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Environmental Restoration Program

Operable Unit 5

South Property
Remedial Investigation/Feasibility Study
Health And Safety Plan

Mound Plant
Miamisburg, Ohio

Final
(Revision 0)

Prepared For:
EG&G Mound Applied Technologies
and
The U.S. Department Of Energy

Prepared By:

SAIC®
An Employee-Owned Company

Science Applications International Corporation
4031 Colonel Glenn Highway, Suite 300
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December 1993

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SOUTH PROPERTY
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LIST OF ACRONYMS

ACGIH	American Conference of Government Industrial Hygienists
ALARA	As Low as Reasonably Achievable
ANSI	American National Standards Institute
AOC(s)	Area(s) of Concern
BOA	Basic Ordering Agreement
CFR	Code of Federal Regulations
CGI	Combustible Gas Indicator
DAC	Derived Air Concentration
DOE	U.S. Department of Energy
DOE-AL	DOE-Albuquerque
DOT	U.S. Department of Transportation
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration
FFA	Federal Facility Agreement
FID	Flame Ionization Detector
FIDLER	Field Instrument for the Detection of Low-Energy Radiation
GFCI	Ground Fault Circuit Interrupters
G-M	Geiger-Mueller
GMC-H	Gas Mask, Full-Face with HEPA Cartridge
HCP	Hearing Conservation Program
HGC	Hydro Geo Chemical Inc.
H&S	Health and Safety
HSP	Health and Safety Plan
ICRP	International Council on Radiation Protection
IDLH	Immediately Dangerous to Life or Health
IDM	Investigative Derived Material
MSDS	Material Safety Data Sheet
NCRP	National Council on Radiation Protection and Measurements
NIOSH	National Institute for Occupational Safety and Health
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NRC	Nuclear Regulatory Commission
NRR	Noise Reduction Rating
OSHA	Occupational Safety and Health Administration
OTM	On-Site Task Manager
OU	Operable Unit
PEL	Permissible Exposure Limit
PD	Pressure Demand
PID	Photoionization Detector
PP	Positive Pressure
PPE	Personal Protective Equipment
PPM	Parts Per Million
QAPjP	Quality Assurance Project Plan
RAM	Real-Time Aerosol Monitor
RI/FS	Remedial Investigation/Feasibility Study
SAP	Sampling and Analysis Plan
SCBA	Self Contained Breathing Apparatus
SHSC	Site Health and Safety Coordinator

SOP	Standard Operating Procedure
TSDF	Treatment, Storage, or Disposal Facility
TLV	Threshold Limit Value
TWA	Time Weighted Average
VOC	Volatile Organic Compound
WL	Working Level

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1. INTRODUCTION

This Health and Safety Plan (HSP) is one component of the Operable Unit 5 (OU5) Sampling and Analysis Plan (SAP) prepared for the U.S. Department of Energy (DOE) Mound Plant. It has been prepared as required by the Federal Facility Agreement (FFA) for Mound Plant and follows the format recommended by the U.S. Environmental Protection Agency (EPA) for Remedial Investigations/Feasibility Studies (RI/FSs) (EPA 1988). It complies with the Occupational Safety and Health Administration (OSHA) requirements of 29 CFR 1910.120 for investigations at hazardous waste sites (CFR 1990). This plan provides information on the following topics:

- key health and safety personnel,
- risk analysis (site hazards),
- worker training,
- pre-entry site briefing,
- personal protective equipment,
- medical surveillance requirements,
- frequency and types of monitoring,
- site control measures,
- spill containment,
- decontamination procedures,
- standard operating procedures (SOPs) for the site,
- contingency plans, and
- confined space entry procedures.

This plan provides specific information applicable to the OU5 Work Plan at Mound Plant and is being prepared under the Environmental Restoration (ER) Program. The OU9 Site-Wide HSP (DOE 1992a) provides generalized health and safety guidelines. The OU5 HSP provides an overview of the hazards associated with OU5 investigations. In instances where the OU5 HSP conflicts with the OU9 HSP, the OU5 HSP will control the activities associated with all OU5 RI/FS work. OU5 includes the geographic area of the Site which is south and east of the plant drainage ditch, and is broadly defined as the Special Metallurgical/Plutonium Processing area (SM/PP Hill), the New Property and those areas not geographically within the boundaries of OU2. The scope of OU5 requires the determination of the nature and extent of radioactive and non-radioactive contamination in the OU5 soils and

determination of the nature and extent of contamination if a groundwater contamination source is subsequently identified.

