG. Other

**PRELIMINARY
ASSESSMENT /
SITE INSPECTION**

**REMEDIAL INVESTIGATION /
FEASIBILITY STUDY SCOPING**

PURPOSES:

- Identify, collect, and organize available information for known and new McClellan AFB potential release locations (PRLs)
- Determine sources and nature of potential releases, pathways of exposure, exposure targets, and threats to public health or the environment
- Identify needs for additional site/analytical data
- Identify sites that pose no threat or potential threat to public health, welfare, or the environment

TASKS:

- Record searches
- Aerial photo interpretation
- Interviews with base personnel
- Site visits
- Prepare site files

**POTENTIAL
SUBSEQUENT
ACTIONS:**

- No further action
- RI/FS scoping
- Expedited Response Actions

STRATEGIES:

- Inspect currently operating facilities which use hazardous materials for evidence of contaminant release to soils; add to list of new PRLs, locations where evidence of release is discovered
- Group all known and new PRLs and sites by preliminary groundwater operable units (PGOUs)
- Evaluate all old and new PRLs and sites that are identified within each operable unit
- Expedite assessment of newly identified PRLs for high priority PGOUs to allow integrated soil and groundwater sampling plans to be prepared

DOCUMENTATION:

- Preliminary Assessment Report (for each PRL)
- Technical Memoranda (for each site)
- Site files (site specific information that is not included in the above reports)

Figure 3-2. Preliminary Assessment / Site Inspection.

requirements of RCRA are being addressed by other ongoing programs at McClellan AFB. Those facilities with the potential to contribute to soil and groundwater contamination are the primary focus of this assessment.

To address the substantive requirements of RCRA, as required under the IAG, a list has been compiled of currently operating facilities which now use or have historically used, stored, or disposed of hazardous materials. Many of the facilities on this list are also on the current list of PRLs (Appendix A) and will be investigated as part of the PA/SI task. Those facilities not investigated as part of the PA/SI task will be reviewed to determine if there is a potential for the release of hazardous materials to the soil or groundwater. This inspection will include visual observation, review of operating records and engineering drawings, and interviews with current employees. If a potential for release exists, the facility will be considered a new PRL and investigated further.

The PA/SI will result in one of three recommendations for each site:

- Conduct a Remedial Investigation and Feasibility Study at sites where the presence of contamination is indicated, but where no immediate threat exists;
- Implement a prompt and appropriate response action where contamination poses an immediate threat to human health, welfare, and/or the environment; and
- Determine that no further action is necessary, if the results shown that the site has not contributed to or has/had the potential for contaminant releases to soil and groundwater.

Preliminary Assessments/Site Inspections of PRLs and sites will be conducted within the boundaries of each preliminary operable unit previously identified (Section 1.1). Operable units located along the southern boundary of McClellan AFB will be investigated first to identify areas of contaminated groundwater that could migrate off base and the sources of the contaminants. Groundwater Operable Unit B is slated for investigation first, followed by Groundwater Operable Unit A. Preliminary Assessments/Site Inspections for any new PRLs identified for these operable units will be expeditiously prepared to allow integration of the available information into the planning process for the more detailed investigations. In a similar manner, PA/SI data will be

collected into Summary Reports for the other Operable Units. The Operable Unit(s) order listed in Section 3.0 (C, followed by D, and E, F, G, and H) will be used.

Preliminary Assessment reports will be prepared for those PRLs where no analytical data have been collected. Technical Memorandums will be prepared for sites. The contents of these two types of reports are similar; both include a summary of historical operations conducted at the site, a compilation and evaluation of information collected, an evaluation of potential hazards, an evaluation of previous recommendations, and current conclusions and recommendations. A Summary Report will be prepared for all sites and PRLs within an Operable Unit summarizing all current and historic operations and previous investigations.

Site and location files are also prepared for all sites and PRLs, respectively. These files contain data reports as well as information and references not included in the summary report for a particular site, such as interview notes, information from base files, inspection notes, soil boring logs, and analytical data. Site and location files will be updated as additional information is obtained for a particular site.

3.2 Investigation Phase

The second phase of the McClellan AFB CERCLA response program consists of seven investigation activities:

- Remedial Investigation Scoping;
- Site Characterizations;
- Initial Screening & Development of Alternatives;
- Treatability Investigations;
- Detailed Analysis of Alternatives;
- Remedial Investigation and Feasibility Study Reports; and
- Selection of Remedial Action.

Discussions of each of these activities and their relationship to each other follow. Further details are discussed in Section 4.0.

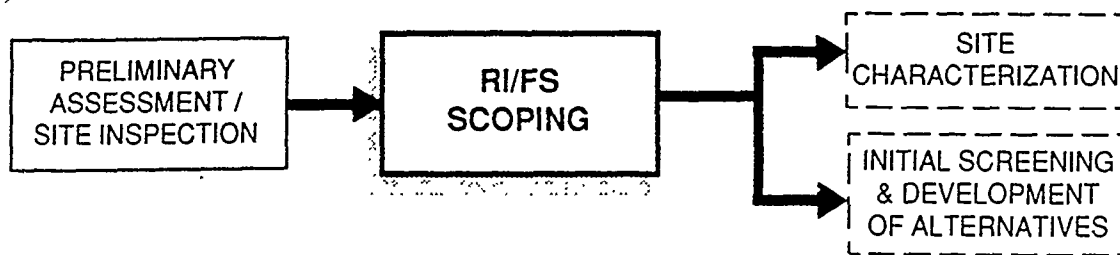
3.2.1 Remedial Investigation/Feasibility Study Scoping

Remedial Investigation/Feasibility Study (RI/FS) scoping is the initial step in the investigation phase where the site management strategy is developed and project

plans are prepared to guide future activities at McClellan AFB. During RI/FS scoping, criteria are also established to determine the priorities for site investigation activities and for conducting appropriate expedited or remedial response actions. Figure 3-3 presents an overview of the specific objectives, tasks, strategies, and deliverables associated with this activity. Discussions of specific project plans and RI/FS scoping activities follow.

The documents that will govern the implementation and document progress of the McClellan AFB Program include:

- The Comprehensive CERCLA Workplan (CCW);
- Project Plans that serve as guidance documents for the overall program, including:
 - Quality Assurance Project Plan,
 - Sampling and Analysis Plans, which provide a mechanism for planning and managing field activities,
 - Health and Safety Plan,
 - Community Relations Plan,
 - Preliminary Applicable or Relevant and Appropriate Requirements (ARARs),
 - Risk Assessment Protocol Manual,
 - Data Management Plan;
- Administrative Record Work Plan;
- Regulatory Agency Status Reports and Meetings; and



PURPOSES:

- Determine appropriate Expedited Response Actions and set priorities for conducting actions
- Develop project plans and management strategies to implement a comprehensive CERCLA Program for McClellan AFB that is consistent with the IAG
- Develop a schedule for implementation of plans and strategies

TASKS:

- Prepare Comprehensive CERCLA Workplan
- Prepare detailed project plans
- Establish Data Quality Objectives to be included in Sampling and Analysis Plans
- Develop conceptual site model
- Identify and reach agreement with federal, state, and local regulatory agencies on preliminary ARARs
- Begin formulation of potential remedial alternatives
- Evaluate the need for treatability studies

STRATEGIES:

- Group sites and develop remedial plans according to operable units (OUs). Focus on highest priority OUs first
- Streamline the McClellan AFB CERCLA Program to provide technical and cost effective response actions that are consistent with established priorities
- Involve the public during the initial planning of the overall McClellan clean up program, and in the review of the documents

**POTENTIAL
SUBSEQUENT
ACTIONS:**

- Expedited Response Actions (for highest priority sites/OUs which pose an immediate threat to public health, welfare, or the environment)
- Site characterization (where additional data are needed)
- Initial screening and development of alternatives (if available data are sufficient to allow a cost effective remedial program to proceed)

DOCUMENTATION:

- Comprehensive CERCLA Workplan (CCW) and updates
- Community Relations Plan (CRP) and updates
- Health and Safety Plan
- Quality Assurance Project Plan
- Administrative Record and Information Repository
- Monthly status reports
- Sampling and Analysis Plans for site characterization efforts
- Ranking Package
- Risk Assessment Manual

Figure 3-3. Remedial Investigation / Feasibility Study (RI/FS) Scoping.

Comprehensive CERCLA Workplan (CCW)

The Comprehensive CERCLA Workplan (CCW), presented here, is the conceptual framework for conducting remedial activities to meet CERCLA and IAG requirements. It defines the objectives, rationale, and schedules to be followed throughout the McClellan AFB Program. The CCW will be updated each January by the Air Force to reflect the dynamics of the program and to revise the cleanup effort plan, as appropriate. Although this workplan addresses the entire CERCLA process, descriptions of specific tasks vary depending on the amount and quality of existing data. Where additional data are required to plan tasks, the level of detail provided herein is limited. The scope of these future activities will be refined in future revisions to the CCW.

Project Plans and Communications

A Quality Assurance Project Plan (QAPP) has been prepared (Radian, May 1990) to ensure that the data collected during the RI are gathered in a consistent and defensible manner. The QAPP includes specifications for all field sampling, laboratory analysis, data management activities and follows guidelines presented in the U.S. EPA *Interim Guidelines and Specifications for Preparing Quality Project Plans*. Other regulatory documents consulted include the U.S. EPA's *Interim Final Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (October 1988), as well as the *California Site Mitigation Decision Tree Manual* (May 1986) prepared by the DHS. The McClellan AFB QAPP will be reviewed periodically and modified as appropriate. The QAPP includes the following sections:

- Introduction;
- Project Description;
- Project Organization and Responsibility;
- Quality Assurance Objectives for Measurement and Geologic Data;
- Field Procedures:
 - Geophysical Techniques,
 - Drilling,
 - Well Installation,
 - Sample Storage and Preservation Requirements,

- Groundwater Sampling,
- Surface Water Sampling,
- Soil Sampling,
- Sediment Sampling,
- Soil Vapor Sampling, and
- Ambient Air Monitoring;
- Sample Custody;
- Calibration Procedures and Frequency;
- Analytical Procedures and Calibration;
- Data Reduction, Validation, and Reporting;
- Internal Quality Control;
- Performance and Systems Audits;
- Preventive Maintenance;
- Data Assessment Procedures;
- Corrective Action;
- Quality Assurance Reports; and
- Site Management.

General data quality objectives (DQOs) have been developed as part of the QAPP in accordance with the U.S. EPA guidance document *Data Quality Objectives for Remedial Response Activities Development Process* (March 1987). Data quality objectives are qualitative and quantitative specifications developed during the RI/FS process to ensure that data are adequate for supporting decisions. Specific DQOs will be developed, as appropriate, for each data collection effort during the development of distinct Sampling and Analysis Plans and must be considered to determine the selection of the number, type, frequency of samples, and the type of analytical methods and quality assurance procedures to be used. Some highlights from the QAPP are described below.

Data Quality Objectives are discussed at greater length in the Data Management Plan discussion found later in this section.

The Field Procedures section of the QAPP includes descriptions of all sampling protocols to be used in the field. These protocols include: geophysical techniques; groundwater, surface water, soil, soil vapor, and air sampling or direct measurement techniques; well drilling and installation; and field management (permits, work logistics, access, etc.).

The Analytical Procedures section of the QAPP includes a brief description of standard analytical methods and lists of parameters to be measured along with detection limits that are attainable with the specified techniques. The data assessment section identifies statistical calculations and assessment procedures that will be used to evaluate and document data quality.

The Data Reduction, Validation, and Reporting section includes data generation, data processing and storage, standard data reporting requirements, and numbering methodology, and describes the procedures used to establish and maintain a data management system for McClellan AFB analytical data. This system provides for the efficient storage, retrieval, and analysis of data gathered during the McClellan AFB RI/FS. The data management functions include:

- Verified data entry/transfer from the laboratory to the database;
- Incorporation of new data as it is obtained during the RI/FS;
- Quality assurance/quality control information to verify analytical data;
- Data and file manipulation capabilities as required by project personnel;
- Data retrieval for analysis and interpretation, reporting, mapping, and graphics; and
- Maintenance of a file system containing all raw data sheets for verification and quality control audits.

A copy of the QAPP will be in the possession of field sampling teams for all sampling efforts. Subcontractors will also be required to comply with the procedures documented in the QAPP.

If revisions and/or new sections of the QAPP are required as part of a new field data collection task, they will be prepared as part of that task and incorporated into the comprehensive RI/FS QAPP. This includes revisions to information regarding subcontractor qualifications for sampling, well drilling, and analytical tasks.

Sampling and Analysis Plans

Sampling and Analysis Plans are specific workplans that are prepared for all field activities. They describe the:

- Site background;
- Specific sampling objectives (including DQOs);
- Initial sampling location and analysis methods;
- The decision matrix for sampling and analysis at each site;
- The sample numbering system to be used;
- Sampling equipment and procedures; and
- Sample handling and analysis.

Where possible, specific sections may be referenced to the appropriate section within the QAPP.

Current McClellan AFB SAPs include:

- Preliminary Pathway Assessment (Surface Water);
- Preliminary Groundwater Operable Unit Remedial Investigation (PGOURI);
- OU B Groundwater Operable Unit Remedial Investigation; and
- Groundwater Sampling and Analysis Program.

These SAPs apply to field efforts that have been performed, are ongoing, or are proposed to be conducted in the near future. Details of these SAPs are presented

in the following Section 3.2.2. Other specific SAPs will be prepared for distinct phases in the investigations as noted in Section 4.0.

Health and Safety Plan

The Health and Safety Plan (Radian, January 1989) has been prepared and forms the basis of a safety program designed to protect the health and safety of workers conducting hazardous waste site inspections at McClellan AFB. This plan was prepared in accordance with applicable U.S. EPA, National Institute for Occupational Safety and Health (NIOSH), Air Force, and California Department of Health Services (DHS) guidelines. The primary guidance document is *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities* (October 1985) prepared as a joint effort by NIOSH, OSHA, U.S. EPA, and the U.S. Coast Guard. Applicable requirements of the California Administrative Code, Title 8 (General Industrial Health and Safety Orders) and the Federal OSHA Standard "Hazardous Waste Operations and Emergency Response," 29 CFR 1910.120 have been incorporated.

The complete Health and Safety Plan includes the following sections:

- Introduction, with a statement of activities and responsibilities of key personnel;
- General site information;
- Contaminant characterization;
- Hazard analysis--physical and chemical;
- Monitoring program;
- Hydrocarbon hazard response criteria;
- Personal protective equipment;
- Site control and work zones;
- Employee/contractor training;

- Medical considerations;
- Emergency response plan; and
- Recordkeeping requirements.

The characterization section includes hazard evaluation and safety precautions for all applicable field procedures that have been implemented to date or are anticipated to occur in the near future. If additional procedures are required for a new task, or if work activities are anticipated for an area containing potential contaminants and/or health and safety hazards not adequately addressed in the current plan, addendums will be prepared by an appropriate health and safety professional as part of that task and will be incorporated into the Health and Safety Plan.

Community Relations Plan

A Community Relations Plan (Radian, August 1988) for McClellan AFB was prepared in accordance with CERCLA guidelines. The Community Relations Plan (CRP) describes the current situation, a history of the McClellan AFB waste problem, and what response actions have been implemented to date, focusing on public concerns. The plan also chronicles community involvement in McClellan AFB activities, provides a profile of the community, records community concerns, and outlines the Air Force's plans for communicating with and responding to these concerns. Twenty specific methods for meeting the CRP objective are spelled out in the CRP. The CRP identifies a schedule for these activities and explains their relationship to scoping, investigation, and cleanup activities. Also included in the CRP are elected official and media contact lists; meeting and information repository locations; the McClellan AFB Installation Restoration Program (IRP) Task Force Charter; and transcripts of community interviews. The CRP will be reviewed and revised annually to respond to current community concerns and needs as determined through interviews with members of the community and public officials.

A major vehicle for communicating remedial action plans to interested citizens is the Community Relations Task Force. This group comprises representatives from McClellan AFB, the California Congressional Offices, regulatory agencies, and county and city governments. The group meets quarterly to review progress and plans to clean up the base, and to make suggestions on cleanup activities. The county and city government task force members serve as a communications link with the local community by

bringing concerns and questions before the other Task Force members and by carrying McClellan AFB and agency decisions back to the concerned citizens. Task Force meetings also provide a forum for concerned citizens to directly express concerns and ask questions of the respective Task Force members.

Preliminary Applicable or Relevant and Appropriate Requirements (ARARs)

Section 121(d) of CERCLA as amended by Superfund Amendments and Reauthorization Act (SARA) requires that remediation activities at McClellan AFB meet applicable or relevant and appropriate requirements (ARARs). Identification of ARARs is an integral and ongoing component of the RI/FS process. The intent of meeting ARARs is to select and implement remedies that are protective of human health and the environment in accordance with other regulatory requirements.

The Technical Approach: Evaluation and Selection of ARARs and Other Cleanup Levels (Radian, August 1988) identifies ARARs that are potentially applicable to the remediation of hazardous waste sites at McClellan AFB, providing potential cleanup levels for most of the contaminants identified on the base to date. A method for determining cleanup levels in the absence of ARARs is also specified. This document will be updated, as appropriate, as new regulations are promulgated or if new compounds are discovered.

Other ARARs, such as those required for a specific type of cleanup, will be identified during the course of the McClellan AFB remedial investigation. Prior to issuing draft reports requiring ARAR determinations, the Project Managers will meet to identify pertinent ARARs. DHS will identify potential state ARARs. Draft ARAR determinations will be prepared by the Air Force to facilitate discussions among the parties; ARAR determinations will be reexamined throughout the RI/FS process.

Risk Assessment Protocol Manual

The final Risk Assessment Protocol Manual (Radian, March 1987) was prepared as a basis for all risk assessment activities. This manual identifies the relationships among the supporting processes including: data needs; exposure assessment methods and assumptions; types of fate and transport models to be used; toxicological assessment methods; uncertainty analysis methods; data management requirements; quality assurance; and peer review procedures. It will ensure that decision-making

throughout the McClellan AFB CERCLA Response Program is based on consistent, defensible, and clearly documented analyses.

Data Management Plan

An information management needs assessment is being conducted by McClellan AFB for their internal as well as regulatory agency requirements. The assessment will evaluate current and future information needs for the participating organizations involved in the McClellan AFB CERCLA Project. From this evaluation, the feasibility of creating an automated information system to meet the participants' needs will be determined. McClellan AFB will then determine specific details for implementing the information management system. McClellan AFB anticipates that the detailed implementation plan for the information management system will serve as the Data Management Plan.

McClellan AFB currently uses a data management system. The major system components, data tracking and storage, reporting, data quality documentation, and data security are described below. This section concludes with a discussion of data quality objectives.

Reporting--Several types of reporting from the computerized database are required to support RI/FS activities. Analytical results for field samples, and geologic and lithologic information are reported in specified formats for the central IRP database. Standard and custom reports for technical reports and data analysis and interpretation are produced. Standard reporting guidelines and specifications have been established in the QAPP. Standard QC data reports are also required for data validation.

Data Quality Documentation--Data quality is evaluated and documented as part of data management and QA/QC activities. Data assessment and review procedures are specified in the QAPP. These procedures consist of initial review of all analytical and field results for consistency and completeness. The analytical results are electronically transferred to the IRPIMS database, and QC checks are conducted to ensure accurate data loading. Standard QC reports are produced and used to validate the data. Suspect results are investigated and corrective actions taken as needed; data flags are used to document data quality problems for analytical results. Data assessment reports are prepared for each data collection activity and included as part of the technical report.

Soil and groundwater data collected prior to 1985 do not have adequate control data. Data quality assessments are not proposed for this data. Groundwater data, collected prior to 1985 stored in a database, has been transferred into the project database. The remaining groundwater data and the soil data collected prior to 1985 is archived in hard copy format.

Data Security--Security of all data is ensured by controlled access to Radian offices, and strict checkout procedures for any technical reports or data files. The computer systems are password protected to restrict access to data files.

Data Quality Objectives (DQOs)--DQOs guide data collection efforts for each phase of the RI/FS. Data Quality Objectives are qualitative and quantitative statements that specify the quality of data required to support decisions made during remedial activities. They are developed to ensure that data of known and adequate quality are obtained as part of these activities. Data Quality Objective development is a staged process that consists of identifying the types of decisions to be made about a site, identifying data needs and uses required to support the decision-making process, and design of a data collection program to obtain and report the data. DQO development is an ongoing, iterative process where the data collection objectives may be reevaluated and revised considering new data and results from earlier phases of the RI/FS. A brief description of each DQO development stage and how the process is being applied to the McClellan AFB RI/FS is presented in this section.

Identification of decision types is the first stage of DQO development, in which data users are identified and involved at the beginning of the site investigation phase of the RI/FS. The available data are evaluated and a conceptual model of the site is developed. From this, specific investigation objectives and types of decisions to be made are determined. The remedial action objectives and decision types for sites at McClellan AFB are being developed within the designated operable units and, in general, are used to:

- Identify potential or known locations of hazardous materials release;
- Determine the type, magnitude, and extent of contamination at those locations;
- Identify contaminant pathways and determine threats to human health and the environment; and

- Select and implement the most cost-effective remedial actions to clean up the sites to nonhazardous levels.

The remedial action objectives and decision types for an operable unit or individual potential release locations will be stated explicitly in technical reports, workplans and/or sampling and analysis plans developed for the RI/FS investigations.

The second stage of DQO development is to identify data uses and the need for additional data. Included in this stage is establishing criteria for data adequacy or quality, and selection of appropriate sampling and analytical methods. The data quality criteria are called quality assurance objectives (QAOs) and are expressed in terms of precision, accuracy, representativeness, completeness, and comparability (PARCC) objectives for all types of measurement data. The QAOs are presented in the McClellan AFB RI/FS Quality Assurance Project Plan (QAPP). Determining the appropriate locations, number and type of samples, including QA/QC samples, and selection of sampling and analytical methods is an important aspect of this stage of DQO development. This stage of DQO development is represented in specific sampling and analysis plans for individual sample collection efforts, and in the QAPP.

Data uses include health and safety monitoring during field activities, establishing baseline conditions and monitoring trends in contaminant concentrations, risk assessment or comparison to human health criteria, model input parameters, evaluation of remedial alternatives, and engineering design specifications for soil or groundwater remedial measures. When multiple uses are intended for the data, they can be prioritized in terms of data quality requirements and other factors that influence the data collection activity. Other factors to consider are required detection limits and contaminants and concentrations of concern that will dictate selection of specific analytical methods. Critical samples or locations will also include the number and type of samples to be collected. When data have multiple uses within one or more phases of the RI/FS, selection of the sampling and analytical methods will be based on satisfying the highest priority use of the data. This approach is the most cost-effective, and limits the potential to collect multiple samples at a given location over time to satisfy different data use and quality requirements that are currently known.

Data collection efforts to date have primarily focused on the initial investigation phases of the RI/FS to establish baseline conditions and determine the type, magnitude, and extent of contamination basewide. The data have also been used to perform trend analyses by well and general location, and to monitor the effect of remedial



measures that have already been implemented, such as the extraction systems in OUs D and C. These data have also been used to define the operable units for continued investigation. Additional data have been collected to support selection of response alternatives. These data have been integrated into the overall data collection and reporting scheme.

The third phase of the DQO development process is design of a data collection program. This is specified in the sampling and analysis plan for each sample collection effort and incorporates QAPP elements directly or by reference. Because the QAPP has developed in a comprehensive format, the sampling and analysis plans must specify the number and type of samples, locations, and QA/QC requirements for the sampling effort. Data handling and reporting also is addressed in both the QAPP and individual sampling and analysis plans.

Administrative Record and Information Repository

The Superfund Amendments and Reauthorization Act (SARA) requires that an Administrative Record supporting the selection of a response action be established at or near the facility under investigation in a location accessible to the general public. Additionally, each item developed, received, published, or made available to the public under SARA 117(d) must be available for public inspection and copying at an information repository at this location.

An Administrative Record Workplan for McClellan AFB states that the Administrative Record and Information Repository will be established in accordance with SARA. The McClellan AFB Administrative Record is currently being developed and will contain all documents used by McClellan AFB in the RI/FS decision-making process, including all documents considered or relied on to select or design remedial actions. The Administrative Record will be updated on a quarterly basis. Each update will include an index of documents in the complete record.

Several information repositories located near McClellan AFB have been established. They are:

Sacramento Central Library, 828 I Street, Sacramento, CA 95814
Phone: 449-5203, Ms. Abe -- Complete Reports



North Highlands Branch Library, 3601 Plymouth Drive,
North Highlands, CA 95660
Phone: 331-0675, Ms. Wallen -- Executive Summary of Reports

Rio Linda Branch Library, 902 Oak Lane, Rio Linda, CA 95673
Phone: 991-4515, Mr. Tomasik -- Executive Summary of Reports

Del Paso Heights Branch Library, 920 Grand Avenue,
Sacramento, CA 95838
Phone: 927-1133, Ms. Bate -- Executive Summary of Reports

McClellan AFB Library, McClellan AFB, CA 95652
Phone: 643-4640, Mr. Champneys -- Complete Reports

Regulatory Agency Status Reports and Meetings

Regulatory Agency Status Reports and Meetings will be prepared and conducted on a scheduled basis to facilitate communication with regulatory agencies. Agency status reports describing the technical progress of the McClellan AFB Remedial Response Program will be prepared monthly and submitted to the regulatory agencies. The McClellan AFB tasks will be organized and presented in a consistent manner and will discuss the following items for each task or activity:

- Identification of the activity;
- Status of work and progress during the reporting period;
- Schedule status;
- Difficulties encountered during the reporting period;
- Actions being taken to rectify problems; and
- Key activities planned for the next reporting period.

In addition to monthly status reports, quarterly meetings with the regulatory agencies will be held. Technical planning meetings with the agencies will also occur during the preparation of key documents. Fifteen days after the documents have been submitted to the agencies, a meeting will be held to present the contents, and explain the conclusions if so requested by the project managers. Fifteen days after the close of the 60-day agency review period for draft documents, the agencies and McClellan AFB will meet to discuss comments. Forty-five days after this meeting, McClellan AFB will transmit either a response to agency comments or a draft final report for secondary and

primary documents, respectively. A final document will be transmitted 30 days after the draft final document is issued if no comments are made in the draft final document.

3.2.2 Site Characterization

Site characterization is the step within the investigation phase where detailed site-specific remedial investigations are implemented for the purposes of defining sources of contaminants, determining the nature and extent of contamination, assessing the potential threat to human health, welfare, or the environment, and providing data for developing and evaluating potential remedial alternatives. This subsection discusses remedial investigation tasks that are recently completed, ongoing, or are planned for the future at McClellan AFB. Figure 3-4 presents a summary overview of the objectives, tasks, strategies, and deliverables associated with this activity.

Table 3-1 summarizes the purpose, priority, and status of all currently planned site investigation activities. Since groundwater poses the greatest potential route of exposure to the public, these investigations address both the extent of groundwater contaminant migration and the sources of contamination. This two-pronged approach allows control of contaminant migration to protect off-base groundwater while the investigation of the more concentrated sources of contamination continue. The investigations described in Table 3-1 will also form the basis for long-term remedial actions.

The process of site characterization at the McClellan AFB will nominally occur in four major tasks as indicated in Figure 3-5. These four steps will lead to a response action through either an Expedited Response Action (e.g., Engineering Analysis/Cost Evaluation - EE/CA) or full-scale investigation. The four steps involved with site characterization are briefly described below.

1. Preliminary Assessment/Site Inspections

These are conducted for each of the 170 sites, as described previously in Section 3.1.

2. Preliminary Groundwater Operable Unit Remedial Investigation (PGOURI)

The objective of the PGOURI is to collect data for the entire base to allow characterization of the local hydrogeology. Specific purposes of the PGOURI include developing a better understanding of:

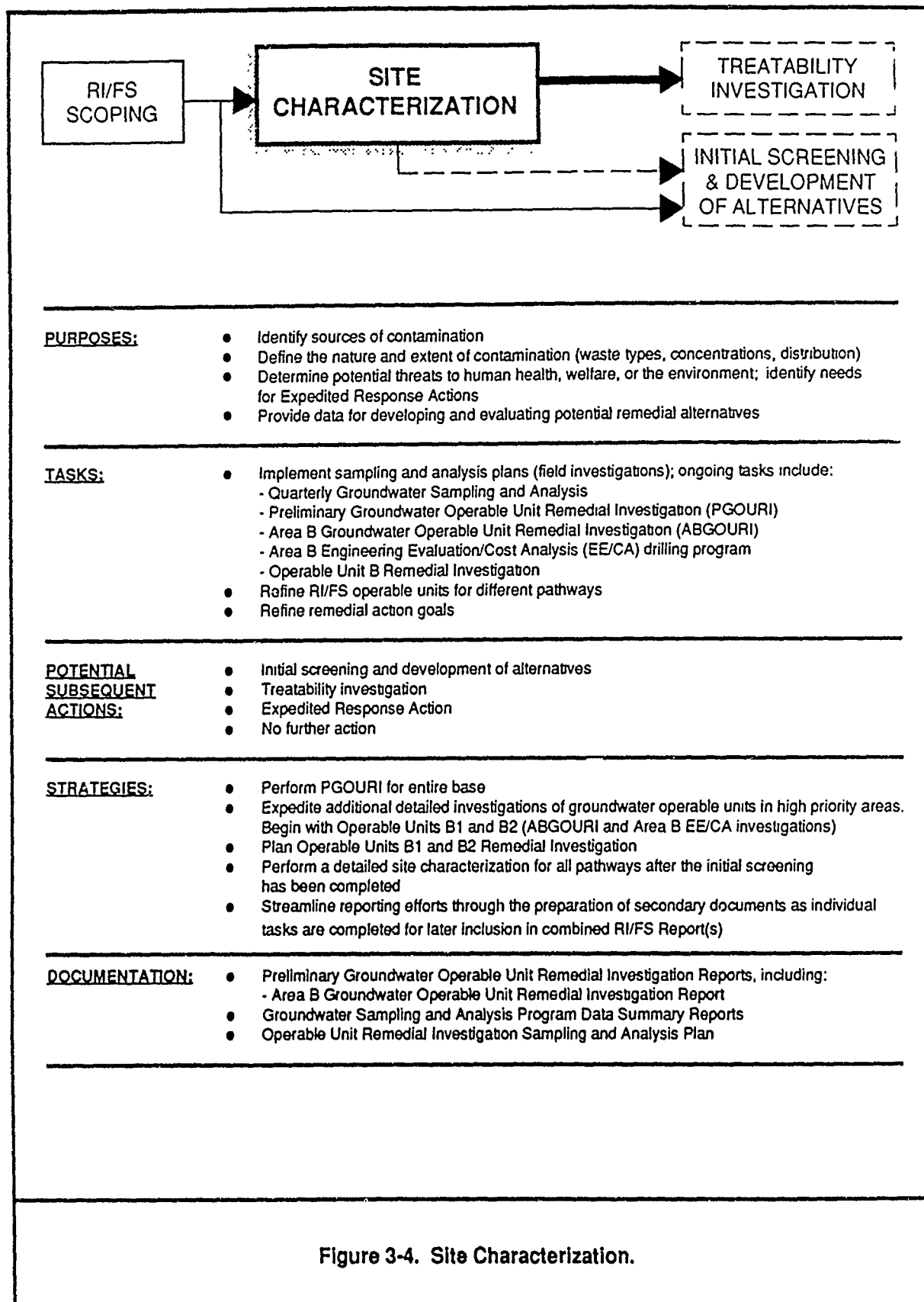


TABLE 3-1. CURRENT SITE CHARACTERIZATION INVESTIGATIONS

Investigation ^a	Purpose	Status
Groundwater Sampling and Analysis Program	- Characterize and monitor the magnitude and extent of groundwater contamination. - Evaluate the effectiveness of response actions implemented for control and cleanup of contaminated groundwater (Areas C and D extraction systems). - Determine trends in contaminant migration. - Collect and analyze groundwater samples from monitoring wells located on and off base, and evaluate and interpret the analytical results. Monitoring and extraction wells are sampled on a quarterly, semiannual, annual or biennial basis. - Collect data to help establish the priority to further investigate the contaminant concentrations and groundwater flow for operable units located along the southern boundary of McClellan AFB, since contaminated groundwater in this area has the greatest potential to flow off base toward near-by municipal and residential water supply wells.	- Ongoing. - Data from each quarterly sampling activity are presented in quarterly Data Summary reports. Data gathered during the four quarters of 1988 received a detailed evaluation and interpretation in the <u>Annual Technical Report (Radian, July 1989)</u>.
Preliminary Groundwater Operable Unit Investigation (PGOURI)	- Provide basewide data on groundwater flow and contaminant concentrations by installing additional groundwater monitoring wells. - Refine preliminary groundwater operable units.	- Sampling and Analysis Plan prepared following an evaluation of relevant hydrogeological data prepared by other contractors. - Ongoing field work commenced in September 1989.
Operable Unit B Groundwater Operable Unit Remedial Investigations (ABGOURI)	- Determine if any threat of contamination to active municipal water supply wells exist in the operable units defined by Area B and the area southwest of Area B (off base). - Identify hydrogeologic zones that are most appropriate for future monitoring of groundwater and contaminant migration.	- Conducted in April 1989. - ABGOURI report complete. - Based on review of the data collected during investigation, the Area B Engineering Evaluation/Cost Analysis was implemented.

