

# **NOTICE**

**All drawings located at the end of the document.**

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ROCKY FLATS PLANT  
ENVIRONMENTAL MANAGEMENT DEPARTMENT

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# Site Specific Health and Safety Plan for the Source Removal at the Mound Site IHSS 113



## Rocky Mountain Remediation Services, L.L.C.

February 1997

ADMIN RECORD



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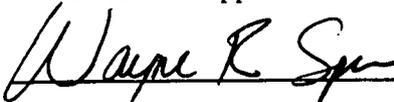
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ADMINISTRATIVE INFORMATION

Site: Rocky Flats Environmental Technology Site (RFETS), Golden, Colorado  
Project Name: Source Removal at the Mound Site - IHSS 113  
Date Prepared: February 28, 1997

Approvals

I have read and approved this HASP with respect to project hazards and regulatory requirements.

  
\_\_\_\_\_

Wayne Sproles  
RMRS - Project Manager

3/3/97  
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Date

  
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M.D. Schreckengast  
RMRS - Health and Safety Supervisor

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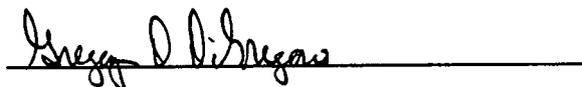
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Jerry Anderson  
RMRS - Radiological Coordinator

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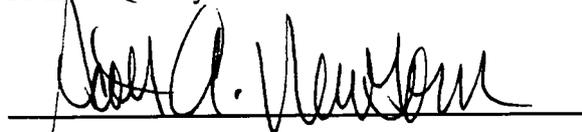
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Greg DiGregorio  
RMRS - Quality Assurance

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Date

  
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Scott Newsom  
SSOC - Radiological Engineering

3/3/97  
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Date

  
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Lorenzo Ubras  
SSOC - RMRS Radiological Safety Section Manager

3/3/97  
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Date

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Field Change No.1

Field Change No.15

## REFERENCES

- American Conference of Governmental Industrial Hygienists *Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices*, 1995-1996
- Department of Energy (DOE) Order 5480.9A, *Construction Project Safety and Health Management*
- Department of Energy (DOE) Form F5480.4, *Complaint Form*
- Department of Energy (DOE) Form 5484.3, *Individual Accident/Incident Report*
- DOE Title 10 CFR 855 *Occupational Radiation Protection*
- DOW Chemical Company, Rocky Flats Division *Letter from R.M. Vogel to E.A. Putzier titled "Logistics of Mound Excavation," dated September 11, 1970*
- Kaiser-Hill *Auditable Safety Analysis for the Mound Site Source Removal Project*
- NIOSH *Pocket Guide to Chemical Hazards*, 1994
- OSHA Title 29 CFR 1904 *Recording and Reporting Occupational Injuries and Illnesses*
- OSHA Title 29 CFR 1910 *Safety and Health Regulations for General Industry*
- OSHA Title 29 CFR 1926 *Safety and Health Regulations for Construction*
- OSHA Title 29 CFR 1926.65 *Hazardous Waste Operations and Emergency Response*
- Rocky Flats Environmental Technologies Site *Administrative Procedures Manual*
  - ADM-16.01 *Occurrence Reporting Process*
- Rocky Flats Environmental Technologies Site *Conduct of Operations Manual*
  - COOP-006 - *Operating Area Logs and Records*
- Rocky Flats Environmental Technologies Site *Field Operations Manual*
  - FO.01 - *Air Monitoring and Dust Control*
  - FO.03 - *Field Decontamination Operations*
  - FO.04 - *Decontamination of Equipment at Decontamination Facilities*
  - FO.06 - *Handling of Personal Protective Equipment*
  - FO.07 - *Handling of Decontamination Water and Wash Water*
  - FO.12 - *Decontamination Facility Operations*
- Rocky Flats Environmental Technologies Site *Health and Safety Practices Manual*
  - HSP-2.08 *Lockout/Tagout*
  - HSP-Section 4 - *Medical Program*
  - HSP-9.06 *Powered Industrial Trucks*
  - HSP-12.10 *Hand and Portable Power Tools*
  - HSP-18.07 *External Radiation Dosimetry*
  - HSP-18.10 *Radiological Material Transfer and Unrestricted Release of Property and Waste*
  - HSP-18.20 *Routine Bioassay Monitoring Program*
  - HSP-21.04 *Emergency Response and Spill Control*
- Rocky Flats Environmental Technology Site *Radiological Control Manual*

- Rocky Flats Environmental Technologies Site *Radiological Operating Instructions Manual*
- ROI-2.01 *Personnel Contamination Monitoring*
- ROI-3.01 *Performance of Surface Contamination Surveys*
- ROI-3.02 *Radiological Requirements for Unrestricted Release*
- ROI-4.02 *Air Sampling*
- ROI-4.03 *Portable Low Volume Air Sampling*
- Rocky Flats Environmental Technologies Site *Soil Disturbance Permit #CB0340PL, Site Preparation Activities for Mound "Source Removal"*
- Rocky Flats Environmental Technologies Site *Soil Disturbance Permit #CB0340PL, IHSS 113, "Source Removal Action" (Mound Site)*
- Rocky Mountain Remediation Services *Field Implementation Plan for the Source Removal at the Mound Site, IHSS 113*
- Rocky Mountain Remediation Services *Heat Stress Monitoring Procedure (Discussed in letter #RJC-014-96.)*
- Rocky Mountain Remediation Services *Integrated Work Control Package #T0090239, Source Removal at the Mound Site*
- Rocky Mountain Remediation Services *Proposed Action Memorandum for the Source Removal at the Mound Site, IHSS 113*
- Rocky Mountain Remediation Services *Sampling and Analysis Plan to Support the Source Removal at the Mound Site, IHSS 113*
- Section 01700-1 *Subcontractor Health and Safety Requirements (9/23/96)*
- SW.01 (1-C91-ERP-SW.01) *Control and Disposition of Incidental Waters*

## LIST OF ACRONYMS

ACGIH	American Conference of Governmental Industrial Hygienists
AIHA	American Industrial Hygiene Association
ALARA	As Low As Reasonably Achievable
ANSI	American National Standards Institute
COC	Chemical of Concern
CPM	Counts Per Minute
CRZ	Contamination Reduction Zone
CSFS	Contaminated Soil Feed Stockpile
DAC	Derived Air Concentration
dB	Decibels
DOE	Department of Energy
EZ	Exclusion Zone
FID	Flame Ionization Detector
FIDLER	Field Instrument for the Detection of Low Energy Radiation
FIP	Field Implementation Plan for the Source Removal at the Mound Site, IHSS 113
FO	Field Operations Manual
GFCI	Ground Fault Circuit Interrupter
HASP	Health and Safety Plan
HSP	Health and Safety Practices Manual
HSS	Health and Safety Specialist
IHSS	Individual Hazardous Substance Site
KH	Kaiser-Hill
MDC	Minimal Detectable Counts
MSDS	Material Safety Data Sheet
NIOSH	National Institute of Occupational Safety and Health
OSHA	Occupational Safety and Health Administration
PAH	Polycyclic Aromatic Hydrocarbons
PAM	Proposed Action Memorandum for the Source Removal at the Mound Site, IHSS 113
PCB	Polychlorinated Biphenyls
pCi/g	Pico Curies Per Gram
PID	Photoionization Detector
PPE	Personal Protective Equipment
PPM	Parts Per Million
RBA	Radiological Buffer Area
RCT	Radiological Control Technician
RFETS	Rocky Flats Environmental Technology Site
ROI	Radiological Operating Instructions Manual

RMRS Rocky Mountain Remediation Services  
RTG Resource Technologies Group  
RWP Radiological Work Permit  
SAP Sampling and Analysis Plan to Support the Source Removal at the Mound Site,  
IHSS 113  
SCA Soil Contamination Area  
SCBA Self Contained Breathing Apparatus  
SEG Scientific Ecology Group  
SSO Site Safety Officer  
SSOC Safe Site of Colorado  
SVOC Semi-Volatile Organic Compound  
TDU Thermal Desorption Unit  
VOC Volatile Organic Compound  
WBGT Wet Bulb Globe Thermometer

## 1.0 INTRODUCTION

This site specific Health and Safety Plan (HASP) addresses the hazards associated with each phase of site operation and establishes guidelines to protect project personnel, collocated workers, the general public, equipment, and the environment during the implementation of field activities associated with the Source Removal Action at the Mound Site, IHSS 113. This work will be conducted as an accelerated action under the Final Proposed Action Memorandum for the Source Removal at the Mound Site, IHSS 113 (PAM).

This work will adhere to the regulations and guidelines outlined in Occupational Safety and Health Administration (OSHA) Title 29 CFR 1926.65 "Hazardous Waste Operations and Emergency Response," Department of Energy (DOE) Order 5480.9A, "Construction Project Safety and Health Management," and DOE Title 10 CFR 835, "Occupational Radiation Protection." When not addressed in OSHA Title 29 CFR 1926.65, all nonradiological work will be performed in accordance with Title OSHA 29 CFR 1910 "Safety and Health Regulations for General Industry" or OSHA Title 29 CFR 1926 "Safety and Health Regulations for Construction."

In addition to this HASP, an Auditable Safety Analysis was prepared and is included in Appendix A.

The specific activities to be performed are defined in Section 4.0 of this HASP. The health and safety guidelines and requirements presented are based on a review of available information and an evaluation of potential hazards. This HASP outlines the health and safety procedures and equipment required for activities at this site to minimize the potential for exposures of field personnel. Revisions to this HASP require approval from the RMRS Project Manager, RMRS Radiological Coordinator, RMRS Health and Safety Supervisor, RMRS Radiological Safety Section Manager, and SSOC Radiological Engineering.

This HASP applies to Rocky Flats Environmental Technology Site contractors, subcontractors, and visitors involved in operations, management, or administration at the Mound Site.

## 2.0 PROJECT PERSONNEL RESPONSIBILITIES

The responsibilities and authorities of each individual relating to health and safety issues are presented below. The project Health and Safety Organization is shown in Figure 2.1. A project phone list is presented in Table 2.1.

### 2.1 ALL PERSONNEL

Each person is responsible for the health and safety of themselves and their coworkers, for completing tasks in a safe manner, and reporting any unsafe acts or unanticipated hazards or conditions to the Project Manager, Site Safety Officer, or the Health and Safety Specialist. All personnel are responsible for continuous adherence to this HASP during the performance of their work. No person may work in a manner that conflicts with the safety and environmental precautions expressed in this document.

### 2.2 RMRS VICE PRESIDENT OR DESIGNEE

The RMRS Vice President or designee is responsible for the following:

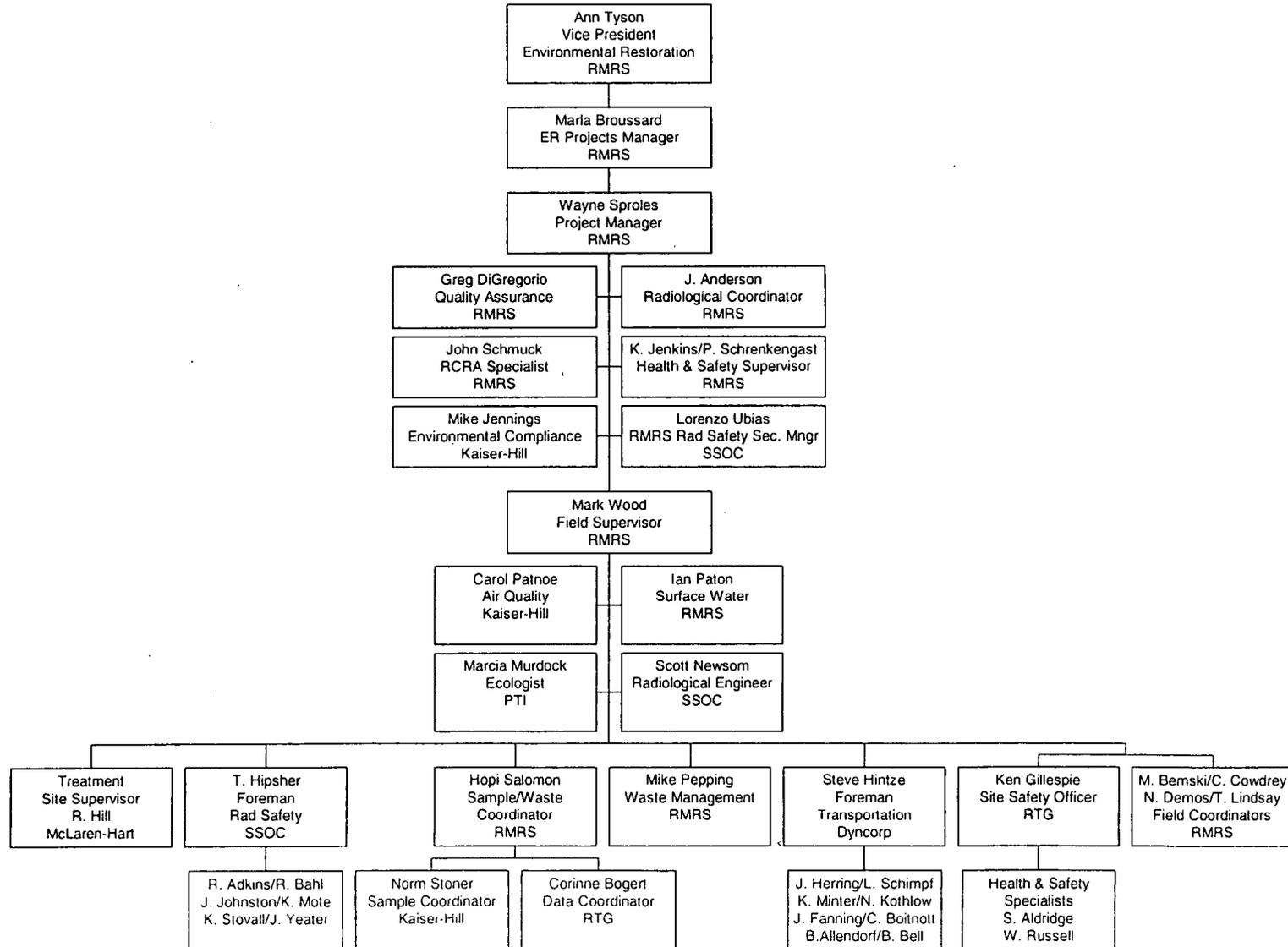
- Liason activities between Kaiser-Hill Environmental Restoration management and RMRS Project management;
- Providing assistance to the Project Manager; and
- Issuing approval for restart of the project following suspension of activities.

### 2.3 PROJECT MANAGER

The Project Manager is responsible for overall operations during fieldwork on the site including the health safety of project personnel during site activities. The project manger is responsible for implementation of the HASP and protecting surrounding facilities and any potentially affected communities. The Project Manager's specific health and safety duties include the following:

- Managing the development and implementation of the site specific HASP and Activity Hazard Analyses;
- Performing periodic on site inspections to make certain that the HASP is being followed;
- Coordinating with the Site Safety Officer and Health and Safety Supervisor on health and safety matters;
- Ensuring that resources are available for all health and safety requirements;
- Providing the appropriate monitoring and safety equipment necessary for implementing this HASP;
- Suspending field activities if health and safety of personnel are endangered pending an evaluation by the Site Safety Officer or the Health and Safety Supervisor;
- Suspending field activities for radiological safety issues and consulting with Radiological Safety;

Figure 2.1  
 Project Organization



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**Table 2.1**  
**Project Phone List**

Name	Company/Title	Phone	Pager	Radio	Home
Adkins, Rich	KH - RCT	2397	-	-	
Aldridge, Steve	RMRS - Contractor HSS			3719	
Allendorf, Brett	KH - Transportation	4530	-	-	
Anderson, Jerry	RMRS - Rad Coordinator	6438	7447	-	
Bahl, Robert	KH - RCT	2397	-	-	
Barnes, Dave	RTG - Health and Safety Specialist	5352	3542	3748	
Batson, Cherry	RMRS - Site Access Coordinator	3542	6126	-	
Bell, Briant	KH - Transportation	4530	-	-	
Boitnott, Clarence	KH - Transportation	4530	-	-	
Broussard, Marla	RMRS - Field Operations Manager	6007	4010	3740	
Casillas, Andrea	RMRS - Field Operations Yard	5302	1227	3802	
Chandler, Skip	RMRS - H&S Team Leader	6673	3806	1659	
Cirillo, Russ	RMRS - Bldg. 891 Water Treatment	5876	5477	3765	
Cowdery, Craig	RMRS - Project Support	6953	5466	3743	
Coyne, Dan	RMRS - Maintenance	8177	7223	3411	
Demos, Nick	RMRS - Project Support	4605	3842	3810	
DiGregorio, Greg	RMRS - Quality Assurance	5688	1732	-	
Fanning, Joe	KH - Transportation	4530	-	-	
Garcia, Rich	SEG - Waste Tech Supervisor	6616	7509	4838	
Gillespie, Ken	RTG - Site Safety Officer	5356	4007	3733	
Herring, Jeff	KH - Transportation	4530	-	-	
Hintz, Steve	Dyncorp - Transportation Foreman	4530	4269	4106	
Hipsher, Tim	SSOC - Rad Operations Foreman	2397	3369	3271	
Johnston, J	KH - RCT	2397	-	-	
Jenkins, Ken	RMRS - H&S Team Leader	5374	7455	4505	
Kothlow, Neil	KH - Transportation	4530	-	-	
Lindsey, Tom	RMRS - Project Support	5705	7478	3776	
Minter, Kerry	KH - Transportation	4530	-	-	
Mote, Kathy	KH - RCT	2397	-	-	
Newsom, Scott	SSOC - Radiological Engineer	8148	3977	3242	
Parson, Gary	KH - Excavation Specialist	4197	1899	4533	
Patnoe, Carol	KH - Air Quality	2440	-	-	
Paton, Ian	RMRS - Surface Water	2680	5238	-	
Pepping, Mike	RMRS - Waste Generator	3075	7464	3808	
Russell, Wade	RTG - Health and Safety Specialist	5356	6136	3728	
Salomon, Hopi	RMRS - Sample/Waste Manager	6627	5129	3779	
Schimpf, Lou	KH - Transportation	4530	-	-	
Schreckengast, Peggy	RMRS - H&S Supervisor	6790	3059	3702	
Sieben, Ann	KH - Program Manager	9886	4482	3769	
Sproles, Wayne	RMRS - Project Manager	5790	1245	3798	
Stoner, Norm	KH - Environmental Lab	4289	-	-	
Stovall, Kent	KH - RCT	2397	-	-	

Field Change No.7

Field Change No.2

15

**Table 2.1**  
**Project Phone List (cont.)**

Name	Company/Title	Phone	Pager	Radio	Home
Tyson, Ann	RMRS - VP Env. Restoration	4829	1011	-	
Ubias, Lorenzo	SSOC - RMRS Rad Safety Sec. Mngr.	8231	5507	-	
Wood, Mark	RMRS - Field Supervisor	6689	5904	3796	
Yeater, Judy	KH - RCT	2397	-	-	

- Suspending individuals from field activities for infractions of the HASP pending an evaluation by the Site Safety Officer and/or the Health and Safety Supervisor;
- Ensuring that proper controls and work practices are in place following any unanticipated hazard or condition including necessary changes to the HASP or Activity Hazard Analyses;
- Escorting employees with injuries or illnesses to RFETS Medical;
- Implementing emergency procedures as required; and
- Assisting in accident investigations and implementing corrective actions to any unsafe conditions.