The contaminants of concern and the area of the plant in which work is being performed dictate what monitoring will be required. Within the OU5, a number of areas are known to be contaminated with radioactive materials, principally plutonium and thorium. Other areas may have been contaminated by dispersion of material from adjacent areas through natural processes (wind, surface water, or groundwater transport, erosion, plants or animals) or by human actions (excavation, hauling, dumping, etc.). The investigative activities being performed are as follows:

- field screening/analyses,
- soil sampling,
- sediment sampling,
- geologic/hydrogeologic investigations including well installation,
- water sampling at seeps and surface water impoundments on the SM/PP Hill and the New Property,
- air sampling (if appropriate), and
- ecology assessing (if appropriate).

This plan is structured so that field personnel will easily be able to identify specific hazards and monitoring requirements for each activity. Workers participating in the above activities will read this plan and sign an approval sheet. The original approval sheet and a copy of this HSP must be kept onsite (either with the field log book or at another Mound Site location) as designated by the Subcontractor Project Manager.

2. POLICY AND STANDARDS

The DOE is responsible for health, safety, and environmental protection programs at DOE-owned, contractor-operated facilities. DOE is mandated to conduct the ER Program in a manner that will limit risks to the health and safety of employees and the general public and that will provide adequate protection for property and the environment. Specific procedures may include engineering controls, administrative controls, and the use of equipment for personal protection.

One of the main tenets of this HSP is that exposures of workers to radiation and toxic materials should be kept to levels as low as reasonably achievable (ALARA). Health physicists and industrial hygienists help in meeting this goal by participating in the planning of tasks and by providing ALARA reviews of project work plans. These ALARA reviews ensure that reasonable efforts have been made to minimize exposures to workers and the general public.

The environmental, health, and safety protection requirements that apply to remedial investigations under the ER Program are described in DOE Headquarters and DOE Albuquerque (DOE-AL) Field Office orders. This operable unit-specific HSP is based on these orders and follows applicable federal, state (Ohio), and local standards.

3. HEALTH AND SAFETY RESPONSIBILITIES

The subcontractor Health and Safety Manager is responsible for the oversight of the health and safety (H&S) responsibilities at ER Program sites. At Mound Plant, the subcontractor Project Manager and subcontractor Onsite Task Manager (OTM) are responsible for site worker safety. The subcontractor Site Health and Safety Coordinator (SHSC) provides guidance to the subcontractor OTM regarding potential health hazards during characterization and investigative activities. As with all field activities, field personnel should be aware of potential hazards at all times. Reporting and coordinating responsibilities are shown on the flowchart in Figure 3.1.

3.1. INSTALLATION RESPONSIBILITIES

The EG&G Mound Plant Safety and Loss Prevention Department has primary responsibility for implementing H&S requirements according to installation procedures. The manager of this department will guide the subcontractor OTM in establishing H&S requirements that are consistent with current Mound Plant policies and standards, and will also ensure that an EG&G Mound Plant health physics surveyor is present to perform radiological measurements when required by Mound Plant procedures.

3.2. ER PROGRAM SUBCONTRACTOR PERSONNEL RESPONSIBILITIES

3.2.1. ER Program Subcontractor Project Manager

The subcontractor Project Manager is responsible for the following:

- ensuring compliance with the HSP and ensuring a safe work environment for the field team members,
- being familiar with emergency response procedures and notification requirements and implementing them as needed,
- ensuring coordination of field activities with the EG&G Mound Plant Safety and Loss Prevention Department, and
- assigning the OTM.

3.2.2. ER Program Subcontractor Health and Safety Manager

The subcontractor Health and Safety Manager is responsible for the following:

- reviewing the OU5 HSP and any modifications or addenda to the plan,
- assigning a SHSC,