(Continued)

TABLE 3-1. (Continued)

Investigation ^a	Purpose	Status
Operable Unit B Engineering Evaluation/ Cost Analysis	- Obtain additional data on contaminant concentrations and aquifer characteristics by installation of 15 groundwater monitoring wells and aquifer testing. - Identify and evaluate response alternatives to address groundwater contamination in Operable Unit B.	- Field work began in September 1989. - Document preparation began in December 1989.
Remedial Investigation (RI)	- Identify, characterize, and prioritize contaminant sources within operable units. - Conduct RI for each operable unit, as applicable.	- Sampling and Analysis Plans to be prepared for each operable unit following completion of the Preliminary Assessments for that unit. - Sampling and Analytical Plan for Operable Unit B is being prepared. - Field work to begin on Operable Unit B in Summer 1990.
Preliminary Surface Water Pathway Assessment	Determine the potential for migration of hazardous constituents via surface water.	- Sampling and Analysis Plan prepared. - Field work completed. - Report completed in Fall 1989. - Data potentially used to refine Operable Units, ERAs, Remedial Actions, or No Further Actions, as appropriate.

^aThe Preliminary Groundwater Operable Unit Investigation and Remedial Investigations are described in more detail in the text.

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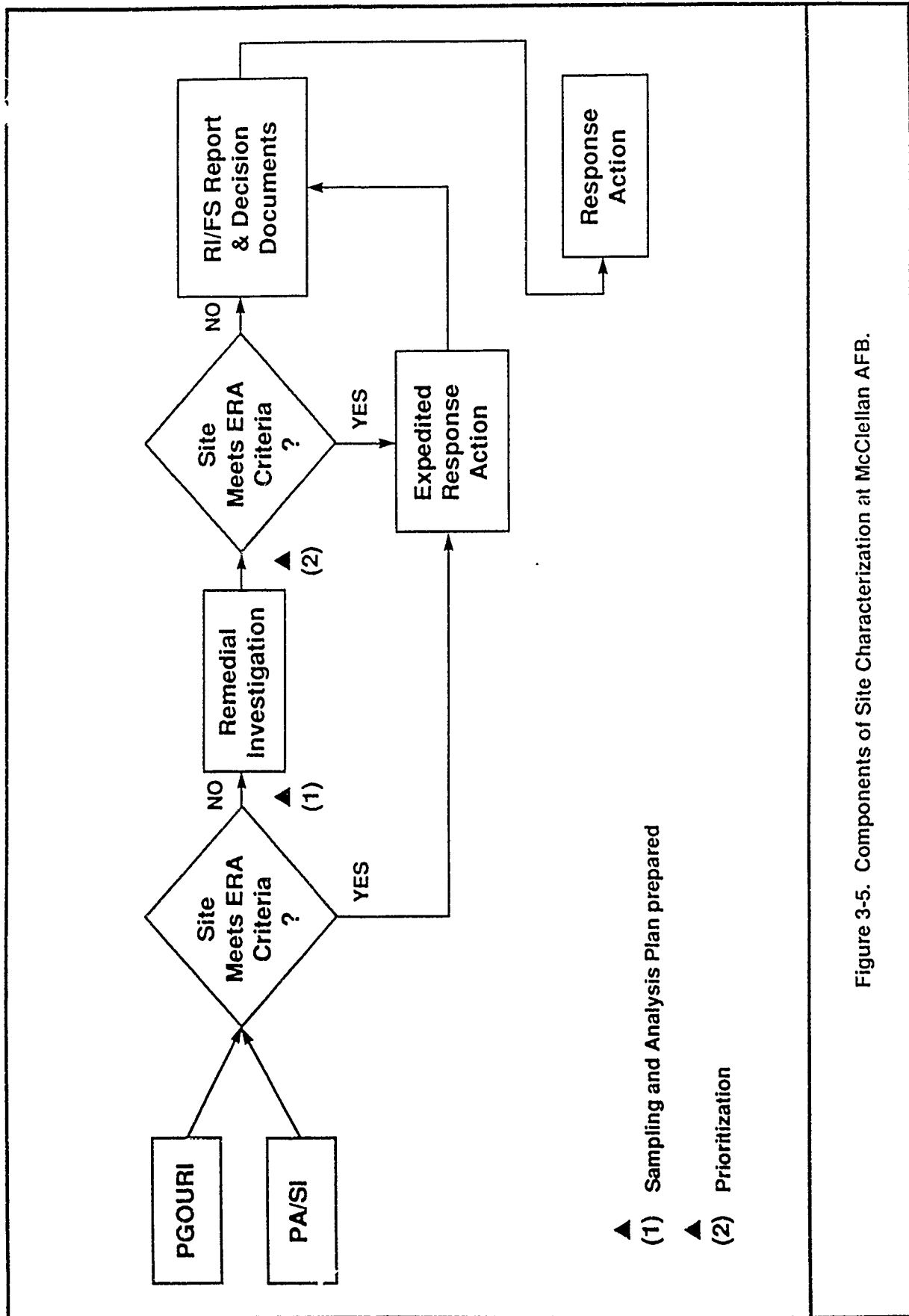


Figure 3-5. Components of Site Characterization at McClellan AFB.

- On- and off-base groundwater flow,
- Relationships between saturated zones,
- Extent and migration of contaminated groundwater, and
- Effects of on- and off-base pumping on contaminant migration.

The results of this assessment will help evaluate groundwater impacts, refine groundwater operable units and remedial alternatives in the RI/FS, and identify the type of groundwater modeling needed to evaluate the effectiveness of remedial alternatives.

Should results of the PGOURI indicate the potential for contaminated groundwater to migrate off base and threaten nearby water supply wells, then a Groundwater Operable Unit Remedial Investigation will be planned and implemented. This investigation will be similar to the OU B Operable Unit Remedial Investigation and will define the extent of contamination, direction of migration, and any threat to city wells, and will evaluate the feasibility of initiating a removal action to alleviate any existing threat. A Groundwater Operable Unit Remedial Investigation will not be considered a replacement for, but only a phase of, a full-scale remedial investigation.

3. Operable Unit (OU) Remedial Investigation (RI)

The purpose of the OU RI is to identify the sources, nature, and extent of contaminants contributing to soil and groundwater contamination.

- Phase I investigations will be the first investigation described in RI SAPs prepared for the operable units. Operable Unit B will be the first areas subjected to Phase I investigations because a contaminant plume is migrating off base from those areas. Phase I is a screening phase of data collection to determine if contaminants are present in soils, and if so, to determine if they have migrated to groundwater. If no contaminants are found in sites during Phase I, no further action will be taken. Samples of soil, groundwater or soil vapor will be selected for quantitative analyses in a certified laboratory.

A soil gas investigation may be implemented prior to the Phase I investigation to guide the collection of samples during Phase I. This

approach must be verified in the field prior to general implementation. A detailed description of soil gas sampling and analysis methods will be documented in the respective RI SAPs.

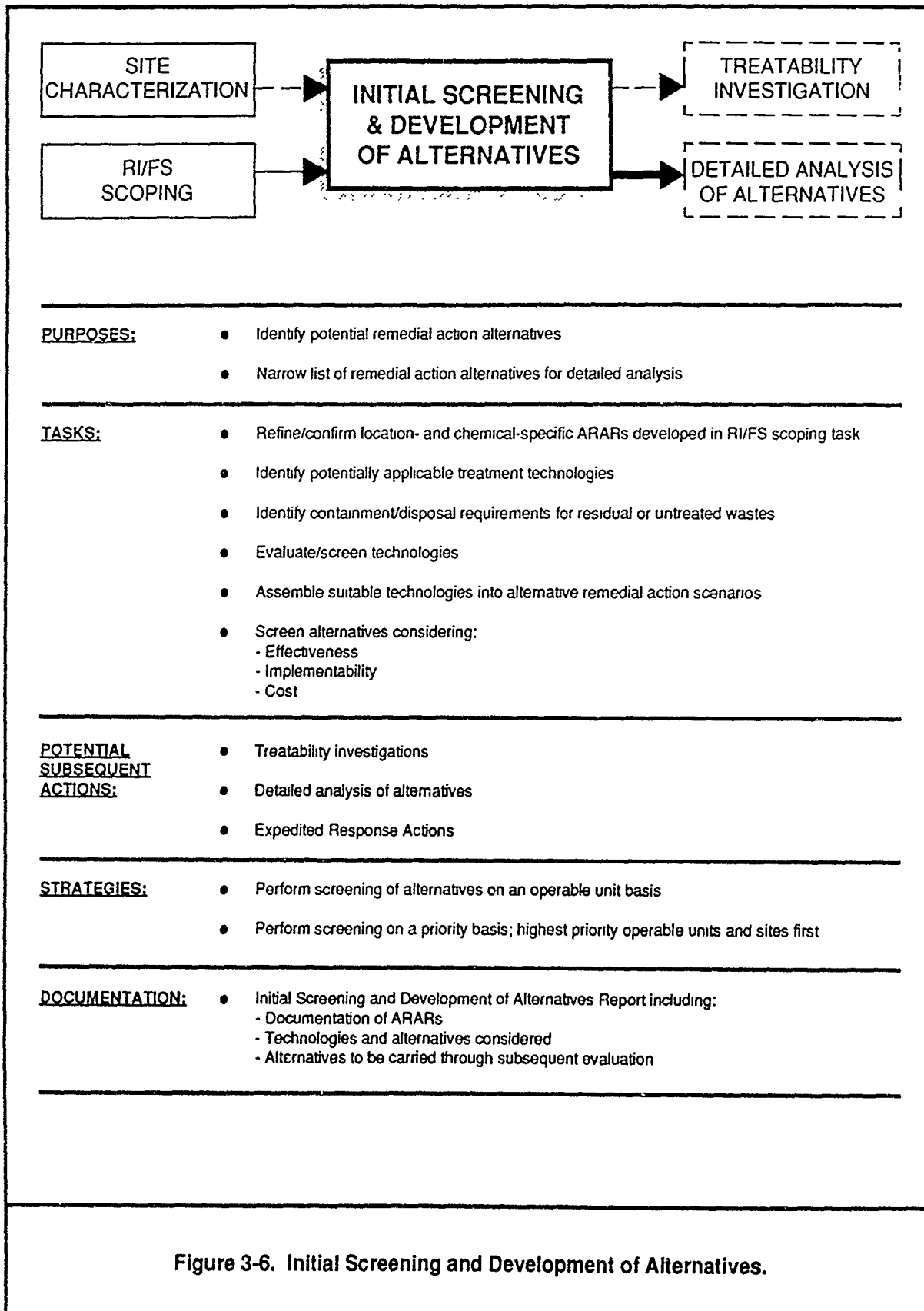
In addition to prioritizing sites for further investigation, data from Phase I will be used to initiate Expedited Response Actions (if appropriate), or to support the determination for no further action.

- Phase II investigations will be the principal data collection phase of the RI. Site characterization will be planned for each OU, beginning with OU B, and described in detail in the RI SAP. Following completion of Phase I for a site, a logical sampling decision protocol will be implemented to complete characterization of the nature and extent of contamination and to collect data to support selection and design of cleanup alternatives. The sampling decision protocol allows flexible decision making, based on field conditions that meet established objectives and environmental parameters. Data developed during Phase I will be evaluated against criteria and result in recommendations for additional field sampling. The full site characterization will include data from past investigations, and will be performed in full conformance with CERCLA guidance. The investigation will include characterization of contaminants in soil, surface water, groundwater, and soil vapor. During this phase, appropriate Expedited Response Actions may also be initiated.

3.2.3 Initial Screening and Development of Alternatives

The purpose of the Initial Screening and Development of Alternatives task is to identify potential remedial action alternatives and to narrow the list of remedial action alternatives for detailed analysis. Figure 3-6 presents a summary of the objectives, tasks, strategies, and deliverables associated with this activity.

This task will begin during the planning of the site characterization task by utilizing information gathered during the RI field investigations to identify and screen candidate remedial technologies. The screening process will occur by comparing the potential technologies against the Remedial Action objectives and technical implementability. Those technologies that remain after screening will be assembled into remedial alternatives. Remedial alternatives are formulated by combining technologies



to address all contaminant pathways and points of exposure. Once a list of remedial action alternatives is developed, alternatives will be screened to eliminate those which are an order of magnitude more costly than other acceptable alternatives or which have adverse environmental impacts which preclude their use. Alternatives that satisfy the remedial response objectives and contribute substantially to the protection of public health, welfare, and the environment will be considered further. Alternatives may also be added during this and remaining stages as a result of new technologies or new program concerns.

Several potential subsequent actions are possible as a result of the Initial Screening and Development of Alternatives task. These actions include:

- Initiation of expedited response actions;
- Treatability investigation(s); and
- Detailed analysis of alternatives.

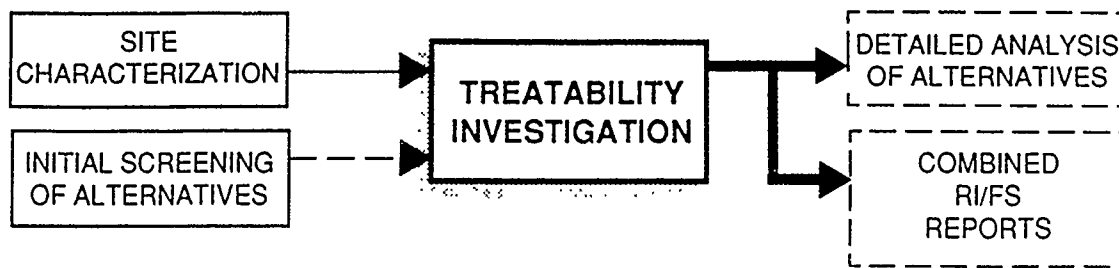
The identification and initiation of expedited response actions is a possibility throughout the McClellan AFB program. Based on this initial feasibility evaluation, additional site characterization data or bench and pilot scale studies may be needed before the feasibility evaluations can be completed.

For the screening phase, evaluations will be performed on an operable unit basis. This and subsequent feasibility study activities will be performed on a priority basis to ensure that operable units which pose the greatest threats to public health and welfare are evaluated first. Potential candidates for priority treatment include those operable units that present the greatest potential for off-base contaminant migration.

An Initial Screening and Development of Alternatives report will be prepared summarizing the results of the evaluation for each operable unit. Upon completion of all operable unit evaluations, an Initial Screening and Development of Alternatives Report will be prepared for the entire base. Regulatory agency participation will be promoted throughout this process.

3.2.4 Treatability Investigations

The purpose of treatability investigations is to obtain needed data to support the evaluation of remedial alternatives. Figure 3-7 presents a summary of the objectives, tasks, strategies, and deliverables associated with this activity. In addition, data gathered



PURPOSES:

- Obtain data for detailed evaluation of alternatives
- Obtain further site characterization data as needed to develop workable remedial technology designs

TASKS:

- Conduct literature survey and document the need for treatability testing
- Perform bench and pilot scale feasibility and treatability tests
- Collect site-specific field data

**POTENTIAL
SUBSEQUENT
ACTIONS:**

- Detailed analysis of alternatives
- Expedited Response Actions

STRATEGIES:

- Closely track remedial technology developments during the progress of the RI program to avoid unnecessary costs, duplication of others' treatability work, and schedule delays
- Emphasize the use of technologies that are available or can be designed to operate in a modular or mobile fashion

DOCUMENTATION:

- Treatability Study Workplan
- QAPP (Revised)
- Sampling and Analysis Plans (by sites)
- Treatability study reports (by technologies)
- Treatability study Health and Safety Plan

Figure 3-7. Treatability Investigation.

during treatability investigations can be used to assess potential risks to public health. Tasks conducted during the treatability investigation include:

- Review of existing data and comparison to Data Quality Objectives (DQOs);
- Evaluate existing site-specific data;
- Evaluate existing remedial technology data;
- Collection of site-specific data; and
- Bench- and pilot-scale treatability studies.

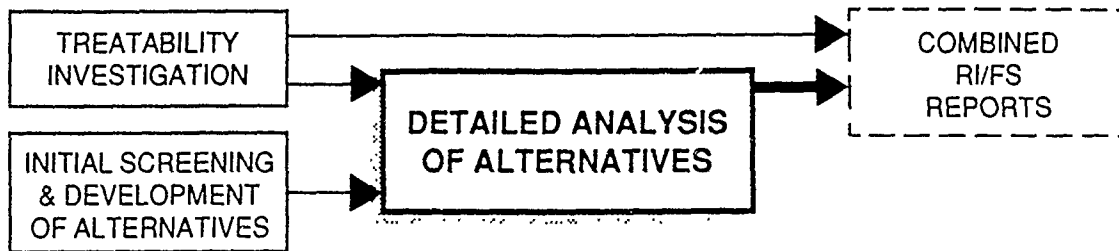
A review of existing data and comparison to DQOs is performed to determine whether the data from previous site characterizations are sufficient and of acceptable quality to describe the site conditions and risks to public health and the environment so that the treatability study evaluation can proceed. If it is determined that additional site information is needed, for example, to further define the extent of soil contamination, additional soil borings may be recommended.

Bench- and pilot-scale treatability testing provide sufficient information to allow treatment technologies to be fully developed and evaluated, to reduce the uncertainties of the treatment cost and performance estimates, and to provide information needed to develop the remedial design of the selected remedy. The evaluation of incineration technologies, fixation and stabilization techniques, groundwater extraction and treatment, and soil gas extraction are several candidate technologies that could be recommended for treatability studies.

McClellan AFB is currently planning to conduct a treatability investigation to address contamination in soil containing hazardous waste. This evaluation of technologies is necessary to comply with the land ban of hazardous wastes.

3.2.5 Detailed Analysis of Alternatives

During the detailed analysis, the alternatives brought through screening are further refined, as appropriate, and analyzed in detail with respect to previously established Remedial Action objectives. Figure 3-8 presents a summary of the objectives,



PURPOSES:

- Select from among technically feasible remedial alternatives, the most attractive, based upon a consideration of the following criteria:
 - Short-term effectiveness
 - Long-term effectiveness and permanence
 - Reduction of toxicity, mobility, or volume
 - Implementability
 - Cost
 - Safety
 - Compliance with ARARs
 - Overall protection of human health and environment
 - Regulatory agency acceptance
 - Community acceptance

TASKS:

- Evaluate performance, reliability, implementability, and safety features of selected alternatives
- Perform comparative Risk Assessment to determine relative impacts of alternatives on public health and the environment
- Cost analysis
- Obtain community input

**POTENTIAL
SUBSEQUENT
ACTIONS:**

- RI/FS Report
- Expedited Response Actions

STRATEGIES:

- Integrate Feasibility Study results with site characterization, treatability investigation, and risk assessment results in the combined RI/FS Reports
- Obtain active regulatory agency involvement and review of the Detailed Analysis of Alternatives Report

DOCUMENTATION:

- Detailed Analysis of Alternatives Report

Figure 3-8. Detailed Analysis of Alternatives.

tasks, strategies, and deliverables associated with this activity. This task begins after the completion of the Initial Screening and Development of Alternatives task. If existing data are inadequate to support the detailed analysis, then additional information may be collected during the treatability investigations. This final step in the alternatives evaluation process involves an assessment of the selected alternatives with respect to the following criteria:

- Short-term effectiveness;
- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility, or volume;
- Implementability;
- Cost;
- Compliance with ARARs;
- Overall protection of human health and environment;
- Regulatory agency acceptance; and
- Community acceptance.

Those alternatives that remain after the initial screening will be subjected to a detailed analysis. The objective of this analysis is to select the most cost-effective and technically acceptable alternative as required by the National Contingency Plan (NCP).

Several potential subsequent actions can occur after completion of the Detailed Analysis of Alternatives. One of the possible actions is the identification and initiation of an Expedited Response Action, which may involve removal, treatment, or the implementation of an interim measure to mitigate the short-term impact of the contamination problem.

Another potential subsequent action is the preparation of a Feasibility Study Report which will summarize treatability investigations (if performed), and the results/conclusions of the remedial alternatives evaluation.

The results of the Detailed Analysis of Alternatives task will be documented in a report that will contain:

- Descriptions of the combined technologies that make up each remedial alternative;

- Control, storage, treatment and/or disposal requirements;
- Special engineering, safety, environmental, public health, and welfare, or other considerations that affect the feasibility of each alternative;
- Operation, maintenance, and monitoring requirements for the short and long term;
- Public health and/or environmental impacts associated with each alternative; and
- Implementation schedule.

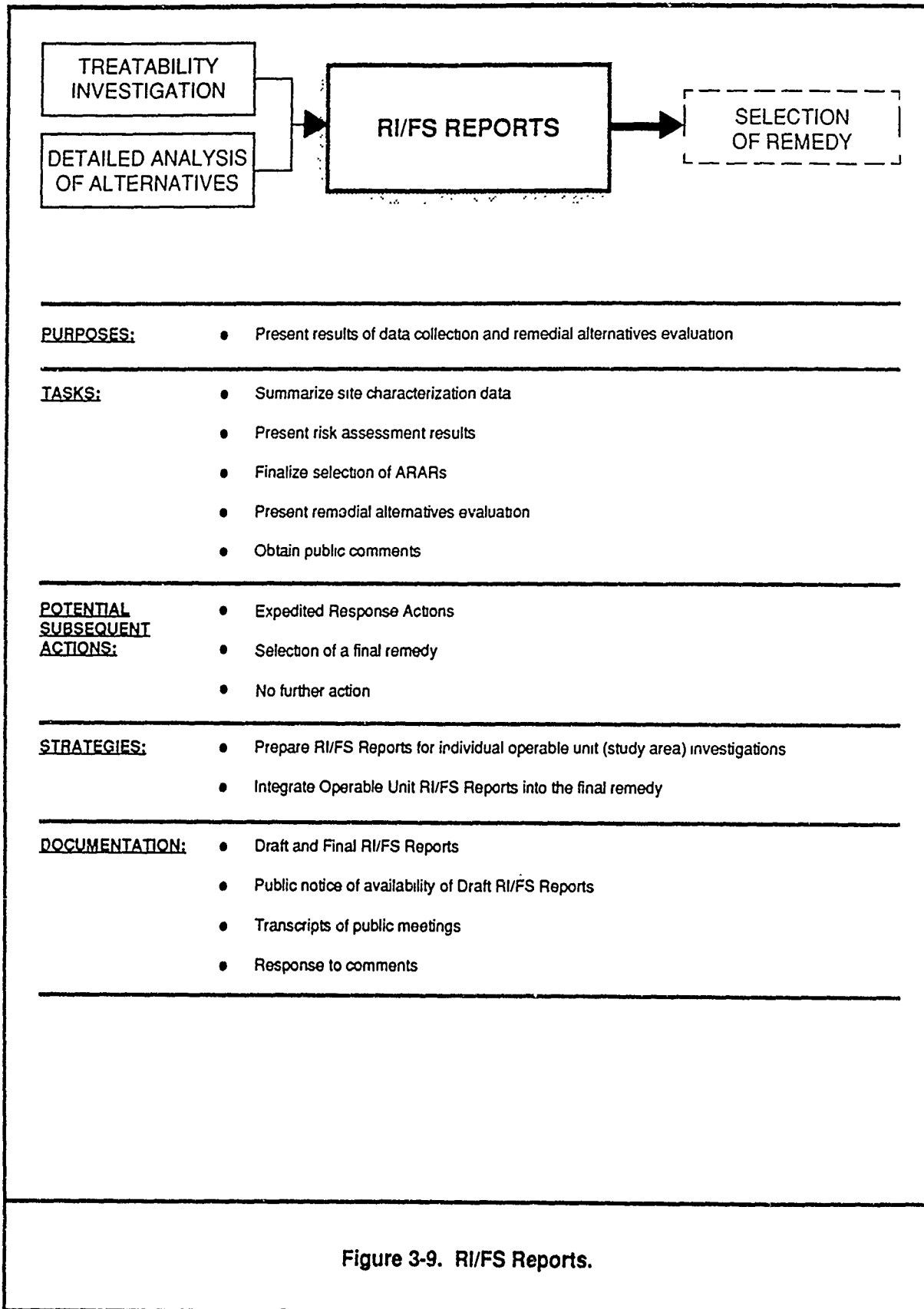
A follow-on Risk Assessment to the Health Risk Assessment (Section 3.4) will be performed as part of the public health and environmental impact assessment in this task. This follow-on Risk Assessment will focus on risks to potential receptors if various proposed remedial actions are implemented.

During the Detailed Analysis of Alternatives task, as in the initial screening task, the evaluations will be performed on an operable unit basis and will focus on those operable units with the highest unmitigated risks first. Regulatory agency participation will be encouraged throughout this process.

3.2.6 Remedial Investigation/Feasibility Study Report

The Remedial Investigation/Feasibility Study (RI/FS) report, a primary document, summarizes the results of data collection and characterization activities and the evaluation of the remedial alternatives. Figure 3-9 presents a summary of the objectives, tasks, strategies, and deliverables associated with this activity. The RI/FS Reports will present the information obtained from the following activities:

- Site characterization investigations;
- Risk assessments;
- Selection of Applicable or Relevant and Appropriate Requirements; and
- Selection and evaluation of remedial alternatives.



The RI/FS Reports will summarize the results and present the interpretation of data collected during site characterization investigations. An RI/FS Report and the associated secondary documents will be prepared for each operable unit investigation.

A basewide RI/FS Report may also be prepared. This document will consider the accumulation of all previous Operable Unit investigation results, reevaluate whether previously conducted interim Expedited Response Actions and Operable Unit actions will remain as part of the final remedy, and support the selection of a final remedy.

After an Operable Unit RI/FS Report has been prepared, several subsequent actions, associated with decisions made in the Selection of Remedy task, are possible:

- Initiate Expedited Response Actions;
- Select a final remedy; and
- Determine whether no further action is appropriate either for individual operable units or for specific sites within the operable units.

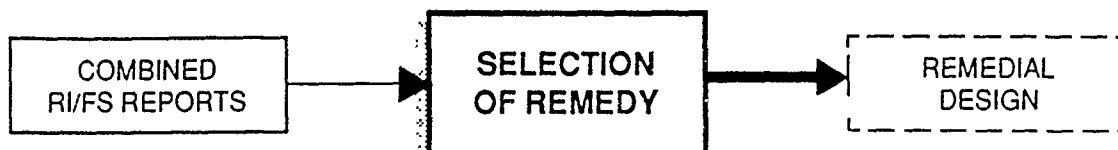
Expedited Response Actions may involve removals (including time-critical and non-time-critical) or the interim or final treatment or isolation of a contaminated area. These actions may be initiated at any point in the CERCLA process. Expedited Response Actions will be conducted in accordance with state and federal laws and procedures.

The selection of a final remedy will be based upon data summarized in the RI/FS Report. Final remedies may involve either a single operable unit or the overall base (all operable units). Details on remedy selection are provided in the next section.

3.2.7 Selection of Remedy

The selection of a final remedy involves a number of activities performed concurrent with and following the RI/FS report. Figure 3-10 presents a summary of the objectives, tasks, strategies, and deliverables associated with this activity. These activities include:

- Proposed Plan;



PURPOSES:

- Select remedial action
- Initiate necessary response actions and prepare documentation presenting the need for remedial action

TASKS:

- Select remedial action
- Prepare Decision Document(s) for recommendation of no further action
- Prepare Record of Decision(s)
- Prepare final site scores in accordance with Defense Priority Model (DPM)

**POTENTIAL
SUBSEQUENT
ACTIONS:**

- Remedial design
- Expedited Response Action
- No further action

STRATEGIES:

- Identify and document the need for Expedited Response Actions and remedial actions and initiate steps to perform the appropriate actions during the McClellan AFB program
- Promote the use of removal actions to streamline cleanups

DOCUMENTATION:

- Proposed plan
- Decision Document
- Record of Decision (ROD), including Responsiveness Summary
- Final DPM site scores

Figure 3-10. Selection of Remedy.

- Responsiveness Summary; and
- Record of Decision.

Proposed Plan

The Proposed Plan is a required primary document in the IAG, and is the step in the process where the recommended remedy is proposed. The Proposed Plan will be prepared by McClellan AFB and will include:

- A summary of the alternatives considered in the Detailed Analysis of Alternatives task during the Feasibility Study;
- A description of the preferred alternative; and
- The rationale for selecting the preferred alternative.

A Proposed Plan will be issued for regulatory agency and public comment and may result in the selection of an alternative other than the preferred alternative or may result in modifications to the preferred alternative. The Proposed Plan may address operable unit actions or basewide initiatives, as appropriate. This document will be issued concurrently with the RI/FS report.

Responsiveness Summary

At the end of the public comment period for the Proposed Plan, a Responsiveness Summary will be prepared and included in the Record of Decision (ROD) that receives concurrence from the agencies. The responsiveness summary will present a complete summary of the significant comments received from the public along with responses to the comments. Responsiveness summaries will be prepared for each Proposed Plan.