#### 2.4 HEALTH AND SAFETY SUPERVISOR

The Health and Safety Supervisor is responsible for overall compliance with and implementation of the HASP. The Health and Safety Supervisors responsibilities are as follows:

- Develop health and safety requirements for the project;
- Assist in the development of the site specific Activity Hazard Analyses and the HASP;
- Approve the site specific Activity Hazard Analyses and the HASP;
- Approve all changes to the site specific Activity Hazard Analyses and the HASP;
- Provide health and safety assistance to the Site Safety Officer (SSO) and Health and Safety Specialists (HSS);
- Provide assistance to the SSO and HSS in addressing health and safety issues which cannot be solved in the field;
- Conduct weekly health and safety inspections of the project;
- Ensure prompt reporting of all accidents and incidents; and
- Maintain all required health and safety statistical information pertinent to employee hours worked.

Me

**Table 2.1**  
**Project Phone List (cont.)**

Name	Company/Title	Phone	Pager	Radio	Home
Ubias, Lorenzo	SSOC - RMRS Rad Safety Sec. Mngr.	8231	5507	-	
Wood, Mark	RMRS - Field Supervisor	6689	5904	3796	
Yeater, Judy	KH - RCT	2397	-	-	

- Suspending individuals from field activities for infractions of the HASP pending an evaluation by the Site Safety Officer and/or the Health and Safety Supervisor;
- Ensuring that proper controls and work practices are in place following any unanticipated hazard or condition including necessary changes to the HASP or Activity Hazard Analyses;
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- Assisting in accident investigations and implementing corrective actions to any unsafe conditions.

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- Develop health and safety requirements for the project;
- Assist in the development of the site specific Activity Hazard Analyses and the HASP;
- Approve the site specific Activity Hazard Analyses and the HASP;
- Approve all changes to the site specific Activity Hazard Analyses and the HASP;
- Provide health and safety assistance to the Site Safety Officer (SSO) and Health and Safety Specialists (HSS);
- Provide assistance to the SSO and HSS in addressing health and safety issues which cannot be solved in the field;
- Conduct weekly health and safety inspections of the project;
- Ensure prompt reporting of all accidents and incidents; and
- Maintain all required health and safety statistical information pertinent to employee hours worked.

## 2.5 SITE SAFETY OFFICER (SSO)

The SSO is responsible for on site compliance with and implementation of the HASP. The SSO and ultimately the Project Manager are responsible for the safe conduct of operations. The specific health and safety duties of the SSO include the following:

- Develop the site specific Activity Hazard Analyses and the HASP;
- Reporting to the Health and Safety Supervisor and the Project Manager on health and safety matters;
- Providing a copy of the HASP to all field crews;
- Ensuring that current medical clearance and training documentation is available;
- Obtaining required health and safety equipment and maintaining equipment on the site;
- Conducting daily pre-work health and safety briefings;
- Conducting daily site health and safety inspections and immediately correcting all deficiencies;
- Supervising the Health and Safety Specialists;
- Immediately reporting all safety-related incidents or accidents to the Health and Safety Supervisor and the Project Manager;
- Overseeing or conducting required health and safety monitoring such as air contaminant, noise, and heat or cold stress monitoring;
- Maintaining a health and safety log including monitoring results and observations;
- Suspending work or otherwise limiting personnel exposures if this HASP appears to be unsuitable or inadequate, or if the health or safety of personnel is endangered; and
- Implementing emergency procedures as required.

## 2.6 HEALTH SAFETY SPECIALIST (HSS)

The HASP for the Mound Site Source Removal is implemented by the HSS. The specific health and safety duties of the HSS include the following:

- Assisting the Site Safety Officer in implementing the HASP;
- Reporting to the Site Safety Officer and the Field Supervisor on health and safety matters;
- Assisting the Site Safety Officer in conducting daily pre-work health and safety briefings;
- Immediately reporting all safety-related incidents or accidents to the Site Safety Officer and the Field Supervisor;
- Conducting required health and safety monitoring such as air contaminant, noise, and heat or cold stress monitoring;
- Maintaining a health and safety log including monitoring results and observations;
- Directing personnel to change work practices if existing practices are deemed to be hazardous to the health and safety of personnel; and
- Implementing emergency procedures as required.

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## 2.7 FIELD SUPERVISOR

The Field Supervisor, in coordination with the Project Manager and the Site Safety Officer, will be responsible for the implementation of this HASP. This will include communicating site requirements to all on site project personnel. The Field Supervisors specific health and safety duties include the following:

- Enforcing the requirements of the HASP;
- Suspending work, as required, to ensure personal safety and protection of property, or where life or property-threatening non-compliance with safety requirements is found;
- Ensuring site permits are obtained before work begins at each site;
- Notifying the Project Manager of any accidents, spills, or emergencies;
- Informing facility personnel of activities that will be carried out on a particular day;
- Communicating with the Site Safety Officer about the schedule of work at the facility;
- Ensuring that all site personnel have been given the proper medical clearance;
- Ensuring that all site personnel have met appropriate training requirements and have the appropriate training documentation at the site;
- Conducting daily site health and safety inspections and reporting all unsafe conditions to the Site Safety Officer;
- Implementing corrective actions to any unsafe conditions; and
- Implementing emergency procedures as required.

## 2.8 RADIOLOGICAL CONTROL TECHNICIANS AND RADIOLOGICAL ENGINEERING

The radiological engineer and radiological control technicians (RCTs) will be responsible for implementation of the HASP. This includes communicating site radiological conditions to all on site project personnel and consultation with the Field Supervisor and the Project Manager. The specific duties of the Radiological Engineer and the RCTs include the following:

- Implementing radiological guidelines;
- Preparing the Radiological Work Permits (RWP) and posting the area appropriately;
- Coordinating and documenting activities to limit radiation exposures to levels that are As Low As Reasonably Achievable (ALARA);
- Performing radiological surveys of soils, equipment, and personnel;
- Performing radiological air monitoring;
- Documenting and submitting copies of all formalized radiological surveys and air monitoring data to the Project Manager or Field Supervisor;
- Maintaining a log of pertinent observations; and
- Suspending work in accordance with the Radiological Work Permit (RWP) if health or safety of personnel or the environment is endangered.

## 2.9 SUBCONTRACTORS

Subcontractors will implement and follow this plan. The following specific responsibilities are included:

- Attend site specific orientation and follow the requirements set forth in this plan;
- Provide Site Safety Officer with copies of Material Safety Data Sheets (MSDS) for all hazardous chemicals brought on the site; and
- Provide copies of all required training and medical authorizations to the Site Safety Officer.

### **3.0 SITE INFORMATION**

#### **3.1 ROCKY FLATS ENVIRONMENTAL TECHNOLOGIES SITE (RFETS)**

##### **3.1.1 RFETS Location**

RFETS is located in northern Jefferson County, Colorado, approximately 16 miles northwest of Denver. The cities of Boulder, Broomfield, Westminster, and Arvada are located less than 10 miles to the north, northeast, east, and southeast, respectively. RFETS consists of approximately 6,550 acres and occupies Sections 1 through 4 and 9 through 15 of Township 2 South, Range 70 West, 6th Principal Meridian. Major plant buildings are located within an RFETS security area of approximately 400 acres. The security area is surrounded by a buffer zone of approximately 6,150 acres. RFETS is generally bounded on the north by State Highway 128. To the east is Jefferson County Highway 17, also known as Indiana Street; to the south are agricultural and industrial properties, and State Highway 72; and to the west is State Highway 93. A RFETS location map is shown in Figure 3.1.

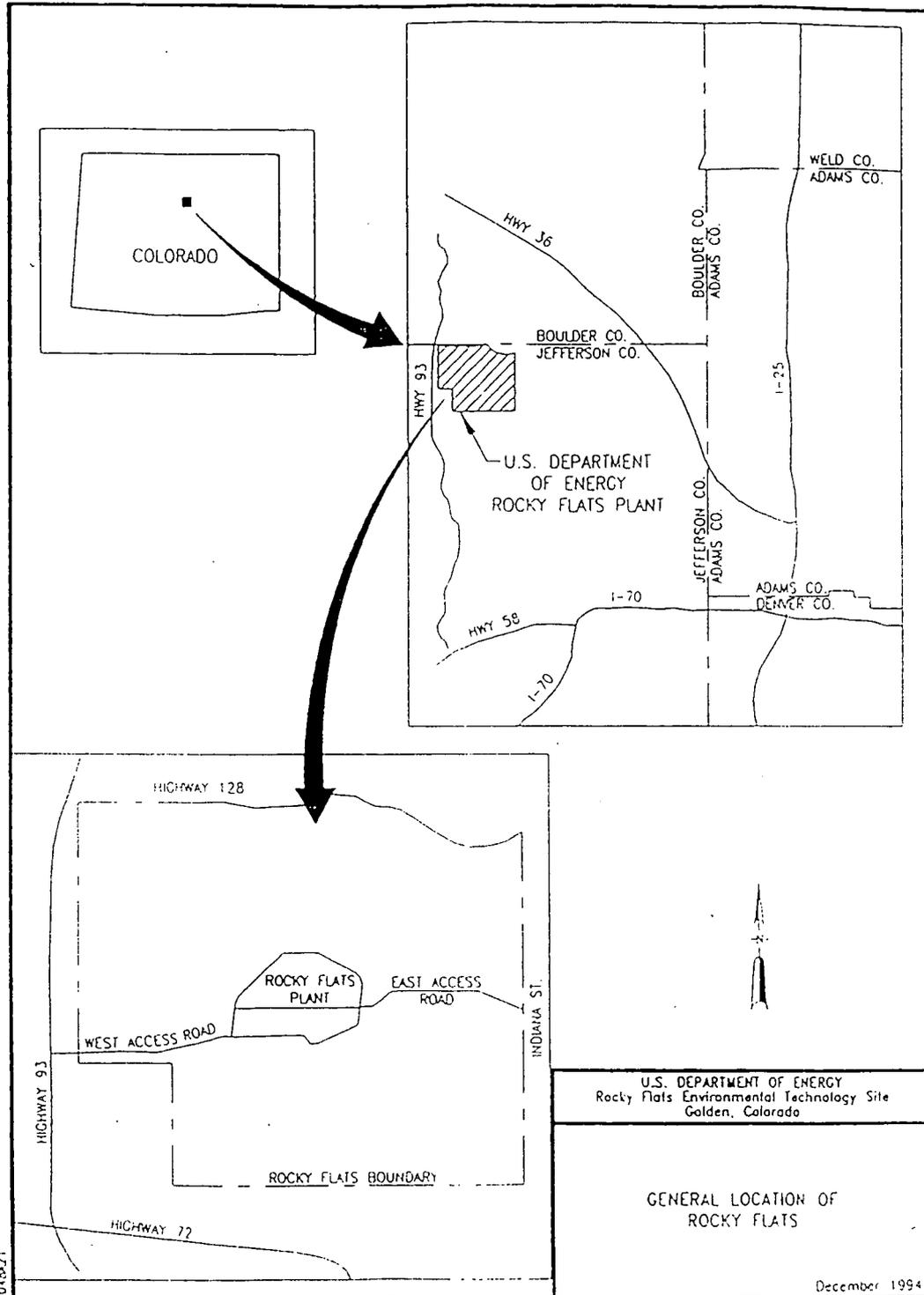
##### **3.1.2 RFETS Background**

RFETS is a government-owned and contractor-operated facility that is part of the nationwide nuclear weapons production complex. It was operated for the U. S. Atomic Energy Commission (AEC) from RFETS's inception in 1951, then known as the Rocky Flats Plant, until the AEC was dissolved in January 1975. Then, responsibility for Rocky Flats Plant was assigned to the Energy Research and Development Administration (ERDA), which was succeeded by the Department of Energy (DOE) in 1977. Dow Chemical USA, an operating unit of the Dow Chemical Company, was the managing and operating contractor of the facility from 1951 until June 30, 1975. Rockwell International succeeded Dow Chemical USA from July 1, 1975 to January 1, 1990. EG&G Rocky Flats, Inc. succeeded Rockwell International and operated the plant from January 1, 1990 to July 1, 1995. The plant name was changed to Rocky Flats Environmental Technologies Site in 1994. The plant has been operated by Kaiser-Hill Company Incorporated since July 1, 1995.

##### **3.1.3 RFETS Operations**

Prior to 1992, production activities included fabrication of nuclear weapons components from beryllium, plutonium, stainless steel, and uranium; assembly of components; and chemical recovery and purification of recyclable transuranic radionuclides. Other activities included research and development in metallurgy, machining, nondestructive testing, coatings, remote engineering, chemistry, and physics. The major classes of waste generated includes hazardous waste, radioactive waste, and mixed (hazardous and radioactive) waste. Currently, the mission at RFETS is decontaminating, decommissioning, and environmental restoration.

Figure 3.1  
RFETS Site Location Map



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## 3.2 THE MOUND SITE (IHSS 113)

### 3.2.1 The Mound Site Location

The Mound Site is located north of Central Avenue, and east of the protected area (PA) fence. For the purpose of this HASP, the Mound Site will be broken down into two areas, the excavation and the Contaminated Soil Feed Stockpile (CSFS) which is located approximately 600 feet to the east of the Mound Site proper. Map of the site are illustrated in Figures 3.2, 3.3, and 3.4.

### 3.2.2 The Mound Site Background

Between 1954 and 1958 approximately 1,405 drums were placed at the Mound Site and covered with soil; thus generating a "mound". The drums contained uranium and beryllium contaminated lathe coolant (a mixture of approximately 70 percent hydraulic oil and 30 percent carbon tetrachloride), tetrachloroethylene (PCE), and trichloroethylene. Historic information also indicates that some of the coolant contained plutonium.

In 1970, all drums were removed from the Mound Site along with some radiologically contaminated soil. Approximately 10 percent of the drums were thought to have leaked at the time of removal. Solid material was shipped offsite for disposal and liquids were sent to Building 774 for processing. No airborne radiological contamination was detected during the drum removal. Soil from the excavation was graded and the excess was placed in the landfill.

As a result of the past activities, numerous subsurface soil and groundwater characterization studies have been conducted at the Mound Site. These characterizations included the drilling of 22 boreholes, a soil gas vapor survey, and the installation of seven groundwater monitoring wells. The data from these investigations indicate levels of volatile organic compounds (VOCs), primarily tetrachloroethylene, in the soil at levels requiring cleanup.



## 4.0 SCOPE OF WORK

The scope of work will involve site preparation and subsequent excavation of approximately 400 to 1,000 cubic yards of contaminated soil using standard excavation equipment. The soil will be transported to and temporarily stockpiled in the CSFS, located approximately 600 feet east of the Mound Site (Figure 3.2). The CSFS is just south of where the thermal desorption treatment equipment will be mobilized to process the soil. After excavation is completed, contaminated soil will be treated using a low temperature thermal desorption remediation technology and stockpiled in the treated soil stockpile area. Treated soil, upon confirmed attainment of performance goals, will be backfilled into the excavation. The following is a breakdown of the tasks to be implemented during the source removal at the Mound Site. A task-specific hazard analysis is included in Section 5.5 and task specific Activity Hazard Analyses are included in Appendix B. Note: Should additional tasks with activities and hazards similar to those listed below arise during the course of the project, a task specific Activity Hazard Analysis will be developed and incorporated into Appendix B.

### 4.1 TASK 1 - SITE PREPARATION

Most of the site preparation will involve the installation of a culvert in the Central Avenue drainage ditch and the subsequent backfilling of the ditch to provide a loading area during excavation of the Mound Site. The remainder of the work will consist of minor road improvements, and establishing work zones and equipment infrastructure at both the excavation and the CSFS areas.

The culvert installation, minor road improvements, and establishing equipment infrastructure are included in this HASP for overall project continuity although the work does not involve radiological or chemical hazards. Work will be performed in accordance with all portions of this HASP with the exception of the portions which address chemical and radiological hazards.

Tasks to be completed during the installation of the culvert and conducting minor road improvements will include:

- Installing approximately two hundred feet of 30" culvert in the bottom of the Central Avenue drainage ditch. This will require excavating approximately one foot of the bottom of the ditch to attain proper grade for the culvert. Excavated soil will be placed on the northeast side of the mound excavation area to control incidental runoff and runoff during excavation of the Mound Site;
- Backfilling the Central Avenue drainage ditch to provide a loading area during excavation of the Mound Site. Backfilling the Central Avenue drainage ditch will require the removal of vegetative soil, scarifying the surface, compacting the fill material, and the use of a nuclear soil density gauge to evaluate compaction; and

Field Change No.10

Field Change No.18

- Conducting minor road improvements along Central Avenue including the placement of road base, compacting and grading.

Tasks to be completed during the establishment of equipment infrastructure at both the excavation and the CSFS include:

- Constructing secondary containments to hold poly tanks that will receive stormwater from either the Mound Site excavation or the plastic lined stormwater ditch surrounding the CSFS;
- Staging poly tanks, pumps, generators, supplied air trailers and other miscellaneous equipment;
- Driving fence posts, ground rods, and equipment hold downs;
- Moving and setting up jersey barriers;
- Setting up exclusion zones (EZ) which for radiological purposes will be the soil contamination areas (SCA), contamination reduction zones (CRZ) which will also contain the radiological buffer area (RBA) including the stepoff pad, project support zones, and general site control zones; and
- Mobilizing heavy equipment.

Activities required to support the culvert installation, minor road improvements, and establishment of equipment infrastructure will include the following:

- Operating heavy equipment and industrial fork trucks;
- Wearing appropriate personal protective equipment;
- Monitoring personnel for noise and heat/cold stress exposure;
- Monitoring wind speed;
- Controlling traffic when conducting minor road improvements along the edge of Central Avenue;
- Spraying water to minimize dust;
- Spraying ConCover® to stabilize the berm on the northeast side of the Mound Site; and
- Securing the work area at the end of each day.

#### 4.2 TASK 2 - INSTALLING STORMWATER DITCH AND REMOVING TOPSOIL AT CSFS

This task involves the installation of a plastic lined stormwater collection ditch and grading the topsoil at the CSFS in preparation for stockpiling contaminated soil from the Mound Site excavation. Activities required to complete this task include the following:

- Working under the stipulations of a Radiological Work Permit
- Operating heavy equipment;
- Wearing appropriate personal protective equipment;
- Performing CSFS EZ/SCA work area high volume radiological air monitoring;
- Performing support zone perimeter low volume radiological air monitoring;
- Performing radiological surveys on soils, and equipment;

- Frisking personnel for radiological purposes;
- Monitoring personnel for noise and heat/cold stress exposure;
- Monitoring wind speed;
- Spraying water to minimize dust;
- Decontaminating equipment;
- Performing personnel contamination control;
- Managing waste such as disposable personal protective equipment; and
- Securing the CSFS at the end of each day.

#### 4.3 TASK 3 - EXCAVATION OF CONTAMINATED SOIL

This task includes excavating approximately 400 to 1,000 cubic yards of contaminated soil. A track mounted excavator (trackhoe) will be used to excavate the soil. The contaminated soil will be placed in a forty ton articulated dump truck and transported to the CSFS. Excavation activities will continue until excavation verification samples indicate that soils equal to or above the VOC cleanup target levels described in the PAM have been removed or the limiting conditions in the PAM have been encountered. Activities required to accomplish the excavation of contaminated soil include the following:

- Working under the stipulations of a Radiological Work Permit
- Operating the excavator;
- Wearing appropriate personal protective equipment;
- Performing excavation EZ/SCA perimeter high volume radiological air monitoring;
- Performing support zone perimeter low volume radiological air monitoring;
- Performing radiological surveys on soils, and equipment;
- Frisking personnel for radiological purposes;
- Conducting real-time air monitoring for VOCs and particulates;
- Conducting personal integrated air sampling for VOCs;
- Monitoring personnel for noise and heat/cold stress exposure;
- Monitoring wind speed;
- Spraying water to minimize dust;
- Pumping incidental stormwater from the excavation;
- Decontaminating equipment;
- Performing personnel contamination control;
- Managing waste such as disposable personal protective equipment; and
- Securing the excavation at the end of each day and during the treatment of contaminated soil.