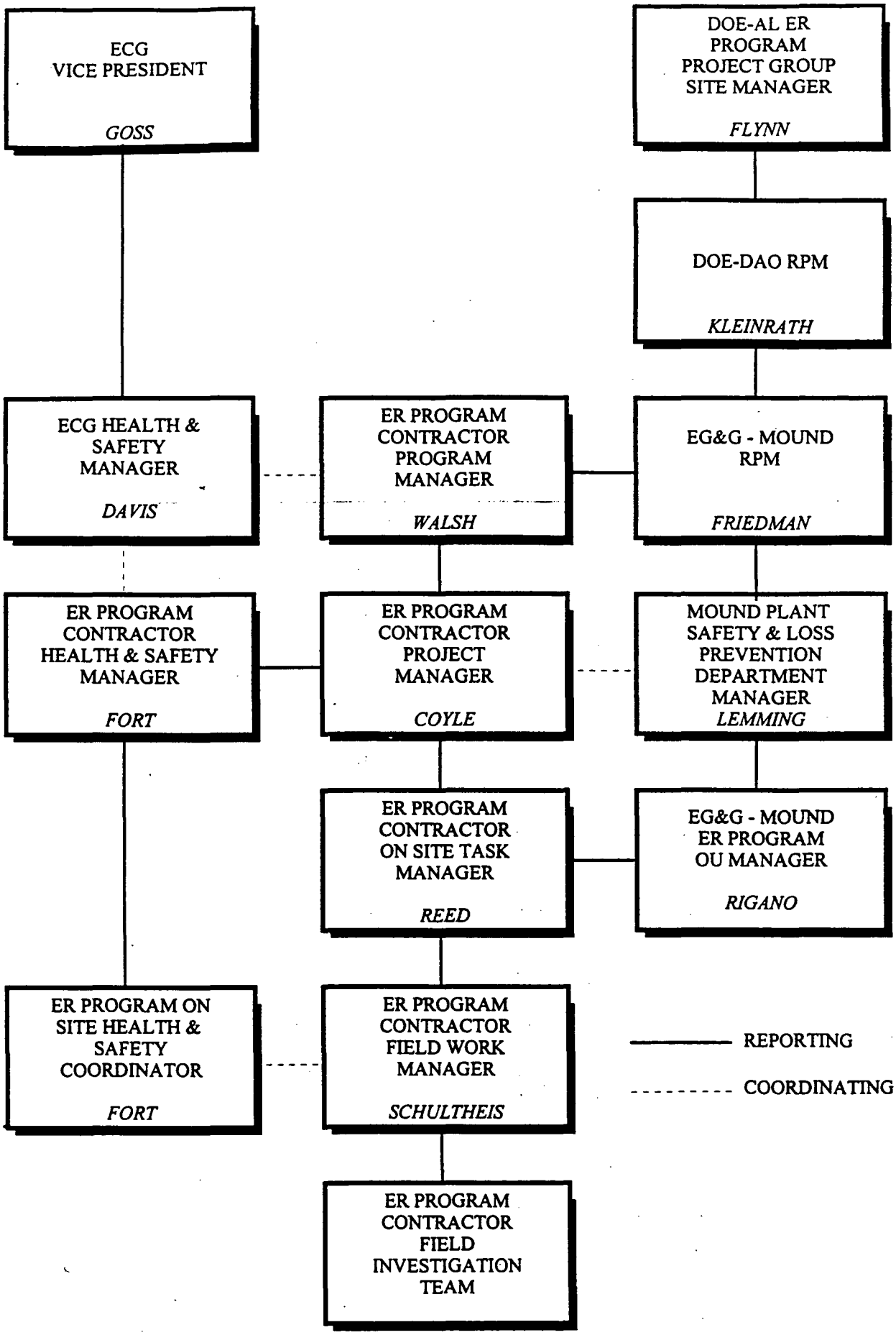

Figure 3.1. Lines of Authority and Communication for Operable Unit 5

- providing technical guidance to the SHSC,
- ensuring compliance with the HSP by conducting H&S audits of site activities, submitting reports of the findings, and approving the resolutions to the findings, and
- overseeing the investigation and reporting of any accidents involving contractor personnel.

3.2.3. ER Program Subcontractor On-Site Task Manager

The subcontractor OTM is responsible for the following:

- reading, concurring with, and complying with the HSP,
- assigning the Field Work Manager,
- reviewing the OU5 HSP and any modifications or addenda to the plan,
- reporting status of task H&S activities to Project Engineer and Contractor Project Manager, and
- initiating emergency action in the event of an emergency in the field.

3.2.4. ER Program Subcontractor SHSC

The subcontractor SHSC is responsible for the following:

- reading, concurring with, complying with, and enforcing the HSP,
- conducting the Site H&S audit prior to commencing field activities at each area of concern (AOC),
- coordinating initial inspections for all onsite safety equipment,
- informing the subcontractor Project Manager and subcontractor OTM of potential H&S hazards,
- coordinating the monitoring of contaminants to determine the degree of hazard present,
- taking control of the scene in the event of an emergency situation if the subcontractor OTM is not available or until Mound Plant emergency personnel arrive,
- ensuring that all personnel have been trained in the appropriate safety procedures, that they have read and understood this HSP, and that these requirements are followed during site activities,
- conducting daily H&S briefings for field team members,

- requiring that field work be terminated if unsafe conditions develop or an imminent hazard is perceived,
- ensuring that required H&S documentation is completed and maintained in appropriate files,
- coordinating the monitoring of contaminants to determine the degree of hazard present,
- reporting to the subcontractor H&S Manager, and
- ensuring a buddy system has been established before work begins.