Record of Decision (ROD)

Following the agency and public review of the Proposed Plan, a ROD document will be prepared. The ROD is a primary document that provides a description of the rationale for selection of a remedy. It contains a detailed summary of site conditions, the contaminants and their status, pathways for release, and alternatives considered for addressing the hazardous substances at the site. The ROD also provides documentation required by CERCLA, as amended, and the NCP. A ROD will be

prepared following completion of the Proposed Plan for each response action. Records of Decision also will be prepared for response actions which have already been completed under the Air Force's IRP. These response actions include:

- Installation of a synthetic liner and a clay cap in OU D; and
- Installation of the OU D Groundwater Extraction System, the Groundwater Treatment Plant, and the Off-Base Residential Alternate Water Supply.

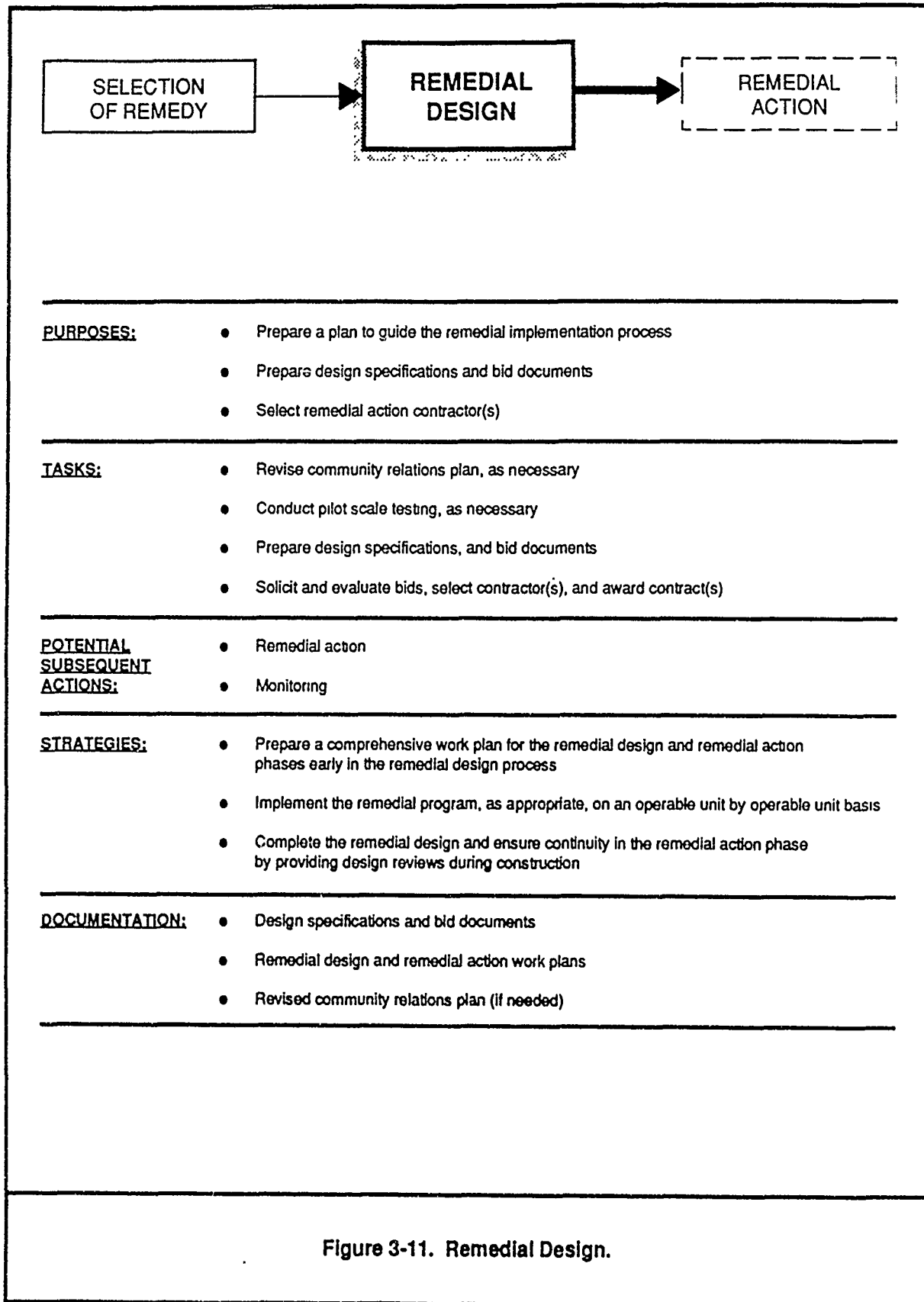
Several potential actions are possible after selection of the remedy. These potential actions include, remedial design, initiation of an expedited response action, or no further action for sites or operable units. If a remedial action alternative is selected for an operable unit action, the evaluation proceeds to the first step in the cleanup phase, the remedial design.

3.3 Implementation of Remedial Alternatives

The final phase of the McClellan AFB remedial program is the implementation of the selected remedy for cleanup of a contaminated area. There are three steps in this phase that involves the design and implementation of the chosen cleanup method and post-construction activities. This section presents a discussion about the application of expedited response actions in the McClellan AFB Remedial Response Program, and is preceded by a detailed discussion of the Remedial Design and Remedial Action phases and their relationship to each other.

3.3.1 Remedial Design

Remedial design is the first major activity in the remedial response process that shifts the focus from planning to actual cleanup. Remedial design typically begins after completion of the Remedial Investigation/Feasibility Study and acceptance of the recommended remedy as described in the Proposed Plan and Record of Decision. Figure 3-11 presents a summary of the objectives, tasks, strategies, and deliverables associated with this activity. The objective of the Remedial Design is to prepare a set of final plans and design specifications for the selected remedial alternative. Utilizing these design documents, a bid package is prepared and released. A contractor is then selected through a competitive bidding process.



In general, the preparation of the remedial design will involve the following activities:

- Prepare Remedial Action Workplan;
- Revise Community Relations Plan, as necessary;
- Conduct pilot scale testing, as necessary;
- Perform property and field surveying;
- Prepare preliminary design;
- Prepare final design; and
- Establish project schedule.

The Remedial Action Workplan will serve as a management tool for activities conducted during the Remedial Design and Remedial Action tasks. This Workplan will be updated annually as new data are obtained during design and implementation of response actions and ongoing RI/FS activities. The Remedial Action Workplan, Community Relations Plan revision (if necessary), and the final remedial design package are deliverables that will receive review and comment.

The Community Relations Plan will be reviewed by the regulatory agencies and the public. Only the regulatory agencies will review the final remedial design. The final remedial design will include the final design plans and specifications, site description with maps, performance expectations, general operation and maintenance requirements, health and safety requirements, and construction cost estimates and project schedules.

Remedial designs developed under the Air Force's Installation Restoration Program have been completed for the OU D cap, the OU D groundwater extraction system, and the Groundwater Treatment Plant. These remedial alternatives have been constructed and have planned Operations and Maintenance procedures.

3.3.2 Remedial Action

Remedial Action is the construction phase of the cleanup and must begin within 15 months of the completion of the ROD. Figure 3-12 presents a summary of the objectives, tasks, strategies, and deliverables associated with this activity. Successful management of the construction includes protection of public health and the environment during construction activities. Several potential actions are possible during and



PURPOSES:

- Construct, operate, and maintain the selected response action

TASKS:

- Construction management
- Project Quality Assurance
- Operation of facilities
- Health and Safety Monitoring

POTENTIAL SUBSEQUENT ACTIONS:

- Expedited Response Actions
- Post-remedial action monitoring and maintenance

STRATEGY:

- Construct the selected remedial action while protecting workers and the public from potential impacts

DOCUMENTATION:

- Site health and safety plan
- Documentation of work performed, equipment installed, site worker and visitor logs, compliance with site health and safety plan, and compliance with QA/QC protocols
- Preparation of "as-built" drawings

Figure 3-12. Remedial Action.

after completion of the remedial action. Emergency situations or site conditions requiring quick response to releases or threatened releases of hazardous substances could be needed during the construction or implementation of the remedial alternative. In addition, upon completion of the remedial action, post-remedial action activities are performed.

Deliverables associated with the Remedial Action task include:

- Site Health and Safety plan;
- Documentation of work performed, equipment installed, site worker and visitor logs, compliance with site Health and Safety Plan, and QA/QC protocols; and
- Preparation of "As-Built" drawings.

Revisions to the final design drawings will be made to reflect the actual constructed design and a set of "As-Built" drawings will be prepared. The preparation and submittal of daily project records including site worker and visitor logs will be maintained and compiled.

Before implementation of the remedial action begins, an approved Site Health and Safety Plan will be developed. The Health and Safety Plan will describe the monitoring program designed to protect on-site workers and the public from releases from the site during the cleanup. The McClellan AFB Health and Safety Plan (Radian, September 1989) will provide some of the technical basis for the Health and Safety Plan used for remedial actions.

3.3.3 Expedited Response Actions

Expedited Response Actions (ERAs) are performed to clean up contamination or to mitigate risks caused by contamination in areas that pose an immediate threat to the public or to the environment. Expedited Response Actions can be identified and implemented any time throughout the CERCLA process. The relationship between ERAs and the normal CERCLA process for identifying, investigating, and remediating contamination is presented in Figure 3-13.

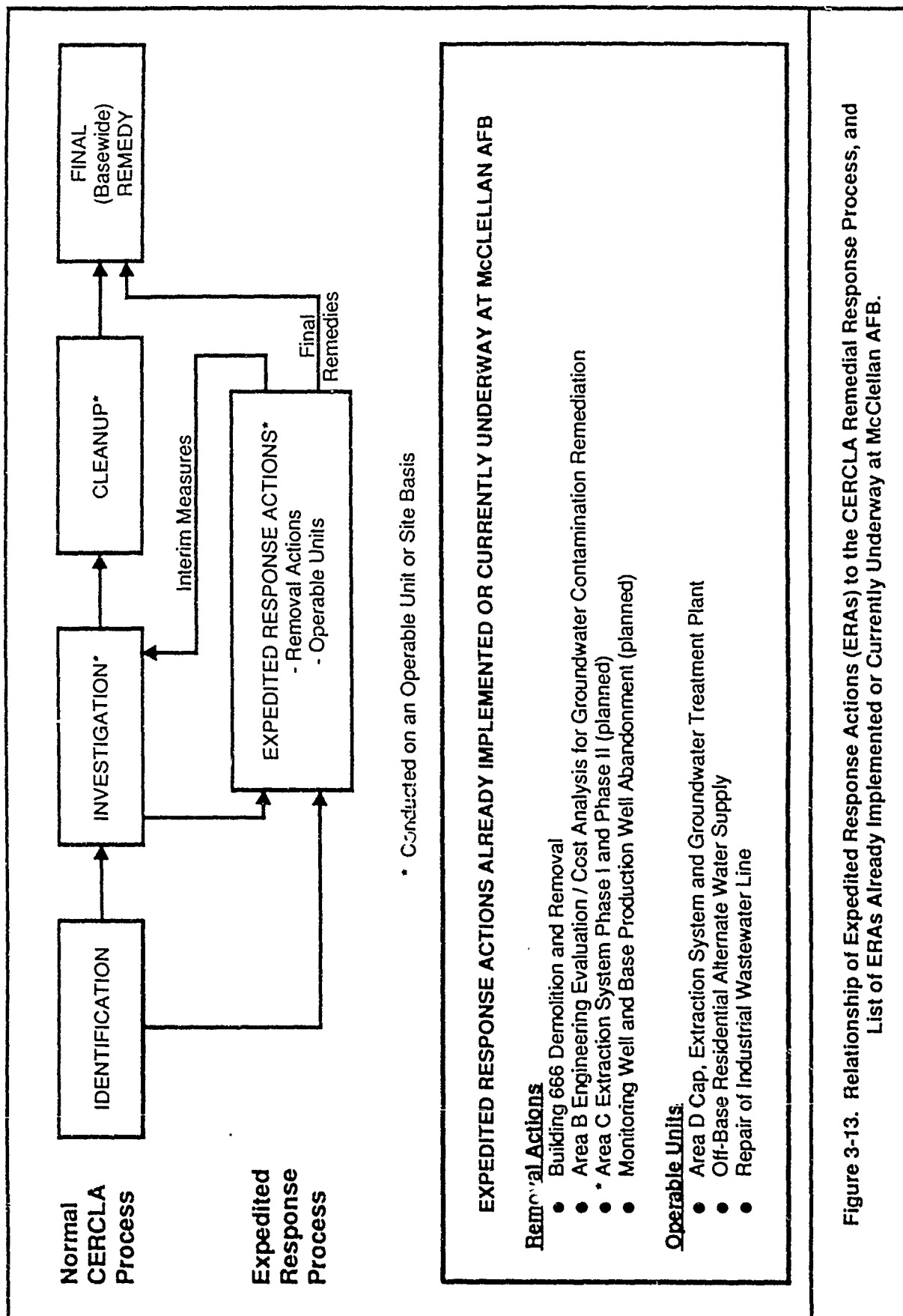


Figure 3-13. Relationship of Expedited Response Actions (ERAs) to the CERCLA Remedial Response Process, and List of ERAs Already Implemented or Currently Underway at McClellan AFB.

Expedited Response Actions involve the isolation or elimination of a contaminant source or exposure pathway, and are implemented to respond to a contaminant source that poses a threat to public health or the environment. ERAs can be either time-critical or non-time critical actions, but in either case, the process of implementing the removal does not follow the steps that are part of the normal RI/FS process. Time-critical removal actions are emergencies requiring immediate response. Non-time critical removal actions do not require the immediate response of time-critical removal actions, but are actions that should be performed on a timely basis. McClellan AFB has conducted several no time-critical removal actions. Expedited Response Actions follow an abbreviated version of the RI/FS process and are implemented when the cleanup of contamination cannot wait for the entire RI/FS process to be completed. A list of McClellan AFB expedited response actions which are already implemented, currently underway, or planned in the near future, is presented in Figure 3-13.

Expedited Response Actions can be either interim remedies or final remedies. An interim remedy is implemented to reduce short-term environmental or public health impacts, but which may not represent a long-term remedy. ERAs that provide more permanent protection and emphasize alternative treatment technologies will generally be preferred. Interim response actions will be re-assessed during the appropriate operable unit RI/FS evaluations and during the final (basewide) RI/FS when final remedial actions are selected.

A final response action is one which is considered to be part of the final (basewide) remedy. McClellan AFB has completed several Expedited Response Actions that are considered part of the final remedy. Examples of this are the Building 666 demolition and removal, and the upcoming Operable Unit B EE/CA and time-critical response actions.

Deliverables which will be prepared during the identification, investigation, and implementation of ERAs include:

- Notification of intent to perform ERAs;
- Engineering Evaluations/Cost Analyses;
- Action Memoranda;
- Response to Comments; and
- Progress Reports.

Regulatory agencies and the public will be notified whenever an Expedited Response Action is proposed. All ERAs will be supported by appropriate documentation. An Action Memorandum will be transmitted to the agencies within 45 days following completion of a time-critical response. For non-time critical responses, McClellan AFB will prepare an Engineering Evaluation/Cost Analysis and an Action Memorandum. This information will be transmitted to the agencies 45 days before the response action begins. As actions are implemented, progress reports will be prepared to keep regulatory agencies and the public informed as to the progress of the response action.

Action Memorandum

An Action Memorandum (AM) is similar to a Record of Decision, but has a more limited purpose and application. An AM will present a description of site location and history; current site status; site conditions including soils, groundwater, surface water, potential receptors, risk assessment (if prepared); a discussion of the alternatives evaluated; and a rationale that is consistent to the extent practicable with ARARs.

Removal Actions

Several removal-type actions were initiated by McClellan AFB prior to passage of the SARA in 1986. The activities were in accordance with the spirit of CERCLA and are listed under Removal Actions in Figure 3-13. Other removal actions are ongoing or are planned. Removal actions in these categories include:

- **Building 666 Demolition and Removal (Completed)**--Building 666 (Site 47) is located in Operable Unit B of McClellan AFB and was demolished in 1988. Building 666 was constructed in 1957 and was used as the base electroplating shop from 1957 to 1980 (Walker, 1983). During this time, Building 666 also contained a radiator repair shop in the northern portion of the building and a sandblasting shop in the southwestern corner of the building. In 1980, the plating operations at Building 666 were discontinued and, from 1980 to 1982, Building 666 was used to store hazardous wastes (Walker, 1983).

In December of 1981, McClellan AFB prepared a preliminary RCRA-closure plan for Building 666 (Walker, 1983). McClellan AFB personnel planned to rehabilitate the building for other uses after the RCRA closure was completed. However, after characterization of the facility,

McClellan AFB contracted EG&G Idaho, Inc. (EG&G) to prepare a demolition plan for Building 666 and Industrial Wastewater Treatment Plant (IWTP) No. 4 located adjacent to Building 666 (EG&G, 1986).

A removal action was performed in 1988 and consisted of the demolition of Building 666 and the adjacent IWTP No. 4. Except for the foundation, Building 666 was demolished and removed. Several areas of the foundation were covered with metal caps. According to the statement of work for dismantlement, these caps were designed to cover the former pits and sumps in Building 666. The area surrounding Building 666 was completely enclosed by fencing. Available information indicates that there are no immediate hazards at Building 666. The area is completely enclosed with fencing and the former sumps and pits are completely covered by roof structures.

Demolition of Building 666 to its foundation was a necessary action. However, remediation of the remaining foundation and contaminated soils at the Building 666 location and at the nearby IWTP (Site 48) and Building 666 storage area (Site 36) is still needed. These actions will be considered in the OU B RI/FS. The OU B ROD will review and document the dismantlement of Building 666.

- **Operable Unit B Groundwater Removal Action (Ongoing)**--Based on the review of data collected during the Area B Groundwater Operable Unit Remedial Investigation in March 1989, McClellan AFB implemented a non-time critical ERA to further investigate and control contaminated groundwater in OU B. This ERA involves two tasks. The first task is to obtain additional field data necessary to characterize the groundwater moving off base from OU B, as discussed previously. The second task, an Engineering Evaluation/Cost Analysis (EE/CA) for groundwater contamination remediation in Operable Unit B, is a comparative analysis of removal action options that are considered for all non-time critical removal actions at NPL sites. The Operable Unit B EE/CA will include all of the tasks described in this section performed in a manner that will streamline implementation.
- **OU C Groundwater Extraction System (Phase I)**--In 1987, a hydrological assessment was performed by EG&G in OU C. Concern about the

effects of the Industrial Wastewater Treatment Plant (IWTP) and nearby disposal sites prompted the Air Force to investigate the movement of groundwater contaminated with metals and organic compounds within and downgradient of OU C. The McClellan AFB IWTP is located in the southern portion of OU C; associated with the plant are the wastewater blending and aeration ponds. Located beneath and adjacent to the plant are several past disposal sites. Past disposal practices resulted in some of these constituents entering the subsurface and migrating to the groundwater. Contaminants had been detected in groundwater at depths from 95 feet to approximately 220 feet below the ground surface (BGS).

To collect the needed information, Phase I of an operable unit remedial investigation of the contaminated groundwater in OU C was performed by EG&G. One extraction well and 11 monitoring wells were installed in the fall of 1987 within and immediately south of OU C. Well clusters, containing three monitoring wells, were installed at two of the monitoring well sites. These wells were screened in shallow, middle, and deep aquifers as defined by EG&G. Another well site included two wells; one well screened in the middle aquifer and one well screened in the deep aquifer. Monitoring well depths and construction materials for these wells are presented in the Hydrogeologic Assessment Report (EG&G, 1988). Three of the monitoring wells (MW-137, MW-140, and MW-141) were converted to extraction wells. A need has been recognized to install additional monitoring wells and piezometers around the extraction wells to confirm their effectiveness. This need is addressed within the *PGOURI Sampling and Analysis Plan* (Radian, September 1989). In late August 1988, the four extraction wells were placed into service. Water is being pumped via an aboveground pipeline to the Groundwater Treatment Plant where organic compounds are removed to meet permitted levels (EG&G, 1988).

- **Base Production Well Abandonment (Planned)**--A Removal Action to abandon unused base production wells is planned to eliminate the potential for the spread of contamination from shallow aquifers to aquifers at greater depths. Open space in the well annulus and open well casing of base production wells may provide a direct conduit for the migration of contaminants to greater depths, increasing remedial action

cleanup costs. A well closure plan will be prepared and reviewed by the agencies, and the plan will then be implemented.

Operable Unit Remedial Actions

Several remedial-type actions were initiated by McClellan AFB prior to passage of SARA in 1986. These activities were in accordance with the spirit of CERCLA, and are listed under Operable Units in Figure 3-13. Remedial Actions in these categories include:

- **OU D Groundwater Extraction and Treatment System**--In 1984, remedial response actions were initiated for OU D, which included the design and construction of a cap, six extraction wells, and a treatment system. During 1985, testing and modeling was performed by McLaren to evaluate the feasibility and design of the OU D groundwater extraction system. The Groundwater Treatment Plant was constructed in late 1986 and performance-tested in January 1987. The extraction system and the treatment plant are currently in operation. Each of the components of the OU D response actions is considered to be an Operable Unit response. A Record of Decision will be submitted for each of the Operable Unit responses as required.

Data have been and will continue to be collected regarding the performance of the OU D extraction system, the treatment plant, and any impacts that are resulting to the air quality in the vicinity of the OU D cap. Each of these response actions will be scheduled for their respective five-year reviews during 1991 and 1992. These Operable Units will be evaluated, along with other implemented response actions, for selection as part of the final remedy when the final basewide RI/FS is performed.

- **Off-Base Residential Alternate Water Supply**--In the Spring of 1986, McClellan AFB announced an Off-Base Residential Alternate Water Supply Plan to provide bottled water on an interim basis to residences and to provide a more permanent solution of installing municipal drinking water hookups to 548 residences west of the base. The remedial action area contained all known areas of off-base groundwater contamination attributed to sources within McClellan AFB boundaries.

The mitigation plan allowed for continued monitoring of private wells in the remedial action area until the municipal water hookups were in-place, at which time private well sampling ceased. Hookups were completed in August 1987. Sampling of off-base monitoring wells continues on a regular basis as part of the Groundwater Sampling and Analysis Program and will help determine the extent and flow characteristics of contaminated groundwater within the remedial action area.

The mitigation plan does allow existing wells used for irrigation purposes to continue operation, but domestic water hookups have been supplied with backflow prevention devices to ensure municipal well water is being used by residents for drinking water. The mitigation plan also recommended that all non-public water supply wells in the remediation area be abandoned in order to eliminate public health concerns, and to slow the spread of groundwater contamination potentially originating from McClellan AFB.

The mitigation plan will allow for the resumption of sampling of off-base private wells if the results of the ongoing Groundwater Sampling and Analysis Program show that contaminant levels in wells outside the remedial action area exceed state or federal action levels.

The McClellan AFB Off-Base Groundwater Mitigation Plan is considered a final remedy for the off-base groundwater contamination in the area west of the base because it has eliminated the possibility of health risks from consuming contaminated groundwater within the off-base remedial action area. A Record of Decision will be submitted as required.

- **Repair of Industrial Wastewater Line**--In 1988, McClellan AFB completed a remedial action consisting of an investigation and repair of the main and branch lines of the Industrial Wastewater Line (IWL); investigations of building service lines were not performed. This remedial action was performed to determine the integrity of the line and to prevent further leakage of chemicals from the IWL. This remedial action consisted of the following:

- Verifying the location of the system main and branch lines;

- Collecting samples for chemical analysis and measuring flow;
- Determining the integrity of the IWL utilizing television inspection and pressure testing;
- Sealing minor cracks or holes with grout; and
- Installing in situ form (cure in-place) pipe in those sections of the line that could not be repaired with grout.

3.3.4 Additional Removal Programs

There are several other removal programs that are of importance to the overall program at McClellan AFB. These are briefly described below.

- **McClellan AFB Underground Storage Tank Program**--The McClellan AFB Underground Storage Tank (UST) Program is responsible for the monitoring, testing, and remediation of underground storage tanks in accordance with federal and state laws. The program is currently managing 76 operating tanks and has investigated nonoperating tanks. No tanks were found at 37 potential tank locations. Past underground storage remediation activities have included:
 - Removal of 32 USTs during the period June 1985 to June 1988; and;
 - Removal of 27 USTs during the period June 1988 to present.

The current McClellan AFB UST Program has scheduled plans for remediating 36 USTs in 1990, 16 in 1991, and for replacing Tank Farm No. 3 with an aboveground storage facility.

- **McClellan AFB Soils Management Program**--As a results of past investigations, McClellan AFB recognizes that areas of contaminated soil beyond those areas currently planned for investigation may exist within the confines of the base. As a result, McClellan AFB has developed a Soils Management Program to proactively identify and prudently manage potentially contaminated soils.

A prime motivation for the development of this plan was the recognition that CERCLA/SARA were not intended to address such an active site as McClellan AFB and its 2,952 acres. In addition, it was recognized that there is an absence of soil cleanup standards for many chemicals and that the interface of CERCLA and RCRA complicates the contaminated soil issues.

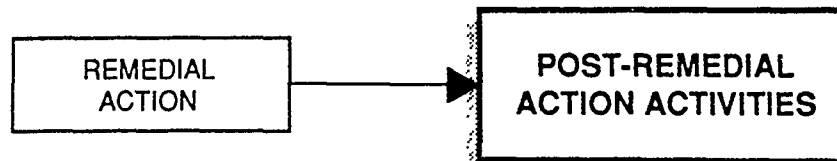
The objectives of this program are: (1) to ensure that contaminated soil is identified early enough during ongoing base activities (i.e., construction, repairs, maintenance efforts) to preclude the off-base disposal of contaminated soils; and (2) to ensure that contaminated soil, once it is identified, is prudently managed in accordance with federal and state requirements and in a way to minimize the effect to ongoing base operations.

This plan will also be implemented in a two-phased approach. In the **Interim Period** (first phase), this plan may require some temporary storage of contaminated soils if Landfill Disposal Restrictions (LDR) prohibit off-site disposal or if the cost effectiveness of off-site soil treatment can only be accomplished with certain volumes of contaminated soil. However, in the **Long-Term** (second phase), particularly with the phase-in of the LDRs for CERCLA wastes and as RI/FS studies and proposed remedial actions for the base progress, there will be a need to develop on-site soil treatment capability. This plan is set up to ensure that as the objectives of this plan are implemented, both in the interim and long-term, it will be accomplished in coordination with all interested parties so that all the applicable requirements are incorporated into this plan, both now and in the future.

The full McClellan AFB Soils Management Program is included as Appendix B. It is submitted for agency review and comments in accordance with IAG requirements, so a common understanding will be developed between all parties as to how McClellan AFB will identify and manage potentially contaminated soil.

3.3.5 Post-Remedial Action Activities

Figure 3-14 presents a summary of the objectives, tasks, strategies, and deliverables associated with post-remedial action activities. Post-remedial actions include those



PURPOSES:

- Ensure compliance with remedial response goals
- Operate and maintain equipment used in ongoing treatment or monitoring programs

TASKS:

- Prepare operation and maintenance plans
- Monitoring of remedial action conformance to design specifications
- Periodic review of remedial response goals and remedial action compliance with goals

**POTENTIAL
SUBSEQUENT
ACTIONS:**

- Reinitiation of response action, if necessary
- Monitoring

STRATEGIES:

- Perform post-remedial action activities first for completed expedited response actions
- Perform post-remedial action activities as required for future expedited response actions and remedial actions

DOCUMENTATION:

- Operation and Maintenance Plans
- Compliance reports
- Five Year Review
- Site delisting procedures (NPL sites)
 - Publish notice of delisting

Figure 3-14. Post-Remedial Action Activities.

activities that are performed after the remedial action phase is completed. Some of these actions include:

- Operation and Maintenance of the remedial facilities;
- Monitoring of remedial action performance compared to design specifications;
- Monitoring of remediation performance and compliance with pre-determined remedial response goals; and
- Removing a site from the list.

Collectively, these activities are designed to ensure that the action is successfully implemented. Operation and maintenance activities are ongoing and will continue for the following McClellan AFB remedial actions:

- OU C extraction system;
- OU D cap and an extraction system;
- Groundwater Treatment Plant; and
- Industrial Wastewater Collection System.

A periodic review of remedial actions, at least every five years after the final ROD, is required for as long as hazardous substances, pollutants, or contaminants that may pose a threat to human health or the environment remain at the site. If it is determined during a five-year review that the remedial action no longer protects human health and the environment, further remedial actions will be considered.

Five-year reviews will be scheduled and performed on the response actions completed at McClellan AFB and for new response actions as they become implemented. The five-year review period will begin upon the acceptance of a Record of Decision for response actions performed under the IRP.

Deliverables associated with post-remedial actions include:

- Compliance review reports;
- Five-Year Revisions; and
- Notices of taking the facility off the list.

Taking a site off the list is appropriate for National Priority List (NPL) sites and would apply to the McClellan AFB facility. The McClellan AFB facility can be removed from the U.S. EPA National Priorities List when the final (basewide) remedy has been completed or if no further remedial actions are shown to be necessary. Procedures for taking a facility off the list include the following:

- Notice of intent to take a facility off the list in local publications and in the Federal Register (include a 30-day comment period); and
- Publication of the formal declaration of removal from the list.

3.4 Risk Assessment

The Risk Assessment process provides an evaluation of the potential threat to human health and the environment in the absence of any remedial action. It will provide a basis for determining whether or not a remedial action is necessary, the justification for performing remedial action, and also the reduction in risk to potential receptors if various proposed remedial actions are implemented.

During the Initial Screening and Development of Alternatives, remedial response objectives will be established based on the baseline risk assessment and the identification of ARARs. Remedial response objectives will be developed to specify contaminants and media of interest, exposure pathways, and remediation goals that permit a range of treatment and containment alternatives to be evaluated.

During the Detailed Analysis of Alternatives, a more detailed assessment of risk will be performed. This assessment will reevaluate indicator chemicals, identify potential exposure pathways, determine target concentrations at human exposure points, estimate target release rates, assess chronic risk for noncarcinogens, and assess potential short-term health effects of each remedial alternative.

Guidance documents consulted in determining the protocol include the U.S. *EPA Superfund Public Health Evaluation Manual* (1986) and *Exposure Assessment Manual* (1986), the California DHS *Site Mitigation Decision Tree Manual* (1986), U.S. EPA health risk assessments guidelines, as published in the *Federal Register* (1986), and U.S. EPA *Methods for Assessing Exposure to Chemical Substances* (1985). Most recently the U.S. EPA document *Risk Assessment Guidance for Superfund, Human Health Evaluation*

Manual Part A (Interim Final) (1989) has been utilized to update the risk assessment effort.

Data developed from a risk assessment may support a Natural Resource Damage Assessment (NRDA). An NRDA is a separate process performed in parallel to the RI/FS process which involves claims for the cost of "restoring, rehabilitating, replacing, or acquiring the equivalent of natural resources injured as a result of the release of a hazardous substance." An NRDA will be performed during the detailed evaluation of remedial alternatives in the FS. Activities under an NRDA include identifying damage to natural resources, determining if pathways exist from source areas to potentially affected resources, quantitation of the extent of damage and potential for recovery of the resource, and development of a plan to restore the resource. Natural resources are broadly defined, including land, fish, wildlife, biota, air, water, groundwater, and drinking water supplies. A Preliminary Natural Resources Survey conducted for McClellan AFB in August 1987 by the U.S. Fish and Wildlife Service found that releases from the site have not affected any lands, minerals, water, endangered or threatened species, anadromous fish, or Native American resources managed or protected by the Department of the Interior.