#### 4.4 TASK 4 - TRANSPORT AND DUMPING OF CONTAMINATED SOIL

This task involves the use of a forty ton articulated dump truck to transport contaminated soil from the excavation to the CSFS. To ensure safe movement of the truck, a Traffic Management Plan has been

prepared and resides in the Field Implementation Plan (FIP). In addition, the Site Safety Officer will escort every load of soil to ensure prompt response to any spills and to monitor for VOCs and particulates. The forty ton articulated truck will be dumped in a manner which limits tire contact with contaminated soil. Activities required to accomplish the transport and dumping of contaminated soil include the following:

- Working under the stipulations of a Radiological Work Permit
- Operating the forty ton dump truck;
- Posting the dump truck as an SCA
- Wearing appropriate personal protective equipment;
- Closing the northernmost lane of the East Access Road;
- Positioning flagpersons on the two north-south roads to control traffic during truck movement;
- Spraying water when loading and prior to transport to minimize dust;
- Escorting the dump truck to ensure prompt response should a spill or dust generation occur;
- Performing CSFS EZ/SCA perimeter high volume radiological air monitoring;
- Performing support zone perimeter low volume radiological air monitoring;
- Performing radiological surveys on soils, and equipment;
- Frisking personnel for radiological purposes;
- Conducting real time air monitoring for VOCs and particulates;
- Conducting personal integrated air sampling for VOCs;
- Monitoring personnel for noise and heat/cold stress exposure;
- Spraying water when dumping soil to minimize dust;
- Decontaminating equipment;
- Performing personnel contamination control; and
- Managing waste such as disposable personal protective equipment.

#### 4.5 TASK 5 - MANAGEMENT OF CONTAMINATED SOIL FEED STOCKPILE

This task involves the management of the contaminated soil at the CSFS. To facilitate efficient loading of the CSFS, a front end loader will be utilized. Management of the CSFS also includes the pumping of incidental water from the stormwater collection system and covering the CSFS with a water-resistant tarpaulin at the end of the shift. On July 7, 1997, the SCA at the CSFS was deposted based on gamma spectroscopy analyses of soil samples obtained from the CSFS. The gamma-ray spectroscopy report indicated no Tier 2 radiological levels were exceeded (Appendix F). Authorization to depost the SCA based on the Tier 2 levels is contained in the document titled "Final Technical Basis for Posting and Radiological Control Requirements in Environmental Restoration Activities", dated March 5, 1997. Upon deposting, radiological controls are not required. However, based on Best Management Practices (BMP) several precautionary controls will be maintained and are summarized below and in the revised ALARA review (Appendix F). The SCA deposting and BMP derived radiological controls are also reflected in Tasks 7, 10, 11, and 12. Activities required to accomplish the loading and management of the CSFS include the following:

Field Change No.15

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Field Change No.15

- Working under the stipulations of a Radiological Work Permit, as required;
- Operating the front end loader;
- Wearing appropriate personal protective equipment;
- Performing CSFS EZ and SCA (if required) perimeter high volume radiological air monitoring, as required and as a BMP;
- Performing support zone perimeter low volume radiological air monitoring, as required and as a BMP;
- Performing radiological surveys on soils, and equipment, as required and as a BMP;
- Frisking personnel for radiological purposes, as required;
- Conducting real-time air monitoring for VOCs and particulates;
- Conducting personal integrated air sampling for VOCs;
- Monitoring personnel for noise and heat/cold stress exposure;
- Spraying water when dumping and moving soil to minimize dust;
- Covering the CSFS with a water-resistant tarpaulin;
- Pumping incidental water from the stormwater collection system;
- Decontaminating equipment;
- Performing personnel contamination control;
- Managing waste such as disposable personal protective equipment; and
- Securing the CSFS at the end of each day.

#### 4.6 TASK 6 - EXCAVATION VERIFICATION SAMPLING

Excavation verification samples will be used to establish the post-action condition of the soils at the boundaries of the excavation. Samples will be collected and analyzed for the VOC contaminants of concern as described in the Sampling and Analysis Plan. Since the existing characterization data indicates that metals and semi-volatile contaminants are below cleanup levels in the trenches, no further soil sampling will be done for those constituents. Activities required to accomplish this sampling include the following:

- Working under the stipulations of a Radiological Work Permit
- Operating the excavator;
- Wearing appropriate personal protective equipment;
- Performing excavation EZ/SCA perimeter high volume radiological air monitoring;
- Performing support zone perimeter low volume radiological air monitoring;
- Performing radiological surveys on soils, and equipment;
- Frisking personnel for radiological purposes;
- Conducting real-time air monitoring for VOCs, and particulates;
- Conducting personal integrated air sampling for VOCs;
- Monitoring personnel for noise and heat/cold stress exposure;
- Decontaminating the excavator bucket;
- Sampling from the excavator bucket;

- Decontaminating sampling equipment;
- Performing personnel contamination control;
- Managing waste such as disposable personal protective equipment and sampling equipment; and
- Packaging the samples for shipment;

#### 4.7 TASK 7 - DECONTAMINATION OF EQUIPMENT

All materials and equipment in contact with soils will require decontamination prior to release from the EZ/SCA at either the excavation or CSFS and prior to free release from RFETS to off site locations. Decontamination methods will vary depending on the location and extent of contamination and effectiveness will be determined by visual inspection, radiological surveys and volatile organic compound monitoring. At the discretion of the Project Manager, items may be decontaminated in the field or transferred to the Main Decontamination Facility. Activities required to decontaminate heavy equipment and materials include the following:

- Working under the stipulations of a Radiological Work Permit, as required;
- Staging heavy equipment;
- Wearing appropriate personal protective equipment;
- Performing excavation or CSFS perimeter high volume radiological air monitoring as required and as a BMP;
- Performing excavation or CSFS perimeter low volume radiological air monitoring as required and as a BMP;
- Performing radiological surveys on equipment as required and as a BMP;
- Frisking personnel for radiological purposes, as required;
- Conducting real-time air monitoring for VOCs and particulates;
- Conducting personal integrated air sampling for VOCs if necessary;
- Monitoring personnel for noise and heat stress exposure;
- Establishing a portable decontamination station with secondary containment;
- Transferring items to the Main Decontamination Facility;
- Spraying water at low or high pressures;
- Wiping or scrubbing;
- Performing personnel contamination control; and
- Managing waste such as disposable personal protective equipment and decontamination fluids.

#### 4.8 TASK 8 - SOIL TREATMENT

Soil will be treated using a low vacuum low temperature thermal desorption system (TDU) operated by a treatment subcontractor. The TDU will be assembled and operated in the TDU area as shown in Figure 3.2. The TDU is a batch treatment system that is capable of desorbing contaminants under a non-oxidative atmosphere and low temperature such that the desorbed contaminants do not degrade and generate thermal or oxidative by-products. The CSFS is located proximal to the TDU site allowing short staging time prior

Field Change No.15

to treatment in the TDUs. Operation of the TDU system will be addressed in an additional Health and Safety Plan which will be prepared by the treatment subcontractor and approved by the RMRS Project Manager, RMRS Radiological Coordinator, RMRS Health and Safety Supervisor, RMRS Radiological Safety Section Manager, and SSOC Radiological Engineering.

#### 4.9 TASK 9 - POST TREATMENT VERIFICATION SAMPLING

Post treatment verification samples will be taken by the treatment subcontractor to verify compliance with treatment standards. Samples will be collected and analyzed for the VOC contaminants of concern as described in the SAP. Since the existing characterization data indicates that metals and semi-volatile contaminants are below cleanup levels, no further soil sampling will be done for those constituents. Post treatment verification sampling will also be addressed in the Health and Safety Plan prepared by the treatment subcontractor.

#### 4.10 TASK 10 - TRANSPORT AND BACKFILL OF TREATED SOIL

This task involves the loading of conventional dump trucks with front end loaders to transport soil from the treated soil stockpile to the excavation. To ensure safe movement of the trucks, a Traffic Management Plan has been prepared and resides in the FIP. In addition, the Site Safety Officer will escort every load of soil to ensure prompt response to any spills. Activities required to accomplish the transport of treated soil include the following:

- Operating the front end loader and dump trucks;
- Wearing appropriate personal protective equipment;
- Performing excavation or treated soil stockpile perimeter low volume radiological air monitoring, as required and as a BMP;
- Performing radiological surveys on equipment, as required and as a BMP;
- Conducting real-time air monitoring for VOCs and particulates;
- Monitoring personnel for noise and heat stress exposure;
- Spraying water when loading and prior to transport to minimize dust;
- Observing the dump trucks to ensure prompt response should a spill or dust generation occur;
- Spraying water when dumping and moving soil to minimize dust; and

#### 4.11 TASK 11 - DECONTAMINATION OF EQUIPMENT

All materials and equipment in contact with soils will require decontamination prior to free release from RFETS to off site locations. Decontamination effectiveness will be determined by visual inspection and radiological surveys. At the discretion of the Project Manager, items may be decontaminated in the field or transferred to the Main Decontamination Facility. Activities required to decontaminate heavy equipment and materials include the following:

Field Change No.15  
Field Change No.18

Field Change No.18

Field Change No.18

- Staging heavy equipment;
- Wearing appropriate personal protective equipment;
- Performing radiological surveys on equipment as required and as a BMP;
- Conducting real-time air monitoring for VOCs as necessary;
- Monitoring personnel for noise and heat stress exposure;
- Establishing a portable decontamination station with secondary containment;
- Transferring items to the Main Decontamination Facility;
- Spraying water at low or high pressures;
- Wiping or scrubbing;
- Managing waste such as disposable personal protective equipment and decontamination fluids.

## 5.0 HAZARD ASSESSMENT

The hazards associated with operations at the Mound Site include hazardous substances (chemical and radiological); biological hazards; and physical hazards.

### 5.1 CHEMICAL HAZARDS

Based on site history and analytical sample results as summarized in the PAM, chemical of concern (COCs) have been identified at the Mound Site. Table 5.1 presents the physical and chemical characteristics for the COCs. The Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PELs) and the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs) will be used to evaluate potential exposure to the COCs. When presented, the PELs and TLVs are the most recent published values. MSDSs for chemical products used on site are included in Appendix C.

The primary exposure pathway for the COCs is the inhalation of vapors or contaminated dust particles. The second exposure pathway is skin or eye contact or absorption. The majority of the COCs are VOCs at normal ambient temperatures and will volatilize into the breathing zone. The COCs could also become airborne in the breathing zone as a result of contaminated dust. Air monitoring will be conducted to locate, control, and reduce the potential for exposure (monitoring requirements are presented in Section 7.3). Dust suppression techniques such as water spraying and careful soil handling shall be used to reduce potential exposures to contaminated airborne dust. The use of level B personal protective equipment will be used to prevent inhalation and skin or eye contact with the COCs. Personnel may be exposed to accidental ingestion of contaminants by hand to mouth transfer after contact with contaminated materials. Ingestion of contaminants will be controlled on the site by specific prohibitions, work practices, and requirements for decontamination. Potential collocated worker exposures will be controlled by continuous EZ/SCA perimeter air monitoring for VOCs and particulates.

#### 5.1.1 Volatile Organic Compounds (VOCs)

The volatile organic compounds of concern are; Carbon Tetrachloride, Methylene Chloride, Tetrachloroethylene (PCE), and Trichloroethylene (TCE). The maximum VOC concentrations in soil or groundwater at the Mound Site are shown in Table 5.2. The primary exposure route of these VOCs is inhalation of vapors.

Table 5.1  
 Physical and Chemical Characteristics of Chemicals of Concern

Contaminant (Synonyms) (Abbreviations)	Action Level	OSHA PELs or ACGIH TLVs	OSHA IDLH	Physical/Chemical Characteristics	Routes of Exposure	First Aid	Exposure Symptoms
Carbon Tetrachloride (Tetrachloromethane)  CAS# 56-23-5	2.5 ppm Skin	5 ppm-TWA 10 ppm-STEL 25 ppm-C (200 ppm - 5 min max peak in any 4 hrs)	Carcinogen 200 ppm	Colorless liquid with a characteristic ether-like odor. Noncombustible liquid. MW: 153.8 Sp.Gr: 1.59 BP: 170°F VP: 91mm Sol: 0.05% FRZ: -9°F Fl.P: NA UEL: NA IP: 11.47eV LEL: NA	Inhalation Ingestion Absorption Contact	Artificial respiration; Seek medical attention; Irrigate and wash area affected immediately.	CNS depression; nausea and vomiting; liver and kidney damage; skin and eye irritation; drowsiness, dizziness, incoordination.
Methylene Chloride (Dichloromethane) (Methylene Dichloride)  CAS# 75-09-2	25 ppm	50 ppm-TWA 1000 ppm-C (2000 ppm - 5 min max peak in any 2 hrs)	Carcinogen 2300 ppm	Colorless liquid with chloroform-like odor; Combustible liquid. MW: 84.9 Sp.Gr: 1.33 BP: 104°F VP: 350mm Sol: 2.0% FRZ: -139°F Fl.P: ? UEL: 23% IP: 11.32eV LEL: 13%	Inhalation Ingestion Contact Absorption	Artificial respiration; Seek medical attention; Irrigate and wash area affected immediately.	Fatigue, weakness, sleepiness, lightheadedness; numbness and tingling in limbs; nausea; skin and eye irritation.
Tetrachloroethylene (Perchloroethylene) (Tetrachloroethene) (Perk) (PCE)  CAS# 127-18-4	12 ppm	25 ppm-TWA 100ppm-STEL 200 ppm-C (300 ppm - 5 min max peak in any 3 hrs)	Carcinogen 150 ppm	Colorless liquid with a mild chloroform-like odor. Noncombustible liquid. MW: 165.8 Sp.Gr: 1.62 BP: 250°F VP: 14mm Sol: 0.02% FRZ: -2°F Fl.P: NA UEL: NA IP: 9.32eV LEL: NA	Inhalation Ingestion Absorption Contact	Artificial respiration; Seek medical attention; Irrigate and wash area affected immediately.	Eye, Nose, throat irritation; nausea; flush face and neck; vertigo, dizziness, incoordination, headache, sleepiness; skin erythema; liver damage.
Trichloroethylene (Ethylene Trichloride) (Trichloroethene) (TCE)  CAS# 79-01-6	25 ppm	50 ppm-TWA 100ppm-STEL 200 ppm-C (300 ppm - 5 min max peak in any 2 hrs)	Carcinogen 1,000 ppm	Colorless liquid with a chloroform-like odor. Combustible liquid. MW: 131.4 Sp.Gr: 1.46 BP: 189°F VP: 58mm Sol: 0.0001% FRZ: -99°F Fl.P: ? UEL: 10.5% IP: 9.45eV LEL: 8%	Inhalation Ingestion Absorption Contact	Artificial respiration; Seek medical attention; Irrigate and wash area affected immediately.	Headache, vertigo; visual disturbance, fatigue, giddiness, tremor, sleepiness, vomiting, nausea; dermatitis, cardiac arrhythmias, paresthesia; eye and skin irritation; liver damage

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**Table 5.1 (Continued)**  
**Physical and Chemical Characteristics of Chemicals of Concern**

**Key:**

- ACGIH - American Conference of Governmental Industrial Hygienists
- BP - Boiling point
- C - Ceiling-Concentration shall not be exceeded at any time
- CNS - Central nervous system
- Fl. pt. - Flash point-the temperature at which the liquid phase gives off enough vapor to flash when exposed to an external ignition source. Closed cup, unless otherwise noted
- FRZ - Freezing point for liquids and gases, °F
- IDLH - Immediately Dangerous to Life and Health-Maximum concentration from which one could escape within 30 minutes without experiencing any irreversible health effects
- IP - Ionization potential, eV (electron volts)
- LEL - Lower explosive (flammable) limit in air, % by volume
- mg/m<sup>3</sup> - milligrams per cubic meter
- MW - Molecular weight
- NA - Not applicable
- OSHA - Occupational Safety and Health Administration
- PEL - Permissible Exposure Limit-Concentration is a time weighted average that must not be exceeded during any 8-hour workshift of a 40-hour workweek. (OSHA)
- PPM - Parts per million
- Skin - Potential significant contribution to the overall exposure by the cutaneous route, including mucous membranes and the eyes, either by contact with vapors or, of probable greater significance, by direct skin contact with the substance.
- Sol - Solubility in water at 68°F, % by weight.
- Sp.Gr - Specific gravity at 68°F referenced to water at 39.2°F
- STEL - Short Term Exposure Limit-A 15-minute average concentration which should not be exceeded at any time during a workday. Exposure over the PEL or TLV up to the STEL should be no longer than 15 minutes and should not occur more than four times per day. There should be at least 60 minutes between successive exposures in this range.
- TLV - Threshold Limit Value-Concentration that nearly all workers may be repeatedly exposed, day after day, without adverse effect. (Based on an 8-hour workday and 40-hour workweek). (ACGIH)
- UEL - Upper explosive (flammable) limit in air, % by volume
- VP - Vapor pressure at 68°F in millimeters (mm) mercury (Hg) unless otherwise noted.

**References:**

Air Contaminants- Permissible Exposure Limits (29 CFR 1910.1000).

American Conference of Governmental Industrial Hygienists, Threshold Limit Values and Biological Exposure Indices for 1995 to 1996.

National Institute of Occupational Safety and Health, Pocket Guide to Chemical Hazards, June, 1994.

**Table 5.2**  
**Maximum Concentrations of Volatile Organic Compounds**  
**in**  
**Soil or Water**

Chemical Name	Concentration (ppm)	Location
Carbon Tetrachloride	0.005	Soil Borehole 14495
Methylene Chloride	19.0	Soil Borehole 14295
Tetrachloroethylene	760.0	Soil Borehole 14295
Trichloroethylene	18.0	Groundwater Well 0174

### 5.1.2 Semi-Volatile Organic Compounds (SVOCs)

Semi-volatile organic compounds have been detected at low concentrations in subsurface soil samples at the Mound Site. Based on the low concentrations and low vapor pressures, inhalation of vapors is not a probable route of exposure. The exposure risk from inhaling contaminated dust particles is low and will be further reduced through dust suppression, air monitoring, and respiratory protection. Finally, ingestion, contact, and absorption exposures are also considered low and will be greatly reduced through effective work practices, personal protective clothing, decontamination, and good personal hygiene. After careful evaluation, there are no semi-volatile compounds which are a chemical of concern.

### 5.1.3 Polycyclic Aromatic Hydrocarbons (PAHs)

Polycyclic aromatic hydrocarbon compounds have been detected at low concentrations in subsurface soil samples at the Mound Site. Inhalation of vapors is not a probable route of exposure due to the low concentrations and low vapor pressures. As with SVOCs, the exposure risk from inhaling contaminated dust particles is low and will be further reduced through dust suppression, air monitoring, and respiratory protection. Ingestion, contact, and absorption exposures are also considered low and will be greatly reduced through effective work practices, personal protective clothing, decontamination, and good personal hygiene. After careful evaluation, there are no polycyclic aromatic hydrocarbon compounds which are a chemical of concern.

#### 5.1.4 Polychlorinated Biphenyls (PCBs)

Polychlorinated biphenyls, formerly used as a component in hydraulic fluid, have been detected in subsurface soil samples at the Mound Site at concentrations up to 5.2 ppm. They are potent liver toxins and have low acute toxicity but can accumulate in fatty tissue leading to delayed health effects. Exposure to PCB's may occur through ingestion, contact, or absorption if workers are in direct contact with soil or materials containing PCBs. Ingestion, contact, and absorption exposures are considered low and will be greatly reduced through effective work practices, personal protective clothing, decontamination, and good personal hygiene. Due to the low vapor pressure of PCBs, inhalation of vapors is not a probable route of exposure. Inhalation of PCBs bound to dust particles is possible, but the exposure risk is low and will be further reduced through the dust suppression and respiratory protection. After careful evaluation, there are no polychlorinated biphenyl compounds which are a chemical of concern.

#### 5.1.5 Metals

Various metals have been detected in subsurface soil samples at the Mound Site. Based on the concentrations detected, the potential of exposure is low and does not warrant a possible risk for exceeding action levels.