3.2.5. ER Program Subcontractor Field Investigation Team

Each subcontractor Field Investigation Team member is ultimately responsible for his or her own safety. It is each team member's responsibility to point out unsafe conditions. They will read, understand, concur with, and comply with the requirements set forth in this plan. No team member will knowingly perform any task under unsafe conditions or in an unsafe manner. Only qualified and experienced team members will be permitted to capture wildlife if required.

3.2.6. ER Program Subcontractor Field Work Manager

The Subcontractor Field Work Manager is responsible for the following:

- ensuring day-to-day compliance with the H&S procedures set forth in this plan,
- acting as a backup to the SHSC in the event of an emergency,
- reporting to the subcontractor OTM, and
- as requested by the SHSC, conducting initial and/or daily pre-entry Site H&S briefings for the subcontractor Field Investigation Team.

4. RISK/HAZARD ANALYSIS

4.1. IDENTIFICATION AND ASSESSMENT OF POTENTIAL HAZARDS

The SHSC will inspect each AOC prior to commencing work at that AOC. The results of this AOC inspection will be documented on a Site-Specific HSP Worksheet (an example may be found in Appendix B) and used as the basis for the pre-entry site briefings. The completed worksheets will be maintained in the AOC-specific records.

4.1.1. Physical Hazards

Physical hazards possible during remedial investigations at Mound Plant include frostbite hazards in the winter, heat stress hazards in the summer, flammable or combustible materials hazards, weather-related hazards (e.g., hail), lifting, cuts and bruises of the hand, vehicular traffic/collision hazards, drilling equipment hazards, slip and fall hazards, utility hazards associated with equipment, noise, and water hazards. The consequence of these hazards include temporary injury, permanent disability, and even death.

For working over or near water where the danger of drowning exists (this plan defines "near" as within 3 feet), the following Occupational Safety and Health Administration (OSHA) requirements must be followed: (1) personnel working over, in, or near water will wear a Coast Guard-approved life vest; (2) rescue ring buoys with 90 feet of line will be provided for emergency rescue (no more than 200 feet apart); and, (3) one life-saving skiff will be available when workers are working over or near water (29 CFR 1926.106).

In addition, the following procedures should be followed when working in a small boat: 1) the boat should have a rope attached that will extend to the shore where it will be manned by a worker who can pull the boat to shore in case of emergency; and, 2) personnel working in the boat should stand as little as possible in order to maintain an even balance. Risk avoidance techniques and personal protective equipment (PPE) should be used to avoid personnel contamination.

Hip waders, rubber boots, and Saranex may be necessary where the ground is saturated, such as in marshy areas or drainage ditches. Hip waders will not be worn by workers in a boat or in water more than 3 feet deep, because the waders may fill with water and make swimming and rescue attempts extremely difficult if a worker slips or falls from the boat.

Tornadoes are possible at Mound Plant during spring, summer, and fall field operations. Prior to beginning field operations, emergency procedures will be obtained from Mound Plant. In addition, the Mound Plant indoctrination pamphlet will be consulted for the appropriate signal for tornadoes. This pamphlet is posted in the office trailer and a copy will be kept at each work location.

Thunderstorms are also a likely possibility during field activities. If lightning is spotted nearby, field personnel will cease operations and leave the area for safety until the SHSC has declared the area safe to reenter. See subsection 12.2 for additional information.

Lifting of heavy objects is required of personnel from time to time, which may result in back sprains or injury from dropped objects. Personnel are encouraged to obtain the aid of other field team members when lifting objects. Personnel will use proper lifting techniques when lifting any object.

Cuts and bruises are possible during most of the work that would be performed at Mound Plant. Gloves, coveralls, steel-toed shoes, and hard hats are examples of protective equipment that minimize the risk of injury.

During this field program, heat-related hazards are more likely to occur than cold-related hazards. Mound Plant ER Program SOP 6.16 should be used to help prevent heat-related illness. If Level C protection becomes necessary, heat stress becomes more of a concern due to the impervious protective clothing.

Cold injury (frostbite and hypothermia) and impaired ability to work are dangers at low temperatures and when the wind-chill factor is significant. The American Conference of Government Industrial Hygienist (ACGIH) TLV booklet should be consulted for recommend actions.