4.0 SCHEDULE

The schedule is composed of two parts: a list of primary and secondary documents with respective due dates and target dates, and a bar-graph presentation of activities showing the temporal relationship among and within the various units. The project schedule is a dynamic planning document and will be updated annually. The schedule may not contain all project details, such as working meetings, which will be scheduled in the monthly status reports.

Several factors in addition to a typical Remedial Investigation/Feasibility Study (RI/FS) task sequence affect the schedule. The funding mechanism for restoration work typically provides fiscal year funds only after the first of January. Consequently, new work in each fiscal year is not scheduled to begin until after the end of the preceding calendar year.

Weather also adds another variable to field sampling programs and response activities. While allowances for difficult access and shutdowns have been anticipated in the schedule, extreme weather conditions may necessitate schedule revisions.

4.1 Introduction

Section 8 (Deadlines) of the Interagency Agreement (IAG) obligates McClellan Air Force Base (AFB) to meet the primary document deliverable dates as shown in Table 4-1 (page 4-14). This table also lists target dates for associated (secondary) documents.

Primary documents include those major reports that are discrete products of the McClellan AFB RI/FS or Remedial Design/Remedial Action (RD/RA) activities. Primary documents will be prepared for each Operable Unit (OU) and for the final (basewide) remedy and submitted to the United States Environmental Protection Agency (U.S. EPA) and the State of California Department of Health Services (DHS) for review and comment. In general, primary documents will include:

- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Workplans, including updates;
- Quality Assurance Project Plans (QAPP);

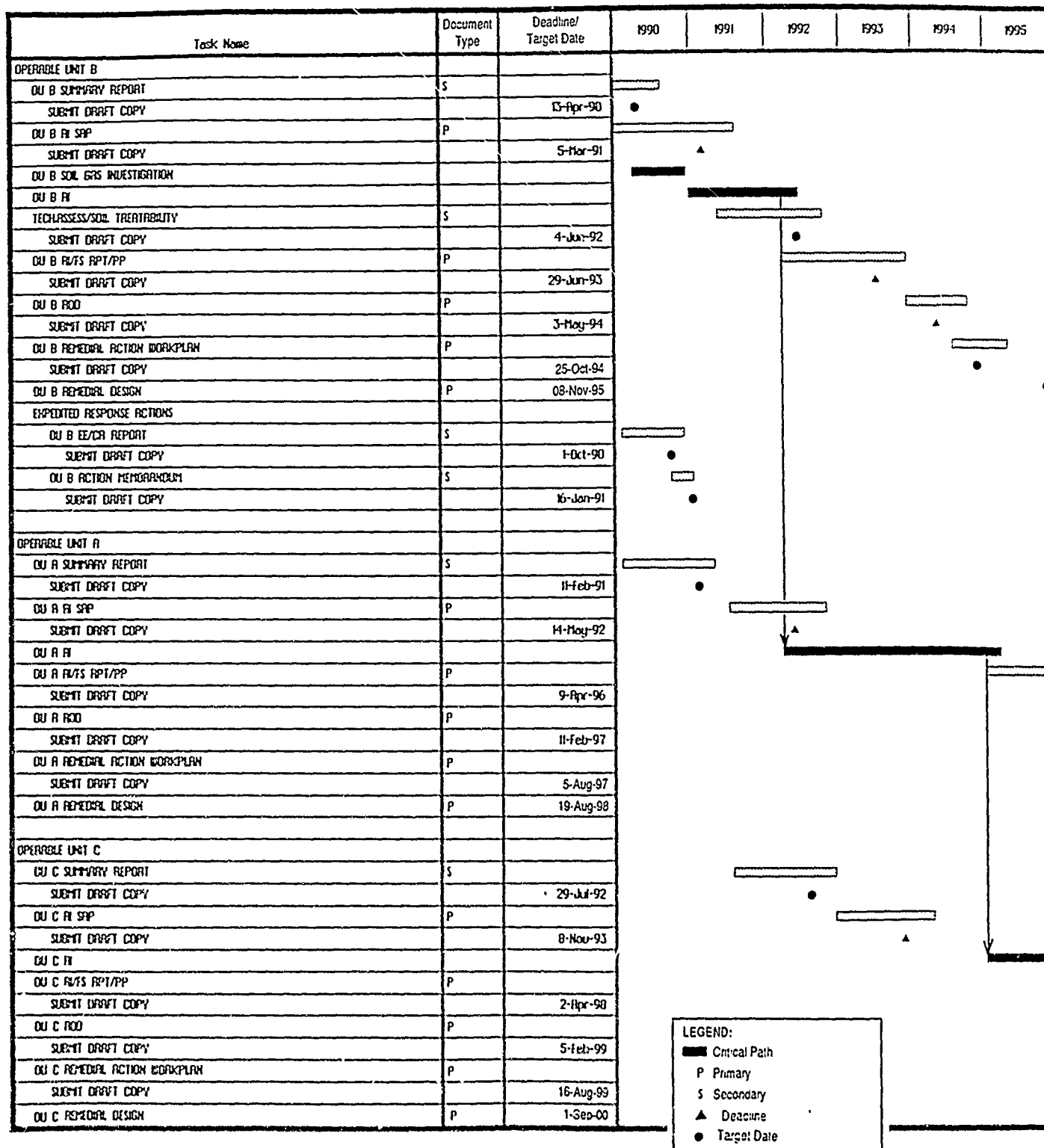
- Community Relations Plan (CRP);
- Sampling and Analysis and Treatability Investigation Plans;
- RI/FS Reports;
- Proposed Plans and Records of Decisions;
- Remedial Designs; and
- Remedial Action Workplans.

Section 8 of the IAG requires deadlines for the Remedial Design and Remedial Action Workplans be formulated after the issuance of the Record of Decision (ROD).

Secondary documents include those reports prepared before the primary documents and which present data for the primary documents. Secondary documents include:

- Sampling and Analysis Data Results;
- Site Characterization Summaries;
- Treatability Study Reports;
- Reports documenting the results of Initial and Detailed Development of Remedial Alternatives;
- Risk Assessments;
- Workplans for supplemental site characterization activities; and
- Well closure plans.

Additional primary and secondary documents can be proposed by the Air Force, the U.S. EPA, or the DHS at any time during the McClellan AFB Response Program. Figures 4-1 through 4-2 are bar chart schedules for tasks that are already

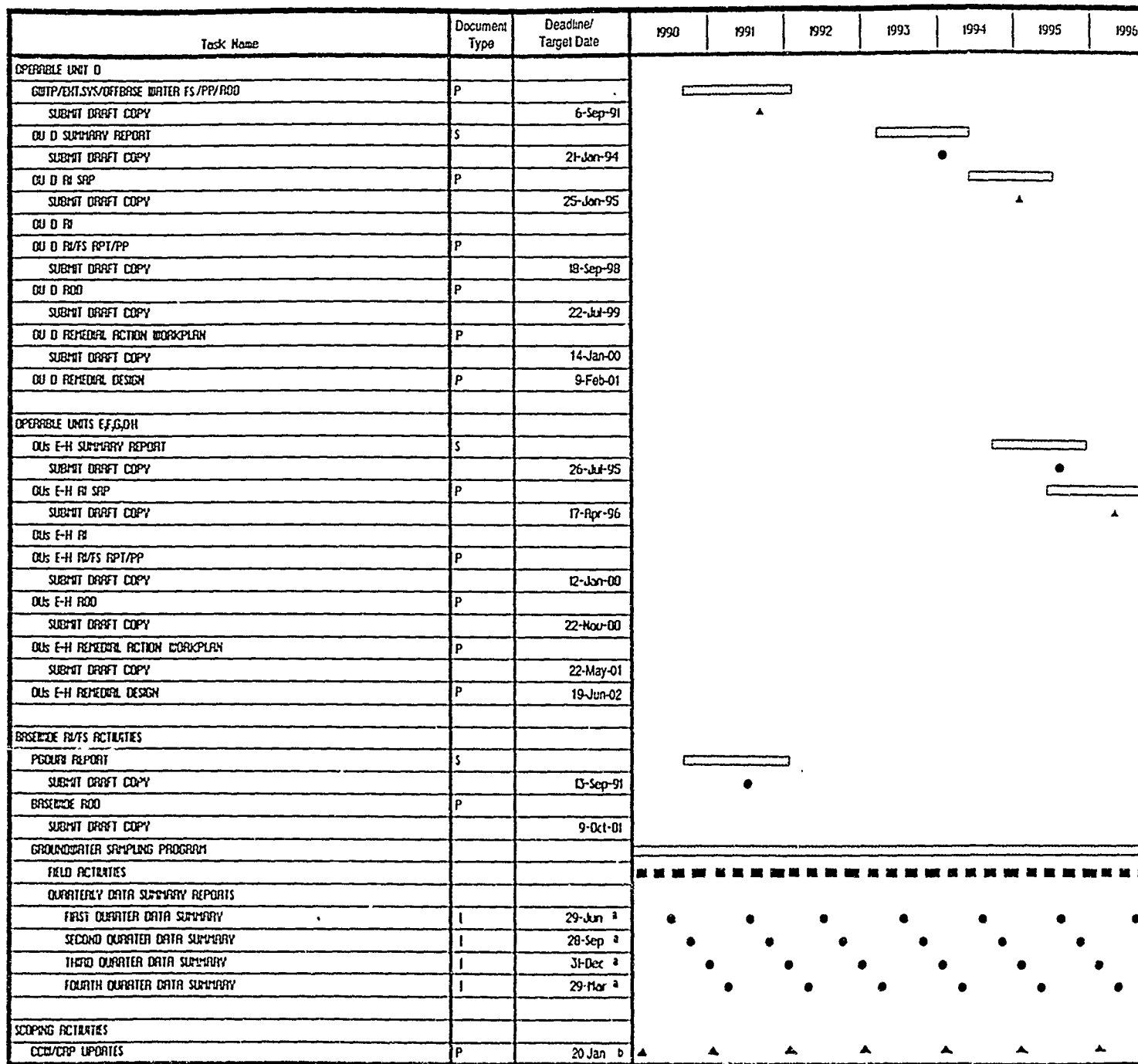


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1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
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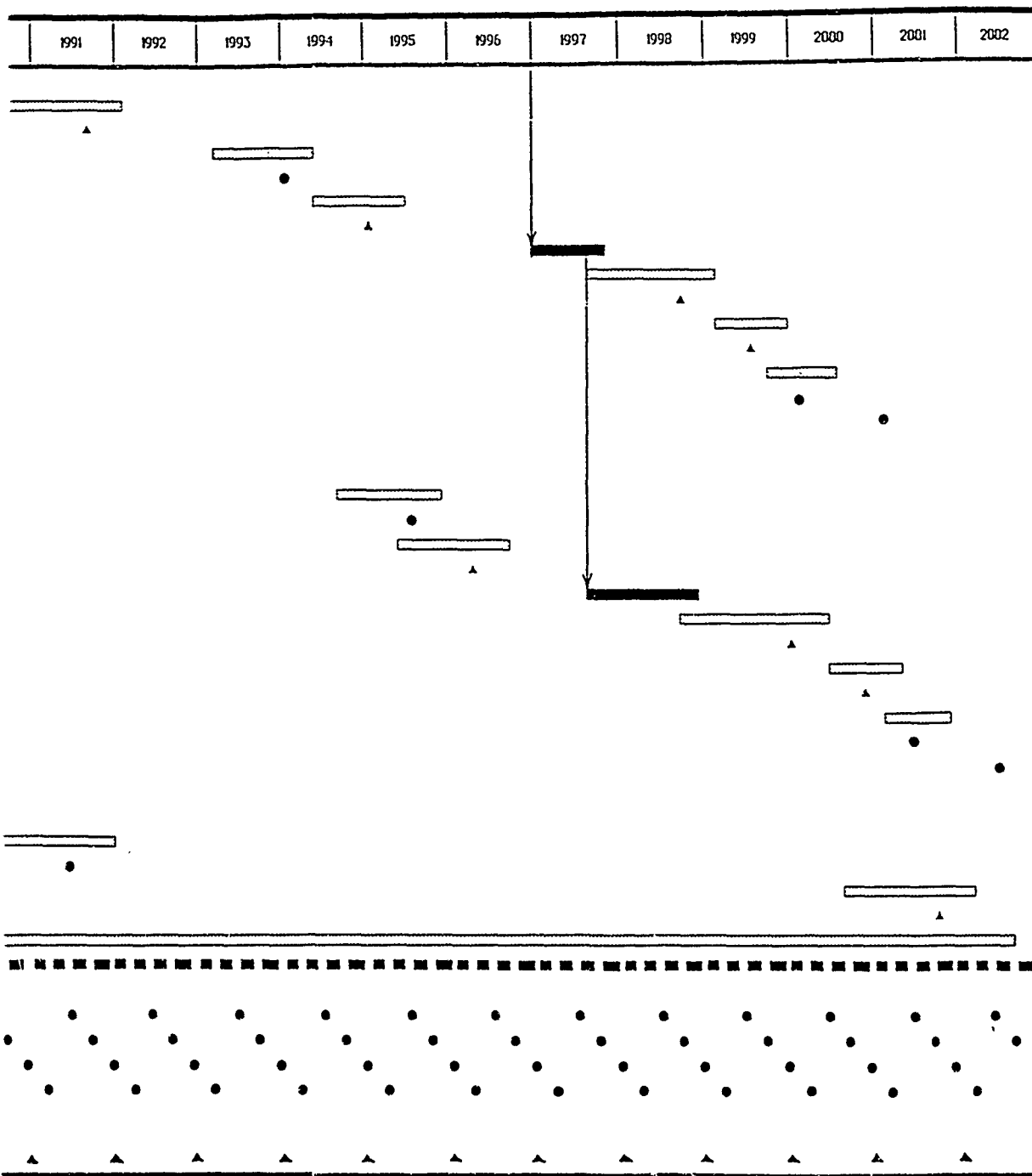
- Critical Path
- P Primary ▲ Deadline
- S Secondary ● Target Date
- I Informational

a Quarterly Data Summary Reports will be submitted annually on the day and month shown
 b Submitted on 20 January of each year per the IAG.

132

WELLAN AFB CERCLA PROGRAM
 IAG Schedule Logic Diagram

Page 2 of 2.



Data Summary Reports will be submitted annually on the day and month shown.
 on 20 January of each year per the IAG.

2072

underway or planned for the overall RI/FS Program, ERAs, planning documents, and associated activities.

The deliverable schedule appearing as Table 4-1 (page 4-13) lists all the documents currently planned from the present through the Records of Decision. Operable Unit B also has the post-ROD deliverables identified. The individual documents are identified as primary and secondary and further identified as draft, draft final, and final. Responses to agency comments and responsiveness summaries are included with their respective documents. Documents are grouped according to OU or as part of the basewide effort. The Comprehensive CERCLA Workplan deliverables are listed in the section entitled "Scoping." In general, activities shown either:

- Initiate work on an OU (e.g., a Summary Report);
- Track a secondary document;
- Track a primary document; or
- Represent a field sampling activity.

4.2 McClellan AFB Priorities

McClellan AFB has established response action priorities and sought funding for environmental restoration of the base. These priorities are based on:

- Needs expressed by the local community;
- Statutory environmental obligations;
- Air Force Logistics Command mission requirements; and

McClellan AFB has already investigated contamination and implemented appropriate cleanup actions for OUs C and D in response to the above priorities. A comprehensive evaluation of the regional groundwater conditions, which builds on existing groundwater data, is currently being performed. The formal CERCLA process has been initiated in the various OUs. The order that will be followed is:

1. Operable Units B
2. Operable Units A
3. Operable Units C
4. Operable Units D
5. Operable Units E, F, G, and H

The sequence of major activities (and their accompanying documents) within each OU will be:

- Preliminary Assessment/Site Inspection (included with other types of data in the OU Summary Reports);
- Remedial Investigation Sampling and Analysis Plan;
- Comprehensive Remedial Investigation field sampling and analysis program;
- Remedial Investigation/Feasibility Study Report and Proposed Plan;
- Record of Decision; and
- Remedial Design/Remedial Action

The first three activities and/or documents will be prepared sequentially following the OU priorities. For example, once the Summary Report for OU B is complete, the Summary Report for OU A is begun. When field sampling and analysis programs are complete, the remaining tasks will be completed sequentially through the Records of Decision for each OU, without regard to the priority of the OUs themselves. This is necessary because of the difference in the amount of time required to characterize the various OUs.

4.3 Operable Units

McClellan AFB has been tentatively divided into eight groundwater operable units (OUs). These units, shown in Figure 1-2, were defined in 1989 by an assessment of groundwater contamination and a review of likely sources of the contamination. The groundwater OUs have been divided into five groups, identified as Operable Units A, B, C, D, and E through H, to facilitate the RI/FS and ERA processes. Field work and documents will be done in accordance with the Operable Unit designation. Boundaries of OUs will be evaluated and updated as groundwater and soil data are collected and reduced.

The sequence described in the following section will carry each OU from Preliminary Assessment/Site Inspection through Record of Decision. As activities on

the OUs progress through the sequence, areas requiring a quicker response, such as an ERA, will be identified. The necessary documentation to support an expedited response will be prepared, the agencies and the public will be informed of McClellan AFB's intent, and the removal action will be initiated.

The remedial action process at McClellan AFB follows guidance documents prepared by the U.S. EPA as listed in Section 5.0. The IAG requires a specific review sequence with specified review periods for each step of the process. The overall schedule is lengthy; the times specified in the IAG for the various reviews and revisions (without extensions) are reflected in the bar chart schedule. The following sections describe the major scheduled activities shown on Figures 4-1 through 4-6. The information in the following sections has been discussed at greater depth in Section 3.0; it is provided here for the reader's convenience.

4.3.1 Preliminary Assessments, Current Operating Facility Assessments, and Historical Reviews

The preliminary assessments, current operating facility assessments, and historical reviews provide an initial understanding of the potentially contaminated sites and areas in each OU of McClellan AFB by gathering and organizing all available information on them. Sources of information include previous contractors' reports, site inspections, base records, operations personnel interviews, aerial photographs, and analytical data. This information is compiled, reviewed, and reported in the Summary Report (below). All collected data are placed in files and archived. Expedited Response Actions can be initiated during this phase if any of the information indicates the need or if the McClellan AFB mission requires timely use of the particular area or site.

4.3.2 Summary Report

Information collected during the preliminary assessments, currently operating facility assessments, or historical reviews are presented in the Summary Report for each OU. Brief introductions are provided describing significant sources of information and features of the targeted areas. This is a secondary document to be reviewed by the regulatory agencies. It is also the basis for the Field Sampling Plans. Possible ERAs are identified in this document.

4.3.3 Remedial Investigation Sampling and Analysis Plan

A Remedial Investigation (RI) will be conducted for each OU described in Section 4.2.1. As an integral component of each RI, a Sampling and Analysis Plan (SAP) will be developed. The SAP consists of two parts: the Field Sampling Plan (FSP) and the basewide Quality Assurance Project Plan (QAPP). The FSPs for each OU are prepared following standard U.S. EPA guidelines. In addition to the site background, the FSP:

- Reports Data Quality Objectives (DQOs);
- Describes sample locations and frequencies;
- Establishes a sample designation system;
- Describes sampling equipment and procedures; and
- Discusses sample handling and analysis.

The second part of the SAP is the QAPP. This document has been prepared, reviewed by the regulatory agencies, and finalized. The QAPP is a dynamic document and will be updated as dictated by the needs of the project. Any modifications required for the RI will be provided as appendices to the respective FSPs or as page and section updates to the QAPP.

4.3.4 Remedial Investigation Field Program

The previous activity documents the controls over the actual field sample collection and laboratory analysis conducted during the RI phase. The RI field program will collect and analyze selected samples to characterize the known and possible contaminant sources within each operable unit. The collected data will:

- Be the basis for developing an initial comprehensive site model;
- Provide data for the Health Risk Assessment and the Feasibility Study;
- Provide input for an early soil treatment technology study;
- Allow development of Preliminary Remediation Goals; and
- Allow PRLs to be dropped from further consideration.

The RI will select sample locations based on existing data and understanding of the site developed during the activities described in Section 4.3.1 (Preliminary Assessments, Current Operating Facility Assessments, and Historical Reviews).

4.3.5 Remedial Investigation/Feasibility Study Reports

The RI/FS Report will be prepared in two sections: the RI including the Health Risk Assessment (HRA), and the Feasibility Study (FS). The RI and HRA will be prepared concurrently and a draft of each document will be submitted for review by the IAG participants. The FS will evolve from the initial screening and detailed analyses of alternatives. It will also be reviewed in draft form by U.S. EPA Region IX and DHS. The HRA will be incorporated as a section of the RI. The RI/FS report is a primary document and will be presented to the public in conjunction with the Proposed Plan.

4.3.6 Proposed Plan

The Proposed Plan is a summary of the background information, the remedial action options, and information on how the public may participate in the remedial action selection process. This document solicits public comments on the proposed alternative, as well as other alternatives. The public's comments are addressed in the Responsiveness Summary, which is reported in the Record of Decision. The Proposed Plan is a primary document prepared concurrently with the RI/FS report.

4.3.7 Record of Decision

The Record of Decision (ROD) documents how the proposed remedial alternative was selected and how the operable units will be remediated. An ROD will be prepared for each OU. A basewide ROD will evaluate any non-final remedial actions and be the basis for removing McClellan AFB from the National Priorities List (NPL). Any new information discovered by McClellan AFB or arising from responses to public comments will be addressed in the OU and basewide RODs. The RODs are primary documents.

4.3.8 Expedited Response Actions

Expedited Response Actions (ERAs) are a significant facet of the McClellan AFB cleanup program for two reasons. First, McClellan AFB is proactively taking steps to control contaminant migration. Second, land available for development is at a premium on the base. To support their ongoing defense mission, McClellan AFB must clean up various areas and sites on a timely basis to meet internal environmental

protection goals and to allow for new construction. Expedited Response Actions will be a mechanism to provide timely response actions.

As previously indicated, ERAs may be identified at various points in the RI/FS process. In addition to data analysis and review phases, ERAs may be initiated upon discovery of conditions endangering human health or the environment during field sampling programs.

4.3.9 Basewide Soil Treatability Study

Initial assessments suggest that soils at various locations around the base are potential sources of contamination. It is likely that one or more soil treatment technology will be implemented on base. The various treatment technologies will be analyzed in a separate activity, to permit the earliest construction and operation of a treatment facility. This soil treatment capacity would be available for ERAs as well as remedial actions.

4.4 Groundwater Investigations

Preventing exposures to contaminated groundwater has been and continues to be a major focus for the McClellan AFB IRP. Two major response activities have been implemented and a third is currently being planned for implementation in fiscal year 1990. The emphasis on groundwater led to the earlier characterization and monitoring efforts that are still in effect. This, in turn, has led to a better understanding of the nature and extent of groundwater contamination. As investigations continue, areas where exposures could potentially occur will be identified and ERAs initiated if appropriate. If exposure risks from groundwater do not pose an imminent threat, further investigation and remediation will become part of the operable unit RI/FS process.

The following sections describe current and proposed groundwater investigation and remediation activities.

4.4.1 Operable Unit B

Contamination that has been found in the groundwater beneath OU B and beyond the base boundary probably comes from sources within this OU. McClellan AFB is implementing a removal action in response to this situation. The first phase is

being expedited to intercept the contaminated groundwater flow near the contamination source. The flow of this contaminated water is toward a McClellan AFB production well. The second phase is a non-time critical activity to slow or stop the migration of contaminated groundwater toward the base boundary. The plans for these activities will be documented in an Engineering Evaluation/Cost Analysis (EE/CA).

4.4.2 Operable Units C & D

As described in Section 3.3.3, groundwater extraction systems in OUs C and D and a treatment plant are currently in operation. The OU C extraction system will be upgraded. Records of Decision will be prepared to review and document the decision procedures that resulted in:

- The synthetic liner and clay cap in OU D; and
- The OU D Groundwater Extraction System, the Groundwater Treatment Plant, and the Off-Base Residential Water Supply.

4.4.3 Basewide

A prime focus of the McClellan AFB cleanup efforts to date have been to eliminate public exposures to contaminants in groundwater. This effort is being continued through two programs described in the following sections. Also discussed are two RODs not specifically associated with an OU and the well abandonment plan.

Preliminary Groundwater Operable Unit Remedial Investigation (PGOURI)

The PGOURI is a basewide effort to collect geologic and hydrogeologic data through downhole geophysics and additional monitoring wells. This activity is not specific to any OU, but supplements the existing group of monitoring wells basewide. New wells will characterize groundwater in previously uninvestigated areas and better define the nature and extent of contamination in areas of known contamination. The sample and data analyses from the PGOURI effort will be reported as a secondary document.

Groundwater Sampling and Analysis Program (GSAP)

Under this program, the large number of monitoring wells on and off base are sounded and sampled. The samples are analyzed, analytical results are reported,



and preliminary interpretation of data is performed. Raw data are reported monthly in the IAG status reports and validated data are reported quarterly. This program also produces an annual report presenting four quarters of data. The GSAP is an existing program that will continue in the future. The data generated by this activity are entered into a database, which is the basic resource for all groundwater investigations. Analysis of these data will indicate areas that should be remediated on an expedited basis and those areas that will be resolved by the RI/FS process.

Off-Base Residential Alternate Water Supply Record of Decision

As stated in Section 3.3.3, McClellan AFB provided 548 residences with municipal drinking water taps for residences west of the base. This action will be reviewed and the decision process documented with a ROD in 1991.

Well Abandonment Plan

Several production and monitoring wells have been identified for abandonment, since these wells in their present state may provide a conduit for contaminant migration. This plan will be written and submitted to the IAG members for review prior to implementation.

Basewide Record of Decision

Once the OUs approach the final stages of remedial action, a basewide ROD will be prepared. This will be a final ROD to close out the CERCLA restoration program at McClellan AFB.

TABLE 4-1. McCLELLAN AFB IAG DELIVERABLE SCHEDULE

Document Title	Document		Dates	
	Category	Type	Deadline ^a	Target
<u>OPERABLE UNIT B</u>				
OU B Summary Report	S	RC	--	15 AUG 90
OU B RI Sampling and Analysis Plan (SAP)	P	D	05 MAR 91	--
		DF	Per IAG Section 7 (Consultation)	05 JUL 91
		F	Per IAG Section 7 (Consultation)	06 AUG 91
OU B Remedial Investigation/ Feasibility Study Report and Proposed Plan	P	D	29 JUN 93	--
		DF	Per IAG Section 7 (Consultation)	29 OCT 93
		F	Per IAG Section 7 (Consultation)	30 NOV 93
OU B Technology Assessment/Soil Treatability Study	S	D	--	04 JUN 92
		RC	--	06 OCT 92
OU B Record of Decision	P	D	03 MAY 94	--
		DF	Per IAG Section 7 (Consultation)	02 SEP 94
		F	Per IAG Section 7 (Consultation)	04 OCT 94
OU B Remedial Design/Remedial Action (RD/RA) Schedule	--	--	--	23 SEP 94
OU B Remedial Action Workplan	P	D	--	25 OCT 94 ^b
		DF	Per IAG Section 7 (Consultation)	24 FEB 95
		F	Per IAG Section 7 (Consultation)	28 MAR 95
OU B Remedial Design	--	--	--	08 NOV 95 ^b
<u>Expedited Response Actions</u>				
OU B EE/CA Report	S	D	--	01 OCT 90
		RC	--	03 DEC 90
OU B EE/CA Action Memorandum	S	D	--	16 JAN 91

(Continued)

TABLE 4-1. (Continued)

Document Title	Document		Dates	
	Category	Type	Deadline ^a	Target
<u>OPERABLE UNIT A</u>				
OU A Summary Report	S	D	--	11 FEB 91
		RC	--	10 JUN 91
OU A RI SAP	P	D	14 MAY 92	--
		DF	Per IAG Section 7 (Consultation)	15 SEP 92
		F	Per IAG Section 7 (Consultation)	15 OCT 92
OU A Remedial Investigation/ Feasibility Study Report and Proposed Plan	P	D	09 APR 96	--
		DF	Per IAG Section 7 (Consultation)	09 AUG 96
		F	Per IAG Section 7 (Consultation)	10 SEP 96
OU A Record of Decision	P	D	11 FEB 97	--
		DF	Per IAG Section 7 (Consultation)	13 JUN 97
		F	Per IAG Section 7 (Consultation)	15 JUL 97
OU A Remedial Design/Remedial Action (RD/RA) Schedule	--	--	--	04 JUL 97
OU A Remedial Action Workplan	P	D	--	05 AUG 97 ^b
		DF	Per IAG Section 7 (Consultation)	05 DEC 97
		F	Per IAG Section 7 (Consultation)	06 JAN 98
OU A Remedial Design	--	--	--	19 AUG 98 ^b
<u>OPERABLE UNIT C</u>				
OU C Summary Report	S	D	--	29 JUL 92
		RC	--	30 NOV 92
OU C RI SAP	P	D	08 NOV 93	--
		DF	Per IAG Section 7 (Consultation)	10 MAR 94
		F	Per IAG Section 7 (Consultation)	11 APR 94

(Continued)

TABLE 4-1. (Continued)

Document Title	Document		Dates	
	Category	Type	Deadline ^a	Target
OPERABLE UNIT C (Continued)				
OU C Remedial Investigation/ Feasibility Study Report and Proposed Plan	P	D	02 APR 98	--
		DF	Per IAG Section 7 (Consultation)	04 AUG 98
		F	Per IAG Section 7 (Consultation)	03 SEP 98
OU C Record of Decision	P	D	05 FEB 99	--
		DF	Per IAG Section 7 (Consultation)	24 JUN 99
		F	Per IAG Section 7 (Consultation)	26 JUL 99
OU C Remedial Design/Remedial Action (RD/RA) Schedule	--	--	--	15 JUL 99
OU C Remedial Action Workplan	P	D	--	16 AUG 99 ^b
		DF	Per IAG Section 7 (Consultation)	16 DEC 99
		F	Per IAG Section 7 (Consultation)	17 JAN 00
OU C Remedial Design	--	--	--	01 SEP 00 ^b
OPERABLE UNIT D				
Area D Groundwater Treatment Plant/Groundwater Extraction System and Off-Base Residential Water Supply FS/Proposed Plan/ ROD ^c	P	D	06 SEP 91	--
		DF	Per IAG Section 7 (Consultation)	08 JAN 92
		F	Per IAG Section 7 (Consultation)	07 FEB 92
OU D Summary Report	S	D	--	21 JAN 94
		RC	--	25 MAY 94
OU D RI SAP	P	D	25 JAN 95	--
		DF	Per IAG Section 7 (Consultation)	30 MAY 95
		F	Per IAG Section 7 (Consultation)	28 JUN 95
OU D Remedial Investigation/ Feasibility Study Report and Proposed Plan	P	D	18 SEP 98	--
		DF	Per IAG Section 7 (Consultation)	20 JAN 99
		F	Per L.G. Section 7 (Consultation)	19 FEB 99

(Continued)

TABLE 4-1. (Continued)