The radioactive metals Americium, Plutonium, and Uranium were evaluated for chemical toxicity hazards as well as radioactive toxicity hazards. For each of these metals, the radiological hazard is greater than the chemical toxicity hazard. The controls in place to limit radiological exposure are more protective than controls that would be established to ensure protection from the chemical toxicity hazards presented by Americium, Plutonium, and Uranium.

### 5.2 RADIOLOGICAL HAZARDS

Based on analytical sample results as summarized in the PAM, above-background concentrations of Americium-241, Plutonium-239/240, Uranium-233/234, Uranium-235, and Uranium-238 have been identified in subsurface soils at the Mound Site. The physical and chemical characteristics of the radionuclides are presented in Table 5.3. Maximum concentration of radionuclides detected in the soil at the Mound Site are listed in Table 5.4.

Radiological hazards, including potential collocated worker exposure, associated with the Mound Site will be controlled by the use of a RWP, real time contamination detection instruments, perimeter high volume air monitoring, vicinity low volume air monitoring, dust suppression, bioassay, and external dosimetry. The radiological hazards can be broken down into two distinct categories: external radiation exposure, and internal radiation exposure. Based on process history knowledge and characterization data at the Mound Site, the total expected exposure to workers is less than 5mrem.

**Table 5.3**  
**Physical and Chemical Characteristics of Radionuclides of Concern**

Contaminant (Synonyms) (Abbreviations)	OSHA PELs or ACGIH TLVs <sup>1</sup>	OSHA IDLH <sup>1</sup>	Physical/Chemical Characteristics	Routes of Exposure	First Aid	Exposure Symptoms
Americium 241 (Am-241)	5 rem/yr $2 \times 10^{-12}$ uCi/ml DAC <sup>2</sup>	Carcinogen	Silvery, somewhat malleable radioactive metal.	Inhalation Ingestion Absorption Contact	Follow directions of on-site Radiological Personnel.	No acute symptoms from low level exposures
Plutonium 239/240	5 rem/yr $2 \times 10^{-12}$ uCi/ml DAC	Carcinogen	Silvery, radioactive metal	Inhalation Ingestion Absorption Contact	Follow directions of on-site Radiological Personnel.	No acute symptoms from low level exposures
Uranium 233/234	5 rem/yr $2 \times 10^{-11}$ uCi/ml DAC 0.05 mg/m <sup>3</sup> -TWA 0.06 mg/m <sup>3</sup> -C	Carcinogen 10 mg/m <sup>3</sup>	Silvery, radioactive metal	Inhalation Ingestion Absorption Contact	Follow directions of on-site Radiological Personnel.	No acute symptoms from low level exposures
Uranium 235	5 rem/yr $2 \times 10^{-11}$ uCi/ml DAC 0.05 mg/m <sup>3</sup> -TWA 0.06 mg/m <sup>3</sup> -C	Carcinogen 10 mg/m <sup>3</sup>	Silvery, radioactive metal	Inhalation Ingestion Absorption Contact	Follow directions of on-site Radiological Personnel.	No acute symptoms from low level exposures
Uranium 238	5 rem/yr $2 \times 10^{-11}$ uCi/ml DAC 0.05 mg/m <sup>3</sup> -TWA 0.06 mg/m <sup>3</sup> -C	Carcinogen 10 mg/m <sup>3</sup>	Silvery, radioactive metal	Inhalation Ingestion Absorption Contact	Follow directions of on-site Radiological Personnel. Decontamination will be performed per ROI-2.03.	No acute symptoms from low level exposures

<sup>1</sup> mg/m<sup>3</sup> are for chemical properties.  
<sup>2</sup> DAC - Derived Air Concentration

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**Table 5.4**  
**Maximum Concentrations of Radionuclides**  
**in Soil**

Radionuclide	Concentration (pCi/g)	Location
Americium - 241	0.3572	Soil Borehole 14295
Plutonium - 239/240	1.905	Soil Borehole 14295
Uranium - 233/234	18.41	Soil Borehole 14295
Uranium - 235	1.376	Soil Borehole 14295
Uranium - 238	101.1	Soil Borehole 14295

### 5.2.1 External Radiation Exposure

Beta and gamma radiations are emitted by the radionuclides which are present in the soils at the Mound Site. However, the hazard associated with the level of beta radiation in the Mound Site soils is minimal. External beta radiation cannot penetrate beyond the shallow layers of the skin or the lens of the eye, and so associated hazards are confined to these areas. Eye and skin exposure to external beta radiation is greatly reduced or eliminated through the use of eye protection and personal protective clothing.

External gamma radiation, unlike beta radiation, readily penetrates deep into the body and is therefore hazardous to internal organs. However, the hazard associated with the level of gamma radiation in the Mound Site soils is minimal. Clothing and eye protection are not effective at reducing external gamma radiation exposure. Four accepted methods to minimize gamma exposures are:

- The use of shielding between personnel and the radiation source;
- Minimizing time in the radiation area;
- Maximizing distance from the radiation source; and
- Reducing or minimizing the source of radiation.

Due to low levels of gamma radiation, external shielding designed to reduce gamma radiation exposure

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will not be necessary for workers at the Mound Site. Should external radiation be of concern, the most effective methods of reducing worker exposure to external gamma radiation will be by posting areas where elevated gamma exposure rates exist and limiting the amount of time workers spend in these areas. Work assignments will be evaluated to ensure that personnel are maintaining a maximum possible distance from radiation sources.

### 5.2.2 Internal Radiation Exposure

Alpha radiation is the primary radiation hazard which may be present at the Mound Site. Alpha radiation, due to its relatively large mass and charge, does not pose an external hazard and will not penetrate the outer layer of dead skin cells. However, alpha radiation is a significant internal hazard due to the large amount of energy deposited in small, localized areas of internal organs. Alpha radiation is principally admitted to the body by inhalation of airborne contamination but ingestion, injection, and absorption of surface contamination through the skin are also possible. Radioactive contamination existing in the form of loose material is capable of migrating or being transported by a variety of mechanisms such as movement of personnel, vehicles, equipment, and wind.

Air particulates that are suspended or have settled out on horizontal surfaces (equipment) and have been resuspended pose an inhalation hazard. Drinking contaminated water, eating contaminated food, and/or transferring contamination to the mouth pose an ingestion hazard. Abrasions, lacerations, or punctures of the skin resulting from contact with contaminated surfaces pose an injection hazard. Absorption hazards exist when radioactive isotopes are chemically incorporated in a substance that is able to permeate the skin.

Exposure to radioactive contamination and the potential for internal contamination will be controlled by the proper use and removal of PPE; administrative controls in radiological controlled areas including prohibitions against smoking, eating, drinking and chewing; and proper use of respirators when airborne contamination above prescribed limits is suspected.

### 5.3 BIOLOGICAL HAZARDS

During field work at this site, personnel may encounter a wide variety of insects including bees, wasps, mosquitoes, and spiders.

Stings of bees and wasps may cause serious allergic reactions in certain individuals. Personnel with known insect allergies or sensitivities should notify the SSO before field work begins. Ticks are parasites that feed on the blood of an animal/human host and can carry several severe diseases, the least severe bringing several days of fever and pain and the worst causing brain damage. Poisonous snakes or spiders may also be encountered at the site. Personnel should visually check before reaching into a covered area and walking through grassy areas. If a person is stung/bitten by a bee, wasp, snake, or spider, call

extension 2911, notify the Site Safety Officer or Field Supervisor, and immediately transport the person to the RFETS medical center.

## 5.4 PHYSICAL HAZARDS

The following sections discuss physical hazards and the measures to be taken to control the hazards.

### 5.4.1 Heavy Equipment Hazards

The operation of heavy equipment poses a hazard to personnel, equipment, and property. Control measures for the safe operation of heavy equipment will include:

- Heavy equipment from off site vendors will be inspected by Skip Chandler, RMRS Health and Safety, or his designee prior to entering RFETS;
- Hoisting equipment from off site vendors will be inspected by Skip Chandler, RMRS Health and Safety, or his designee prior to entering RFETS;
- On site heavy equipment will be inspected by Skip Chandler, RMRS Health and Safety, or his designee prior to entering the Mound Site.
- Heavy equipment will have rollover protection systems;
- Operators will be properly trained in the use and limitations of the specific pieces of heavy equipment being operated;
- Heavy equipment will be inspected by the operator prior to the beginning of each shift and an inspection checklist will be completed;
- Seat belts will be worn by heavy equipment operators at all times;
- Establishing heavy equipment roadways and operating areas;
- Ground personnel will wear orange reflective vests and hard hats when heavy equipment is in use;
- Personnel will remain at least twenty feet from all heavy equipment while they are in operation and maintain line of site with the operator;
- When sampling or obtaining FIDLER readings at the excavator or front end loader buckets, the operator will set the bucket on the ground, disengage the hydraulic system, set the parking brake, and give a hand signal indicating that ground personnel may approach;
- At no time will any personnel position themselves under hydraulically operated equipment or loads; and
- The backing up of all heavy equipment will require a spotter to ensure that the path of travel is clear.

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#### 5.4.2 Excavation Hazards

Verticle walled excavations pose a hazard due to cave-ins, slips, trips, falls, and underground utilities. Measures used to control these hazards include:

- The preparation and approval of Soil Disturbance Permits which address overhead and underground utility hazards;
- The excavation will be inspected by a competent person prior to each shift, during each shift, and immediately after any rain or snow storms or other hazard increasing occurrences;
- Heavy equipment entry into the excavation will not be permitted;
- The excavator will be operated in accordance with the manufacturers recommendations in regards to safe operating distances from the excavation;
- At no time will the counterweight on the excavator be positioned above the open excavation;
- A spotter will be present during all excavation activities;
- Personnel entry into the excavation will not be permitted;
- Personnel will stay a minimum of six feet away from the edge of the excavation;
- Personnel closer than six feet to the excavation must wear a full body harness and lifeline attached to an approved anchorage point; and
- Equipment, except the excavator, will be kept a minimum of six feet away from the edge of the excavation.

#### 5.4.3 Noise Exposure Hazards

Work at the site will expose personnel to high noise levels from the operation of heavy equipment and hand tools. Excessive noise exposure can cause both temporary and permanent effects on hearing. The temporary effects of excessive noise include ringing in the ears, interference with communication, and hearing threshold changes. The effect of long-term excessive noise includes varying degrees of noise-induced hearing loss. Measures used to control noise exposure hazards will include:

- Noise monitoring to determine employee exposure;
- Hearing protection for exposures of greater than 85 dBA for any length of time;
- Noise monitoring to confirm the effectiveness of the hearing protection worn; and
- Noise dosimetry to determine employee exposure and whether participation in the Hearing Conservation Program is required. The Hearing Conservation Program includes both training and audiometric testing

#### 5.4.4 Heat and Cold Stress Hazards

During operations there is a potential for worker exposure to serious temperature extremes. These environmental conditions increase the risk of heat or cold stress during field activities. Measures used to control heat stress exposure will include:

- Briefing employees on the causes, prevention, signs/symptoms, and treatment of heat stress.
- Monitoring for exposure to heat stress using a Wet Bulb Globe Thermometer (WBGT);
- Proper monitoring of employee physiology including heart rate and oral temperature;
- Wearing ice vests or other RMRS approved measures;
- Instituting a work-rest regimen based on the KH Heat Stress Program (see Appendix D); and
- Providing personnel with a shaded break area and cool liquids.

Measures used to control cold stress exposure will include:

- Briefing employees on the causes, prevention, signs/symptoms, and treatment of cold stress.
- Monitoring for exposure to cold stress using a dry bulb thermometer and anemometer;
- Wearing adequate insulating dry clothing when the air speed and temperature result in an equivalent chill temperature of  $< 40^{\circ}\text{F}$ ;
- Changing wet clothing;
- Instituting a work-warming regimen based on the ACGIH guidelines (see Appendix D) when the equivalent chill temperature is  $< 19.4^{\circ}$ ;
- Providing personnel with a heated break area and warm sweet drinks; and
- Taking special precautions when handling evaporative liquids such as gasoline at equivalent chill temperatures  $< 39.2^{\circ}\text{F}$ .

#### 5.4.5 Personal Protective Equipment (PPE) Hazards

PPE will be required for most activities placing a physical and mental strain on the wearer. When PPE such as SCBAs, airline respirators, gloves, shoe covers, and protective anti-C coveralls are worn, visibility, hearing, manual dexterity, and communications are impaired. Additionally, the risk of heat stress increases. Measures used to control these hazards will include:

- PPE will be inspected prior to use;
- Keeping the work area clear of trip hazards through diligent housekeeping;
- Providing radios for communication;
- Developing hand signals for communication. Personnel will be briefed on hand signals during the Level B respirator training session; and
- Monitoring for and preventing heat stress as described above.

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#### 5.4.6 Overhead Power Line Hazards

Special precautions must be taken when working or operating heavy equipment in the vicinity of overhead electrical power lines. Contact with electrical power lines can cause shock, burns, or death. Measures used to control overhead power line hazards will include:

- Assume all overhead lines are energized;
- Heavy equipment will be operated with a 10' minimum clearance between the power lines and any part of the equipment; and
- Strictly adhering to RFETS Health and Safety Practices Manual (HSP) HSP-2.08, "Lock Out/Tag Out" when conducting lock out/tag out operations on overhead lines.

#### 5.4.7 Vehicular Traffic Hazards

Employees will exhibit special caution when working along active roadways. Measures used to control traffic hazards will include:

- Wearing orange vests;
- Positioning flagpersons along active roadways to control traffic;
- Closing roads as needed;
- Placing jersey barriers around regularly occupied work areas.

#### 5.4.8 Portable Electric Generator Hazards

Due to a lack of permanently installed electrical power, portable electric generators will be used extensively during the project. Generators will be used to power portable hand tools, pumps, and the perimeter radiological air samplers. Measures used to control the hazards associated with the use of generators will include:

- Extension cords will be intended for outdoor use, inspected by the user, and protected from unnecessary damage;
- Any extension cords which show signs of damage or deterioration will be immediately removed from service;
- Generators will be equipped with GFCI outlets which will be tested daily by the user;
- Generators will be properly grounded via a ground rod;
- A 10 lb. ABC fire extinguisher will be located next to all generators;
- Refueling will be conducted at the beginning of the shift when the generators are cool; and
- Refueling will be conducted with the generator on the ground surface or with the generator grounded to the fuel dispenser.

The RFETS Lock Out/Tag Out Program (HSP 2.08) will be strictly adhered to during the servicing and maintenance of machines or equipment in which the unexpected energization or start up of the machine or equipment, or release of stored energy could cause injury to personnel.

#### 5.4.9 Hand Tool Hazards

The improper use of hand tools can result in injury to personnel and damage to property. Measures used to protect personnel and equipment will include:

- Hand tools will be inspected by the user prior to use;
- Hand tools will be used for their intended use and operated in accordance with HSP-12.10;
- Guards will be in place and no modifications will be made;
- Portable power tools will be plugged into GFCI protected outlets; and
- Portable power tools will be UL listed and have a three wire grounded plug or be double insulated.

#### 5.4.10 Compressed Gas Hazards

Compressed gas cylinders and systems pose a hazard to personnel and property due to unknown contents, misuse, and rupture. The use of compressed gas cylinders and systems during the project will be those associated with the supplied airline respirators and SCBA systems. Measures used to control the use of compressed gas cylinders and systems will include:

- Obtaining certification papers with all breathing air or other compressed gas shipments;
- Ensuring that all cylinders and systems are properly labeled;
- The air trailer attendant will inspect cylinders and systems prior to and during each shift;
- Heavy equipment operators will inspect heavy equipment mounted airline bottles prior to and during each shift;
- Securing cylinders in the upright position; and
- Properly tightening all fittings and connections.

#### 5.4.11 Hoisting and Rigging Equipment Hazards

Hoisting and rigging equipment poses a unique hazard due to sudden failure. Measures used to control the use of hoisting and rigging equipment will include:

- Hoisting equipment from off site vendors will be inspected by Skip Chandler, RMRS Health and Safety, or his designee prior to entering RFETS;
- Operators will be properly trained in the use and limitations of the specific pieces of hoisting equipment being operated;

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- Hoisting equipment will be inspected by the operator prior to the beginning of each shift and an inspection checklist will be completed;
- Rigging equipment will be inspected by the user prior to use on a daily basis;
- Any rigging equipment which show signs of damage or deterioration will be immediately removed from service;
- Ensuring that all rigging equipment is properly positioned;
- At no time will any personnel position themselves under hoisted loads; and
- Ground personnel will wear orange vests and maintain line of site with the operator.

#### 5.4.12 Fork Truck Hazards

The operation of fork trucks pose a hazard to personnel, equipment, and property. Control measures for the safe operation of fork trucks will include:

- Fork truck operators will hold a current Fork Truck Operator Permit;
- Fork trucks will be inspected by the operator prior to the beginning of each shift and an inspection checklist will be completed;
- Ground personnel will wear orange vests and maintain line of site with the operator; and
- All loads will be secured.

#### 5.4.13 Ladder Hazards

Work on ladders poses a hazard due to falls and ladder failure. Control measures for the use of ladders will include:

- Ladder users will have current Ladder Safety Awareness training;
- Ladders will be Type I-A, Industrial Extra Heavy Duty or better;
- Aluminum ladders will not be used in areas where there is electrical power equipment;
- Three legged ladders are strictly prohibited;
- Ladders will be inspected by the user prior to use on a daily basis;
- Ladders which show signs of damage or deterioration will be immediately removed from service;
- Ladders will be used for their intended purpose; and
- Work on ladders at heights greater than six feet will require evaluation from the SSO.

#### 5.4.14 Elevated Work Hazards

Unprotected elevated work at heights greater than six feet poses a hazard due to the potential for falls. Prior to wearing fall arrest equipment, attempts will be made to eliminate the hazard. If, however, the hazard cannot be eliminated and fall arrest equipment must be worn, the following control measures will be followed:

- Personnel shall have current Fall Protection qualification;
- Fall arrest equipment will be inspected by the user prior to use on a daily basis;
- Fall arrest equipment which show signs of damage or deterioration will be immediately removed from service; and
- The fall arrest system will consist of a full body harness, shock absorbing lanyard, and an approved anchorage point.

#### **5.4.15 Flammable or Combustible Liquid Storage Hazards**

Hazards associated with improper flammable or combustible liquid storage include fires and spills. Work controls involved with flammable or combustible liquid storage include:

- Containers will be metal safety cans in good repair;
- Containers will be equipped with spring loaded closing devices and flame arresters;
- Containers will be properly labeled; and
- Container will be stored in approved flammable storage cabinets when not in use.

#### **5.4.16 ConCover® Machine Hazards**

During site preparation and at various times during the project a soil stabilizing product known as ConCover® will be applied. Hazards associated with the ConCover® machine include inhalation of silica during the mixing of the two part solution, contact with rotating internal parts, exposure to high pressure liquids, and falling from the unit while in transport. Control measures for the use of the ConCover® machine include:

- At a minimum, a full-facepiece air-purifying respirator with HEPA cartridges will be worn;
- Personnel will not reach into the machine during the mixing of the solution;
- At no time will the nozzle be pointed at any body part or other personnel; and
- Operators will ride only in the approved area while in transport and the restraint device(s) will be in place.

#### **5.4.17 High Temperature, High Pressure Decontamination System Hazards**

Should the use of a high temperature, high pressure decontamination system be required in the field, personnel will have current Pressure Safety II training and the following control measures will be implemented:

- Personnel will be briefed on the use of the system;
- The wand, trigger mechanism, hoses, and temperature/pressure generating unit will be inspected by the user prior to use;

- At no time will the wand be pointed at any body part or other personnel; and
- Polycoated Tyvek®, 16" high steel toed rubber boots, safety glasses, hard hat with face shield, and inner and outer nitrile gloves will be worn at a minimum.