Flammable and combustible materials are not as great a concern as site contaminants. However, combustible fuels such as gasoline may be required for operating field equipment. Gasoline will be stored in OSHA-approved safety cans. Combustible materials will be cleared around the sampling locations to prevent accidental ignition by the combustion engines. If combustible material cannot be removed, they will be wetted down with water before filling the engines. Engines will be shut off during refueling.

4.1.2. Noise

Noise exposures in excess of 85 dB(A) Time-Weighted Average (TWA) are considered excessive. There are two requirements that specify personnel noise exposure limit criteria. They are:

- 29 CFR 1910.95 - OSHA standard for noise exposure. The standard includes permissible exposure limits (PELs), medical monitoring requirements, and training requirements; and
- ACGIH TLVs for noise.

The lower noise level requirements of the ACGIH TLVs provide the allowable noise exposure requirements for Mound employees.

Engineering controls such as mufflers on heavy equipment exhausts or on air release valves should be used on equipment where possible. If engineering solutions cannot reduce the noise, administrative controls such as increasing the distance between workers in the high noise area or limiting exposure time should be used if possible.

Noise exposure is often not constant and is difficult to control with either engineering or administrative solutions. Hearing protection is often the only control option feasible. Employees should be encouraged to wear hearing protection when noise levels are >80 dB(A) TWA. Mound policy requires hearing protection to be worn when noise levels exceed 85 dB(A) TWA. A Hearing Conservation Program (HCP) shall be instituted for workers exposed to 80 dB(A) TWA or above.

Employees should be given the opportunity to select a hearing protector from a variety of suitable ones provided by the employer [20 CFR 1910.95(i)(1)]. In all cases the chosen hearing protectors should have a Noise Reduction Rating (NRR) high enough to reduce the noise at the ear drum to 80 dB(A) or lower. All employees exposed to noise at levels higher than 105 dB(A) for an extended period of time shall wear double hearing protection consisting of muffs and plugs.

The controls necessary to ensure that noise exposures are maintained below 80 dB(A) TWA may include engineering controls to reduce noise at its source, administrative controls to reduce the duration of exposures, personal protective equipment (PPE) capable of attenuating the noise to acceptable levels, or combination of these controls. Permissible noise exposure limits for unprotected personnel are shown on Table IV.1.

Table IV.1. Permissible Noise Exposure Limits (1992 ACGIIH TLV Booklet)

Continuous Noise	
Permitted Exposure Time in Hours	Sound Level in dB(a)
8	85
7	86
6.1	87
5.3	88
4.6	89
4	90
none	>95
Impact Noise	
Permitted Number of Impacts per Day	Sound Level Peak in dB
10,000	120
1,000	130
100	140
0	>140

Area noise monitoring will be conducted with a sound level meter to determine the need for personnel monitoring. If any job areas register levels of 80 dB(A) or higher, personnel monitoring should be conducted. Personnel monitoring is accomplished by using noise dosimeters that are worn by employees for their full work shift. Cumulative noise dose and peak exposures are then read at the end of their work shift.

4.1.3. Tripping and Falling Hazards

Work areas shall be kept clear of tools, equipment, refuse, or other materials that may present a tripping hazard. Work areas and decontamination areas should be established in areas that provide the surest footing. Areas of uneven or extremely soft ground should be avoided by the sampling teams. Any sampling that must be performed over elevated areas such as culverts or pits should be performed with the sampling personnel attached to a safety belt, safety harness, or lifeline as required by 29 CFR 1926.104.

4.1.4. Excavating and Trenching

All excavating and trenching operations shall be performed in accordance with 29 CFR 1926.651. The following requirements shall be met:

- All loose material shall be either removed or supported;
- Underground energy sources such as power lines, water lines, or boulders shall be located, protected, deenergized, supported, or moved;
- The entrant shall not be farther than 25 feet from a ramp, runway, or ladder that is used as a means of access or egress;
- Trenches shall be inspected daily and after rainfall by a competent person for evidence of sloughing, cave-in, water seepage, or hazardous atmospheres;
- All trenches and excavations deeper than four feet are considered confined spaces and shall require confined space permitting as required by 29 CFR 1910.146;
- Excavated material or other material shall be effectively stored and retained at least two feet from the edge of the excavation;
- If it is necessary to place heavy items or equipment on the level above and near an excavation, the side walls of the excavation shall be sheet-piled, shored, or braced to prevent soil cave-in;
- The walls and faces of all excavation and trenching shall be guarded by a shoring system where a danger of the ground moving is present.