Document Title	Document		Dates	
	Category	Type	Deadline ^a	Target
<u>OPERABLE UNIT D</u> (Continued)				
OU D Record of Decision	P	D	22 JUL 99	--
		DF	Per IAG Section 7 (Consultation)	23 NOV 99
		F	Per IAG Section 7 (Consultation)	23 DEC 99
OU D Remedial Design/Remedial Action (RD/RA) Schedule	--	--	--	14 DEC 99
OU D Remedial Action Workplan	P	D	--	14 JAN 00 ^b
		DF	Per IAG Section 7 (Consultation)	18 MAY 00
		F	Per IAG Section 7 (Consultation)	20 JUN 00
OU D Remedial Design	--	--	--	09 FEB 01 ^b
<u>OPERABLE UNITS E, F, G, & H</u>				
OUs E, F, G, & H Summary Report	S	D	--	26 JUL 95
		RC	--	01 DEC 95
OUs E, F, G, & H RI SAP	P	D	17 APR 96	--
		DF	Per IAG Section 7 (Consultation)	21 AUG 96
		F	Per IAG Section 7 (Consultation)	23 SEP 96
OUs E, F, G, & H Remedial Investigation/Feasibility Study Report and Proposed Plan	P	D	12 JAN 00	--
		DF	Per IAG Section 7 (Consultation)	16 MAY 00
		F	Per IAG Section 7 (Consultation)	16 JUN 00
OUs E, F, G, & H Record of Decision	P	D	22 NOV 00	--
		DF	Per IAG Section 7 (Consultation)	30 MAR 01
		F	Per IAG Section 7 (Consultation)	01 MAY 01
OUs E, F, G & H Remedial Design/Remedial Action (RD/RA) Schedule	--	--	--	20 APR 01

(Continued)

TABLE 4-1. (Continued)

Document Title	Document		Dates	
	Category	Type	Deadline ^a	Target
OPERABLE UNITS E, F, G, & H (Continued)				
OUs E, F, G, & H Remedial Action Workplan	P	D	--	22 MAY 01 ^b
		DF	Per IAG Section 7 (Consultation)	26 SEP 01
		F	Per IAG Section 7 (Consultation)	29 OCT 01
OUs E, F, G, & H Remedial Design	--	--	--	19 JUN 02 ^b
BASEWIDE				
PGOURI Report	S	D	--	13 SEP 91
		RC	--	15 JAN 92
Basewide Record of Decision	P	D	09 OCT 01	--
		DF	Per IAG Section 7 (Consultation)	14 FEB 02
		F	Per IAG Section 7 (Consultation)	19 MAR 02
Groundwater Sampling and Analysis Program	I	--	--	28 SEP 90
	I	--	--	31 DEC 90
	I	--	--	29 MAR 91
	I	--	--	29 JUN 91
	I	--	--	28 SEP 91
	I	--	--	31 DEC 91
	I	--	--	29 MAR 92
	I	--	--	29 JUN 92
	I	--	--	28 SEP 92
	I	--	--	31 DEC 92
	I	--	--	29 MAR 93
	I	--	--	29 JUN 93
	I	--	--	28 SEP 93
	I	--	--	31 DEC 93
	I	--	--	29 MAR 94
	I	--	--	29 JUN 94
	I	--	--	28 SEP 94
	I	--	--	31 DEC 94
	I	--	--	29 MAR 95
	I	--	--	29 JUN 95
	I	--	--	28 SEP 95
	I	--	--	31 DEC 95
	I	--	--	29 MAR 96

(Continued)

TABLE 4-1. (Continued)

Document Title	Document		Dates	
	Category	Type	Deadline ^a	Target
BASEWIDE (Continued)				
Groundwater Sampling and Analysis Program (Continued)	I	--	--	29 JUN 96
	I	--	--	28 SEP 96
	I	--	--	31 DEC 96
	I	--	--	29 MAR 97
	I	--	--	29 JUN 97
	I	--	--	28 SEP 97
	I	--	--	31 DEC 97
	I	--	--	29 MAR 98
	I	--	--	29 JUN 98
	I	--	--	28 SEP 98
	I	--	--	31 DEC 98
	I	--	--	29 MAR 99
	I	--	--	29 JUN 99
	I	--	--	28 SEP 99
	I	--	--	31 DEC 99
	I	--	--	29 MAR 00
	I	--	--	29 JUN 00
	I	--	--	28 SEP 00
	I	--	--	31 DEC 00
	I	--	--	29 MAR 01
	I	--	--	29 JUN 01
	I	--	--	28 SEP 01
	I	--	--	31 DEC 01
	I	--	--	29 MAR 02
	I	--	--	29 JUN 02
	I	--	--	28 SEP 02
	I	--	--	31 DEC 02 ^d
SCOPING				
1990 Comprehensive CERCLA Workplan	P	DF	Per IAG Section 7 (Consultation)	20 JUN 90
		F	Per IAG Section 7 (Consultation)	21 JUL 90
1991 Comprehensive CERCLA Workplan (CCW) & CRP Update	P	D	21 JAN 91	--
		DF	Per IAG Section 7 (Consultation)	23 MAY 91
		F	Per IAG Section 7 (Consultation)	24 JUN 91

(Continued)

TABLE 4-1. (Continued)

Document Title	Document		Dates	
	Category	Type	Deadline ^a	Target
SCOPING (Continued)				
1992 Comprehensive CERCLA Workplan (CCW) & CRP Update	P	D	20 JAN 92	--
		DF	Per IAG Section 7 (Consultation)	21 MAY 92
		F	Per IAG Section 7 (Consultation)	22 JUN 92
1993 Comprehensive CERCLA Workplan (CCW) & CRP Update	P	D	20 JAN 93	--
		DF	Per IAG Section 7 (Consultation)	24 MAY 93
		F	Per IAG Section 7 (Consultation)	23 JUN 93
1994 Comprehensive CERCLA Workplan (CCW) & CRP Update	P	D	20 JAN 94	--
		DF	Per IAG Section 7 (Consultation)	24 MAY 94
		F	Per IAG Section 7 (Consultation)	23 JUN 94
1995 Comprehensive CERCLA Workplan (CCW) & CRP Update	P	D	20 JAN 95	--
		DF	Per IAG Section 7 (Consultation)	24 MAY 95
		F	Per IAG Section 7 (Consultation)	23 JUN 95
1996 Comprehensive CERCLA Workplan (CCW) & CRP Update	P	D	22 JAN 96	--
		DF	Per IAG Section 7 (Consultation)	23 MAY 96
		F	Per IAG Section 7 (Consultation)	24 JUN 96
1997 Comprehensive CERCLA Workplan (CCW) & CRP Update	P	D	20 JAN 97	--
		DF	Per IAG Section 7 (Consultation)	22 MAY 97
		F	Per IAG Section 7 (Consultation)	23 JUN 97
1998 Comprehensive CERCLA Workplan (CCW) & CRP Update	P	D	20 JAN 98	--
		DF	Per IAG Section 7 (Consultation)	22 MAY 98
		F	Per IAG Section 7 (Consultation)	23 JUN 98

(Continued)

TABLE 4-1. (Continued)

Document Title	Document		Dates	
	Category	Type	Deadline ^a	Target
SCOPING (Continued)				
1999 Comprehensive CERCLA Workplan (CCW) & CRP Update	P	D	20 JAN 99	--
		DF	Per IAG Section 7 (Consultation)	24 MAY 99
		F	Per IAG Section 7 (Consultation)	23 JUN 99
2000 Comprehensive CERCLA Workplan (CCW) & CRP Update	P	D	20 JAN 00	--
		DF	Per IAG Section 7 (Consultation)	24 MAY 00
		F	Per IAG Section 7 (Consultation)	26 JUN 00
2001 Comprehensive CERCLA Workplan (CCW) & CRP Update	P	D	20 JAN 01	--
		DF	Per IAG Section 7 (Consultation)	25 MAY 01
		F	Per IAG Section 7 (Consultation)	27 JUN 01

^a Primary documents follow the IAG schedule and do not include dispute resolution.

^b Deadlines for RD/RA documents will be submitted 21 days following issuance of the draft final ROD per Section 8.3 of the IAG. Target dates are shown for discussion purposes.

^c The FS report and proposed plan will be issued at the same time as the ROD. Agency and public comments will be incorporated into the draft final report.

^d Groundwater sampling and analysis activities may continue past this date; deliverables are only shown through 2002 for brevity.

P = Primary Document
S = Secondary Document
I = Informational
D = Draft for Agency Review
DF = Draft Final
F = Final
RC = Response to Comments
TBD = To Be Determined

5.0

REFERENCES

Agency for Toxic Substances and Disease Registry, October 1988. Preliminary Health Assessment, McClellan Air Force Base, Sacramento, California. Prepared by Office of Health Assessment, Agency for Toxic Substances and Disease Registry.

American Conference of Government Industrial Hygienists, 1987. Threshold Limit Values and Biological Exposure Indices for 1987-1988.

California Air Resources Board, July 1988. Air Resources Board Fact Sheet 38, California Air Resources Board, Sacramento, California.

California Department of Health Services, May 1986. California Site Mitigation Decision Tree Manual.

CH2M Hill, 1981. Installation Restoration Program Records Search for McClellan Air Force Base, Vol. 1, No. 1.

EG&G Idaho, Inc., 1986. Statement of Work for Dismantlement of Building 666 (Site 47) and Industrial Wastewater Treatment Plant Number 4 (Site 48).

EG&G Idaho, Inc., 1988. Hydrogeologic Assessment Report for the Surface Impoundment, Area C, McClellan Air Force Base, Sacramento, California, Project Number PRJY871509.

McLaren Environmental Engineering, July 1986. Final Basewide Report on Contamination.

National Institute of Occupational Safety and Health, September 1986. NIOSH Recommendations for Occupational Safety and Health Standards. Morbidity and Mortality Weekly Report, Supplement Vol. 35. Center for Disease Control, Atlanta, Georgia.

Radian Corporation, 1986. Monitoring Well Installation, Installation Restoration Program, Phase II, Stage 2-2, McClellan Air Force Base, California.

Radian Corporation, January 1989. Health and Safety Plan, Installation Restoration Program, Stage 3, McClellan Air Force Base, California.

Radian Corporation, March 1989. Risk Assessment Protocol, Installation Restoration Program, Stage 3, McClellan Air Force Base, California.

Radian Corporation, July 1989. Annual Technical Report (January-December 1988), Installation Restoration Program, Stage 3, McClellan Air Force Base, California.

Radian Corporation, August 1989. Quality Assurance Project Plan, Installation Restoration Program, Stage 3, McClellan Air Force Base, California.

Radian Corporation, August 1988. "Technical Approach: Selection and Evaluation of ARARs and Other Cleanup Levels," Installation Restoration Program, Stage 3, McClellan Air Force Base, California.

Radian Corporation, September 1989. Preliminary Groundwater Operable Unit Remedial Investigation Sampling and Analysis Plan, Installation Restoration Program, Stage 6, McClellan Air Force Base, California.

Radian Corporation, September 1989. Area B Groundwater Operable Unit Remedial Investigation: Technical Report, Installation Restoration Program, Stage 5, McClellan Air Force Base, California.

Radian Corporation, September 1989. Community Relations Plan, Remedial Investigation/Feasibility Study, McClellan Air Force Base, California.

U.S. Environmental Protection Agency, 1980. Ambient Water Quality Criteria Documents, Office of Water Regulations and Standards, Washington, D.C.

U.S. Environmental Protection Agency, 1985. Methods for Assessing Exposure to Chemical Substances, Volumes 1-6.

U.S. Environmental Protection Agency, 1985. National Oil and Hazardous Substances Pollution Contingency Plan: Final Rule. Federal Register 50: 47912-47979.

U.S. Environmental Protection Agency, 1986a. Superfund Public Health Evaluation Manual. Office of Emergency and Remedial Response, Washington, D.C.

U.S. Environmental Protection Agency, 1986b. Superfund Exposure Assessment Manual (Draft). Prepared for the Office of Emergency and Remedial Response. U.S. EPA 540/1-86/060.

U.S. Environmental Protection Agency, 1986c. Guidelines for Exposure Assessment, Federal Register. 51:34042-34030.

U.S. Environmental Protection Agency, May 1986. Quality Criteria for Water, Office of Water Regulations and Standards, Washington, D.C., EPA 440/5-86-001.

U.S. Environmental Protection Agency, March 1987. Health Advisories for 25 Organics. U.S. Environmental Protection Agency, PB87-235578.

U.S. Environmental Protection Agency, October 1987. Community Relations in Superfund A Handbook. Draft. OSWER Directive 9230.0-3B. Washington, D.C., Office of Emergency and Remedial Response.

U.S. Environmental Protection Agency, March 1988. Guidance on Preparing Superfund Decision Documents: The Proposed Plan and Record of Decision. Draft. OSWER Directive 9355.3-02. Washington, D.C., Office of Emergency and Remedial Response.

U.S. Environmental Protection Agency, April 1988. Removal Cost Management Manual. OSWER Directive 9360.0-02B. Washington, D.C., Office of Emergency and Remedial Response.

U.S. Environmental Protection Agency, October 1988. Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA. Interim Final. OSWER Directive 9355.3-01. Washington, D.C., Office of Emergency and Remedial Response.

U.S. Environmental Protection Agency, November 1988. Computer Search of Reference Doses and Cancer Potency Slopes listed on the Integrated Risk Information System.

U.S. Environmental Protection Agency, September 1989. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual. OSWER Directive 9285.7-01a. Washington, D.C., Office of Emergency and Remedial Response.

U.S. Fish and Wildlife Services, August 1987. Preliminary Natural Resources Survey, McClellan Air Force Base, Sacramento, California (ER 87/332).

Walker, Thomas J., 1983. Decontamination Plan to Close Hazardous Waste Facility (Building 666) at McClellan Air Force Base, California.

APPENDIX A

Sites and Potential Release Locations

TABLE A-1. SITES AND POTENTIAL RELEASE LOCATIONS, MCCLELLAN AFB

ID	Description	Location	Size (sq ft)	Identified/Potential Contaminants	Cover	Phase I	
						Rating Score	HRS Score
Operable Unit A1							
PRL 39	LANDFILL	S OF BLDG 351	100,000	NONE DETECTED	YES	60	0.52
PRL 40	INDUSTRIAL WASTEWATER SLUDGE	NE OF SANITARY WTP	21,000	SOLVENTS	YES	66	27.90
PRL L-2	INDUSTRIAL WASTEWATER LINE	AREA A1	--	PRIORITY POLLUTANTS			
PRL B-3	LANDFILL	UNDER BLDG 251	UNKNOWN	SOLVENTS, PETROLEUM PRODUCTS			
PRL B-4	SLUDGE DRYING BED	S OF BLDG 344	2,500	SOLVENTS, METALS			
PRL B-5	LANDFILL	S OF BLDG 375	12,500	SOLVENTS, PETROLEUM PRODUCTS			
PRL P-3	OIL PIT	S OF BLDG 251	6,272	SOLVENTS, PETROLEUM PRODUCTS			
PRL P-4	SUMP	E OF BLDG 351	3,360	SOLVENTS, PETROLEUM PRODUCTS			
PRL S-1	PLATING SHOP	IN BLDG 343	12,000	SOLVENTS, METALS, CYANIDE			
PRL S-6	INTP #1	E OF BLDG 346	4,200	SOLVENTS, METALS			
PRL S-14	PAINT SHOP/SPRAY BOOTH	BLDG 22	8,400	SOLVENTS, PETROLEUM PRODUCTS			
PRL S-16	SOLVENTS/PAINT SPRAY BOOTHS	BLDG 250	250,000	SOLVENTS, PETROLEUM PRODUCTS			
PRL S-17	REPAIR SHOP/SPRAY BOOTHS	BLDG 251	27,000	SOLVENTS, PETROLEUM PRODUCTS			
PRL S-18	REPAIR SHOP/CLEANING SHOP	BLDG 252	27,000	SOLVENTS, PETROLEUM PRODUCTS			
PRL S-19	ENTOMOLOGY STORAGE AREA	NE OF SANITARY WTP	3,600	PESTICIDES			
PRL S-20	PHOTO LAB	BLDG 336	14,000	SOLVENTS, METALS			
PRL S-21	DEGREASER/SPRAY BOOTHS	IN BLDG 351	28,000	SOLVENTS, PETROLEUM PRODUCTS			
PRL S-22	REPAIR SHOP/SPRAY BOOTHS	IN BLDG 355	10,000	SOLVENTS, PETROLEUM PRODUCTS			
PRL S-23	PLATING SHOP	IN BLDG 358	14,000	SOLVENTS, METALS, CYANIDE			
PRL S-24	DEPAINT WASHRACK	AT BLDG 375	25,000	SOLVENTS, PETROLEUM PRODUCTS			
PRL T-10	SOLVENT TANK	BLDG 362	56,000	SOLVENTS			
PRL T-12	WASTE OIL/SOLVENT TANK	BLDG 342	2,400	SOLVENTS			
PRL T-17	TANK FARM	S OF BLDG 350	2,800	SOLVENTS, PETROLEUM PRODUCTS			
PRL T-18	TANK FARM	E OF BLDG 343	5,400	SOLVENTS, PETROLEUM PRODUCTS			
PRL T-19	TANK FARM	E OF BLDG 344	5,400	SOLVENTS, PETROLEUM PRODUCTS			
PRL T-21	UNDERGROUND SOLVENT TANK	W OF BLDG 342	10,000	SOLVENTS, PETROLEUM PRODUCTS			
PRL T-30	UNDERGROUND SOLVENT TANK	S OF BLDG 252	3,600	SOLVENTS			
PRL T-36	500 GALLON STODDARD SOLVENT TANK	NEAR BLDG 329	6,700	SOLVENTS			
PRL T-37	STODDARD SOLVENT TANK	S OF BLDG 360	6,700	SOLVENTS			

(Continued)

TABLE A-1. (Continued)

ID	Description	Location	Size (sq ft)	Identified/Potential Contaminants	Cover	Phase I Rating Score	HRS Score
<u>Operable Unit A1 (Continued)</u>							
PRL T-47	OIL/WATER SEPARATOR	E OF BLDG 346A	6,700	PETROLEUM PRODUCTS			
PRL T-59	UNDERGROUND STORAGE TANK	NEAR BLDG 340	2,500	PETROLEUM PRODUCTS			
<u>Operable Unit A2</u>							
CS 38	UNDERGROUND TANKS/SLUDGE LANDFILL	BLDG 475	240,000	SOLVENTS, PRIORITY POLLUTANTS, METALS	YES	65	37.20
PRL 25	LANDFILL	S END OF N/S RUNWAY	110,000	NONE DETECTED	PARTIAL	37	0.52
PRL 37	LANDFILL	ADJ. TO TAXIWAY 7165	125,000	SOLVENTS, OIL/GREASE	PARTIAL	--	16.74
PRL L-3	INDUSTRIAL WASTEWATER LINE	AREA A2	UNKNOWN	PRIORITY POLLUTANTS			
UPRL L-4	INDUSTRIAL WASTEWATER LINE	AREA A2	UNKNOWN	PRIORITY POLLUTANTS			
PRL B-2	SPOIL PIT/BORROW PIT	UNDER N/S RUNWAY	UNKNOWN	UNKNOWN			
PRL P-5	OPEN DITCH	N OF BLDG 475	2,200	SOLVENTS, OTHER			
PRL P-6	OPEN DITCH	N OF BLDG 475	2,200	SOLVENTS, OTHER			
PRL S-2	CHEMICAL WAREHOUSE	IN BLDG 447	9,400	SOLVENTS			
PRL S-3	ACID STORAGE WAREHOUSE	W OF BLDG 447	5,600	ACIDS			
PRL S-4	TREATMENT PLANT/SLUDGE BEDS	N OF BLDG 431	13,000	SOLVENTS, METALS, PETROLEUM PRODUCTS			
PRL S-7	IWTP #3	NE OF BLDG 475	8,100	SOLVENTS, METALS			
PRL S-25	TRANSFORMER SHOP	BLDG 440	27,000	PCBS, SOLVENTS, PETROLEUM PRODUCTS			
PRL S-26	MAINTENANCE SHOP/SPRAY BOOTHS	BLDG 473	38,000	SOLVENTS, PETROLEUM PRODUCTS			
PRL S-27	SOLVENT RECOVERY STILL	BLDG 478	7,200	SOLVENTS			
PRL S-36	OIL DRUM STORAGE	N OF BLDG 410	27,000	SOLVENTS, PETROLEUM PRODUCTS			
PRL S-37	OIL DRUM STORAGE	N OF BLDG 410	27,000	SOLVENTS, PETROLEUM PRODUCTS			
PRL S-38	DRUM STORAGE	N OF BLDG 431	15,000	SOLVENTS			
PRL T-15	TANK FARM	N OF BLDG 447	25,000	SOLVENTS, PETROLEUM PRODUCTS			
PRL T-16	TANK FARM	N OF BLDG 475	6,700	SOLVENTS, PETROLEUM PRODUCTS			
PRL T-20	TANK FARM	W OF BLDG 475	20,000	SOLVENTS, PETROLEUM PRODUCTS			
PRL T-57	IWL DRAIN AT BLDG 431	W OF BLDG 431	75,000	PRIORITY POLLUTANTS			

(Continued)

TABLE A-1. (Continued)

ID	Description	Location	Size (sq ft)	Identified/Potential Contaminants	Cover	Phase I Rating Score	HRS Score
Operable Unit A3							
CS 24	LANDFILL	E OF BLDG 621	41,000	PRIORITY POLLUTANTS	PARTIAL	37	37.20
PRL 34	WASTE SOLVENT STORAGE TANKS	E OF BLDG 640	100	PRIORITY POLLUTANTS	NO	38	29.77
PRL P-8	ACID AND CYANIDE PIT	S END OF W/S RUNWAY	38,000	ACID, METALS			
PRL S-9	ASBESTOS STORAGE	E OF BLDG 642	10,000	ASBESTOS			
PRL T-6	UNDERGROUND SOLVENT TANK	BLDG 640	3,100	SOLVENTS			
PRL T-7	SOLVENT PIT/WASTE THINNER TANK	BLDG 640	14,000	SOLVENTS			
PRL T-61	UNDERGROUND STORAGE TANK	BLDG 614	1,000	GASOLINE			
Operable Unit B1							
CS 23	LANDFILL	BLDG 781	24,000	PRIORITY POLLUTANTS	PARTIAL	35	46.51
PRL 29	LANDFILL	WE OF BLDG 700	120,000	NONE DETECTED	NO	42	0.50
PRL 31	INCINERATOR ASH BURIAL PIT	NEAR BLDG 680	53,000	ARSENIC	NO	41	11.92
PRL B-1	LANDFILL	E OF BLDG 700	109,200	UNKNOWN			
PRL B-9	LANDFILL	E OF BLDG 700	UNKNOWN	UNKNOWN			
PRL P-2	WASTE POND	S OF BLDG 687	18,816	SOLVENTS, PETROLEUM PRODUCTS			
PRL S-13	OPEN STORAGE	BLDGS 709, 727, 729	120,000	SOLVENTS			
PRL S-33	HAZARDOUS MATERIALS STORAGE	BLDG 786	84,000	SOLVENTS, OTHER			
PRL S-41	MAT K DRAINAGE	S OF BLDG 711	125,000	SOLVENTS, PETROLEUM PRODUCTS, LEAD			
PRL T-8	FUEL TANK	BLDG 756	16,000	PETROLEUM PRODUCTS, SOLVENTS			
PRL T-45	OIL/WATER SEPARATOR	N OF BLDG 74	3,600	PETROLEUM PRODUCTS			
PRL T-46	OIL/WATER SEPARATOR	S OF BLDG 764	6,700	PETROLEUM PRODUCTS			
PRL T-48	OIL/WATER SEPARATOR	S OF BLDG 765	6,700	PETROLEUM PRODUCTS			
Operable Unit B2							
CS 47	ABANDONED PLATING SHOP	BLDG 666	44,000	SOLVENTS, METALS	YES	--	27.90
CS 48	ABANDONED IWTP	IWTP #4	2,500	SOLVENTS, METALS, OIL/GREASE	YES	--	33.47
PRL 30	RADIO/CHEM LAB/LANDFILL	E OF BLDG 628	39,000	SOLVENTS, METALS	PARTIAL	--	--
PRL 35	SCRAP METAL BURIAL PIT	BLDG 652	35,000	NONE DETECTED	PARTIAL	--	0.52
PRL 36	OPEN STORAGE AREA	N OF BLDG 666	30,000	SOLVENTS, CYANIDE	PARTIAL	--	27.90

(Continued)

TABLE A-1. (Continued)

ID	Description	Location	Size (sq ft)	Identified/Potential Contaminants	Cover	Phase I	
						Rating Score	HRS Score
Operable Unit B2 (Continued)							
PRL L-5	INDUSTRIAL WASTEWATER LINE	AREA B2	UNKNOWN	PRIORITY POLLUTANTS			
PRL L-6	INDUSTRIAL WASTEWATER LINE	AREA B2	UNKNOWN	PRIORITY POLLUTANTS			
PRL P-9	OPEN DRAINAGE DITCH	N OF BLDG 660	1,700	SOLVENTS, METALS			
PRL S-5	IWTP	N OF BLDG 652	7,100	SOLVENTS, METALS			
PRL S-12	PCB STORAGE	BLDG 624	20,000	PCBs			
PRL S-28	OIL/PAINT STORAGE	N OF BLDG 600	5,000	OIL/GREASE			
PRL S-29	PCB STORAGE	IN BLDG 655	190,000	PCBs			
PRL S-30	DEPAINT WASHRACK	BLDG 658	15,000	SOLVENTS, PETROLEUM PRODUCTS			
PRL S-34	DEGREASER/PAINT SPRAY BOOTH	BLDG 652	35,000	SOLVENTS, OTHER			
PRL S-35	SOLVENT SPRAY BOOTH	BLDG 654	25,000	SOLVENTS, OTHER			
PRL T-60	UNDERGROUND STORAGE TANK	NW BLDG 656	2,500	PETROLEUM PRODUCTS			
Operable Unit C1							
CS 7	SLUDGE/OIL PIT	E OF BLDG 701	35,000	PRIORITY POLLUTANTS, OIL/GREASE, PCB	NO	67	22.58
CS 10	LANDFILL	W OF BLDG 774	32,000	PRIORITY POLLUTANTS, PCB	NO	63	22.58
CS 11	LANDFILL	W OF BLDG 774	32,000	PRIORITY POLLUTANTS	NO	63	22.58
CS 12	LANDFILL	SW OF BLDG 774	55,000	PRIORITY POLLUTANTS	NO	63	22.58
CS 13	LANDFILL	W OF BLDG 774	54,000	PRIORITY POLLUTANTS	NO	63	37.54
CS 14	LANDFILL	S OF BLDG 701	54,000	PRIORITY POLLUTANTS	NO	63	22.58
CS 43	LANDFILL	NW OF BLDG 704	20,000	PRIORITY POLLUTANTS	NO	49	22.58
CS 52	BURN PIT	NW OF BLDG 704	20,000	PRIORITY POLLUTANTS	YES	--	20.84
CS 67	LANDFILL	NW OF BLDG 702	40,000	PRIORITY POLLUTANTS, PETROLEUM PRODUCTS	YES	--	19.98
PRL 8	SLUDGE/REFUSE LANDFILL	NW OF BLDG 774	59,000	SOLVENTS, PRIORITY POLLUTANTS	NO	66	22.57
PRL 9	LANDFILL	W OF BLDG 774	40,000	PRIORITY POLLUTANTS	NO	63	6.70
PRL 15	SODIUM VALVE TRENCH	SW OF BLDG 774	30	NONE DETECTED	NO	44	0
PRL 16	SODIUM VALVE TRENCH	S OF BLDG 701	30	NONE DETECTED	NO	44	0
PRL 49	LANDFILL	NE OF BLDG 704	45,000	NONE DETECTED	NO	--	0
PRL 50	SETTLING POND	NW OF BLDG 704	11,000	NONE DETECTED	YES	--	0
PRL 51	HOLDING POND	NW OF IWTP	180,000	NONE DETECTED	YES	--	0

(Continued)

(Continued)

TABLE A-1. (Continued)

ID	Description	Location	Size (sq ft)	Identified/Potential Contaminants	Cover	Phase I Rating Score	HRS Score
<u>Operable Unit C1 (Continued)</u>							
PRL 53	SETTLING POND	NW OF BLDG 704	96,000	SOLVENTS	YES	--	0
PRL S-46	UNKNOWN	N OF BLDG 774	UNKNOWN	VOLATILE ORGANIC COMPOUNDS			
<u>Operable Unit C2</u>							
CS 22	BURN PIT/LANDFILL	S OF IOTP AREA- BSN	40,000	PRIORITY POLLUTANTS, PCB, OIL/GREASE	NO	66	48.37
CS 42	OIL STORAGE/LANDFILL	IOTP AERATION BASIN	11,000	PRIORITY POLLUTANTS, OIL/GREASE, PCB	YES	--	48.37
CS 69	BURN PIT	SE OF BLDG 704	UNKNOWN	PRIORITY POLLUTANTS	NO	--	22.58
PRL 17	LANDFILL	SE OF BLDG 704	40,000	SOLVENTS	NO	65	0
PRL 18	LANDFILL	SE OF BLDG 704	40,000	NONE DETECTED	NO	65	0
PRL 19	LANDFILL	SE OF BLDG 704	40,000	NONE DETECTED	NO	65	0
PRL 20	SLUDGE/OIL PIT	SE OF BLDG 704	50,000	SOLVENTS	NO	64	0
PRL 21	SLUDGE/OIL PIT	SE OF BLDG 704	50,000	SOLVENTS	NO	64	0
PRL 28	SLUDGE PIT	W OF IOTP	3,000	PRIORITY POLLUTANTS	YES	50	4.34
PRL 32	RADIO/HAZ WASTE STORAGE	S OF IOTP	160	PRIORITY POLLUTANTS	PARTIAL	51	4.49
PRL 41	LANDFILL	BLDG 704	36,000	PRIORITY POLLUTANTS	PARTIAL	49	21.70
PRL 54	STORAGE AREA	S OF BLDG 704	6,300	NONE DETECTED	NO	--	0
PRL 55	ACID STORAGE AREA/LANDFILL	S OF BLDG 704	900	SOLVENTS	YES	--	0
PRL 56	STORAGE AREA	S OF BLDG 704	100,000	NONE DETECTED	NO	--	0
PRL 57	LANDFILL	S OF BLDG 704	25,000	NONE DETECTED	NO	--	0
PRL 60	HOLDING POND	S OF IOTP	80,000	NONE DETECTED	YES	--	0
PRL 61	CHEMICAL WASTE PIT	E OF BLDG 722	500	NONE DETECTED	YES	--	0
PRL 62	CHEMICAL WASTE PIT	E OF BLDG 722	500	NONE DETECTED	YES	--	0
PRL 63	UNLINED DITCH	SE OF BLDG 704	20,000	NONE DETECTED	YES	--	0
PRL 64	UNLINED DITCH	SE OF BLDG 704	20,000	NONE DETECTED	PARTIAL	--	0
PRL 65	LANDFILL	E OF BLDG 692	400,000	NONE DETECTED	PARTIAL	--	0
PRL 66	DITCHES AND POND	W OF BLDG 721	UNKNOWN	NONE DETECTED	YES	--	0
PRL 68	SLUDGE PONDS	W OF SITE 42	13,000	NONE DETECTED	PARTIAL	--	0
PRL L-7	INDUSTRIAL WASTEWATER LINE	AREA C2	UNKNOWN	PRIORITY POLLUTANTS	YES	--	22.32
PRL P-10	MAGPIE CREEK	N OF BLDG 783	UNKNOWN	VOLATILE ORGANIC COMPOUNDS	YES	--	