### 5.5 TASK BY TASK HAZARD ANALYSIS

Table 5.5 presents a task by task hazard analysis for each location based on the hazards listed in the above sections. The hazard evaluation for each activity is based on the following criteria.

- Low - activities are likely to result in no exposure to chemical, radiological, or biological hazards. Physical hazards are minimal.
- Moderate - activities could possibly result in chemical, radiological, or biological exposures below established exposure limits. Physical hazards exist but are controlled through effective work practices.
- High - activities could possibly result in chemical, radiological, or biological exposures near or above established exposure limits. Physical hazards exist and exposure to the hazard is not controlled.

**Table 5.5**  
**Task by Task Hazard Analysis**

Tasks	Biological	Chemical	Physical	Radiological
Site Preparation	Low	Low	Moderate	Low
Stormwater Ditch and Topsoil at CSFS	Low	Low	Moderate	Moderate
Excavate Contaminated Soil	Low	High	Moderate	Moderate
Transport Contaminated Soils	Low	Moderate	Moderate	Moderate
Manage Contaminated Soil Feed Stockpile	Low	High	Moderate	Moderate
Trench Verification Sampling	Low	Moderate	Moderate	Moderate
Decontaminate Equipment	Low	Moderate	Moderate	Moderate
Transport and Backfill Treated Soil	Low	Low	Moderate	Low
Decontaminate Equipment	Low	Low	Moderate	Low

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## 6.0 GENERAL HEALTH AND SAFETY REQUIREMENTS

All on-site employees are required to obtain clearance from the RMRS Project Manager, or the RMRS Health and Safety Supervisor before beginning work at this site. Training requirements for specific individuals will depend on the tasks to be performed and associated hazards or risks, and safety requirements.

### 6.1 MEDICAL SURVEILLANCE

All personnel assigned to field activities must participate in RFETS Medical Surveillance Program, in accordance with 29 CFR 1926.65 (f) and HSP Section 4.0, with subsequent certification by an occupational physician for physical fitness, the ability to perform hazardous waste work, nuclear work, and wear both an air purifying and a supplied air respirator. Radiation dosimeters and bioassay testing will be furnished by RFETS as necessary for personnel working on this project.

The RMRS Health and Safety Supervisor will review medical documentation from the physician to ensure fitness for duty. Any restrictions will be noted and adhered to.

### 6.2 SAFETY TRAINING

Employees will not participate in field activities until they have been trained to a level required by their job function and responsibility. All training and field experience will be verified and records shall be maintained by the Site Safety Officer in the Mound Site Health and Safety office located in trailer T900D. Training requirements are summarized in Table 6.1 and must be current. An "X" means the training is required.

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Table 6.1  
 Safety Training Summary

Required Training	EZ/SCA and CRZ/RBA Personnel	Project Support Zone Personnel
General Employee Radiation Training (#019-278-01) <sup>2,3</sup>	X	X
Haz. Com. Work Area Indoctrination (#019-750-03) <sup>2,3</sup>	X	X
Lock Out/Tag Out Briefing (#019-866-02)	X	X
OSHA 40 - Hour (#018-691-03)	X	X
OSHA 8 - Hour (#018-691-05)	X	X
OSHA Supervisor (#018-691-01)	X <sup>1</sup>	X <sup>1</sup>
OSHA 3 - Day On Site Supervision (#018-691-07)	X	X
Pre-Evolution Briefing <sup>2,3</sup>	X	X
Radiation Worker II (#023-482-01)	X	
Respirator Indoctrination (#056-284-01)	X	
Respirator Fit Chamber Certification (#056-284-02)	X	
HSP-21.04 CBT (#047-115-00) or Briefing <sup>2,3</sup>	X	X
Supplied Air Respirator Indoctrination	X	

<sup>1</sup> For supervisors and foremen.

<sup>2</sup> For personnel involved in the culvert installation and site preparation.

<sup>3</sup> For personnel involved in transport and backfill of treated soil, decontamination of equipment used to handle treated soil, and site reclamation.

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### 6.3 SITE-SPECIFIC SAFETY BRIEFING

A site specific Hazard Communication briefing will be conducted for all employees, including subcontractors, prior to commencement of field activities. The following topics will be discussed at this briefing:

- Names of health and safety personnel and alternates responsible for site health and safety;
- Health and safety organization;
- Hazards at the site including chemical, radiological, physical, and biological;
- Location and review of MSDSs for all hazardous chemicals on site;
- Exposure risk;
- Personal protective equipment to be used;
- Personnel and equipment decontamination procedures;
- Air monitoring for radionuclides and chemicals of concern; and
- Emergency procedures.

If an off site vendor is used to perform parts of this project, then the following items will also be discussed:

- Employee rights and responsibilities and location of DOE form F5480.4, "Complaint Form";
- General subcontractor, lower-tier subcontractor and/or vendor responsibilities;
- Location of the approved Health and Safety Plan;
- First aid and medical facilities;
- Emergency response procedures including local warning and evacuation systems;
- Specific occupational health and safety procedures applicable to the project;
- The Hazard Communications Program;
- Employee access to exposure monitoring data and medical records;
- Construction hazard recognition and the procedures for reporting or correcting unsafe conditions;
- Procedures for reporting accidents or incidents;
- Fire prevention and control;
- Alcohol and drug abuse policy; and
- Disciplinary actions for safety infractions and violations.

It is the employees responsibility to ensure he/she is familiar with the HASP contents relating to their specific job tasks. If at anytime, an employee does not feel they understand the contents of the HASP, another briefing shall be administered. Once the briefing is completed and employees understand the contents of the HASP, they will be required to sign the Safety Compliance Agreement form acknowledging they understand and agree to comply with this HASP.

If a new employee who has not gone through the site-specific safety orientation meeting is assigned to the site, the SSO must provide a similar briefing to the new employee before he or she participates in any field activities. New employees must sign the Safety Compliance Agreement form and meet the training requirements of Section 6.2 before beginning field work for this project.

#### 6.4 DAILY/SHIFT HEALTH AND SAFETY MEETINGS

Daily/shift plan-of-the-day (POD) and safety briefings for site employees will be conducted. The briefings will address the day's planned activities, reminders of safety responsibilities, new chemicals brought on site, and any safety concerns. These meetings will be documented by the Site Safety Officer.

#### 6.5 ACCIDENT/INCIDENT REPORTING

All accidents, incidents, and near misses will be immediately reported to the Field Supervisor and the Project Manager. It is the Project Manager's responsibility to ensure that the appropriate personnel are notified of the accident/incident. In addition, RFETS requires Department of Energy (DOE) form 5484.X, "Individual Accident/Injury Report" to be completed for all first aid incidents and the following:

"Recordable" occupational injuries or illnesses as defined below.

- OCCUPATIONAL INJURY is any injury such as a cut, fracture, sprain, or amputation that results from a work accident or from an exposure involving a single incident in the work environment that requires more than standard first aid.

Note: Conditions resulting from animal or insect bites, or one-time exposure to chemicals, are considered to be injuries.

- OCCUPATIONAL ILLNESS of an employee is any abnormal condition or disorder, other than one resulting from an occupational injury, caused by exposure to environmental factors associated with employment. It includes acute and chronic illnesses or diseases that may be caused by inhalation, absorption, ingestion, or direct contact with a toxic material.
- PROPERTY DAMAGE LOSSES of \$1,000 or more are reported as follows: Accidents that cause damage to DOE property, regardless of fault, or accident wherein DOE may be liable for damage to a second party, are reportable if damage is \$1,000 or more. Include damage to facilities, inventories, equipment, and properly parked motor vehicles. Exclude damage resulting from a DOE-reportable vehicle accident.
- GOVERNMENT MOTOR VEHICLE ACCIDENTS resulting in damages of \$250 or more, or involving injury, are reported unless the government vehicle is not at fault, damage of less than

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\$250 is sustained by the government vehicle, and no injury is inflicted on the government vehicle occupants.

## 6.6 VISITOR CLEARANCES

Visitors to the work site will be given a site specific safety orientation by the Site Safety Officer or Field Supervisor as described in Section 6.3. Prior to entering the EZ/SCA or CRZ/RBA, visitors will provide the Site Safety Officer with documentation of training required by Section 6.2. All visitors who do not provide documentation will not be allowed in the EZ/SCA or CRZ/RBA. Visitors without the training required in Section 6.2 must be escorted in the project support zone by a trained individual.

## 6.7 HEALTH AND SAFETY LOGBOOK

Separate health and safety logbooks shall be maintained by the SSO, HSS, and RCT's and turned in to the Project Manager once the project is completed. The Project Manager will then turn in the project logbooks and documents to the environmental records management group. Logged information will meet the requirements of RFETS Conduct of Operations Manual, COOP-006, "Operating Area Logs and Records" and shall include: (1) summary of daily health and safety issues, (2) all measurements taken; (3) types of monitoring conducted; (4) description of unforeseen hazards and steps taken to mitigate hazards; (5) safety infractions; (6) accidents and injuries; and (7) other significant health and safety items.

## 7.0 SITE-SPECIFIC HEALTH AND SAFETY REQUIREMENTS

### 7.1 SITE CONTROL

Site control is necessary to prevent unauthorized, untrained, or unprotected personnel or visitors from being exposed to the hazards associated with the site. During activities at the Mound Site, site control measures will include the following:

- All personnel and visitors are required to enter their name, time in, and time out on the sign in sheet located at the access control point in the Project Support Zone;
- Adhering to the personnel roster requirements on the Radiological Work Permit;
- Posting signage communicating information such as required personal protective equipment, work zone boundaries, and radiological hazards;
- Securing all work areas at the end of each shift;
- Cones will be placed six feet back from the edge of the excavation to warn personnel of the edge of the excavation; and
- Erecting a fence around the excavation during the treatment phase of the project.

### 7.2 WORK ZONES

The excavation and the CSFS will be divided into three basic zones:

1. Exclusion Zone (EZ) - For radiological purposes, the exclusion zone boundary will also be the Soil Contamination Area boundary (SCA).;
2. Contamination Reduction Zone (CRZ) - For radiological purposes the CRZ will contain the Radiological Buffer Area (RBA) which will include the stepoff pad; and
3. the Project Support Zone.

The EZ/SCA includes areas of physical, chemical, or radiological hazards. The EZ/SCA will be clearly marked with banner tape, fencing or other high visibility markings, and signs. Only authorized personnel are permitted within the EZ/SCA. The EZ/SCA will be the areas around the excavation and the CSFS where all soil will be handled. Mandatory training and the use of personal protective equipment will be required for entry into the EZ/SCA. NOTE: The boundaries and locations of the EZ/SCA are subject to change should the health of safety of collocated workers, the public, or the environment be in question.

The Contamination Reduction Zone CRZ/RBA is the corridor through which all personnel and equipment will enter and exit from the EZ/SCA. Entrances and exits shall be clearly marked with high visibility items such as traffic cones, banner tape or other high visibility markings, and signs. The CRZ/RBA contains decontamination equipment and containers for disposable personal protective equipment, etc. All personnel radiological frisking will occur in the CRZ/RBA at the stepoff pad. NOTE: To ensure that the health and safety of collocated workers and the public is not in question, the boundaries and locations of the EZ/SCA and CRZ/RBA are subject to change based on air monitoring results and potential

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exposure to chemical, radiological or safety hazards.

The Project Support Zone contains personnel who perform support functions and a provides break area. Managers, support equipment, etc. are generally located in the project support zone. Personnel and equipment exiting the EZ/SCA must be decontaminated within the CRZ/RBA prior the entering the project support zone.

On July 7, 1997, the SCA radiological posting of Mound Site soils was removed based on gamma spectroscopy analysis which indicated that no Tier 2 radiological levels were exceeded. Therefore, once the soil has been treated to remove the volatile organic compounds, the soil will not require site controls as stipulated in either 10CFR835 or 29CFR1926.65 during the following tasks; transport and backfill of treated soil, decontamination of equipment used to transport and backfill treated soil, and site reclamation. Site controls during these tasks will be limited to fences, barricades, and signs used to protect personnel from physical hazards.

### 7.3 PERSONAL PROTECTIVE EQUIPMENT (PPE)

The purpose of personal protective equipment (PPE), including clothing, is to shield or isolate individuals from the chemical, radiological, physical and biological hazards that they may encounter at sites containing hazardous or toxic materials. The careful selection and use of PPE will protect the respiratory system, skin, eyes, face, hands, feet, head, body, and hearing.

No single combination of protective equipment and clothing is capable of protecting against all hazards, and PPE must be used in conjunction with other protective methods. The use of PPE can in itself create significant worker hazards, such as heat stress, physical and psychological stress, and impaired vision, mobility, and communication.

Specific protective garments are selected on the basis of a variety of criteria. In general, the greater the hazard, the greater the level of PPE. For any given situation, equipment and clothing must be selected to provide an adequate level of protection. Over-protection as well as under-protection can be hazardous and should be avoided.

Table 7.1 summarizes PPE requirements for specific tasks associated with operations at the Mound Site. Non-routine, miscellaneous subtask PPE requirements are addressed in Table 7.2. The following sections detail the criteria for selecting specific PPE which will apply to this project. NOTE: The PPE shown in Tables 7.1 and 7.2 are subject to change at the discretion of the Site Safety Officer and the Radiological Engineer. PPE worn will be that which is more restrictive for chemical or radiological hazards.

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**Table 7.1**  
**Task Specific**  
**Personal Protective Equipment Summary**

Task	Level	Body <sup>1</sup>	Foot	Head	Eye <sup>2</sup>	Hand	Respirator
Site Preparation	D	Work clothes	Steel toed safety shoes	Hard hat	Safety glasses with side shields	Heavy duty leather gloves	None required. FF, APR when mixing ConCover®
Installing Stormwater Ditch and Grading Topsoil at the CSFS	Modified D	Anti-C Tyvek®	Steel toe safety shoes and shoe covers	Hard hat	Safety glasses with side shields	Inner surgeon and outer nitrile gloves or inner gloves and heavy duty leather work gloves (cotton liners optional)	None required
Excavation of Contaminated Soil and CSFS Hot Spot	B	Anti-C Tyvek®	Steel toe safety shoes and shoe covers	Hard hat	None	Inner surgeon and outer nitrile gloves (cotton liners optional)	Supplied air or SCBA
Transport of Contaminated Soil	B	Anti-C Tyvek®	Steel toe safety shoes and shoe covers	Hard hat	None	Inner surgeon and outer nitrile gloves (cotton liners optional)	Supplied air or SCBA
Management of CSFS	B <sup>3</sup>	Anti-C Tyvek®	Steel toe safety shoes and shoe covers	Hard hat	None	Inner surgeon and outer nitrile gloves (cotton liners optional)	Supplied air or SCBA
Excavation/CSFS Verification Sampling	B	Anti-C Tyvek®	Steel toe safety shoes and shoe covers	Hard hat	None	Inner surgeon and outer nitrile gloves (cotton liners optional)	Supplied air or SCBA
Decontamination of Equipment <sup>5</sup>	B <sup>3</sup>	Anti-C Tyvek®	Steel toe safety shoes and shoe covers	Hard hat	None <sup>4</sup>	Inner surgeon and outer nitrile gloves (cotton liners optional)	Supplied air or SCBA
Transport and Backfill of Treated Soil	D	Work Clothes	Steel toe safety shoes	Hard hat	Safety glasses with side shields	Heavy duty leather work gloves as necessary	None required
Decontamination of Equipment <sup>5</sup> (post transport and backfill of treated soil)	D	Work Clothes	Steel toe safety shoes	Hard hat	Safety glasses with side shields	Heavy duty leather work gloves as necessary	None required

<sup>1</sup> If splash hazards exists and cannot be mitigated, polycoated Tyvek® will be worn. Anti-C Tyvek® required in radiological control areas only.  
<sup>2</sup> No eye protection will be required when a full facepiece respirator is worn.  
<sup>3</sup> Work may be conducted without respiratory protection if continuous real time air monitoring indicates no volatile organic compounds at levels above background and the RWP does not require respirators for radiological purposes.  
<sup>4</sup> If no respiratory protection is required, safety glasses with side shields will be worn.  
<sup>5</sup> If high pressure water is used, 16" high, steel toed rubber boots will be worn. If no respiratory protection is required and high pressure water is used, a hard hat mounted face shield will be worn in addition to the safety glasses.

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**Table 7.2**  
**Miscellaneous Subtasks**  
**Personal Protective Equipment Summary**

Task	Level	Body	Foot	Head	Eye <sup>1</sup>	Hand	Respirator
Mixing ConCover®	C	Tyvek®	Steel toed safety shoes	Hard hat	None required	Inner surgeon gloves and heavy duty leather work gloves	Full-facepiece air-purifying with HEPA cartridge
Pumping incidental waters or decontamination liquids into holding tanks or tanker trucks. PPE is for personnel in the support zone. PPE in the EZ/SCA will be that required for the task being performed.	Modified D	Long sleeve cotton coveralls with neoprene apron	Steel toed safety shoes	Hard hat with face shield	Safety glasses with side shields	Outer nitrile gloves or inner surgeon gloves with heavy duty leather gloves.	Based on breathing zone air monitoring
Frisking personnel or equipment at the stepoff pad located in the CRZ/RBA	Modified D	Long sleeve cotton coveralls	Steel toed safety shoes	Hard hat	Safety glasses with side shields	Inner surgeon gloves	None required
Conducting radiological or industrial hygiene air monitoring in the CRZ/RBA	Modified D	Long sleeve cotton coveralls	Steel toed safety shoes	Hard hat	Safety glasses with side shields	None required	None required
Refueling Heavy Equipment at the EZ/SCA Boundary	Modified D <sup>2</sup>	Anti-C Tyvek®	Steel toed safety shoes and shoe covers	Hard hat	Safety glasses with side shields	Outer nitrile gloves or inner surgeon gloves with heavy duty leather gloves	None required
Refilling Heavy Equipment Airline Bottles at the EZ/SCA Boundary	Modified D <sup>2</sup>	Anti-C Tyvek®	Steel toe safety shoes and shoe covers	Hard hat	Safety glasses with side shields	Outer nitrile gloves or inner surgeon gloves with heavy duty leather gloves	None required
General Heavy Equipment Maintenance at the EZ/SCA Boundary	Modified D <sup>2</sup>	Anti-C Tyvek®	Steel toe safety shoes and shoe covers	Hard hat	Safety glasses with side shields	Outer nitrile gloves or inner surgeon gloves with heavy duty leather gloves	None required
Repair Waterline/Culvert, and Erect Fence in the EZ/SCA	Modified D <sup>3</sup>	Anti-C Tyvek®	Steel toe safety shoes and shoe covers	Hard hat	Safety glasses with side shields	Outer nitrile gloves or inner surgeon gloves with heavy duty leather gloves	None required

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<sup>1</sup> No eye protection will be required when a full facepiece respirator is worn.  
<sup>2</sup> Modified level D PPE will be allowed if all of the following conditions are met:  
 1. Continuous real time air monitoring indicates no volatile organic compounds at levels above background.  
 2. No excavating is taking place.  
 3. Personnel stay as close to the equipment as possible - No wandering.  
 4. Radiological control technicians are present.  
<sup>3</sup> Modified level D PPE will be allowed if all of the following conditions are met:  
 1. Real time air monitoring indicates no volatile organic compounds at levels above background.  
 2. Radiological control technicians are present as required on the RWP.

### 7.3.1 Level D Personal Protective Equipment

The use of Level D personal protective equipment is defined by the following criteria:

- No contaminants are present, or contaminants are present below the action levels established in the HASP for respirator use; and
- Work functions preclude splashes, immersion, or potential for unexpected inhalation of any chemicals or radionuclides.

Level D is a field work uniform affording minimal skin protection and no respiratory protection. It consists of the following PPE:

- Steel toe safety shoes (ANSI Z41.1 approved);
- Heavy duty leather work gloves;
- Safety glasses (ANSI Z87.1 approved) with side shields; and
- Hard hat (ANSI Z89.1 approved).