4.1.5. Overhead Obstructions

All personnel working within proximity of overhead equipment will be required to wear a hard hat. Falling objects also pose the risk of injury to the feet. To minimize this risk, steel-toed safety shoes shall be worn by all on-site personnel.

4.1.6. Entanglement Hazards

All loose articles such as clothing, jewelry, hair and tags shall be secured in place to prevent entanglement with moving parts of machinery and equipment.

4.1.7. Hand-Arm Vibration

Vibrating hand tools such jackhammers and drills can cause damage to the nervous and circulatory systems of the hands. Tools that cause excessive vibration when used should be fitted with vibration absorbing grips and handles or replaced with tools less likely to cause excessive hand or arm vibration.

4.1.8. Control of Energy Sources (Lock Out/Tag Out)

In accordance with 29 CFR 1910.147 a program shall be implemented for the control of all potential energy sources during servicing, installation, or maintenance of equipment. This program shall apply during the performance of field maintenance activities. Potential energy sources include but are not limited to electrical energy, steam, pressurized piping, mechanical motion, hydraulic and pneumatic pressure, and gravitational energy. To safely perform activities in the presence of hazardous energy sources, points of control shall be deactivated by authorized personnel. Control methods include: removal of fuses in electrical equipment, placing blanks in pipes, and placing blocks in machinery to prevent movement. Potential energy sources that may require locking and tagging specific to OU5 include underground lines, pipes and cables, and sampling equipment that may require repair. EG&G Mound Plant Lock Out/Tag Out Procedures M-3, SAIC Lock Out/Tag Out Program and 29CFR1910.147 requirements will be followed.

4.1.9. Chemical Hazards

Chemical hazards possible during investigations of OU5 include organic solvents and exposure to toxic materials. Ambient concentrations of these chemicals will probably be negligible in most areas (and therefore of minimal consequence to site workers) according to the information obtained from Mound Plant records and from past analytical results from existing monitoring wells. The potential consequences of exposure to these chemical hazards include respiratory illness, short-term and long-term decreases in immunologic protection, cancer, and even death.

Sources of chemical hazards in OU5 include waste oils, paint, paint thinners, solvents, and various metals (DOE 1992, Volume 7). Soil gas data shows concentrations of halogenated volatile organics and chlorinated hydrocarbons in the parts-per-billion range in some areas of the plant. Some of the volatile organic compounds (VOCs) previously detected are benzene, chloroethene (vinyl chloride), trichloroethylene, tetrachloroethane, 1,2-*trans*-dichloroethylene, tetrachloromethane (carbon tetrachloride), trichloromethane (chloroform), and 1,1,1-trichloroethane. Table IV.2 lists the exposure limits for the non-radiological hazardous materials expected to be in the OU5 environment.

A general reference on hazardous materials (National Institute for Occupational Safety and Health (NIOSH) 1990) and specific MSDSs will be available onsite for review and consultation. These references include the exposure-limit values and concentrations of suspected site contaminants immediately dangerous to life and health (OSHA 1990; NIOSH 1990; ACGIH 1992). The exposure limit value refers to airborne concentrations of substances and conditions which nearly all workers may be exposed to for 8 hours per day, 52 weeks per year, without adverse health effects.

If additional chemical hazards are identified during the field program, the exposure-limit values associated with any additional chemicals will be provided on-site and discussed with field personnel.

4.1.10. Radiological Hazards

Because of past activities at Mound Plant, radiological hazards are associated with many of the potential release sites addressed by the ER Program. Table IV.3 lists the radionuclides associated with OU5. The potential consequences of exposure to radiological hazards include nausea, blood disorders, cancer, mutation of reproductive genes and even death. Since radiation exposures tend to cause chronic effects (i.e., developing over a long period of time, and many years after the exposure has occurred), exposure limits (in Table IV.3) have been conservatively established assuming potential exposures will occur over long time periods. Primary exposure pathways include inhalation and ingestion. A Mound Health Physicist will be on-site during applicable field activities to monitor radiation levels.

Plutonium is the most common radioactive contaminant at Mound Plant and should be anticipated, at least in low levels, at all the AOCs. Thorium may be encountered during some soil-testing activities. Consequently it is possible to encounter some airborne alpha contamination. The Mound Plant health physicist and safety manager through the construction survey and monitoring group will be notified when intrusive activities (excavation and drilling) are required so that an excavation permit may be issued.