(Continued)

TABLE A-1. (Continued)

ID	Description	Location	Size (sq ft)	Identified/Potential Contaminants	Cover	Phase I Rating Score	HRS Score
<u>Operable Unit C2 (Continued)</u>							
PRL S-11	BCE/PCE STORAGE	BLDG 636	47,000	PCB, SOLVENTS, PETROLEUM PRODUCTS			
PRL S-31	AIRCRAFT PAINT HANGAR	BLDG 692	47,000	PAINTS, SOLVENTS, PETROLEUM PRODUCTS			
PRL S-32	PAINT STORAGE AREA	BLDG 694	10,080	PAINTS, SOLVENTS, PETROLEUM PRODUCTS			
PRL S-48	UNKNOWN	W OF BLDG 720	UNKNOWN	VOLATILE ORGANIC COMPOUNDS			
<u>Operable Unit D</u>							
CS A	SLUDGE DISPOSAL PIT	NW CORNER OF BASE	UNKNOWN	SOLVENTS, PRIORITY POLLUTANTS, METALS	NO	--	--
CS S	FUEL/SOLVENT/OILBURN PIT	NW CORNER OF BASE	9,200	SOLVENTS, PRIORITY POLLUTANTS, PETROLEUM PRODUCTS	YES	--	--
CS T	FUEL/SOLVENT SLUDGE PIT	NW CORNER OF BASE	8,400	SOLVENTS, PRIORITY POLLUTANTS, METALS, PETROLEUM PRODUCTS	YES	--	--
CS 1	LANDFILL	NW CORNER OF BASE	10,500	PRIORITY POLLUTANTS	YES	61	--
CS 2	SLUDGE/OIL PIT	NW CORNER OF BASE	20,000	PRIORITY POLLUTANTS	YES	71	--
CS 3	SLUDGE/OIL PIT	NW CORNER OF BASE	50,700	PRIORITY POLLUTANTS	YES	71	--
CS 4	SLUDGE/OIL PIT	NW CORNER OF BASE	15,000	PRIORITY POLLUTANTS	YES	72	--
CS 5	SLUDGE/OIL PIT	NW CORNER OF BASE	15,600	PRIORITY POLLUTANTS	YES	71	--
CS 6	OIL BURN PIT	NW CORNER OF BASE	7,500	SOLVENTS, METALS	PARTIAL	71	--
CS 26	SLUDGE/OIL BURN PIT	NW CORNER OF BASE	40,000	SOLVENTS, METALS	YES	71	--
PRL 27	SODIUM VALVE TRENCH	BLDG 1085	100	NONE DETECTED	PARTIAL	--	--
PRL 33	IWTP SLUDGE LANDFARM	NW CORNER OF BASE	2,000,000	SOLVENTS	YES	--	--
PRL T-11	UNDERGROUND STORAGE TANK	BLDG 1093	1,000	SOLVENTS	YES	--	--
<u>Operable Unit D,E,G,H</u>							
PRL P-7	OPEN DITCH	NE TO AREA D	5,000 LINEAR	PETROLEUM PRODUCTS, SOLVENTS			
<u>Operable Unit E</u>							
PRL 45	PAINT WASTE LANDFILL	N END OF BASE	150,000	NONE DETECTED	NO	42	0.50
PRL S-10	STORAGE AREA	NW OF BLDG 1086	63,000	SOLVENTS, RADIATION			

(Continued)

TABLE A-1. (Continued)

ID	Description	Location	Size (sq ft)	Identified/Potential Contaminants	Cover	Phase I Rating Score	HRS Score
<u>Operable Unit F</u>							
PRL B-6	WASTE AREA	N OF N/S RUNWAY	627,200	UNKNOWN			
<u>Operable Unit G</u>							
PRL L-1	INDUSTRIAL WASTEWATER LINE	AREA G	UNKNOWN	PRIORITY POLLUTANTS			
PRL S-42	HOBBY SHOP/M&R WASHRACK	N OF BLDG 1439	8,100	SOLVENTS, PETROLEUM PRODUCTS			
PRL S-43	AIRCRAFT WASHRACK	NE CORNER OF MAT V	49,000	SOLVENTS, PETROLEUM PRODUCTS			
PRL S-44	AIRCRAFT MAINTENANCE AREA	S OF BLDG 1071/MAT U	275,000	SOLVENTS, PETROLEUM PRODUCTS			
PRL T-31	UNDERGROUND STORAGE TANK	NEAR BLDG 1028	12,500	SOLVENTS			
PRL T-32	UNDERGROUND STORAGE TANK	NEAR BLDG 1023	12,500	SOLVENTS			
PRL T-33	UNDERGROUND STORAGE TANK	NEAR BLDG 1021	12,500	SOLVENTS			
PRL T-44	STODDARD SOLVENT TANK	NW OF BLDG 1048	10,000	SOLVENTS			
PRL T-62	UNDERGROUND STORAGE TANK	NE OF BLDG 1075	UNKNOWN	VOLATILE ORGANIC COMPOUNDS			
<u>Operable Unit H</u>							
PRL B-7	SPOIL AREA	N OF BLDG 243	627,200	UNKNOWN			
PRL P-1	DRAINAGE DITCH/PONDS	W OF BLDG 878	56,448	SOLVENTS, PETROLEUM PRODUCTS			
PRL S-8	ELECTROPLATING SHOP	IN BLDG 243G	35,000	SOLVENTS, METALS, CYANIDE			
PRL S-15	DEGREASER/SPRAY BOOTHS	BLDG 243	290,000	SOLVENTS, PETROLEUM PRODUCTS			
PRL S-39	NEW MUSEUM SITE	DUDLEY BLVD/PALM ST	94,000	SOLVENTS			
PRL S-40	TROOP ISSUE SITE	NW OF BLDG 910	19,000	UNKNOWN			
PRL S-45	AIRCRAFT MAINTENANCE AREA	W OF BLDG 878	615,000	SOLVENTS, PETROLEUM PRODUCTS			
PRL S-47	UNKNOWN	NE OF BLDG 943	UNKNOWN	VOLATILE ORGANIC COMPOUNDS			

CS = Confirmed Site.

PRL = Potential Release Location.

HRS = Hazard Ranking System.

IWL = Industrial Wastewater Line.

IWTP = Industrial Wastewater Treatment Plant.

RADIAN
CORPORATION

Status of PRL/Site Locations

**AREA A1
LOCATION STATUS**

IDENTIFICATION NUMBER																																
39	40	B3	B4	B5	L2	P3	P4	S1	S6	S14	S16	S17	S18	S19	S20	S21	S22	S23	S24	T10	T12	T17	T18	T19	T21	T30	T36	T37	T47	T59		
DISCOVERY & SCOPING:																																
Preliminary Assessment/Location File																																
Site Inspection																																
Interviews																																
No Further Action Recommended																																
New Sites/ Potential Release Locations																																
REMEDIAL INVESTIGATION:																																
SAMPLING & ANALYSIS PLAN:																																
Site Char.: PPA - Surface Water & Sediments																																
Soil Gas Investigation																																
Prelim. Groundwater Operable Unit RI																																
Groundwater Sampling & Analysis Program																																
Solid Waste Assessment Testing (Air)																																
RI DATA COLLECTION:																																
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FS Risk Assessment																																
FS Report																																
Treatability Study																																
REMEDATION - REMOVAL ACTION:																																
EE/CA																																
REMEDATION - OPERABLE UNIT:																																
Record of Decision																																
Remedial Design																																
Remedial Action (Construction)																																
Five-Year Review																																
REMEDATION - BASEWIDE FINAL:																																
Record of Decision																																
Remedial Design																																
Remedial Action (Construction)																																
Operation & Maintenance																																

LEGEND: ● Completed Activity

■ Continuing Activity

* Some of these investigations apply to all sites & are not tracked on a site-by-site basis

**AREA A2
LOCATION STATUS**

AREA A2 LOCATION STATUS		IDENTIFICATION NUMBER																							
		CS 38	25	37	B2	L3	L4	P5	P6	S2	S3	S4	S7	S25	S26	S27	S36	S37	S38	T15	T16	T20	T57		
DISCOVERY & SCOPING:																									
Preliminary Assessment/Location File																									
Site Inspection																									
Interviews																									
No Further Action Recommended																									
New Sites / Potential Release Locations																									
REMEDIAL INVESTIGATION*:																									
SAMPLING & ANALYSIS PLAN:																									
Site Char.: PPA - Surface Water & Sediments																									
Soil Gas Investigation																									
Prelim. Groundwater Operable Unit RI																									
Groundwater Sampling & Analysis Program																									
Solid Waste Assessment Testing (Air)																									
RI DATA COLLECTION:																									
Site Char.: PPA - Surface Water & Sediments																									
Soil Gas Investigation																									
Prelim. Groundwater Operable Unit RI																									
Groundwater Sampling & Analysis Program																									
Solid Waste Assessment Testing (Air)																									
Sampling & Data Results																									
Site Characterization Summaries																									
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Remedial Design																									
Remedial Action (Construction)																									
Operation & Maintenance																									

LEGEND: ● Completed Activity ■ Continuing Activity * Some of these investigations apply to all sites & are not tracked on a site-by-site basis

AREA A3 LOCATION STATUS		IDENTIFICATION NUMBER											
CS 24	34	P8	S9	T6	T7	T61							
DISCOVERY & SCOPING:													
Preliminary Assessment/Location File													
Site Inspection													
Interviews													
No Further Action Recommended													
New Sites / Potential Release Locations													
REMEDIATION INVESTIGATION*:													
SAMPLING & ANALYSIS PLAN:													
Site Char.: PPA - Surface Water & Sediments													
Soil Gas Investigation													
Prelim. Groundwater Operable Unit RI													
Groundwater Sampling & Analysis Program													
Solid Waste Assessment Testing (Air)													
RI DATA COLLECTION:													
Site Char.: PPA - Surface Water & Sediments													
Soil Gas Investigation													
Prelim. Groundwater Operable Unit RI													
Groundwater Sampling & Analysis Program													
Solid Waste Assessment Testing (Air)													
Sampling & Data Results													
Site Characterization Summaries													
Risk Assessment													
RI Report													
Site Characterization Supplemental Surveys													
FEASIBILITY STUDY:													
Identify & Screen Remedial Technologies													
Develop & Screen Remedial Alternatives													
ES Risk Assessment													
ES Report													
Treatability Study													
REMEDIATION - REMOVAL ACTION:													
EECA													
REMEDIATION - OPERABLE UNIT:													
Record of Decision													
Remedial Design													
Remedial Action (Construction)													
Five-Year Review													
REMEDIATION - BASEWIDE FINAL:													
Record of Decision													
Remedial Design													
Remedial Action (Construction)													
Operation & Maintenance													

LEGEND: ● Completed Activity ■ Continuing Activity * Some of these investigations apply to all sites & are not tracked on a site-by-site basis

AREA B1 LOCATION STATUS		IDENTIFICATION NUMBER															
		CS 23	29	31	B1	B9	P2	S13	S33	S41	T8	T45	T46	T48			
DISCOVERY & SCOPING:																	
Preliminary Assessment/Location File		●	●	●	●	●	●	●	●	●	●	●	●	●			
Site Inspection		●	●	●	●	●	●	●	●	●	●	●	●	●			
Interviews		●	●	●	●	●	●	●	●	●	●	●	●	●			
No Further Action Recommended																	
New Sites/Potential Release Locations																	
REMEDIAL INVESTIGATION:																	
SAMPLING & ANALYSIS PLAN:																	
Site Char.: PPA - Surface Water & Sediments								●									
Soil Gas Investigation																	
Prelim. Groundwater Operable Unit RI																	
Groundwater Sampling & Analysis Program																	
Solid Waste Assessment Testing (Air)																	
RI DATA COLLECTION:																	
Site Char.: PPA - Surface Water & Sediments								●									
Soil Gas Investigation																	
Prelim. Groundwater Operable Unit RI																	
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Remedial Design																	
Remedial Action (Construction)																	
FIVE-YEAR REVIEW																	
REMEDIAL ACTION - BASEWIDE FINAL:																	
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Remedial Design																	
Remedial Action (Construction)																	
Operation & Maintenance																	

LEGEND: ● Completed Activity ■ Continuing Activity * Some of these investigations apply to all sites & are not tracked on a site-by-site basis

AREA B2 LOCATION STATUS		IDENTIFICATION NUMBER															
		CS 47	CS 48	30	35	36	L5	L6	P9	S5	S12	S28	S29	S30	S34	S35	T60
DISCOVERY & SCOPING:																	
Preliminary Assessment/Location File		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Site Inspection		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
Interviews		●	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
No Further Action Recommended					●		●										
New Sites/Potential Release Locations																	●
REMEDIATION INVESTIGATION:																	
SAMPLING & ANALYSIS PLAN:																	
Site Char.: PPA - Surface Water & Sediments																	
Soil Gas Investigation																	
Prelim. Groundwater Operable Unit RI																	
Groundwater Sampling & Analysis Program																	
Solid Waste Assessment Testing (Air)																	
RI DATA COLLECTION:																	
Site Char.: PPA - Surface Water & Sediments																	
Soil Gas Investigation																	
Prelim. Groundwater Operable Unit RI																	
Groundwater Sampling & Analysis Program																	
Solid Waste Assessment Testing (Air)																	
Sampling & Data Results																	
Site Characterization Summaries																	
Risk Assessment																	
RI Report																	
Site Characterization Supplemental Surveys																	
FEASIBILITY STUDY:																	
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Develop & Screen Remedial Alternatives																	
FS Risk Assessment																	
FS Report																	
Treatability Study																	
REMEDIATION - REMOVAL ACTION:																	
EECA																	
REMEDIATION - OPERABLE UNIT:																	
Record of Decision																	
Remedial Design																	
Remedial Action (Construction)																	
Five-Year Review																	
REMEDIATION - BASEWIDE FINAL:																	
Record of Decision																	
Remedial Design																	
Remedial Action (Construction)																	
Operation & Maintenance																	

LEGEND: ● Completed Activity ■ Continuing Activity * Some of these investigations apply to all sites & are not tracked on a site-by site basis

LEGEND: ● Completed Activity
 ■ Continuing Activity

- Some of these investigations apply to all sites & are not tracked on a site-by-site basis

AREA C2 LOCATION STATUS		IDENTIFICATION NUMBER																											
		CS 22	CS 42	CS 60	17	18	19	20	21	28	32	41	54	55	56	57	60	61	62	63	64	66	68	L7	P10	S11	S31	S32	S48
DISCOVERY & SCOPING:																													
Preliminary Assessment/Location File																													
Site Inspection																													
Interviews																													
No Further Action Recommended																													
New Sites / Potential Release Locations																													
REMEDIAL INVESTIGATION:																													
SAMPLING & ANALYSIS PLAN:																													
Site Char.: PPA - Surface Water & Sediments																													
Soil Gas Investigation																													
Prelim. Groundwater Operable Unit RI																													
Groundwater Sampling & Analysis Program																													
Solid Waste Assessment Testing (Air)																													
RI DATA COLLECTION:																													
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REMEDIAL ACTION - REMOVAL ACTION:																													
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REMEDIAL ACTION - OPERABLE UNIT:																													
Record of Decision																													
Remedial Design																													
Remedial Action (Construction)																													
Five-Year Review																													
REMEDIAL ACTION - BASEWIDE FINAL:																													
Record of Decision																													
Remedial Design																													
Remedial Action (Construction)																													
Operation & Maintenance																													

LEGEND: ● Completed Activity

■ Continuing Activity

* Some of those investigations apply to all sites & are not tracked on a site-by-site basis

LEGEND: ● Completed Activity ■ Continuing Activity * Some of these investigations apply to all sites & are not tracked on a site-by-site basis

AREA D LOCATION STATUS	IDENTIFICATION NUMBER															
	CS A	CS S	CS T	CS 1	CS 2	CS 3	CS 4	CS 5	CS 6	CS 26	27	33	T11			
DISCOVERY & SCOPING:																
Preliminary Assessment / Local File																
Site Inspection																
Interviews																
No Further Action Recommended																
New Sites / Potential Release Locations																
REMEDIAL INVESTIGATION:																
SAMPLING & ANALYSIS PLAN:																
Site Char.: PPA - Surface Water & Sediments																
Soil Gas Investigation																
Prelim. Groundwater Operable Unit RI																
Groundwater Sampling & Analysis Program																
Solid Waste Assessment Testing (Air)																
RI DATA COLLECTION:																
Site Char.: PPA - Surface Water & Sediments																
Soil Gas Investigation																
Prelim. Groundwater Operable Unit RI																
Groundwater Sampling & Analysis Program																
Solid Waste Assessment Testing (Air)																
Sampling & Data Results																
Site Characterization Summaries																
Risk Assessment																
RI Report																
Site Characterization Supplemental Surveys																
FEASIBILITY STUDY:																
Identify & Screen Remedial Technologies																
Develop & Screen Remedial Alternatives																
ES Risk Assessment																
FS Report																
Treatability Study																
REMEDIAL ACTION - REMOVAL ACTION:																
EE/CA																
REMEDIAL ACTION - OPERABLE UNIT:																
Record of Decision																
Remedial Design																
Remedial Action (Construction)																
Five-Year Review																
REMEDIAL ACTION - BASEWIDE FINAL:																
Record of Decision																
Remedial Design																
Remedial Action (Construction)																
Operation & Maintenance																

LEGEND: ● Completed Activity ■ Continuing Activity * Some of these investigations apply to all sites & are not tracked on a site-by-site basis

AREA E		LOCATION STATUS		IDENTIFICATION NUMBER	
45	S10				
DISCOVERY & SCOPING:					
Preliminary Assessment/Location File					
Site Inspection					
Interviews					
No Further Action Recommended					
New Sites/Potential Release Locations					
REMEDIAL INVESTIGATION*:					
SAMPLING & ANALYSIS PLAN:					
Site Char.: PPA - Surface Water & Sediments					
Soil Gas Investigation					
Prelim. Groundwater Operable Unit RI					
Groundwater Sampling & Analysis Program					
Solid Waste Assessment Testing (Air)					
RI DATA COLLECTION:					
Site Char.: PPA - Surface Water & Sediments					
Soil Gas Investigation					
Prelim. Groundwater Operable Unit RI					
Groundwater Sampling & Analysis Program					
Solid Waste Assessment Testing (Air)					
Sampling & Data Results					
Site Characterization Summaries					
Risk Assessment					
RI Report					
Site Characterization Supplemental Surveys					
FEASIBILITY STUDY:					
Identify & Screen Remedial Technologies					
Develop & Screen Remedial Alternatives					
FS Risk Assessment					
FS Report					
Involuntary Study					
REMEDATION - REMOVAL ACTION:					
EECA					
REMEDATION - OPERABLE UNIT:					
Record of Decision					
Remedial Design					
Remedial Action (Construction)					
Five-Year Review					
REMEDATION - BASEWIDE FINAL:					
Record of Decision					
Remedial Design					
Remedial Action (Construction)					
Operation & Maintenance					

LEGEND:

●	Completed Activity
■	Continuing Activity
• Some of these investigations apply to all sites & are not tracked on a site-by-site basis	

[illegible]

LEGEND: ● Completed Activity
 ■ Continuing Activity
 • Some of these investigations apply to all sites & are not tracked on a site-by-site basis

AREA H

LOCATION STATUS

IDENTIFICATION NUMBER

DISCOVERY & SCOPING:

Preliminary Assessment/Location File

Site Inspection

Interviews

No Further Action Recommended

New Sites / Potential Release Locations

REMEDIAL INVESTIGATION:

SAMPLING & ANALYSIS PLAN:

Site Char.: PPA - Surface Water & Sediments

Soil Gas Investigation

Prelim. Groundwater Operable Unit RI

Groundwater Sampling & Analysis Program

Solid Waste Assessment Testing (Air)

RI DATA COLLECTION:

Site Char.: PPA - Surface Water & Sediments

Soil Gas Investigation

Prelim. Groundwater Operable Unit RI

Groundwater Sampling & Analysis Program

Solid Waste Assessment Testing (Air)

Sampling & Data Results

Site Characterization Summaries

Risk Assessment

RI Report

Site Characterization Supplemental Surveys

FEASIBILITY STUDY:

Identify & Screen Remedial Technologies

Develop & Screen Remedial Alternatives

FS Risk Assessment

FS Report

Treatability Study

REMEDIAL ACTION - REMOVAL ACTION:

EECA

REMEDIAL ACTION - OPERABLE UNIT:

Record of Decision

Remedial Design

Remedial Action (Construction)

Five-Year Review

REMEDIAL ACTION - BASEWIDE FINAL:

Record of Decision

Remedial Design

Remedial Action (Construction)

Operation & Maintenance

LEGEND: ● Completed Activity

■ Continuing Activity

* Some of these investigations apply to all sites & are not tracked on a site-by-site basis

LEGEND: ● Completed Activity ■ Continuing Activity * Some of these investigations apply to all sites & are not tracked on a site-by-site basis

APPENDIX B

Soils Management Program

MCLELLAN AFB

**Directorate of
Environmental
Management**

**SOILS MANAGEMENT
PROGRAM**

SOIL MANAGEMENT PLAN

TABLE OF CONTENTS

	<u>PAGE</u>
I Introduction	1
Regulatory Agency Interface	2
Soil Management Program Interface with On-Going RI/FS Efforts	2
II Soil Management Program	4
Soil Management Process Flow Chart	9
Table CCWE Constituent Concentration in Waste Extract 40 CFR 268.41(a)	13
Table CCW Constituent Concentration in Wastes 40 CFR 268.43	14
California Restricted Waste Applicable to Soils 40 CFR 268.32, Appendix III	19
III Preliminary Risk Assessment	22

INTRODUCTION

McClellan Air Force Base was listed on the Environmental Protection Agency's (EPA) National Priorities List (NPL) on 22 Jul 1987. This NPL designation applies to the entire base and is not restricted to the specific sites currently under investigation. In addition, Comprehensive Environmental Response Compensation & Liability Act/Superfund Amendment & Reauthorization Act (CERCLA/SARA) requires McClellan to conduct its remedial investigation/feasibility studies and remedial action efforts in accordance with Federal and State requirements. To ensure these requirements are met, an Interagency Agreement (IAG) was signed 21 Jul 1989 to establish the procedural framework between the Air Force, the State of California, and the Environmental Protection Agency in conducting these efforts.

As a result of our past investigations, McClellan recognizes that areas of contaminated soil beyond those areas currently planned for investigation may exist within the confines of the base. As a result, McClellan has developed a Soil Management Program to proactively identify and prudently manage potentially contaminated soils.

A prime motivation for the development of this plan was the recognition that CERCLA/SARA was not drafted to address many on-going activities at a large site as McClellan and its 2,952 acres. In addition, it was recognized that there is an absence of soil cleanup standards for many chemicals and that the interface of CERCLA and the Resource Conservation Recovery Act (RCRA) complicates contaminated soil issues. As a result, the goal in developing this plan was to find a way of incorporating the substantive requirements of CERCLA/SARA and RCRA into the ongoing base activities (i.e., Construction Projects, Repairs, Maintenance) and other environmental projects (i.e., Underground Storage Tank (UST) Removals) that may involve potentially contaminated soils, while at the same time minimizing the impact to our day-to-day operations. As a general rule for projects where soils are excavated; if there are no appreciable (over 50 ppm) OVA or HNu readings, no unusual soil discoloration, and no knowledge of any adjacent potential release locations, excavated soil will be placed besides the trenches from whence it came. When the project is completed, the soil will be placed back into the trench from whence it came. If there are appreciable OVA or HNu readings, or unusual soil discoloration or records indicate the excavation project is on or adjacent to a potential release location, then those excavated soils, after composite samples are collected, will either be placed on and covered by at least 6 mil plastic beside the trench from whence it came or transferred to the McClellan soils holding area. Soil samples will be collected and analyzed using the Toxic Characteristic Leaching Procedure (TCLP) and the acute aquatic 96-hour LC50 bioassay procedures in order to determine appropriate treatment/disposition. Once the project has been completed, the trench will be filled with clean soil or the excavated soils, if the excavated soils do not exceed the LDRs and pass the acute aquatic 96-hour LC50 bioassay test. More specific guidance is provided under minor construction, repairs, emergency repairs and underground storage tank

removal processes. The overall objective of this program is two-fold: (1) to ensure contaminated soil is identified early enough during ongoing base activities (i.e., construction, repairs, maintenance efforts) to preclude the off-base disposal of contaminated soils; and (2) to ensure that contaminated soil, once it is identified, is prudently managed in accordance with Federal and State requirements and in a way, to minimize the effect to our ongoing base operations.

This plan will also be implemented in a two-phased approach. In the Interim Period (first phase), this plan will require some temporary holding of contaminated soils if Landfill Disposal Restrictions (LDR) prohibit off-site disposal, if the cost effectiveness of on or off-site soil treatment can only be accomplished with certain volumes of contaminated soil, or until treatment/disposal options are formulated.

In Oct 1989, under the first phase of this plan, McClellan implemented the construction of a soils holding area which meets the substantive requirements of RCRA. In Jan 1990, an Operations and Maintenance Plan was developed for this soils holding area.

However, in the Long Term (second phase), particularly with the phase-in of the LDRs for CERCLA wastes and as Remedial Investigation/Feasibility Study (RI/FS) studies and proposed remedial actions for the base progress, there will be a need to develop on-site soil treatment capability. This plan is set up to ensure that as the objectives of this plan are implemented, both in the interim and long term, it will be accomplished in coordination with all interested parties so that all the applicable requirements are incorporated into this plan, both now and in the future.

REGULATORY AGENCY INTERFACE

It is recognized that the success of this Soil Management Program will require effective interface between all parties. Notifications of soil management actions (In Accordance With (IAW) Section 11.1 of IAG) will be included as part of our monthly IAG status report. This report will also include information regarding upcoming soil management sampling activities, as well as any Soil Management Decision Documents that were developed during the preceding month. This will keep the regulatory agencies informed of the activities occurring within this program, which will provide for an opportunity for regulatory comments and review if necessary (IAW Section 11.1 of IAG).

SOIL MANAGEMENT PROGRAM INTERFACE WITH ONGOING RI/FS EFFORTS

It is recognized that the data and findings from the Soil Management Program is important to ongoing RI/FS studies at McClellan. To ensure this information is interfaced with this program, all data generated within the Soil Management Program will be incorporated into the RI/FS efforts on a

semi-annual basis. The contractor conducting the RI/FS activities in the Operable Unit area that this data was obtained, will evaluate this information to determine if it warrants a new site or Potential Release Location (PRL) designation or if it can be incorporated into an existing site or PRL. The status of this information will be summarized annually into the Comprehensive CERCLA Workplan (CCW) to ensure incorporation into the RI/FS process. In addition, the annual CCW will provide an opportunity for revisions to the Soil Management Plan, where necessary, to comply with new requirements.

SOIL MANAGEMENT PROGRAM

McClellan has been evaluating contamination on McClellan since October 1979. There have been numerous engineering studies performed indicating that the predominant types of contaminants found in the soil and groundwater have been those chemicals used in mission essential maintenance operations. For the most part, these have been identified to be Volatile Chlorinated Aliphatics, Volatile Aromatics, Diesel and Jet Fuels. Numerous soil samples have been analyzed for EPA 8010-Volatile Chlorinated Aliphatics; EPA 8020-Volatile Aromatics; EPA 8270-Semi-Volatile Organics; EPA 8015-NonHalogenated Volatile Organics and Modified EPA 6010-TTLC/Metals. The results of previous sampling have provided McClellan with a basis for establishing a plan and rationale for assessing and prudently managing contaminated soils. In recognition of the intent of the IAG to integrate CERCLA and RCRA this Soil Management Plan was designed as a screening methodology addressing both SARA/CERCLA and substantive RCRA requirements as they apply to contaminated soils.

This Soil Management Plan provides rationale in assessing soil contamination for appropriate soil disposition. While it is not McClellan's goal to permanently hold contaminated soil on-site; we must also attempt to meet the objective of CERCLA/SARA in conducting treatment on-site wherever possible. Recognizing that on-site treatment/disposal options may require substantial time to formulate, or that certain volumes of soil may be needed to make on-site treatment options viable, some CERCLA contaminated soil may be held in the McClellan soils holding area. Soil held in the soils holding area will be managed as outlined in the soil holding area Operations and Maintenance Plan (Jan 1990). The holding of CERCLA contaminated soil on-base will be in accordance with federal, state and local regulatory requirements (ref Section 19.1 of IAG). Regulatory agencies will be informed through the Soil Management Decision Document as to how each batch of CERCLA contaminated soil will be managed on a case-by-case basis. In this Soil Management Plan, wastes that are restricted under the Land Disposal Restriction (LDR) program outlined in 40 CFR, Part 268, are referred to as LDR waste. Restricted waste includes all F001, F002, F003, F004 and F005 spent solvent wastes, all listed dioxin wastes (i.e. F020, F021, F022, F023, F026, F027 and F028), all California listed waste and all first-third and second-third wastes as defined in 40 CFR 268.10 and 40 CFR 268.11, respectively. Determinations as to whether a hazardous waste listed in 40 CFR 268.10 and 268.11 exceeds the applicable treatment standards (LDRs) specified in 40 CFR 268.41 (atch 5) and 40 CFR 268.43 (atch 6), is made by taking a representative waste extract (TCLP) or the entire waste depending on whether the treatment standards are expressed as concentrations in waste extract or the waste. The results obtained from the analysis of the TCLP extract, will be compared to the LDRs, referring to the values shown for the hazardous constituents listed in Table CCWE, 40 CFR 168.41 (atch 5). The TCLP is utilized since it was designed to determine the mobility of both organic and inorganic contaminants that may be present in the soils. Acute aquatic 96-hour LC₅₀ bioassays will also be performed on certain soil samples. This will be addressed in detail in subsequent sections.

This plan is not intended to mean that all soil that is excavated at McClellan will be sampled. Its intention is to provide controls such that if excavation is performed in known or potential areas of contamination, measures are taken to properly assess and manage the disposition of this soil. McClellan will continue to use its knowledge of potential release locations in reference to project site, monitor with portable OVA or HNu analyzers, as well as visibly inspect soils to assist in making determinations of which soils need to be analyzed. This approach is consistent with the Land Ban requirements identified in 40 CFR 268.7. However, all soils collected for analyses will be collected in accordance with standard EPA protocol. All soils analyzed, with the exception of Underground Storage Tank (UST) soils, will be analyzed using the Toxic Characteristic Leaching Procedures (TCLP) outlined in 40 CFR, Part 268, Appendix I. UST soils will be analyzed by the appropriate EPA methods to quantify petroleum hydrocarbons, as well as other contaminant solvents that historically have been found to be predominant on base. If the results from these UST analyses indicate the presence of other nonpetroleum contaminants, then additional UST samples will be collected and analyzed using the TCLP and 96-hour acute bioassay procedures.