Modified Level D personal protective equipment provides an increased level of skin protection and no respiratory protection. It consists of the following PPE:

- Steel toe safety shoes;
- leather work gloves;
- Safety glasses with side shields;
- Hard hat;
- Anti-C Tyvek® coveralls or long sleeved cotton coveralls;
- Outer nitrile gloves or inner surgeon gloves and heavy duty leather work gloves; and
- Disposable shoe covers.

### 7.3.2 Level C Personal Protective Equipment

The main selection criterion for Level C, as opposed to the less restrictive Level D, is that conditions require and permit wearing air-purifying respirators. A full-face, air-purifying respirator can be used only if all of the following conditions are met:

- Oxygen concentrations are greater than 19.5 percent and less than 23.5 percent by volume;
- Measured air concentrations of identified substances will be reduced by the respirator below the PEL or TLV;
- Atmospheric contaminant concentrations do not exceed IDLH levels;
- Continuous direct readings on monitoring instruments, such as FIDs or PIDs, are within

the action levels prescribed in the HASP for air-purifying respirator use;

- The substance in question has adequate warning properties;
- The individual has taken the Respirator Indoctrination CBT class;
- The individual has passed a mask specific quantitative fit-test;
- The individual has medical clearance for the use of air-purifying respirators; and
- The appropriate cartridge is used and its service limit concentration is not exceeded.

Level C personal protective equipment provides moderate skin and respiratory protection. It consists of the following PPE:

- Full-facepiece, air-purifying respirator with correct cartridges;
- Steel toe safety shoes;
- Hard hat;
- Anti-C Tyvek® coveralls;
- Inner surgeon and outer nitrile gloves; and
- Disposable shoe covers.

### 7.3.3 Level B Personal Protective Equipment

In cases where air-purifying respirators do not provide adequate respiratory protection, Level B PPE will be worn. Criterion for selection of Level B PPE are as follows:

- Measured air concentrations of identified substances will be reduced by the supplied air respirator or self contained breathing apparatus (SCBA) below the PEL or TLV;
- Continuous direct readings on monitoring instruments, such as FIDs or PIDs, are within the action levels prescribed in the HASP for supplied air respirator use;
- The individual has taken the Level B Respirator Indoctrination class;
- The individual has passed a mask specific quantitative fit-test; and
- The individual has medical clearance for the use of supplied air respirators.

Level B PPE provides moderate skin protection and the maximum respiratory protection. It consists of the following PPE:

- Full-facepiece, supplied air respirator or SCBA;
- Steel toe safety shoes;
- Hard hat;
- Anti-C Tyvek® coveralls;
- Inner surgeon and outer nitrile gloves; and
- Disposable shoe covers.

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### 7.3.4 Storage, Inspection, and Maintenance of PPE

Clothing and respirators must be properly stored to prevent damage and/or malfunction due to exposure to dust, sunlight, damaging chemicals, and impact. Proper storage of PPE and respirators will include the following:

- Clothing and respirators will be stored in a dry, clean, uncontaminated area out of direct sunlight;
- Clothing and respirators will not be stored in proximity to any chemicals such as gasoline;
- Clothing will be stacked in orderly fashion so that no other objects or equipment are on top of them leading to tears, punctures, rips, or deformations;
- All SCBAs and airline respirators will be properly placed in their cases;
- All full-facepiece air-purifying respirators will be stored in a single layer with no other objects or equipment placed on top of them which could lead to deformation of the facepiece; and
- Different types and materials of clothing should be clearly marked or stored separately to prevent issuing the wrong clothing by mistake.

Inspection of clothing and respirators (SCBAs, airline, and full-facepiece air-purifying) is imperative to ensure proper protection. It is the responsibility of each individual to thoroughly inspect all clothing and respirators prior to and during field activities. Inspection of clothing will include the following:

- Visually inspecting for imperfect seams, non-uniform coatings, tears, and malfunctioning closures;
- Holding clothing up to light and inspecting for pinholes;
- Flexing the products to inspect for cracks and other signs of shelf deterioration;
- Inspect gloves for pinholes by blowing into the them, sealing the gauntlet, and observing for air leakage;
- While in the field, periodically inspect for tears, punctures, and closure failures; and
- After use, inspect for signs of degradation, permeation, or other signs of deterioration.

Inspection of SCBAs and airline respirators will be performed prior to each use and will include:

- Visually inspect the air cylinder, backpack, harnesses, high and low pressure hoses, and regulators;
- Visually inspect the facepiece assembly;
- Inspect all connections for proper tightness;
- Conduct a leak test;
- Conduct the audio alarm test; and
- Conduct a unit function test in both normal operating mode and in the emergency bypass mode.

Inspection of full-facepiece air-purifying respirators will be performed prior to each use and will include:

- Visually inspect the facepiece seal, lens, and harness;
- Inspect the inhalation and exhalation valves;
- Inspect cartridges for proper type and expiration date; and
- Conduct both positive and negative pressure tests.

Maintenance of all PPE and SCBAs or airline respirators will be performed only by individuals having specialized training and equipment.

### 7.3.5 PPE Donning and Doffing Guidelines

The following guidelines are required when Level C PPE or higher is required for a task. No person shall be allowed to enter the EZ/SCA or CRZ/RBA if they are not wearing the appropriate PPE. Donning and doffing guidelines will be posted at the appropriate location at both the excavation and the CSFS.

#### Donning Guidelines

After inspecting supplied air respirators and SCBA systems, PPE will be donned in the following order:

1. Cotton glove liners
2. Shoe covers
3. Anti-C Tyvek® coveralls
4. Rubber overshoes
5. Skull cap
6. Respiratory protection, as required
7. Hood, as required
8. Gloves
9. Tape up wrists and ankle seams, tab tape for easy removal
10. Thermoluminescent dosimeters (TLDs) should be worn outside the Anti-C Tyvek® coveralls.
11. Attach facepiece to air line or self-contained breathing apparatus (level B).

## Doffing Guidelines

After completion of gross decontamination and washing and rinsing shoe covers and gloves, it is recommended that PPE be removed in the following order:

1. Remove exposed tape
2. Remove rubber overshoes
3. Remove outer gloves
4. Remove hood from front to rear
5. Remove respirator protection, as applicable
6. Remove Anti-C Tyvek® coveralls, inside out, touching inside only
7. Remove each shoe cover, placing shoe onto clean stepoff pad
8. Remove inner gloves and cloth liners as applicable
9. Commence whole body frisking per RFETS Radiological Operating Instructions Manual (ROI), ROI-2.01, "Personal Contamination Monitoring."
10. Monitor dosimeter, and equipment
11. Wash hands and face.
12. Clean and sanitize respirator after receiving radiological clearance from RCTs

Disposable PPE will be discarded in the properly labeled container and handled in accordance with RFETS Field Operations Manual (FO), FO.06, "Handling of Personal Protective Equipment." Decontamination for Modified Level D, Level C and Level B will be per Section 7.5.

### 7.4 MONITORING REQUIREMENTS

Monitoring of the environmental conditions in and around the excavation and the CSFS must occur because of the potential for contaminants to be present. The following sections describe the monitoring program to be implemented and appropriate exposure limits and actions levels. Where feasible, personnel exposures to hazardous materials (other than radioactive substances) shall be maintained within the TLVs adopted by the ACGIH or the PELs adopted by OSHA, whichever is more stringent. Exposure to radioactive material will be maintained as low as reasonably achievable (ALARA) and below the RFETS administrative control limit of 750 mrem. Table 7.3 presents a summary of the monitoring program.

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Table 7.3  
 Monitoring Program Summary

RADIATION			
Hazard	Action Level	Action(s) to be Taken	Monitoring Frequency
Equipment and material contamination	Alpha contamination: > 20 dpm/100cm <sup>2</sup> removable > 100 dpm/100cm <sup>2</sup> total. Not to exceed > 300 dpm/100cm <sup>2</sup> total, 100 dpm/100cm <sup>2</sup> averaged over 1m <sup>2</sup>  Beta/gamma contamination: > 1000 dpm/100cm <sup>2</sup> removable > 5000 dpm/100cm <sup>2</sup> total.	Suspend operations, secure area and notify the Field Supervisor and Radiological Safety.	Prior to removal from radiological control area. As a Best Management Practice (BMP) prior to decontamination of equipment which comes in contact with treated soil during loading, transport, and backfilling and is destined for off site unrestricted release.
Personnel contamination.	> MDC of instrument	Suspend operations, secure area and notify the Field Supervisor and Radiological Safety.	Prior to exiting radiological control areas.
Long-lived radioactive airborne particulates.	10% of the DAC <sup>1</sup> (if full-facepiece air-purifying respirators are not worn) 50 DAC (if full-facepiece, air-purifying respirators are worn)	Remove personnel from effected area, suspend operations, secure area and notify the Field Supervisor and Radiological Safety.	Per the Radiological Work Permit. As a Best Management Practice (BMP) during loading and backfilling of treated soil.
Low Energy X-Ray and Gamma radiation (FIDLER)	> 5000 cpm	Suspend Operations. Notify the Field Supervisor and Radiological Safety.  Segregate soil.	Each bucket or at the discretion of the Radiological Engineer per the Sampling and Analysis Plan. None during the loading, transport, and backfilling of treated soil.

<sup>1</sup> DAC - Derived Air Concentration.

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**Table 7.3  
 Monitoring Program Summary (cont.)**

<b>CHEMICAL</b>			
Hazard	Action Level	Action(s) to be Taken	Monitoring Frequency
Volatile organic compounds	> Background (if supplied air respirators are not worn)	Remove personnel from effected area or don Level B respiratory protection	Continuous in the CRZ/RBA and Project Support Zone during excavation and dumping

<b>NOISE</b>			
Hazard	Action Level	Action(s) to be Taken	Monitoring Frequency
Short term high noise levels	> 85 dBA	Don suitable hearing protection. Initiate noise dosimetry	As needed to characterize new equipment and/or operations
Continuous high noise levels	> 85dBA average over 8-hour shift	Don suitable hearing protection. Participation in a Hearing Conservation Program.	As needed to characterize new equipment and/or operations

<b>RESPIRABLE DUST</b>			
Hazard	Action Level	Action(s) to be Taken	Monitoring Frequency
Inhalation of dust	1.5mg/m <sup>3</sup>	Remove personnel from effected area or don full face-piece air purifying respirators (APRs) with HEPA cartridges (in the absence of chemical contamination).	Continuous during dust generating activities

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**Table 7.3  
 Monitoring Program Summary (cont.)**

<b>HEAT STRESS</b>			
<b>Hazard</b>	<b>Action Level</b>	<b>Action(s) to be Taken</b>	<b>Monitoring Frequency</b>
Heat stress	Varies depending on work load and if PPE is worn. <sup>1</sup>	Work-rest regimen, ice vests, or other RMRS approved measures.	Varies depending on work load and if PPE is worn. <sup>1</sup>
<sup>1</sup> Monitoring will be performed when work area temperature exceeds 77°F. See Appendix D for guidance and action levels for work involving the use of personal protective equipment.			

<b>COLD STRESS</b>			
<b>Hazard</b>	<b>Action Level</b>	<b>Action(s) to be Taken</b>	<b>Monitoring Frequency</b>
Cold stress	40°F Equivalent chill temperature <sup>1</sup>	Wear adequate insulated dry clothing	Continuous when the equivalent chill temperature is < 40°F
Cold stress aggravated by the use of evaporative liquids such as gasoline	39.2°F Equivalent chill temperature	Avoid soaking clothing or gloves with evaporative liquids	Continuous when the equivalent chill temperature is < 40°F
Cold stress	19.4°F Equivalent chill temperature	Work-warm regimen will be instituted <sup>2</sup>	Continuous when the equivalent chill temperature is < 40°F
<sup>1</sup> Equivalent chill temperature is the combined effect of the air temperature and wind speed. See Appendix D for ACGIH table used to calculate equivalent chill temperature. <sup>2</sup> See Appendix D for ACGIH work-warm regimen schedule			

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**Table 7.3**  
**Monitoring Program Summary (cont.)**

<b>EXPLOSIVE ATMOSPHERES</b>			
<b>Hazard</b>	<b>Action Level</b>	<b>Action(s) to be Taken</b>	<b>Monitoring Frequency</b>
Explosion	> 10% of lower explosive limit	Suspend operations and notify the Field Supervisor	At the discretion of the SSO and HSS

<b>WIND SPEED</b>			
<b>Hazard</b>	<b>Action Level</b>	<b>Action(s) to be Taken</b>	<b>Monitoring Frequency</b>
Contamination dispersion	> 15 mph average for two consecutive 15 minute periods.	At the discretion of the Project Manager and the Site Safety Officer.	Continuous during all field activities.
Contamination dispersion	> 30 mph average for two consecutive 15 minute periods.	Terminate dust generating activities.	Continuous during all field activities.
Personnel injury	> 45 mph average for two consecutive 15 minute periods.	Secure area and terminate field operations.	Continuous during all field activities

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#### 7.4.1 Chemical Monitoring

Air monitoring for VOCs will be conducted using a Foxboro, Inc., Model TVA-1000, which uses both a photoionization detector (PID) and a flame ionization detector (FID) to measure airborne concentrations of VOCs and SVOCs. The PID is equipped with a 10.6eV lamp and has a range of 0-2,000 ppm and the FID has a range of 0-50,000 ppm. Both the PID and FID will be calibrated daily prior to use and a yearly factory calibration and service is recommended. Daily calibrations will be per the manufacturers specifications and results will be entered in the Industrial Hygiene Instrumentation Calibration Logbook. The lamp, probe, and filters will be cleaned and/or replaced periodically. When measuring mixtures of volatile organic compounds, PID/FID devices are used as a screening instrument and cannot identify and quantify specific volatile organic compounds within the mixture. Due to the variable response of the PID/FID to different compounds, and the inability to identify the specific compound within the mixture, any reading above background will be the action level unless the compound of concern and the PID/FID response factors are known.

Air monitoring for VOCs will also be conducted using a HNU Systems, Inc., Model DL-101-2, Photoionization Detector (PID) equipped with a 11.7eV lamp. The PID measures the concentration of airborne concentration of VOCs in parts per million (ppm) using the principle of photoionization. The PID has a range of 0 - 2000 ppm. The PID will be calibrated daily with a 100 ppm standard of isobutylene prior to use and a yearly factory calibration is recommended. Daily calibration will be per the manufacturers specifications and results will be entered in the Industrial Hygiene Instrumentation Calibration Logbook. The lamp, probe, and filters will be cleaned and/or replaced periodically.

#### 7.4.2 Radiological Monitoring

The radiation exposure of an occupational worker will be maintained as far below the U.S. Department of Energy (DOE) limits as is reasonably achievable (ALARA). A local annual administrative dose equivalent level of 750 mrem committed effective dose equivalent is in effect. Based on process history knowledge of the Mound Site soils, the total expected exposure to workers is less than 5 mrem. To ensure that radiological exposures are maintained as low as reasonably achievable (ALARA), personnel and equipment will be monitored using a variety of techniques which are discussed in the following sections.

##### 7.4.2.1 Personnel and Equipment Monitoring

Personnel leaving the EZ/SCA will enter the CRZ/RBA where they will be monitored by RCTs for radioactive contamination in accordance with ROI-2.01. If personnel contamination is detected, operations will be terminated, the area will be secured, and the Project Manager, Field Supervisor, and Radiological Engineering will be notified. Depending on the location and level of the contamination further actions will be taken.

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After any necessary decontamination, all equipment and materials leaving the EZ/SCA will be surveyed, and released by RCTs in accordance with ROI-3.01, "Performance of Surface Contamination Surveys" and ROI-3.02, "Radiological Requirements for Uncontrolled Release".

Instrumentation to be used for personnel and equipment contamination monitoring are those recommended by RFETS Radiological Safety and consist of the following:

- NE Technology, Model Electra, with dual alpha/beta probe;
- Eberline, Model SAC-4, alpha smear counter;
- Eberline, Model BC-4, beta/gamma smear counter; and
- Science Applications International Corp., Model AP-2, portable alpha analyzer.

Any alternate instruments will be approved by RFETS Radiological Engineering. All instruments will be maintained, calibrated, performance tested, and used in accordance with the RFETS Radiological Operating Instructions Manual.

#### 7.4.2.2 Soil Monitoring

During site preparation and excavation, monitoring of the soil will be required. Monitoring of the soil will be conducted using a Bicon, Corp., Model Analyst equipped with a G5 probe which is a field instrument for detecting low energy radiation (FIDLER) The FIDLER will be maintained, calibrated, and used in accordance with the ROI-6.6, "Use of the Bicon FIDLER".

#### 7.4.2.3 Radioactive Air Particulate Monitoring

Radiological air monitoring will be performed in accordance with the RWP and will consist of high volume and low volume air sampling.

High volume air monitoring will be conducted at the EZ/SCZ boundary at both the excavation and the CSFS to ensure that levels of airborne radioactive particulates are <10% of the DAC. Monitoring will be accomplished using Staplex Company, Inc., Model TFIA, high volume air samplers which will be maintained, calibrated, and used in accordance with ROI-4.02, "Air Sampling".

Low volume air monitoring will be conducted in the support zone perimeter at both the excavation and the CSFS to ensure that levels of airborne radioactive particulates are <10% of the DAC. Monitoring will be accomplished using Radeco, Model HD-66A, or Gast, Model RV23-14CV low volume air samplers which will be maintained, calibrated, and used in accordance with ROI-4.03, "Portable Low Volume Air Sampling".

#### **7.4.2.4 External Radiation Monitoring**

After successful completion of the medical and training requirements specified in Section 6.0 of this plan, employees who will work within the SCA and RBA will be issued thermoluminescent dosimeters. Dosimeters will be issued, worn, stored and processed in accordance with HSP-18.07, "External Radiation Dosimetry."

#### **7.4.2.5 Internal Radiation Monitoring**

Employees who are issued dosimeter badges are subject to periodic urine and/or fecal samples which are collected and analyzed in accordance with HSP-18.20, "Routine Bioassay Monitoring Program." Additional urine and/or fecal bioassay samples may be required as determined by RFETS Radiological Safety.

#### **7.4.3 Miscellaneous Monitoring**

In addition to chemical and radiological monitoring, numerous other potential hazards exist which require the use of real time monitoring instruments. These hazards include noise, respirable dust, wind speed, heat stress, and explosive atmospheres.

##### **7.4.3.1 Noise Monitoring**

Noise levels will be monitored to delineate areas or activities where hearing protection is required, the effectiveness of hearing protection required, and whether or not personnel need to participate in a Hearing Conservation Program. The instrument used will be an Ametek, Model MK-3, audio dosimeter. The MK-3 is a microprocessor controlled personal monitor that measures noise exposure in the dBA range and displays a variety of results including real time dBA level, exposure time, exposure dose, average dBA level, maximum dBA level, and the 8-hour time weighted exposure dose. The MK-3 is calibrated on a daily bases before and after use. Daily calibrations will be per the manufacturers specifications and results will be entered in the Industrial Hygiene Instrumentation Calibration Logbook. Annual calibration and service of the instrument and the calibrator is required.

##### **7.4.3.2 Respirable Dust Monitoring**

Respirable dust monitoring will be accomplished using a Monitoring Instruments for the Environment, Inc., Model PDM-3, Miniature Real-time Aerosol Monitor (Miniram). The miniram is an airborne particulate monitor whose operating principle is based on the scattered electromagnetic radiation in the near infrared. The miniram continuously senses the particles in the sensing chamber and displays the dust levels in mg/m<sup>3</sup>. Because the miniram is preferential to particles 0.1 to 10 micrometers in size, it is useful in determining the levels of not only respirable dust but fumes, smokes, and fogs. The instrument

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will be calibrated using a dust free Z-Bag prior to each use and periodic cleaning of the sensing chamber is required. Daily calibration will be per the manufacturers specifications and results will be entered in the Industrial Hygiene Instrumentation Calibration Logbook. A yearly factory calibration and servicing is recommended. Monitoring will be conducted during all dust generating activities.