Table IV.2. Hazardous Material Exposure Limits

MATERIAL	NIOSH[1]		OSHA[2]		ACGIH[3]	
	TWA	STEL	TWA	STEL	TWA	STEL
Benzene	0.1 ppm	1 ppm	1 ppm	5 ppm	10 ppm	-
Vinyl Chloride	(5)	(5)	1 ppm	5 ppm	5 ppm	-
Trichloroethylene	25 ppm	-	50 ppm	200 ppm	50 ppm	200 ppm
Tetrachloroethane	(4)	1 ppm	1 ppm	25 ppm	-	-
1-2 Dichloroethylene	200 ppm	-	200 ppm	-	5 ppm	20 ppm
Carbon Tetrachloride	(5)	2 ppm	2 ppm	-	5 ppm	-
Chloroform	(5)	2 ppm	2 ppm	-	10 ppm	-
1,1,1 Trichloroethane	350 ppm	-	350 ppm	-	350 ppm	450 ppm

(1) NIOSH Guide 1990
(2) OSHA, 29 CFR 1910.1000
(3) ACGIH TLV Booklet, 1992-1993
(4) Minimize workplace exposure concentrations; limit number of workers exposed.
(5) Lowest reliably detectable concentration
- Indicates information is not available
TWA - Time Weighted Average
STEL - Short Term Expsoure Limit

Table IV.3. Radiological Hazards of Concern[a,b]
page 1 of 3

Radionuclide	Major Radiations	Radioactive Half-Life	Inhaled Air Lung Retention Class DAC (µCi/mL)			Monitoring Instrument
			D	W	Y	
Actinium-227	Beta, gamma	21.6y	2.E-13	7.E-13	2.E-12	Pancake GM probe
Americium-241	Alpha, gamma	458y	-	2.E-12	-	MicroR meter
Cesium-137	Beta, gamma	30.0y	7.E-08	-	-	MicroR meter
Cobalt-60	Beta, gamma	5.263y	-	7.E-08	1.E-08	MicroR meter
Curium-244	Alpha, gamma	17.6y	-	4.E-12	-	Alpha scintillometer or gas proportional
Neptunium-237	Alpha, gamma	2.14×10^6y	-	2.E-12	-	Alpha scintillometer or gas proportional
Neptunium-239	Beta, gamma	2.346d	-	1.E-06	-	Alpha scintillometer or gas proportional
Plutonium-238	Alpha, gamma	86.4y	-	3.E-12	7.E-12	FIDLER, or Alpha scintillometer
Plutonium-239	Alpha, gamma	24,390y	-	2.E-12	6.E-12	FIDLER, or Alpha scintillometer
Plutonium-240	Alpha, gamma	6580y	-	2.E-12	6.E-12	FIDLER, or Alpha scintillometer
Plutonium-241	Beta, gamma	13.2y	-	1.E-10	3.E-10	Pancake GM probe
Plutonium-242	Alpha, gamma	3.79×10^5y	-	2.E-12	6.E-12	Alpha scintillometer or gas proportional
Polonium-208	Alpha, gamma	2.93y	NL	NL	NL	Alpha scintillometer or gas proportional
Polonium-209	Alpha, gamma	103y	NL	NL	NL	Alpha scintillometer or gas proportional
Polonium-210	Alpha, gamma	138.40d	3.E-10	3.E-10	-	Alpha scintillometer or gas proportional
Protactinium-231	Alpha, gamma	3.25×10^4y	-	7.E-13	2.E-12	Alpha scintillometer or gas proportional
Radium-226	Alpha, gamma	1602y	-	3.E-10	-	Alpha scintillometer or gas proportional

Table IV.3. Radiological Hazards of Concern[a,b]
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Radon-222	Alpha, gamma	3.8229d	8.E-08[d]	-	-	A field instrument is not needed to detect this radionuclide in outdoor areas
Strontium-90	Beta	27.7y	8.E-09	-	8.E-09	Pancake GM probe
Thorium-228	Alpha, gamma	1.910y	-	4.E-12	7.E-12	Alpha scintillometer or gas proportional
Thorium-229	Alpha, gamma	7340y	-	4.E-13	1.E-12	Alpha scintillometer or gas proportional
Thorium-230	Alpha, gamma	8.0×10^4y	-	3.E-12	7.E-12	Alpha scintillometer or gas proportional
Thorium-232	Alpha, gamma	1.41×10^{10}y	-	5.E-13	1.E-12	Alpha scintillometer or gas proportional
Tritium (water)[e]	Beta	12.262y	2.E-05	2.E-05	2.E-05	No field instrument is commonly available to detect this radionuclide
Tritium (Elemental)[e]	Beta	12.262y	5.E-01	5.E-01	5.E-01	No field instrument is commonly available to detect this radionuclide
Uranium-233	Alpha, gamma	1.62×10^5y	5.E-10	3.E-10	2.E-11	Alpha scintillometer or gas proportional
Uranium-234	Alpha, gamma	2.47×10^5y	5.E-10	3.E-10	2.E-11	Alpha scintillometer or gas proportional
Uranium-235	Alpha, gamma	7.1×10^8y	6.E-10	3.E-10	2.E-11	Alpha scintillometer or gas proportional
Uranium-238	Alpha, gamma	4.51×10^9y	6.E-10	3.E-10	2.E-11	Alpha scintillometer or gas proportional