In the past, the overwhelming majority of contaminated soils analyzed under the Soil Management Program contained SARA listed hazardous substances that were determined not to be hazardous by Federal RCRA or State of California classification guidelines. In the absence of soil clean up levels, a combination of LDRs criteria and a risk evaluation methodology approach has been developed from which land use soil management decisions will be made.

The Soil Management Flow Diagram is identified in attachment 1. There are three main sections to the flow diagram. They are: (1) Sampling Analyses (atch 2); (2) Soil Disposition Criteria and (3) Soil Management Decision Document (atch 3). Also, there are several subsections to each main section and they are identified on the respective attachments. The preliminary risk evaluation, which is a subsection of the Soil Disposition Criteria main section, is separately addressed in attachment 4.

MINOR CONSTRUCTION, REPAIRS, EMERGENCY REPAIRS

Whenever possible, site location of minor construction and repair projects will be presampled and analyzed using the TCLP. In cases where presampling is not possible, the projects will proceed with the necessary excavation. Excavated soils from these types of projects will be placed back into the areas from where they were excavated, unless the soils indicate appreciable OVA or HNu (over 50 ppm) concentrations or unusual soil discoloration exists indicating possible soil contamination. If there are appreciable OVA or HNu readings, or unusual soil discoloration or records indicate the excavation project is on or adjacent to a potential release location, then those excavated soils, after composite samples are collected, will either be placed on and covered by at least 6 mil plastic beside the trench from

whence it came or transferred to McClellan's soil holding area. The excavated soils will be monitored for volatile organic vapor concentration with either a portable HNu or OVA analyzer. In cases where there are elevated OVA or HNu readings, composite samples will be collected and analyzed using the Toxic Characteristics Leaching Procedure (TCLP) outlined in 40 CFR, Part 268, Appendix I and also analyzed for acute aquatic 96-hour LC50 bioassay.

If records indicate that the project is on or adjacent to a potential release location, then the TCLP and bioassay analytical procedures will also be performed. Results obtained will be added to IRP documentation for further study in the RI/FS. In those areas where there are no appreciable HNu or OVA readings, no discolored soil and no records indicating the project is on or adjacent to potential release locations, excess soils from these projects may be used at selected locations on-base as fill material. Documentation of the reutilization of soils used as fill material will be included in the appropriate soil management decision documents. All data will be forwarded to McClellan IAG Project Manager for semi-annual inclusion into the RI/FS process.

UNDERGROUND STORAGE TANK (UST) REMOVALS

Removals of underground storage tanks fall under the jurisdiction of the Local Implementing Agency (LIA), which in this case is the Sacramento County Environmental Management Department). During UST removals, soil in areas suspected of being contaminated will be monitored with an OVA or HNu. Composite samples will be collected at the direction of the LIA from those areas where appreciable OVA or HNu readings indicates volatile organics are present. These composite samples will be analyzed for contaminants using EPA Methods 8010, 8020, 8015 (modified) and Total Petroleum Hydrocarbons by EPA Method 418.1. If it has been determined by analytical results that the total petroleum products found were less than 1000 ppm and solely were as a result of leaking lines/storage tanks containing jet fuel, gasoline, kerosene, standard solvent or diesel fuels, and no other solvent contaminants found, coordination with the LIA will determine ultimate cleanup and concurrence/nonconcurrence obtained to consolidate petroleum contaminated soil back into the same UST location. In cases where benzene, xylene, ethyl benzene are found, these contaminants will be considered as constituents of the major petroleum blend found, i.e. gasoline. For example, each of the chemicals mentioned can be found as constituents in gasoline, jet fuel and some kerosenes. However, if other solvent contamination is found, i.e. 1,1,1-trichloroethane or tetrachloroethane, then additional samples will be taken for TCLP and acute aquatic 96-hour LC50 bioassays. The TCLP results will be compared to the LDRs, risk evaluation performed in order to determine soil use/disposition. This data and site will then be incorporated into the RI/FS as a new site. If the total petroleum hydrocarbon concentration is greater than 1000 ppm, then we will pursue either on-site treatment or off-site treatment/disposal of the soil excavated during the UST removal. The total petroleum hydrocarbon (TPH) concentration of 1000 ppm is not a cleanup level, but is currently used as

guidance by the California Department of Health Services (DHS) to classify UST soils as hazardous or non-hazardous (Leaking Underground Fuel Tank (LUFT) Manual 1989). The 1000 ppm TPH value was based on ignitability characteristics of gasoline in sandy soil. DHS has recognized the complexity of the absorption of various hydrocarbon compounds in different soil types, as well as the different characteristics between old gasoline, new gasoline and diesel fuels. DHS currently is researching this issue with the objective of reassessing this threshold value. In the meantime, the 1000 ppm will be used as guidance in evaluating soils at McClellan, while recognizing the limitations stated above may allow for reassessment of this in the future.

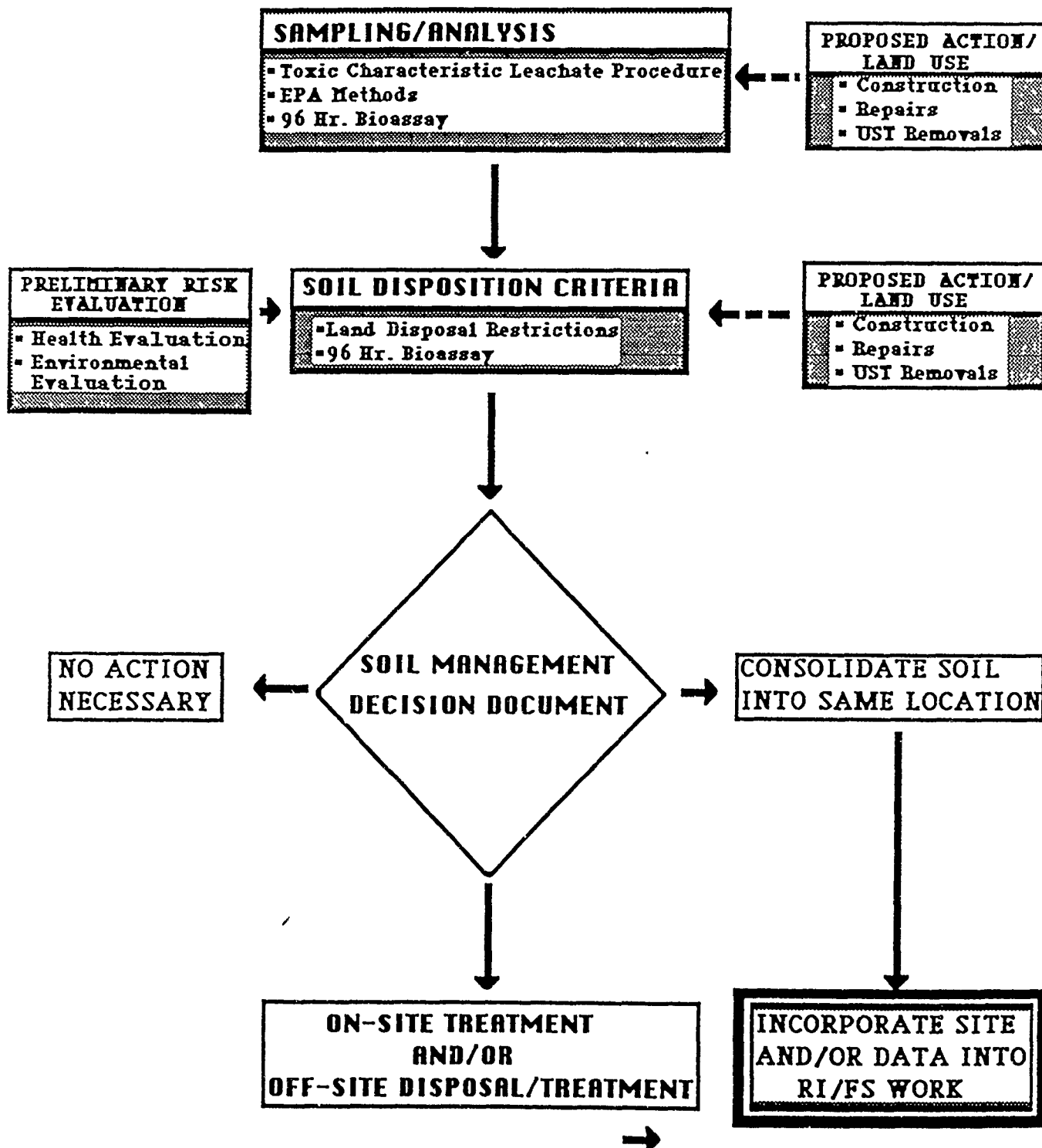
MAJOR CONSTRUCTION (MCP)

The Soil Management Plan is designed to pre-screen sites selected for major construction projects, i.e. Military Construction Projects (MCPs). These are projects funded by Congress that exceed \$200K in construction cost. Once maps showing the proposed MCP siting are received the Installation Restoration Program (IRP) data is evaluated to determine if there are any known IRP sites in the area. The number of core samples to be collected and the depths to which each bore hole will be drilled is based upon the proposed facility drawings. Typically, between 8-15 bore hole samples are collected down to a depth of 15-20 feet. The number of samples taken is based on the size of the construction site and the variability of construction depths. If the MCP project is on or adjacent to an IRP site, then recommendations for resiting the proposed project, if possible, are made. If the proposed project cannot be resited, presampling activities are initiated and core bore samples are collected and analyzed by the TCLP techniques and the results obtained compared to the LDRs. If the sample results exceed the LDRs and excavation is planned for construction, a more extensive partial site evaluation for possible remediation would be made only in those areas which samples indicated results that exceeded the LDRs. When those results are obtained and they indicate that contamination is localized and exceeds the LDRs, a risk evaluation will be performed and some response action to address the localized contamination would be proposed to the regulatory agencies. Coordination with the regulatory agencies will occur to establish the applicable or relevant and appropriate requirements (ARARs) for remediation of the site (ref Section 7.6 of the IAG). A decision document will be formulated regardless of the final disposition of the soil. These decision documents will be forwarded to the regulatory agencies as part of our monthly IAG status reports. Anytime during construction that contamination is found, the same procedures previously stated will be followed.

PRELIMINARY RISK EVALUATION

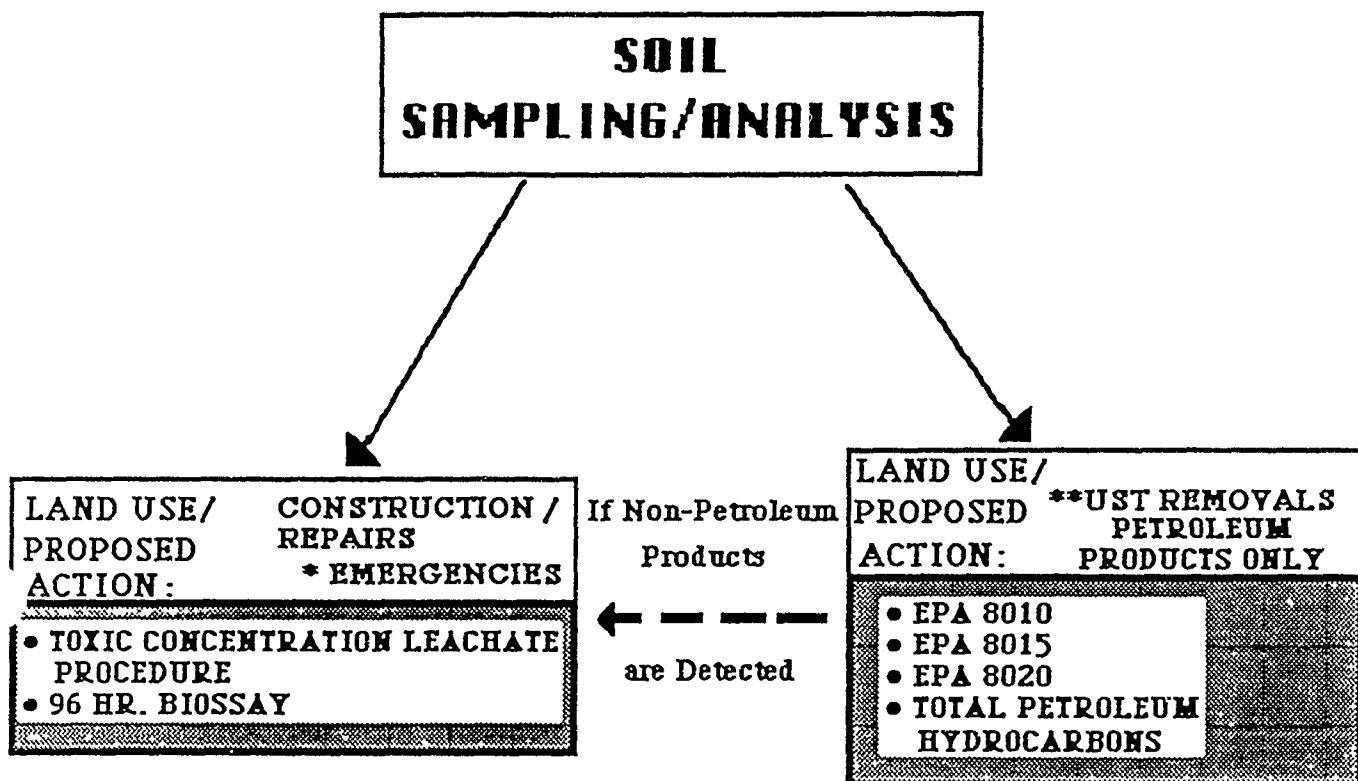
The preliminary risk evaluation was developed to address all type projects where soil digging and trenching may occur. This risk evaluation is for screening purposes only and is not meant to be a final risk quantification for the site. The risk evaluation was formulated using a combination of Industrial Hygiene Principles and State Drinking Water Action Levels and Site Recommended Cleanup Levels. The industrial hygiene principles of toxicology, exposure pathways, physio-chemical properties of contaminants and occupational threshold limit values were also used in developing the risk evaluation. Currently there is no direct correlation between occupational exposure limits and environmental limits or standards. However, in the absence of environmental standards for contaminants found, some type of relationship between the two was established for screening purposes. The preliminary risk evaluation (atch 8) has two major portions: (1) a health evaluation portion that is designed to assess the need for Personal Protective Equipment (PPE) requirements and (2) an environmental evaluation portion that is designed to assess impacts of various contaminants found in the environment. The risk evaluation, used in conjunction with the soils disposition criteria, will provide a mechanism to evaluate soil management alternatives.

McCLELLAN AFB SOIL MANAGEMENT PROGRAM



ATTACHMENT 1

McCLELLAN AFB SOIL MANAGEMENT PROGRAM

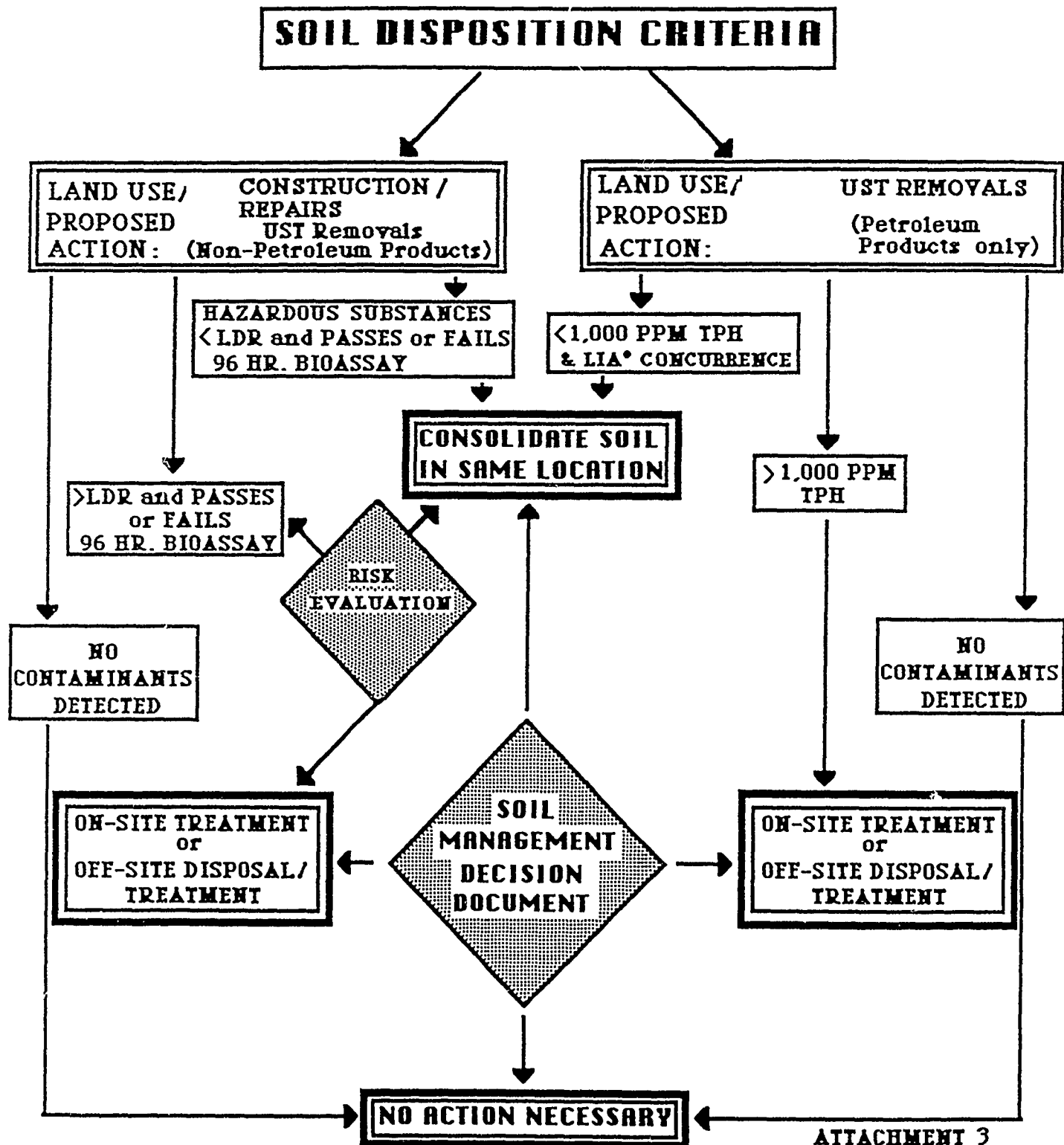


* Sampling Conducted During or After The Emergency, Whichever is Feasible

** UST Removals are Conducted In Accordance with the Local Implementation Agency (Sacramento County Environmental Management Department)

ATTACHMENT 2

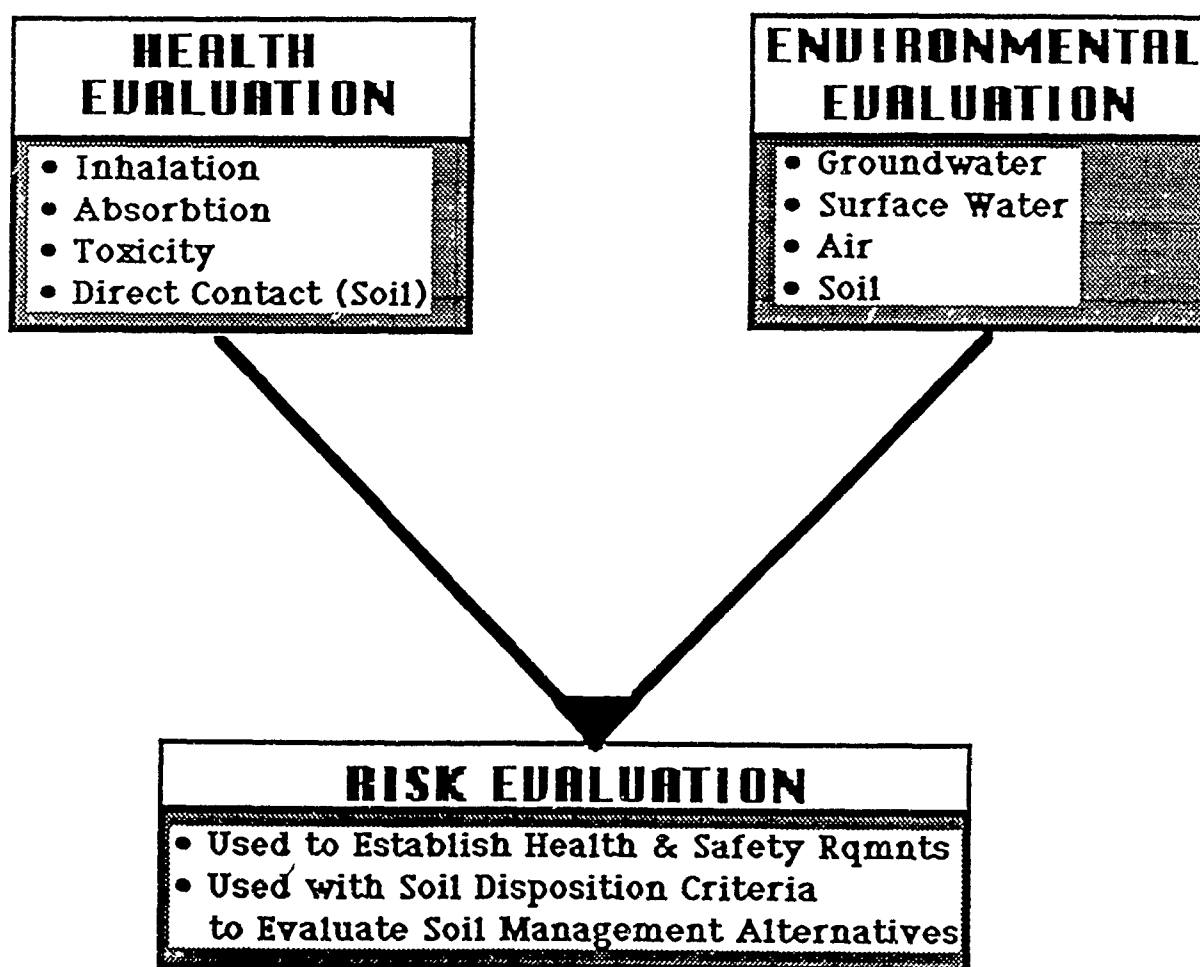
McCLELLAN AFB SOIL MANAGEMENT PROGRAM



* LIA: SACRAMENTO COUNTY ENVIRONMENTAL MANAGEMENT DEPARTMENT

McCLELLAN AFB SOIL MANAGEMENT PROGRAM

PRELIMINARY RISK EVALUATION



ATTACHMENT 4

Table CCWE

Constituent Concentration in Waste Extract

40 CFR 268.41(a)

Constituents must be analyzed in the leachate produced by the Toxicity Characteristic Leaching Procedure (TCLP) found in 40 CFR 268 appendix I.

F001-- F005 spent solvents	Concentration (in mg/l)	
	Wastewater containing spent solvents	All other spent solvent wastes
Acetone	0.05	0.59
n-Butyl alcohol	5.00	5.00
Carbon disulfide	1.05	4.81
Carbon tetrachloride	0.05	0.96
Chlorobenzene	0.15	0.05
Cresols (and cresylic acid)	2.82	0.75
Cyclohexanone	0.125	0.75
1,2-Dichlorobenzene	0.65	0.125
Ethyl acetate	0.05	0.75
Ethylbenzene	0.05	0.053
Ethyl ether	0.05	0.75
Isobutanol ..	5.00	5.00
Methanol	0.25	0.75
Methylene chloride ..	0.20	0.96
Methylene chloride (from the pharmaceutical industry)	12.70	0.96
Methyl ethyl ketone	0.05	0.75
Methyl isobutyl ketone	0.05	0.33
Nitrobenzene ..	0.66	0.125
Pyridine	1.12	0.33
Tetrachloroethylene	0.079	0.05
Toluene	1.12	0.33
1,1,2-Trichloro -		
1,2,2-Trifluoroethane	1.05	0.96
1,1,1-Trichloroethane	1.05	0.41
Trichloroethylene	0.062	0.091
Trichlorofluoromethane	0.05	0.96
Xylene ..	0.05	0.15

F006 nonwastewaters (see also Table CCW in sect. 268.43)	Concentration (in mg/l)
Cadmium	0.066
Chromium (Total)	5.20
Lead ..	0.51
Nickel ..	0.32
Silver	0.072

F007, F008, and F009 nonwastewaters (see also Table CCW in sect. 268.43)	Concentration (in mg/l)
Cadmium	0.066
Chromium (Total)	5.20
Lead ..	0.51
Nickel	0.32
Silver	0.072

F011 and F012 nonwastewaters (see also Table CCW in sect. 268.43)	Concentration (in mg/l)
Cadmium	0.066
Chromium (Total)	5.20
Lead	0.51
Nickel	0.32
Silver	0.072

F020-F023 and F026-F028 dioxin containing wastes	Concentration (in mg/l)
HxCDD--	
All Hexachlorodibenzo-p-dioxins ..	<1 ppb
HxCDF--	
All Hexachlorodibenzofurans	<1 ppb
PeCDD--	
All Pentachlorodibenzo-p-dioxins ..	<1 ppb
PeCDF--	
All Pentachlorodibenzofurans	<1 ppb
TCDD--	
All Tetrachlorodibenzo-p-dioxins ..	<1 ppb
TCDF--	
All Tetrachlorodibenzofurans	<1 ppb
2,4,5-Trichlorophenol	<0.05 ppm
2,4,6-Trichlorophenol	<0.05 ppm
2,3,4,6-Tetrachlorophenol	<0.10 ppm
Pentachlorophenol	<0.01 ppm

F024 nonwastewaters (see also Table CCW in sect. 268.43)	Concentration (in mg/l)
Chromium (Total)	Reserved
Nickel	Reserved

K001 nonwastewaters (see also Table CCW in sect. 268.43)	Concentration (in mg/l)
Lead	0.51

K022 nonwastewaters (see also Table CCW in sect. 268.43)	Concentration (in mg/l)
Chromium (Total)	5.2
Nickel	0.32

K028 nonwastewaters (see also Table CCW in sect. 268.43)	Concentration (in mg/l)
Chromium (Total)	Reserved
Nickel ..	Reserved

K046 nonwastewaters (Nonreactive Subcategory)	Concentration (in mg/l)
Lead ..	0.18

K048, K049, K050, K051 and K052 nonwastewaters (see also Table CCW in sect. 268.43)	Concentration (in mg/l)
Arsenic	0.004
Chromium (Total)	1.7
Nickel ..	0.048
Selenium	0.025

K061 nonwastewaters (Effective until 8/8/90 for the high zinc category -- 15% or greater total zinc)	Concentration (in mg/l)
Cadmium	0.14
Chromium (Total)	5.2
Lead	0.24
Nickel	0.32

K062 nonwastewaters	Concentration (in mg/l)
Chromium (Total)	0.094
Lead	0.37

K071 nonwastewaters	Concentration (in mg/l)
Mercury	0.025

K086 nonwastewaters (Solvent Washes Subcategory) (see also Table CCW in sect. 268.43)	Concentration (in mg/l)
Chromium (Total)	0.094
Lead	0.37

K087 nonwastewaters (see also Table CCW in sect. 268.43)	Concentration (in mg/l)
Lead	0.51

K101 and K102 nonwastewaters (Low Arsenic Subcategory - less than 1% Total Arsenic) (see also Table CCW in sect. 268.43)	Concentration (in mg/l)
Cadmium ..	0.066
Chromium (Total)	5.2
Lead	0.51
Nickel	0.32

K115 nonwastewaters	Concentration (in mg/l)
Nickel	0.32

P074 nonwastewaters (see also Table CCW in sect. 268.43)	Concentration (in mg/l)
Nickel	0.32

P099 nonwastewaters (see also Table CCW in sect. 268.43)	Concentration (in mg/l)
Silver	0.072

P104 nonwastewaters (see also Table CCW in sect. 268.43)	Concentration (in mg/l)
Silver	0.072

Table CCW
Constituent Concentration in Wastes
40 CFR 268.43

Constituents must be analyzed in waste before stabilization/solidification

F001, F002, F003, F004 and F005 wastewaters (Pharmaceutical Industry)	Concentration (in mg/l)
Methylene Chloride	0.044

F006 nonwastewaters (see also Table CCWE in sect. 268.41)	Concentration (in mg/kg)
Cyanides (Total)	590.0
Cyanides (Amenable)	30.0

F007, F008, and F009 nonwastewaters (see also Table CCWE in sect. 268.41)	Concentration (in mg/kg)
Cyanides (Total)	590.0
Cyanides (Amenable)	30.0

F007, F008, and F009 nonwastewaters (see also Table CCWE in sect. 268.41)	Concentration (in mg/l)
Cyanides (Total)	1.9
Cyanides (Amenable)	0.10
Chromium (Total)	0.32
Lead	9.04
Nickel	0.44

F010 nonwastewaters	Concentration (in mg/kg)
Cyanides (Total)	1.5

F010 wastewaters	Concentration (in mg/l)
Cyanides (Total)	1.9
Cyanides (Amenable)	0.10

F011 and F012 nonwastewaters (effective December 8, 1989; from July 8, 1989 until December 8, 1989, these waste are subject to the same treatment standards as F007, F008, and F009 nonwastewaters) (see also Table CCWE in sect. 268.41)	Concentration (in mg/kg)
Cyanides (Total)	110.0
Cyanides (Amenable)	9.1

F011 and F012 wastewaters (see also Table CCWE in sect. 268.41)	Concentration (in mg/l)
Cyanides (Total)	1.9
Cyanides (Amenable)	0.10
Chromium (Total)	0.32
Lead	0.04
Nickel	0.44

F024 nonwastewaters (see also Table CCWE in sect. 268.41)	Concentration (in mg/kg)
2-Chloro-1,3-butadiene	0.28
3-Chloropropene	0.28
1,1-Dichloroethane	0.014
1,2-Dichloroethane	0.014
1,2-Dichloropropane	0.014
cis-1,3-Dichloropropene	0.014
trans-1,3-Dichloropropene	0.014
Bis(2-ethylhexyl)phthalate	1.8
Hexachloroethane	1.8
Hexachlorodibenzo-furans	0.001
Hexachlorodibenzo-p-dioxins	0.001
Pentachlorodibenzo-furans	0.001
Pentachlorodibenzo-p-dioxins	0.001
Tetrachlorodibenzo-furans	0.001

F024 wastewaters (see also Table CCWE in sect. 268.41)	Concentration (in mg/l)
2-Chloro-1,3-butadiene	0.28
3-Chloropropene	0.28
1,1-Dichloroethane	0.014
1,2-Dichloroethane	0.014
1,2-Dichloropropane	0.014
cis-1,3-Dichloropropene	0.014
trans-1,3-Dichloropropene	0.014
Bis(2-ethylhexyl)phthalate	0.036
Hexachloroethane	0.036
Hexachlorodibenzo-furans	0.001
Hexachlorodibenzo-p-dioxins	0.001
Pentachlorodibenzo-furans	0.001
Pentachlorodibenzo-p-dioxins	0.001
Tetrachlorodibenzo-furans	0.001
Chromium (Total)	0.35
Nickel	0.47