#### **7.4.3.3 Wind Speed Monitoring**

Wind speed will be monitored throughout all phases of the project to ensure compliance with FO.01, "Air Monitoring and Dust Control." This will be done by the use of a weather station which will also be capable of monitoring wind direction and temperature. A Davis Instruments, Corp., Model Turbo Meter, electronic wind speed monitor will also be used. The Turbo Meter uses a turbine which is suspended on sapphire jewel bearings. The turbine rotation is sensed by an infrared light beam whose signal is processed by a large scale integrated circuit. The Turbo Meter is factory calibrated and requires no maintenance except minor cleaning.

#### **7.4.3.4 Heat Stress Monitoring**

Heat stress monitoring will be completed using a Imaging and Sensing Technology, Model RSS 214, Heat Stress Monitor. The instrument is a micro-processor based Wet Bulb Globe Thermometer (WBGT) which accurately measures environmental factors which contribute to heat stress. The WBGT reading displayed by the instrument, in either fahrenheit or celsius, is a weighted sum of the dry bulb, wet bulb, and vernon globe temperatures. The WBGT is calibrated prior to use on a daily basis and a yearly factory calibration and servicing is recommended. Daily calibration will be per the manufacturers specifications and results will be entered in the Industrial Hygiene Instrumentation Calibration Logbook. Maintenance is minimal with only the wet bulb wick requiring periodic replacement. Monitoring frequency will depend on the work area temperature, the type of work being performed, and the type of PPE worn. See Appendix D for guidance and action levels for work involving the use of personal protective equipment. Readings in the field will be logged on the Daily WBGT Log.

#### **7.4.3.5 Cold Stress Monitoring**

Cold stress monitoring will be accomplished by obtaining the air temperature and the wind speed and calculating the equivalent chill temperature using the ACGIH table found in Appendix D. Once in the field, wind speed, temperature, and equivalent chill temperature will be logged on the Daily Wind Speed/Cold Stress Log.

#### **7.4.3.6 Explosive Atmosphere Monitoring**

Air monitoring for explosive atmospheres, if necessary, will be conducted using a Mine Safety Appliances, Co., Model Passport, confined space monitor which also has the capability a measuring

airborne concentrations of carbon monoxide and oxygen. The Passport detects the concentration of explosive gases utilizing a catalyzed detector element and displays the results in percent (0-100) of the lower explosive limit. The Passport is calibrated daily prior to use and requires factory calibration and service on a yearly basis. Daily calibration will be per the manufacturers specifications and results will be entered in the Industrial Hygiene Instrumentation Calibration Logbook.

#### 7.4.4 Personal Integrated Air Sampling

In addition to real-time monitoring, personal integrated air sampling will be conducted on a daily basis at both the excavation and the CSFS for Carbon Tetrachloride, Methylene Chloride, Tetrachloroethylene (PCE), and Trichloroethylene (TCE). Job functions in the EZ/SCA will be observed in order to sample the highest risk employees. Samples will be obtained using Mine Safety Appliances, Co., Model Escort Elf, personal sampling pump. The Escort Elf will be calibrated before and after sampling using an A.P. Buck, Inc., Model M-5 (mini-Buck), primary gas flow calibrator. Daily calibration will be per the manufacturers specifications and results will be entered in the Industrial Hygiene Instrumentation Calibration Logbook. The mini-Buck is a National Institute of Science and Technology (NIST) traceable calibrator which is certified on a yearly basis by the manufacturer. All samples will be obtained in accordance with the procedures contained in the NIOSH Manual of Analytical Methods (see Appendix E). Samples will be analyzed by an American Industrial Hygiene Association (AIHA) accredited laboratory.

### 7.5 DECONTAMINATION

Personnel and equipment contamination prevention techniques will be used wherever feasible. Personnel will avoid unnecessary contact with soil and will adhere to the work practices outlined in Section 7.6. Heavy equipment will be operated in a manner which limits tire or track contact with contaminated soil and the forty ton dump truck will be carefully loaded to prevent spillage.

#### 7.5.1 Personnel Decontamination

All personnel exiting the EZ/SCA will enter the CRZ/RBA and must go through a thorough decontamination procedure which will be monitored by the Site Safety Officer. Decontamination of personnel will be done at the boundary of the EZ/SCA in the CRZ/RBA at the stepoff pad and will consist of the following:

- Brushing or scrapping to remove gross decontamination. This will be done carefully so that the integrity of the PPE is not compromised;
- Washing outer shoe covers and gloves in a mild solution of Liquinox® and water using a long handled brush;
- Rinsing outer shoe covers and gloves;

- Removing PPE as outlined in Section 7.3.5;
- A whole body frisk will be conducted; and
- Wash hands and face prior to eating, smoking, or chewing.

### 7.5.2 Equipment Decontamination

All materials and equipment in contact with soils will require decontamination prior to release from the EZ/SCA and prior to free release from RFETS to off site locations.. At the discretion of the Project Manager, equipment may be decontaminated in the field or transferred to the Main Decontamination Facility. Field decontamination will be conducted in accordance with FO.03, "Field Decontamination Operations." Main Decontamination Facility operations will be conducted in accordance with FO.04, "Decontamination of Equipment at Decontamination Facilities," and FO.12, "Decontamination Facility Operations." Depending on the location and extent of contamination, and the purpose of the decontamination, one or more of the following methods may be used:

- Spraying potable water at low pressures;
- Spraying potable water at high pressures and high temperatures;
- Scrapping and brushing;
- Scrubbing with solutions of Liquinox®, or Pipex®;
- Wiping with premoistened, non-alcohol based wipes; and
- Rinsing with deionized water.

Decontamination effectiveness will be determined using radiological and volatile organic vapor monitoring instruments.

### 7.5.3 Management of Decontamination Liquids and Incidental Waters

Liquids generated during decontaminations will be sprayed on the CSFS or placed in holding tanks which will also hold incidental waters pumped from either the excavation or the CSFS stormwater collection system. Incidental water and decontamination liquids will be handled in accordance with SW.01, "Control and Disposition of Incidental Waters," and FO.07, "Handling of Decontamination Water and Wash Water." When needed, the liquids will be pumped from the holding tanks into tanker trucks for transport to Building 891 and subsequent treatment.

Field Change No.1

## 7.6 WORK PRACTICES

### 7.6.1 Radiological Work Permit (RWP)

Work within the radiological control areas will be conducted under the stipulations of several Radiological Work Permits which will be strictly adhered to at all times. Any personnel conducting work contrary to the RWP will be subject to immediate disciplinary action and removed from the project.

### 7.6.2 Prohibited Activities

The following activities are prohibited:

- Eating, drinking, chewing gum or tobacco, and smoking is prohibited within the CRZ/RBA and EZ/SCA;
- Unnecessary contact with contaminated soil such as sitting and kneeling;
- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited except in designated areas;
- Prescribed drugs taken by personnel on operations where the potential for absorption, inhalation, or ingestion of toxic substances exists unless specifically approved by a qualified physician;
- Eating, drinking, smoking or chewing gum or tobacco prior to washing hands and face after exiting the exclusion zone;
- Facial hair which interferes with mask to face seal;
- Hard, non-permeable contact lenses are prohibited in the EZ/SCA; and
- Lighters and matches on site except in designated smoking areas.

### 7.6.3 Spill Prevention

It is the responsibility of all project personnel to conduct work in a manner which prevents the potential release or spill of hazardous materials. The observance of any activity which increases the potential for a release or spill shall be immediately reported to the Field Supervisor or Project Manager. Spill prevention will include the following work practices:

- A one foot freeboard will be maintained in dump trucks;
- Dump trucks will be free of external soil accumulation prior to transport;
- Dump trucks will be limited to 5 mph during transport;
- Heavy equipment and generators will be carefully refueled so as not to overfill;
- Gasoline containers will be stored in flammable cabinets when not in use;
- Heavy equipment will be inspected by the operator prior to the beginning of each shift and an inspection checklist will be completed;
- Pumps and hoses used to pump incidental water to holding tanks will be visually inspected by the

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user prior to each operation;

- Tanks used to hold incidental water and decontamination liquids will be inspected daily; and
- Tanker trucks used to transfer incidental water and decontamination liquids will be filled in accordance with their safety guidelines.

#### 7.6.4 Dust Control Measures

To prevent windblown dispersion and employee inhalation of particulates, FO.01 will be strictly adhered to and potable water will be sprayed for routine dust suppression during excavation, loading, transport, dumping, and stockpiling of contaminated soil. Water will be sprayed to moisten, not mobilize the soil or create runoff. The contaminated soil feed stockpile will be covered with a tarp and the excavation will be sprayed with potable water at the end of each shift. Wind speed will be monitored as described in Section 7.4.3.3 and the action levels in Table 7.3 will be adhered to. Dump trucks used to transport contaminated soil will be limited to a maximum speed of 5 mph.

#### 7.6.5 Buddy System

All work that requires personnel to directly handle, sample or transport hazardous materials, hazardous waste or waste containers at RFETS requires the use of the buddy system. The responsibility of workers utilizing the buddy system include:

- Providing his/her partner with routine and emergency assistance;
- Observing his/her partner for signs of chemical or heat stress exposure;
- Periodically checking the integrity of his/her partner's PPE; and

In addition, any work requiring greater than Level D protection requires use of the buddy system. At no time shall any worker enter the EZ/SCA or CRZ/RBA without the use of the buddy system.

#### 7.6.6 Communications

Due to the small work areas at the excavation and CSFS and requirement of the "buddy system" during work activities, face to face communication among workers will be generally maintained. However, due to the use of Level B respiratory protection and the difficulty in communicating, a set of hand signals has been developed and personnel will be briefed on their use prior to beginning work. Radios will be used for communicating with workers in the EZ/SCA and other plant personnel including emergency responders. EMAD-6 will be used for communication during the duration of this project. In addition, a telephone is located in T900D.

### 7.6.7 Confined Space Entry

Confined space entry is not authorized for this project. If it is determined during the course of field activities that a confined space entry (i.e., entry into the excavation) is required, an addendum to this HASP will be required.

### 7.6.8 Illumination

Night work is not anticipated during this project. If night work is required, it will be performed in compliance with 29 CFR 1926.65 (m), Illumination.

### 7.6.9 Sanitation

Potable water washing and toilet facilities which comply with 29 CFR 1926.65(n) Sanitation at Temporary Work Places, and will be available to all on-site personnel.

## 7.7 UNANTICIPATED HAZARDS OR CONDITIONS

Unanticipated hazards or conditions encountered during this project will be managed in accordance with this RMRS policy statement. "In the event unanticipated hazards or conditions are encountered, the project activities will pause to assess the potential hazard or condition. The potential hazard or condition will be evaluated to determine the severity or significance of the hazard or condition and whether the controls on the project are sufficient to address the hazard or condition. Based on this initial evaluation, a determination will be made whether to proceed with controls currently in place; segregate the hazard or condition from the project activity, if it can be done safely; or curtail operations to address the unexpected hazard or condition. Concurrence to proceed down the selected path must be obtained from the RMRS Vice President or their designee. In addition, the resumption of field activities involving radiological issues will be in accordance with Article 345 of the RFETS Radiological Control Manual."

**Note:** "Unanticipated Hazards or Conditions" do not replace conditions which require emergency response, rather, they ensure that all work is performed based on an informed approach in regards to all potential hazards.

The following sections list possible "Unanticipated Hazards or Conditions" and the corresponding response action.

### 7.7.1 Encountering Debris During Excavation

Historical data indicates that all debris associated with the Mound Site was removed during the 1970 drum removal activities (DOW Chemical Company, Rock Flats Division, Letter from R.M. Vogel to E.A. Putzier titled "Logistics of Mound Excavation," dated September 11, 1970). In the unlikely event that

drums, wood, metal, plastic, rubber, fiberglass or other non-natural debris is found during excavation activities, the following actions will be taken:

- Excavation activities will be immediately suspended and the Project Manager and Field Supervisor will be notified;
- Radiological Safety will be notified;
- Information regarding the debris will be gathered. This will include any labels, markings, or other visual clues as to the nature of the debris;
- Upon approval from the Project Manager or Field Supervisor, and the Radiological Safety Section Manager/RCT Supervisor, the debris will be removed from the excavation and placed on plastic sheeting where it can be surveyed for radiological contamination per ROI-3.01, "Performance of Surface Contamination Surveys", monitored for volatile organic compounds, and further characterized as necessary;
- Based on the radiological survey, VOC monitoring results, and other characterization data, the area radiological postings, RWP, controls, and work practices will be reviewed and modified as necessary; and
- Upon approval from the RMRS Vice President or their designee, excavation activities will resume.

#### 7.7.2 Soil Surface FIDLER Readings > 5,000 CPM

FIDLER readings will be taken on the surface of soil removed from the excavation. If levels > 5,000 cpm are detected, the following actions will be taken.

- Excavation activities will be immediately suspended and the Project Manager or Field Supervisor will be notified;
- Radiological Safety will be notified;
- A plastic covered soil segregation area will be established at the excavation site;
- Based on the FIDLER readings, the area radiological postings, RWP, controls, and work practices will be reviewed and modified as necessary;
- Upon approval from the RMRS Vice President or their designee, excavation activities will resume;
- A composite sample of the segregated soil will be submitted for isotopic analysis;
- The soil will be covered at the end of the day or when segregation is no longer required;
- Based on the sample results, the area radiological postings, RWP, controls, and work practices will be reviewed and modified as necessary; and
- Upon approval from the RMRS Vice President or their designee , the segregated soil will be handled appropriately.

Field Change No.16

### 7.7.3 Perimeter Radiological Air Sample Results >10% DAC

In order to protect collocated in the CRZ/RBA and project support zone, perimeter or work area high volume and low volume air samples will be obtained. A Science Applications International Corp., Model AP-2, portable alpha analyzer will be used to determine if an elevated sample result is due to naturally occurring radioactive material or radioactive contaminants of concern. If a confirmed sampling result is greater than 10% of the DAC, the following actions will be taken:

- All activities will be immediately suspended and the Project Manager or Field Supervisor will be notified;
- The Shift Supervisor will be notified and access to downwind areas will be restricted;
- Radiological Safety will be notified;
- All personnel in the CRZ/RBA and support zone will be moved to a safe upwind assembly area. No personnel will be allowed to leave the assembly area;
- Based on sample and monitoring results, potential personal radiological exposures will be reviewed;
- Based on the sample results, the area radiological postings, RWP, controls, and work practices will be reviewed and modified as necessary; and
- Upon approval from the RMRS Vice President or their designee, work activities will resume.

### 7.7.4 Equipment Radiological Contamination > Transuranic Release Limits

All material and equipment exiting the radiological control areas at the excavation and the CSFS will be surveyed per ROI-3.01. Should any survey results indicate contamination levels greater than those in the RFETS Radiological Control Manual, Table 2-2, the following actions will be taken:

- All activities will be immediately suspended and the Project Manager and Field Supervisor will be notified;
- Radiological Safety will be notified;
- The source of the contamination will be identified and controlled;
- The contaminated material or equipment will be contained, handled, and transferred in accordance with HSP-18.10, "Radioactive Material Transfer and Unrestricted Release of Property and Waste.";
- Based on the survey results, the area radiological postings, RWP, controls, and work practices will be reviewed and modified as necessary; and
- Upon approval from the RMRS Vice President or their designee, work activities will resume.

### 7.7.5 Personal Radiological Contamination

All personnel will be frisked per ROI-2.01 prior to exiting the radiological control areas at the excavation and the CSFS. If levels >MDC of the instrument are detected on personnel after the removal of personal protective equipment, the following actions will be taken:

- All activities will be immediately suspended and the Project Manager and Field Supervisor will be notified;
- Radiological Safety will be notified;
- Depending on the location and level of contamination the, appropriate actions will be taken to protect the contaminated individual and personnel in the area;
- The source of the contamination will be identified and controlled;
- Based on the contamination levels, the area postings, RWP, and work practices will be reviewed and modified; and
- Upon approval from the RMRS Vice President or their designee, work activities will resume.

### 7.7.6 Perimeter VOC Monitoring > Background

In order to protect collocated in the CRZ/RBA and project support zone, perimeter VOC air monitoring will be conducted at both the excavation and the CSFS. Should levels indicate the sustained presence of VOCs at levels greater than background, the following actions will be taken:

- All activities will be immediately suspended and the Project Manager and Field Supervisor will be notified;
- All personnel in the CRZ/RBA and support zone will be moved to a safe upwind location;
- Based on monitoring results potential personal chemical exposures will be reviewed;
- Based on monitoring results, site control and work practices will be reviewed and modified; and
- Upon approval from the RMRS Vice President or their designee, work activities will resume.

## 8.0 EMERGENCY RESPONSE PLAN

Potential emergency situations during work at the Mound Site include hazardous substance release, employee contamination, accidents, injuries, fire, and natural disasters. Safety precautions will be taken to avoid emergency situations. However, if an emergency does arise, the procedures described in this section will be followed. Also, preparatory steps necessary for responding to an emergency situation are given below and they should be complied with before beginning any work at the site.

The Project Manager, with assistance from the Field Supervisor and the Site Safety Officer, has responsibility and authority for coordinating all evacuations and emergency response activities until proper authorities arrive and assume control.

### 8.1 SITE EVACUATION

If an evacuation is necessary at the excavation area, personnel will exit the site via the nearest stepoff pad and proceed to the primary assembly area. The need for personal decontamination and radiological frisking will be evaluated based on the reason for the evacuation and will be communicated to field employees by means of a distinct air-horn signal. One long blast from the air horn indicates a controlled evacuation requiring both decontamination and radiological frisking. Three short blasts will indicate an emergency evacuation during which personnel will immediately evacuate the site without stopping for decontamination or personal radiological frisking. NOTE: During an emergency evacuation, there are no operations within the excavation area that are vital enough to delay the evacuation for even an instant. Because the wind is usually from the northwest, the primary assembly area will be the corner of the protected area fence located approximately 200 feet to the west. Should this area be upwind, the secondary assembly area will be Building 301 located approximately 200 feet to the east. All personnel will be accounted for once they reach the assembly area.

If an evacuation is necessary at the CSFS area, personnel will exit the site via the nearest stepoff pad and proceed to the primary assembly area. The need for personal decontamination and radiological frisking will be evaluated based on the reason for the evacuation and will be communicated to field employees by means of a distinct air horn signal. One long blast from the air horn indicates a controlled evacuation requiring both decontamination and radiological frisking. Three short blasts will indicate an emergency evacuation in which personnel will immediately evacuate the site without stopping for decontamination or personal radiological frisking. NOTE: During an emergency evacuation, there are no operations within the CSFS that are vital enough to delay the evacuation for even an instant. Because the wind is usually from the northwest, the primary assembly area will be the west end of T900C located approximately 200 feet to the west. Should this area be upwind, the secondary assembly area will be approximately 200 feet east of the CSFS area. All personnel will be accounted for once they reach the assembly area.

Assembly areas are shown on the Mound site maps (Figures 3.2, 3.3, and 3.4) which will be posted next to the telephones and in prominent locations at the site.

## 8.2 EMERGENCY SERVICES

### 8.2.1 Emergency Phone Numbers

In case of an emergency, RFETS emergency services must be notified. Kaiser-Hill maintains an emergency response telephone extension of 2911 at RFETS. Extension 2911 may be reached from any plant site telephone or on Radio Channel 2911 and will immediately connect the caller with the Fire Department, Plant Security, the Central Alarm Station, the Shift Superintendent and, during first shift, Occupational Health. Table 8.1 presents a list of Mound Site project personnel who will be notified in the event of any spill, release, employee contamination, accident, injury, fire, or natural disaster. These phone, radio and pager numbers will be posted next to telephones and at prominent locations at the site. Any revisions to the list must be posted and all personnel notified of the changes.

**\*All Life Threatening Emergencies: Dial Extension 2911**

### 8.2.2 Rocky Flats Occupational Health Medical Facility (Building 122)

The Rocky Flats Medical Facility in Building 122 is to be used for medical injuries and emergencies. Depending on the seriousness of the injury, injured personnel may also require care by an off-site hospital. The need for off-site care will be determined by Occupational Health. Directions to the Rocky Flats Occupational Health Medical Facility:

From the Mound Site or the CSFS, go south to Central Avenue and turn right (west) onto Central Avenue. Continue for approximately 1.25 miles. Building 122 will be on the left (south) side of Central Avenue. A map to Building 122 will be posted next to telephones and at prominent locations at the site. See Figure 8.1.

Field Change No.2

**Table 8.1**  
**Emergency Telephone Numbers**

**RFETS EMERGENCY RESPONSE EXTENSION**

**RFETS Phone: 2911**

**RFETS Radio: 2911**

**RFETS SHIFT SUPERINTENDENT**

**RFETS Phone: 2914**

**RFETS Radio: 2914**

**RMRS Emergency Contacts**

Contact: Wayne Sproles  
RMRS Project Manager

RFETS Phone: 5790

RFETS Radio: 3798

RFETS Pager: 1245

Contact: Mark Wood  
RMRS Field Supervisor

RFETS Phone: 6689

RFETS Radio: 3796

RFETS Pager: 5904

Contact: Peggy Schreckengast  
RMRS Health and Safety Supervisor

RFETS Phone: 6790

RFETS Radio: 3359

RFETS Pager: 3059

Contact: Marla Broussard  
RMRS Field Operations Manager

RFETS Phone: 6007

RFETS Radio: 3740

RFETS Pager: 4010

Contact: Jerry Anderson  
RMRS Radiological Coordinator

RFETS Phone: 6438

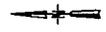
RFETS Radio:

RFETS Pager: 7447

**Figure 8.1**  
**Map to RFETS**  
**Medical - Building 122**

- EXPLANATION**
- Emergency Facility
  - ▲ Emergency Route
- Standard Map Features**
- ▨ Building & other structures
  - Lakes and ponds
  - Streams, ditches, or other drainage features
  - - - Fences
  - - - Rocky Flats boundary
  - Paved roads
  - - - Dirt roads

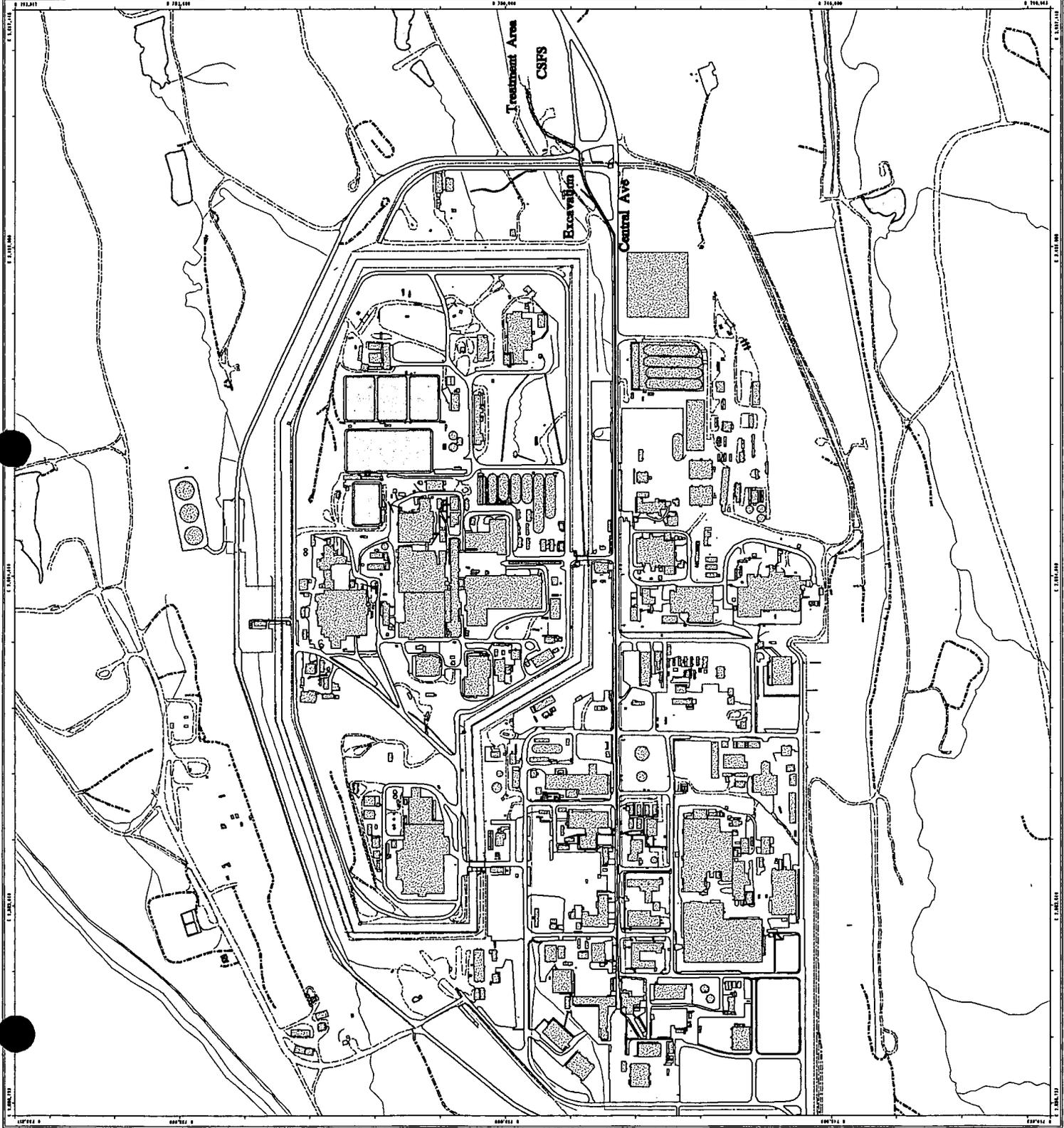
*DATA SOURCES:  
 Aerial photos, maps, and reports provided by  
 Rocky Flats Plant, Inc. - 1982.  
 Hydrology provided by  
 USGS - Salt Laboratory*



Scale - 1 : 10,000  
 1 inch represents approximately 800 feet



State Plane Coordinate System  
 Contour Interval - 100' (NAD 83)



U.S. Department of Energy  
 Rocky Flats Environmental Technology Site

Prepared by  
**RMRS**  
 Rocky Mountain  
 Remediation Services, L.L.C.  
 Emergency Remedial Action Group  
 10000 North Front Street  
 Denver, CO 80231-1000

MAP NO. RF-207  
 February 13, 1997

## 8.3 HAZARDOUS SUBSTANCE RELEASE

### 8.3.1 Spill Response Planning

The Spill Response Plan is designed to establish a program/plan to optimize a safe and informed response to incidental and emergency situations with the intent of protecting Mound Site project personnel, collocated workers, the public, the environment, and property in the event of spills, fire, or explosion. All spills will be addressed per HSP-21.04, "Emergency Response and Spill Control Program." If applicable, reporting will be conducted in accordance with Administrative Procedures Manual, ADM-16.01, "Occurrence Reporting Process."

### 8.3.2 Incidental Spill Operations

Incidental Spill Definition:

Incidental spills are those where the substance can be safely absorbed, neutralized, or otherwise controlled by employees in the immediate release area at the time of the release. In addition, the release does not have the potential to become an emergency within a short time frame.

Spills considered as incidental include:

- Gasoline, diesel, or hydraulic oil spills within the EZ/SCA;
- Gasoline, diesel, or hydraulic oil spills outside of the EZ/SCA;
- Contaminated soil spills outside of the EZ/SCA; and
- Decontamination or incidental water spills inside secondary containments.

Criterion which must be met prior to incidental release response actions at the Mound Site include:

- The RFETS Shift Superintendent must be notified;
- The RMRS Project Manager and RMRS Field Supervisors must be notified;
- Radiological Safety must be notified if spill involves radiological aspects;
- The chemical hazards of the substance spilled are known and quantified;
- The PPE normally worn will provide adequate personal protection;
- Decontamination methods are suitable for the substance spilled; and
- All materials or equipment used during the response are compatible with the substance spilled.

Post incidental spill response will include:

- Ensuring the proper reporting per HSP-21.04 and ADM-16.01; and
- Conducting a briefing to address the cause of the spill, methods of preventing future spills, and ways to improve readiness and response.

### 8.3.3 Emergency Spill Operations

#### Emergency Response Definition:

A response effort by personnel from outside the immediate release area, or by other designated responders to a release that results, or is likely to result, in an uncontrolled release of a hazardous substance.

An emergency response is required in the following situations:

- The responders are not in the immediate response area;
- The release requires emergency evacuation of employees in the area;
- The release poses a serious threat of fire or explosion (exceeds or has the potential to exceed the lower flammable limit);
- The release may cause high levels of exposure to toxic substances; and
- There is uncertainty that the employees in the work area can safely handle the severity of the hazard with the available PPE and equipment.

#### Emergency Spill Response Actions

- IF a release is observed, THEN immediately warn coworkers in the area and notify the Project Manager or Field Supervisor on EMAD 6. IF supervision is not available, notify the Shift Supervisor at 966-2914;
- Shut off pumps transferring liquid if safe to do so;
- Close valves to stop flow into affected area if safe to do so;
- Move to a safe location upwind and post a person upwind to prevent unauthorized personnel from entering the contaminated area; and
- Call 966-2911 or use radio channel 2911 and provide the following information:
  - Exact location of the emergency (nearest road, etc.)
  - Nature of the emergency
  - Condition of patient if applicable (breathing, consciousness, bleeding, etc.)
  - Special hazards in the area
  - Your name
  - Any other information requested

## 8.4 EMPLOYEE CONTAMINATION

### 8.4.1 Chemical Contamination

If any site worker experiences a failure or alteration of protective equipment that affects the protection factor, that person and his/her coworker(s) will immediately leave the work area for which the PPE was required. Re-entry to the area will not be permitted until the equipment has been repaired or replaced. If any incidents occur that involve the chemical contamination or exposure of an employee to hazardous or toxic substances, the Project Manager or Field Supervisor will be notified immediately. If necessary, the RFETS emergency services at extension 2911 shall be notified.

First aid or other decontamination procedures should be administered if they can be without endangering other operations personnel. Chemically contaminated personnel should proceed to the nearest decontamination safety shower and thoroughly irrigate the contaminated area(s). An emergency shower and eyewash station is located in the excavation support zone and in T900D at the CSFS area. No chemical contamination situation at the Mound Site project will be made worse by the use of large amounts of water.

### 8.4.2 Radiological Contamination

All personnel radiological contamination will be addressed in accordance with ROI-2.01.

## 8.5 ACCIDENT/INJURY

In the event of an accident or other event that causes injury to operations or any other personnel present at the Mound Site project, the RFETS emergency extension at 2911 will be notified immediately. The site Fire Department, EMTs, and Security will be dispatched immediately. Details of the emergency and the exact location must be given over the phone. Basic first aid may be administered by properly trained personnel until emergency medical personnel arrive. Each shift will have a minimum of one staff member trained in American Red Cross First Aid and CPR. Any non-emergency medical situation such as minor cuts or sprains should be attended to at RFETS Medical - Building 122. A map showing the location of Building 122 is shown in Figure 8.1.

Field Change No.2

Field Change No.2

### 8.5.1 Emergency Medical Procedures

For severe injuries, illnesses, or overexposures:

- Remove the injure or exposed person(s) from immediate danger if safe to do so;
- Immediately call extension 2911 and provide as much information as possible;
- If possible, at least partial decontamination should be completed. Remove protective equipment and clothing and redress the victim in clean coveralls or wrap in a blanket;
- If decontamination cannot be done, wrap the victim in blankets or plastic sheeting to reduce contamination of other personnel;
- Render emergency first aid until emergency medical personnel arrive; and
- Evacuate all personnel on site to a safe place.

### 8.5.2 Fire/Explosion

The first responsibility of any employee discovering a fire is to warn coworkers and Call the Rocky Flats Fire Department at extension 2911.

UNDER NO CIRCUMSTANCES SHOULD ANYONE ATTEMPT TO FIGHT A FIRE ALONE. Personnel trained as First Responders may then use a fire extinguisher or de-energize small fires in those situations where there is no personal danger in doing so. Fire extinguishers are located next to all generators on site, in T900C and T900D, and in all pieces of heavy equipment.

In the event of an explosion, all personnel will be evacuated and the fire department notified. No personnel shall re-enter the area until it has been cleared by the Rocky Flats Fire Department.

### 8.5.3 Natural Disasters

Natural disasters may occur at the site and include lightning and high winds.

- Lightning – Persons should not work in open areas, near trees or other equipment outside during lightning storms - Stop work and clear the site until storm passes.
- High winds – If high winds are forecast, the site should be cleared before the winds become hazardous. Workers should be instructed to go to an appropriate shelter. If winds are sustained at 30 miles per hour, all soil handling activities will be suspended and work activities will be evaluated. If winds are sustained at 45 miles per hour, all work will be stopped until the wind subsides.
- Notify the Project Manager or Field Supervisor of any work stoppage due to lightning and high winds.

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## 8.6 EMERGENCY EQUIPMENT

This equipment will be stored at appropriate locations selected during site mobilization.

- Fire extinguishers (10 lb A/B/C);
- Extra full set of PPE including SCBA;
- Emergency shower and eyewash stations will be provided and maintained in the support zone at both the CSFS and the excavation; and
- Fully stocked spill kit including:
  - Caution Tape
  - Oil dry absorbent
  - Universal absorbent pads
  - Universal absorbent pillows
  - Universal absorbent booms
  - Plastic non-sparking shovel
  - Large plastic bags
  - White vinyl tape
  - Radiological and Hazardous Waste Labels

Field Change No.2

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# Mound Site Source Removal Map

## Figure 3.2

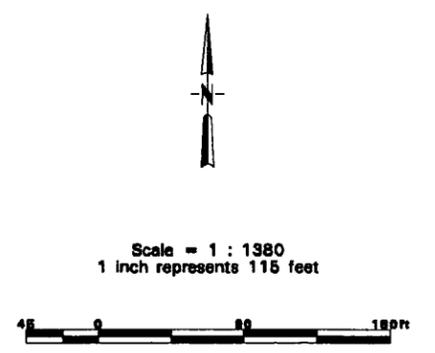
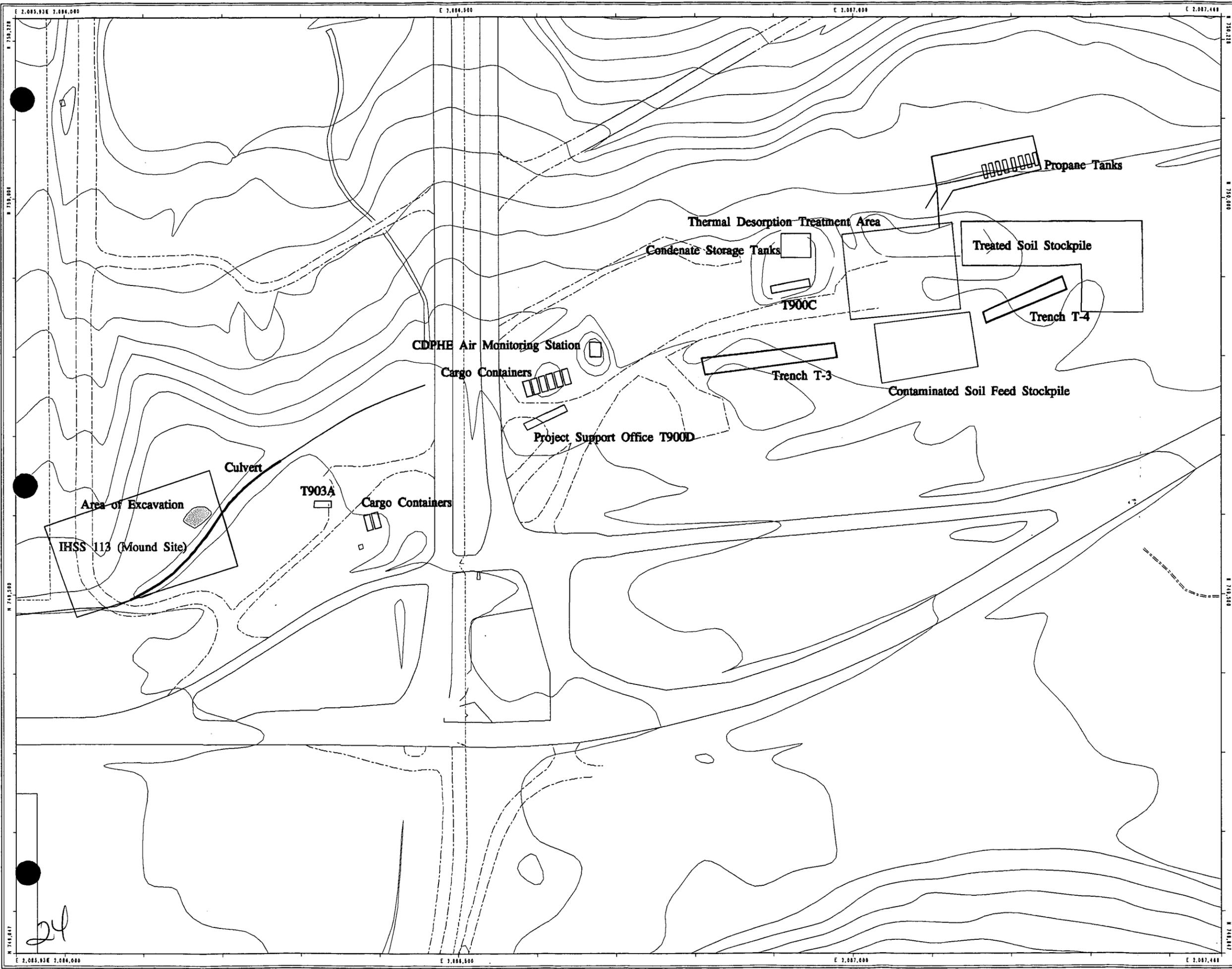
### EXPLANATION

-  Contours (5' intervals)
-  IHSS
-  Culvert

### Standard Map Features

-  Fences
-  Paved roads
-  Dirt roads

**DATA SOURCE:**  
Buildings, roads, and fences provided by  
Pacific Eng.  
E240 Rocky Flats, Inc. - 1991.  
Hydrology provided by  
USGS - (date unknown)



State Plane Coordinate Projection  
Colorado Central Zone  
Datum: NAD27

U.S. Department of Energy  
Rocky Flats Environmental Technology Site

Prepared by:  
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# Contaminated Soil Feed Stockpile Map

## Figure 3-4

### EXPLANATION

-  Contamination Reduction Area
-  Exclusion Zone (Soil Contamination Area)
-  Contaminated Soil Feed Stockpile
-  First Aid Kit
-  Emergency Eyewash & Shower
-  Primary Assembly Area
-  Secondary Assembly Area
-  Power Poles
-  Contours (5' Intervals)
- RBA = Radiological Buffer Area
- PW = Potable Water for dust suppression
- IW = Incidental/storm Water holding tank

### Standard Map Features

-  Fences
-  Paved roads
-  Dirt roads

**DATA SOURCE:**  
 Buildings, roads, and fences provided by  
 Facilities Eng.  
 EG&G Rocky Flats, Inc. - 1991.  
 Hydrology provided by  
 USGS - (date unknown)



Scale = 1 : 720  
 1 inch represents 60 feet



State Plane Coordinate Projection  
 Colorado Central Zone  
 Datum: NAD27

U.S. Department of Energy  
 Rocky Flats Environmental Technology Site

Prepared by:



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