K001 nonwastewaters (see also Table CCWE in sect. 268.41)	Concentration (in mg/kg)
Naphthalene	8.0
Pentachlorophenol	37.0
Phenanthrene	8.0
Pyrene	7.3
Toluene	0.14
Xylenes	0.16

K001 wastewaters	Concentration (in mg/l)
Naphthalene	0.15
Pentachlorophenol	0.88
Phenanthrene	0.15
Pyrene	0.14
Toluene	0.14
Xylenes	0.16
Lead	0.037

K009 and K010 nonwastewaters	Concentration (in mg/kg)
Chloroform	6.0

K009 and K010 wastewaters	Concentration (in mg/l)
Chloroform	0.10

K011, K013, and K014 nonwastewaters	Concentration (in mg/kg)
Acetonitrile	1.8
Acrylonitrile	1.4
Acrylamide	23.0
Benzene	0.03
Cyanides (Total)	57.0

K015 wastewaters	Concentration (in mg/l)
Anthracene	1.0
Benzal chloride	0.28
Benzo (b and/or k) fluoranthene	0.29
Phenanthrene	0.27
Toluene	0.15
Chromium (Total)	0.32
Nickel	0.44

K016 nonwastewaters	Concentration (in mg/kg)
Hexachlorobenzene	28.0
Hexachlorobutadiene	5.6
Hexachlorocyclopentadiene	5.6
Hexachloroethane	28.0
Tetrachloroethene	6.0

K016 wastewaters	Concentration (in mg/l)
Hexachlorobenzene	0.033
Hexachlorobutadiene	0.007
Hexachlorocyclopentadiene	0.007
Hexachloroethane	0.033
Tetrachloroethene	0.007

K018 nonwastewaters	Concentration (in mg/kg)
Chloroethane	6.0
1,1-Dichloroethane	6.0
1,2-Dichloroethane	6.0
Hexachlorobenzene	28.0
Hexachlorobutadiene	5.6
Hexachloroethane	28.0
Pentachloroethane	5.6
1,1,1-Trichloroethane	6.0

K018 wastewaters	Concentration (in mg/l)
Chloroethane	0.007
Chloromethane	0.007
1,1-Dichloroethane	0.007
1,2-Dichloroethane	0.007
Hexachlorobenzene	0.033
Hexachlorobutadiene	0.007
Pentachloroethane	0.007
1,1,1-Trichloroethane	0.007

K019 nonwastewaters	Concentration (in mg/kg)
Bis (2-chloroethyl) ether	5.6
Chlorobenzene	6.0
Chloroform	6.0
1,2-Dichloroethane	6.0
Hexachloroethane	28.0
Naphthalene	5.6
Phenanthrene	5.6
Tetrachloroethene	6.0
1,2,4-Trichlorobenzene	19.0
1,1,1-Trichloroethane	6.0

K019 wastewaters	Concentration (in mg/l)
Bis (2-chloroethyl) ether	0.007
Chlorobenzene	0.006
Chloroform	0.007
p-Dichloroethane	0.008
1,2-Dichloroethane	0.007
Fluorene	0.007
Hexachloroethane	0.033
Naphthalene	0.007
Phenanthrene	0.007
1,2,4,5-Tetrachlorobenzene	0.017
Tetrachloroethene	0.007
1,2,4-Trichlorobenzene	0.023
1,1,1-Trichloroethane	0.007

K020 nonwastewaters	Concentration (in mg/kg)
1,2-Dichloroethane	6.0
1,1,2,2-Tetrachloroethane	5.6
1,2,4,5-Tetrachlorobenzene	6.0

K020 wastewaters	Concentration (in mg/l)
1,2-Dichloroethane	0.007
1,1,2,2-Tetrachloroethane	0.007
Tetrachloroethene	0.007

K022 nonwastewaters (see also Table CCWE in sect. 268.41)	Concentration (in mg/kg)
Acetophenone	19.0
Sum of Diphenylamine and Diphenylnitrosamine	13.0
Phenol	12.0
Toluene	0.034

K023 and K024 nonwastewaters	Concentration (in mg/kg)
Phthalic anhydride	28.0
measured as phthalic acid	

K023 and K024 wastewaters	Concentration (in mg/l)
Phthalic anhydride	0.54
measured as phthalic acid	

K028 nonwastewaters (see also Table CCWE in sect. 268.41)	Concentration (in mg/kg)
1,1-Dichloroethane	6.0
trans-1,2-Dichloroethene	6.0
Hexachlorobutadiene	5.6
Hexachloroethane	28.0
Pentachloroethane	5.6
1,1,1,2-Tetrachloroethane	5.6
1,1,1,2,2-Tetrachloroethane	5.6
1,1,1-Trichloroethane	6.0
1,1,2-Trichloroethane	6.0
Tetrachloroethylene	6.0

K028 wastewaters	Concentration (in mg/l)
1,1-Dichloroethane	0.007
trans-1,2-Dichloroethene	0.033
Hexachlorobutadiene	0.007
Hexachloroethane	0.033
Pentachloroethane	0.033
1,1,1,2-Tetrachloroethane	0.007
1,1,2,2-Tetrachloroethane	0.007
Tetrachloroethylene	0.007
1,1,1-Trichloroethane	0.007
1,1,2-Trichloroethane	0.007
Cadmium	6.4
Chromium (Total)	0.35
Lead	0.037
Nickel	0.47

K029 nonwastewaters	Concentration (in mg/kg)
Chloroform	6.0
1,2-Dichloroethane	6.0
1,1-Dichloroethylene	6.0
1,1,1-Trichloroethane	6.0
Vinyl chloride	6.0

K030 nonwastewaters	Concentration (in mg/kg)
Hexachlorobutadiene	5.6
Hexachloroethane	28.0
Hexachloropropene	19.0
Pentachlorobenzene	28.0
Pentachloroethane	5.6
1,2,4,5-Tetrachlorobenzene	14.0
Tetrachloroethene	6.0
1,2,4-Trichlorobenzene	19.0

K030 wastewaters	Concentration (in mg/l)
o-Dichlorobenzene	0.008
p-Dichlorobenzene	0.008
Hexachlorobutadiene	0.007
Hexachloroethane	0.033
Pentachloroethane	0.007
1,2,4,5-Tetrachlorobenzene	0.017
Tetrachloroethene	0.007
1,2,4-Trichlorobenzene	0.023

K036 wastewaters	Concentration (in mg/l)
Disulfoton	0.025

K037 nonwastewaters	Concentration (in mg/kg)
Disulfoton	0.1
Toluene	28.0

K037 wastewaters	Concentration (in mg/l)
Disulfoton	0.003
Toluene	0.028

K038 and K040 nonwastewaters	Concentration (in mg/kg)
Phorate	0.1

K038 and K040 wastewaters	Concentration (in mg/l)
Phorate	0.025

K043 nonwastewaters	Concentration (in mg/kg)
2,4-Dichlorophenol	0.38
2,6-Dichlorophenol	0.34
Pentachlorophenol	1.9
Tetrachlorophenols (Total)	1.7
2,4,5-Trichlorophenol	0.68
2,4,6-Trichlorophenol	8.2
Hexachlorodibenzo-p-dioxins	7.6
Hexachlorodibenzo-furans	0.001
Pentachlorodibenzo-p-dioxins	0.001
Pentachlorodibenzo-furans	0.001
Tetrachlorodibenzo-p-dioxins	0.001
Tetrachlorodibenzo-furans	0.001

K043 wastewaters	Concentration (in mg/l)
2,4-Dichlorophenol	0.049
2,6-Dichlorophenol	0.013
Pentachlorophenol	0.22
Tetrachlorophenols (Total)	0.006
2,4,5-Trichlorophenol	0.018
2,4,6-Trichlorophenol	0.016
Hexachlorodibenzo-p-dioxins	0.039
Hexachlorodibenzo-furans	0.001
Pentachlorodibenzo-p-dioxins	0.001
Pentachlorodibenzo-furans	0.001
Tetrachlorodibenzo-p-dioxins	0.001
Tetrachlorodibenzo-furans	0.001

K048 nonwastewaters (see also Table CCWE in sect. 268.41)	Concentration (in mg/kg)
Benzene	9.5
Benzo(a)pyrene	0.84
Bis (2-ethylhexyl) phthalate	37.0
Chrysene	2.2
Di-n-butyl phthalate	4.2
Ethylbenzene	67.0
Naphthalene	Reserved
Phenanthrene	7.7
Phenol	2.7
Pyrene	2.0
Toluene	9.5
Xylenes	Reserved
Cyanides (Total)	1.8

K048 wastewaters	Concentration (in mg/l)
Benzene	0.011
Benzo(a)pyrene	0.047
Bis (2-ethylhexyl) phthalate	0.043
Chrysene	0.043
Di-n-butyl phthalate	0.050
Ethylbenzene	0.011
Fluorene	0.050
Naphthalene	0.033
Phenanthrene	0.039
Phenol	0.047
Pyrene	0.045
Toluene	0.011
Xylenes	0.011
Chromium (Total)	0.20
Lead	0.037

K049 nonwastewaters (see also Table CCWE in sect. 268.41)	Concentration (in mg/kg)
Anthracene	6.2
Benzene	9.5
Benzo(a)pyrene	0.84
Bis (2-ethylhexyl) phthalate	37.0
Chrysene	2.2
Ethylbenzene	67.0
Naphthalene	Reserved
Phenanthrene	7.7
Phenol	2.7
Pyrene	2.0
Toluene	9.5
Xylenes	Reserved
Cyanides (Total)	1.8

K049 wastewaters	Concentration (in mg/l)
Anthracene	0.039
Benzene	0.011
Benzo(a)pyrene	0.047
Bis (2-ethylhexyl) phthalate	0.043
Carbon disulfide	0.011
Chrysene	0.043
2,4-Dimethylphenol	0.033
Ethylbenzene	0.011
Naphthalene	0.033
Phenanthrene	0.039
Phenol	0.047
Pyrene	0.045
Toluene	0.011
Xylenes	0.011
Chromium (Total)	0.20
Lead	0.037

K050 nonwastewaters (see also Table CCWE in sect. 268.41)	Concentration (in mg/kg)
Benzo(a)pyrene	0.84
Phenol	2.7
Cyanides (Total)	1.8

K050 wastewaters	Concentration (in mg/l)
Benzo(a)pyrene	0.047
Phenol	0.047
Chromium (Total)	0.20
Lead	0.037

NOTE: "Wastewater" means a waste containing less than 1% filterable solids and less than 1% T.O.C.

Table CCW
Constituent Concentration in Wastes
40 CFR 268.43
(Continued)

Constituents must be analyzed in waste before stabilization

K051 nonwastewaters (see also Table CCWE in sect. 268.41)	Concentration (in mg/kg)
Anthracene	6.2
Benzene	9.5
Benzo(a)anthracene	1.4
Benzo(a)pyrene	0.84
Bis (2-ethylhexyl) phthalate	37.0
Chrysene	2.2
Di-n-butyl phthalate	4.2
Ethylbenzene	67.0
Naphthalene	Reserved
Phenanthrene	7.7
Phenol	2.7
Pyrene	2.0
Toluene	9.5
Xylenes	Reserved
Cyanides (Total)	1.8

K051 wastewaters	Concentration (in mg/l)
Acenaphthene	0.050
Anthracene	0.039
Benzene	0.011
Benzo (a) anthracene	0.043
Benzo(a)pyrene	0.047
Bis (2-ethylhexyl) phthalate	0.043
Chrysene	0.043
Di-n butyl phthalate	0.060
Ethylbenzene	0.011
Flourene	0.050
Naphthalene	0.033
Phenanthrene	0.039
Phenol	0.047
Pyrene	0.045
Toluene	0.011
Xylenes	0.011
Chromium (Total)	0.20
Lead	0.037

K052 nonwastewaters (see also Table CCWE in sect. 268.41)	Concentration (in mg/kg)
Benzene	9.5
Benzo(a)pyrene	0.84
o-Cresol	2.2
p-Cresol	0.90
Ethylbenzene	67.0
Naphthalene	Reserved
Phenanthrene	7.7
Phenol	2.7
Toluene	9.5
Xylenes	Reserved
Cyanides (Total)	1.8

K052 wastewaters	Concentration (in mg/l)
Benzene	0.011
Benzo(a)pyrene	0.047
o-Cresol	0.011
p-Cresol	0.011
2,4-Dimethylphenol	0.033
Ethylbenzene	0.011
Naphthalene	0.033
Phenanthrene	0.039
Phenol	0.047
Toluene	0.011
Xylenes	0.011
Chromium (Total)	0.20
Lead	0.037

K062 wastewaters	Concentration (in mg/l)
Chromium (Total)	0.32
Lead	0.04
Nickel	0.44

K071 wastewaters	Concentration (in mg/l)
Mercury	0.030

K086 nonwastewaters- Solvent Washes Subcategory (see also Table CCWE in sect. 268.41)	Concentration (in mg/kg)
Acetone	0.37
bis (2-ethylhexyl) phthalate	0.49
n-Butyl alcohol	0.37
Cyclohexanone	0.49
1,2-Dichlorobenzene	0.49
Ethyl acetate	0.37
Ethyl benzene	0.031
Methanol	0.37
Methylene chloride	0.037
Methyl ethyl ketone	0.37
Methyl isobutyl ketone	0.37
Naphthalene	0.49
Nitrobenzene	0.49
Toluene	0.031
1,1,1-Trichloroethane	0.044
Trichloroethylene	0.031
Xylenes	0.015

K086 wastewaters- Solvent Washes Subcategory	Concentration (in mg/l)
Acetone	0.015
bis (2-ethylhexyl) phthalate	0.044
n-Butyl alcohol	0.031
Cyclohexanone	0.022
1,2-Dichlorobenzene	0.044
Ethyl acetate	0.031
Ethyl benzene	0.015
Methanol	0.031
Methylene chloride	0.031
Methyl ethyl ketone	0.031
Methyl isobutyl ketone	0.031
Naphthalene	0.044
Nitrobenzene	0.044
Toluene	0.029
1,1,1-Trichloroethane	0.031
Trichloroethylene	0.029
Xylenes	0.015
Chromium (Total)	0.32
Lead	0.037

K087 nonwastewaters (see also Table CCWE in sect. 268.41)	Concentration (in mg/kg)
Acenaphthalene	3.4
Benzene	0.071
Chrysene	3.4
Fluoranthene	3.4
Indeno (1,2,3-cd) pyrene	3.4
Naphthalene	3.4
Phenanthrene	3.4
Toluene	0.65
Xylenes	0.070

K087 wastewaters	Concentration (in mg/l)
Acenaphthalene	0.028
Benzene	0.014
Chrysene	0.028
Fluoranthene	0.028
Indeno (1,2,3-cd) pyrene	0.028
Naphthalene	0.028
Phenanthrene	0.028
Toluene	0.008
Xylenes	0.014
Lead	0.037

K093 and K094 nonwastewaters	Concentration (in mg/kg)
Phthalic acid	28.0

K093 and K094 wastewaters	Concentration (in mg/l)
Phthalic acid	0.54

K095 nonwastewaters	Concentration (in mg/kg)
1,1,1,2-Tetrachloroethane	5.6
1,1,2,2-Tetrachloroethane	5.6
Tetrachloroethene	6.0
1,1,2-Trichloroethane	6.0
Trichloroethylene	5.6
Hexachloroethane	28.0
Pentachloroethane	5.6

K096 nonwastewaters	Concentration (in mg/kg)
1,3-Dichlorobenzene	5.6
Pentachloroethane	5.6
1,1,1,2-Tetrachloroethane	5.6
1,1,2,2-Tetrachloroethane	5.6
Tetrachloroethylene	6.0
1,2,4-Trichlorobenzene	19.0
Trichloroethylene	5.6
1,1,2-Trichloroethane	6.0

K099 nonwastewaters	Concentration (in mg/kg)
2,4-Dichlorophenoxyacetic acid	1.0
Hexachlorodibenzo-p-dioxins	0.001
Hexachlorodibenzofurans	0.001
Pentachlorodibenzo-p-dioxins	0.001
Pentachlorodibenzofurans	0.001
Tetrachlorodibenzo p dioxins	0.001
Tetrachlorodibenzofurans	0.001

K099 wastewaters	Concentration (in mg/l)
2,4-Dichlorophenoxyacetic acid	1.0
Hexachlorodibenzo-p-dioxins	0.001
Hexachlorodibenzofurans	0.001
Pentachlorodibenzo-p-dioxins	0.001
Pentachlorodibenzofurans	0.001
Tetrachlorodibenzo p dioxins	0.001
Tetrachlorodibenzofurans	0.001

K101 nonwastewaters (Low Arsenic Subcategory-less than 1% total arsenic) (see also Table CCWE in sect. 268.41)	Concentration (in mg/kg)
Ortho-Nitroaniline	14.0

K101 wastewaters	Concentration (in mg/l)
Ortho-Nitroaniline	0.27
Arsenic	2.0
Cadmium	0.24
Lead	0.11
Mercury	0.027

K102 nonwastewaters (Low Arsenic Subcategory-less than 1% total arsenic) (see also Table CCWE in sect. 268.41)	Concentration (in mg/kg)
Ortho-Nitrophenol	13.0

K102 wastewaters	Concentration (in mg/l)
Ortho-Nitroaniline	0.028
Arsenic	2.0
Cadmium	0.24
Lead	0.11
Mercury	0.027

K103 nonwastewaters	Concentration (in mg/kg)
Aniline	5.6
Benzene	6.0
2,4-Dinitrophenol	5.6
Nitrobenzene	5.6
Phenol	5.6

K103 wastewaters	Concentration (in mg/l)
Aniline	4.5
Benzene	0.15
2,4-Dinitrophenol	0.61
Nitrobenzene	0.073
Phenol	1.4

K104 nonwastewaters	Concentration (in mg/kg)
Aniline	5.6
Benzene	6.0
2,4-Dinitrophenol	5.6
Nitrobenzene	5.6
Phenol	5.6
Cyanides (Total)	1.8

K104 wastewaters	Concentration (in mg/l)
Aniline	4.5
Benzene	0.15
2,4-Dinitrophenol	0.61
Nitrobenzene	0.073
Phenol	1.4
Cyanides (Total)	2.7

K115 wastewaters (see also Table CCWE in sect. 268.41)	Concentration (in mg/l)
al	0.47

P013 nonwastewaters	Concentration (in mg/kg)
Cyanide (Total)	110.0
Cyanide (Amenable)	9.1

P013 wastewaters	Concentration (in mg/l)
Cyanide (Total)	1.9
Cyanide (Amenable)	0.10

P021 nonwastewaters	Concentration (in mg/kg)
Cyanide (Total)	110.0
Cyanide (Amenable)	9.1

P021 wastewaters	Concentration (in mg/l)
Cyanide (Total)	1.9
Cyanide (Amenable)	0.10

P029 nonwastewaters	Concentration (in mg/kg)
Cyanide (Total)	110.0
Cyanide (Amenable)	9.1

P029 wastewaters	Concentration (in mg/l)
Cyanide (Total)	1.9
Cyanide (Amenable)	0.10

P030 nonwastewaters	Concentration (in mg/kg)
Cyanide (Total)	110.0
Cyanide (Amenable)	9.1

P030 wastewaters	Concentration (in mg/l)
Cyanide (Total)	1.9
Cyanide (Amenable)	0.10

P039 nonwastewaters	Concentration (in mg/kg)
Disulfoton	0.1

P039 wastewaters	Concentration (in mg/l)
Disulfoton	0.025

P063 nonwastewaters	Concentration (in mg/kg)
Cyanide (Total)	110.0
Cyanide (Amenable)	9.1

P063 wastewaters	Concentration (in mg/l)
Cyanide (Total)	1.9
Cyanide (Amenable)	0.10

P071 nonwastewaters	Concentration (in mg/kg)
Methyl parathion	0.025

P071 wastewaters	Concentration (in mg/l)
Methyl parathion	0.025

P074 nonwastewaters (see also Table CCWE in sect. 268.41)	Concentration (in mg/kg)
Cyanide (Total)	110.0
Cyanide (Amenable)	9.1

P074 wastewaters (see also Table CCWE in sect. 268.41)	Concentration (in mg/l)
Cyanide (Total)	1.9
Cyanide (Amenable)	0.10
Nickel	0.44

P089 nonwastewaters	Concentration (in mg/kg)
Parathion	0.1

P089 wastewaters	Concentration (in mg/l)
Parathion	0.025

P094 nonwastewaters	Concentration (in mg/kg)
Phorate	0.1

P094 wastewaters	Concentration (in mg/l)
Phorate	0.025

P097 nonwastewaters	Concentration (in mg/kg)
Famphur	0.1

P097 wastewaters	Concentration (in mg/l)
Famphur	0.025

P098 nonwastewaters	Concentration (in mg/kg)
Cyanide (Total)	110.0
Cyanide (Amenable)	9.1

P098 wastewaters	Concentration (in mg/l)
Cyanide (Total)	1.9
Cyanide (Amenable)	0.10

P099 nonwastewaters (see also Table CCWE in sect. 268.41)	Concentration (in mg/kg)
Cyanide (Total)	110.0
Cyanide (Amenable)	9.1

P099 wastewaters (see also Table CCWE in sect. 268.41)	Concentration (in mg/l)
Cyanide (Total)	1.9
Cyanide (Amenable)	0.10

P104 nonwastewaters (see also Table CCWE in sect. 268.41)	Concentration (in mg/kg)
Cyanide (Total)	110.0
Cyanide (Amenable)	9.1

P104 wastewaters (see also Table CCWE in sect. 268.41)	Concentration (in mg/l)
Cyanide (Total)	1.9
Cyanide (Amenable)	0.10

P106 nonwastewaters	Concentration (in mg/kg)
Cyanide (Total)	110.0
Cyanide (Amenable)	9.1

P106 wastewaters	Concentration (in mg/l)
Cyanide (Total)	1.9
Cyanide (Amenable)	0.10

P121 nonwastewaters	Concentration (in mg/kg)
Cyanide (Total)	110.0
Cyanide (Amenable)	9.1

P121 wastewaters	Concentration (in mg/l)
Cyanide (Total)	1.9
Cyanide (Amenable)	0.10

NOTE: "Wastewater" means a waste containing less than 1% filterable solids and less than 1% T.O.C.

Table CCW
Constituent Concentration in Wastes
40 CFR 268.43
(Continued)

Constituents must be analyzed in waste before stabilization

U028 nonwastewaters	Concentration (in mg/kg)
Bis (2-ethylhexyl) phthalate	28.0

U028 wastewaters	Concentration (in mg/l)
Bis-(2-ethylhexyl) phthalate	0.54

U069 nonwastewaters	Concentration (in mg/kg)
Di-n-butyl phthalate	28.0

U069 wastewaters	Concentration (in mg/l)
Di-n-butyl phthalate	0.54

U088 nonwastewaters	Concentration (in mg/kg)
Diethyl phthalate	28.0

U088 wastewaters	Concentration (in mg/l)
Diethyl phthalate	0.54

U102 nonwastewaters	Concentration (in mg/kg)
Dimethyl phthalate	28.0

U102 wastewaters	Concentration (in mg/l)
Dimethyl phthalate	0.54

U107 nonwastewaters	Concentration (in mg/kg)
Di-n-octyl phthalate	28.0

U107 wastewaters	Concentration (in mg/l)
Di-n-octyl phthalate	0.54

U190 nonwastewaters	Concentration (in mg/kg)
Phthalic anhydride (reported as Phthalic acid)	28.0

U190 wastewaters	Concentration (in mg/l)
Phthalic anhydride (reported as Phthalic acid)	0.54

U235 nonwastewaters	Concentration (in mg/kg)
Tris-(2,3-Dibromopropyl) phosphate ..	0.1

U235 wastewaters	Concentration (in mg/l)
Tris (2,3-Dibromopropyl) phosphate ..	0.025

NOTE: "Wastewater" means a waste containing less than 1% filterable solids and less than 1% T.O.C.

Appendix III to part 268 - List of Halogenated Organic Compounds Regulated Under Sec. 268.32

[Appendix III added by 52 FR 25787, July 8, 1987]

In determining the concentration of HOCs in a hazardous waste for purposes of the Sec. 268.32 land disposal prohibition, EPA has defined the HOCs that must be included in the calculation as any compounds having a carbon-halogen bond which are listed in this Appendix (see Sec. 268.2). Appendix III to Part 268 consists of the following compounds:

Appendix III is a list of HOCs that must be considered when determining if the waste falls under the California list HOC restrictions. The concentrations of these HOCs in the waste must be added together to determine if the 1,000 mg/l restriction is exceeded

Volatiles

Bromodichloromethane
Bromomethane
Carbon Tetrachloride
Chlorobenzene
2-Chloro-1,3-butadiene
Chlorodibromomethane
Chloroethane
2-Chloroethyl vinyl ether
Chloroform
Chloromethane
3-Chloropropene
1,2-Dibromo-3-chloropropane
1,2-Dibromomethane
Dibromomethane
Trans-1,4-Dichloro-2-butene
Dichlorodifluoromethane
1,1-Dichloroethane
1,2-Dichloroethane
1,1-Dichloroethylene
Trans-1,2-Dichloroethene
1,2-Dichloropropane
Trans-1,3-Dichloropropene
cis-1,3-Dichloropropene
Iodomethane
Methylene chloride
1,1,1,2-Tetrachloroethane
1,1,2,2-Tetrachloroethane
Tetrachloroethene
Tribromomethane
1,1,1-Trichloroethane
1,1,2-Trichloroethane
Trichloroethene
Trichloromonofluoromethane
1,2,3-Trichloropropane
Vinyl chloride

Semivolatiles

Bis(2-chloroethoxy)ethane
Bis(2-chloroethyl)ether
Bis(2-chloroisopropyl)ether
p-Chloroaniline
Chlorobenzilate
p-Chloro-m-cresol
2-Chloronaphthalene
2-Chlorophenol
3-Chloropropionitrile
m-Dichlorobenzene
o-Dichlorobenzene
p-dichlorobenzene
3,3'-Dichlorobenzidine

2,4-Dichlorophenol
2,6-Dichlorophenol
Hexachlorobenzene
Hexachlorobutadiene
Hexachlorocyclopentadiene
Hexachloroethane
Hexachloropropene
Hexachloropropene
4,4'-Methylenebis(2-chloroaniline)
Pentachlorobenzene
Pentachloroethane
Pentachloronitrobenzene
Pentachlorophenol
Pronamide
1,2,4,5-Tetrachlorobenzene
2,3,4,6-Tetrachlorophenol
1,2,4-Trichlorobenzene
2,4,5-Trichlorophenol
2,4,6-Trichlorophenol
Tris(2,3-dibromopropyl)phosphate

Organochlorine Pesticides

Aldrin
alpha-BHC
beta-BHC
delta-BHC
gamma-BHC
Chlordane
DDD
DDE
DDT
Dieldrin
Endosulfan I
Endosulfan II
Endrin
Endrin aldehyde
Heptachlor
Heptachlor epoxide
Isodrin
Kepone
Methoxychlor
Toxaphene

Phenoxyacetic Acid Herbicides

2,4-Dichlorophenoxyacetic acid
Silvex
2,4,5-T

PCBs

Aroclor 1016
Aroclor 1221
Aroclor 1232
Aroclor 1242
Aroclor 1248
Aroclor 1254
Aroclor 1260
PCBs not otherwise specified

Dioxins and Furans

Hexachlorodibenzo-p-dioxins

Hexachlorodibenzofuran

Pentachlorodibenzo-p-dioxins

Pentachlorodibenzofuran

Tetrachlorodibenzo-p-dioxins

Tetrachlorodibenzofuran

2,3,7,8-Tetrachlorodibenzo-p-dioxin

PRELIMINARY RISK EVALUATION

I. Contaminant: _____

Contaminant TLV: _____

Contaminant Action Level: _____

II. Concentration in Soil: $\frac{\quad}{(1)}$ ppb (5) (10)
 $<100\text{ppb}$ $100\text{ppb}-1\text{ppm}$ $>1\text{ppm}$

III. Route of Exposure (Health)

		(5)	(0)
TOTAL	a) Inhale	Yes _____	No _____

1) Contaminant concentration:

	(2)	(0)
>1/1000 of TLV Total _____	Yes _____	No _____

2) Contaminant concentration:

	(2)	(0)
>1/100 of AL Total	Yes	No

	(10)	(5)	(2)
3) Toxicity: LC ₅₀ _____	Extreme_____	High_____	Moderate_____
8 Hours, Rat	<10ppm	10-100ppm	100-1000ppm

(1)	(0)
Slight_____	Non Hazardous_____
1000-10,000ppm	>10,000ppm

	(15)	(10)	(5)
TLV _____	Extreme _____	High _____	Moderate _____
	0-1ppm	1-10ppm	10-100ppm

(2) Slight _____ (0) Non Hazardous _____
100-1000mg >1000ppm

[illegible]

TOTAL b) Absorb: (5) (0)
Yes _____ No _____

Contaminant concentration:

	(2)	(0)
>1/500 of TLV total _____	Yes _____	No _____

3) Toxicity: LD₅₀ _____ (10) Extreme _____ (5) High _____ (2) Moderate _____
 8 Hours, Rat 0-1mg 1-50mg 50-500mg

(1) Slight _____ (0) Non Hazardous _____
 500-5000mg >5000mg

4) Vapor Pressure: _____ mm (0) High _____ (5) Medium _____ (10) Low _____
 >75mm 25-75mm <25mm

c) Carcinogenic Effect:

- _____ True human carcinogenics (25)
- _____ Probable human carcinogenic with limited human study (20)
- _____ Probable human carcinogenic with inadequate human study (15)
- _____ Possible human carcinogenic with limited evidence in animals (10)
- _____ Not classified inadequate study on animals (5)
- _____ No evidence of carcinogenicity in humans (0)

TOTAL HEALTH RISK:

Soil Concentration _____ + Inhalation _____ + Absorb _____ + Carcinogenic _____ = _____

TOTAL HEALTH RISK RANGES:

High: 78 - 111

Medium: 30 - 77

Low: 1 - 29

IV. Route of Exposure (Environmental)

1) Groundwater

a) Environmental significant

If greater than States Recommended Soil Clean-up Level (RSCL) levels at 1-15 ft, contaminate is

significant (15) Yes _____ (0) No _____

b) Effect of groundwater

If greater than 10 x RSCL at 15 ft, possible effect on

groundwater (15) (0)
Yes _____ No _____

2) Surface water

a) Solubility in water: (0) (2)
Insoluble _____ Slightly soluble _____
(5) (10)
Soluble _____ Very soluble _____

b) Observable signs of contamination

(10) (0)
Yes _____ No _____

Remarks:

c) Concentration: _____ppb

Action level 1/500 of TLV (10) (0)
Yes _____ No _____

3) Air:

Vapor Pressure: _____mm (10) (5) (0)
High _____ Moderate _____ Low _____
>75mm 25-75mm <25mm

TOTAL ENVIRONMENTAL RISK:

Soil Concentration _____ + Groundwater _____ + Surface water _____ + Air _____ = _____

TOTAL ENVIRONMENTAL RISK RANGES:

High✓ 45 - 95 Immediate removal of soil

Medium: 20 - 44 Soil removal depends on population & project

Low: 2 - 19 Soil can be put back into hole