DAC - Derived Air Concentration. Quantity obtained by dividing the ALI (Annual Limit on Intake) for any given radionuclide by the volume of air breathed by an average worker during a working year ($2.4 \times 10^3 m^3$).
GM - Geiger Müller.
FIDLER - Field instrument for the detection of low energy radiation.
NL - Not listed.
D,W,Y - Day, Week, Year

[a]DHEW 1970. "Radiological Health Handbook." U.S. Department of Health, Education, and Welfare, Public Health Service, Food and Drug Administration, Bureau of Radiological Health, Rockville, Maryland. Revised edition, January 1970.

[b]DOE 1989. "Radiation Protection for Occupational Workers." DOE Order 5480.11, December 21, 1988. U.S. Department of Energy, Washington, D.C., Change 1: July 20, 1989.

[c]A dash indicates no values given for this data category.

Table IV.3. Radiological Hazards of Concern[a,b]
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[d]These values are appropriate for protection from radon combined with its short-lived daughters and are based on information given in the International Committee on Radiological Protection (ICRP) Publication 32: "Limits for Inhalation of Radon Daughters by Workers and Federal Guidance Report No. 11: Limiting Values of Radionuclide Intake and Air Concentrations, and Dose Conversion Factors for Inhalation, Submersion, and Ingestion," (EPA 520/1-88-020). The values given are for 100% equilibrium concentration conditions of the radon daughters with the parent. To allow for an actual measured equilibrium concentration or a demonstrated equilibrium concentration, the values given in this table should be multiplied by the ratio (100%/actual %) or (100%/demonstrated %), respectively. Alternatively, the DAC values for radon-222 may be replaced by 1/3 WL, for appropriate limiting of daughter concentrations.. A "Working Level" (WL) is any combination of short-lived radon daughters in one liter of air without regard to the degree of equilibrium, that will result in the ultimate emission of 1.3E + 05 MeV of alpha energy (DOE 1989). Because of the dosimetric considerations for radon, no f_1 or lung clearance values are listed (DOE 1989).

[e]The ICRP identifies tritiated water as having immediate uptake and distribution; therefore no solubility classes are designated. For purposes of this table, the DAC values are shown as being constant, independent of solubility class. For tritiated water, the inhalation DAC values allow for an additional 50% absorption through the skin, as described in ICRP Publication No. 30: "Limits for Intakes of Radionuclides by Workers". For elemental tritium, the DAC values are based solely on consideration of the dose-equivalent rate to the tissues of the lung from inhaled tritium gas contained within the lung, without absorption in the tissues (DOE 1989).

Tritium is not expected to be encountered in OU5 sampling activities. In the event that low levels are detected, standard soil and groundwater sampling protection equipment (nitrile gloves) would be sufficient to protect personnel.

4.1.11. Non-Ionizing Radiation

Non-ionizing radiation is not normally associated with hazardous waste site activities; however it could be present because of equipment in use on or near the site. Naturally occurring non-ionizing radiation will also be present in the form of ultraviolet radiation from sunlight. Other types of non-ionizing radiation include the following:

- low-frequency radiation;
- radiofrequency radiation;
- microwave radiation;
- lasers, and
- ultrasound.

The SHSC shall review each of the OU5 work areas prior to field activities and information concerning the presence of non-ionizing radiation sources will be included on the site-specific checklist. Exposure levels to the types of non-ionizing radiation will be maintained at or below the ACGIH TLVs for Physical Agents.

4.1.12. Biological Hazards

Potential biological hazards include poison ivy, chiggers, mosquitos, bites from animals and poisonous and non-poisonous reptiles received while working in the field. If live trapping of animals is necessary, only qualified and experienced personnel will be permitted to capture the wildlife. This will prevent unexpected attacks to untrained personnel. First-aid treatment and prevention measures, such as the use of insect repellent, will be available to prevent and treat exposure to the biological hazards. The potential consequences of exposure to biological hazards are generally minor, such as local soreness and swelling. However, more severe consequences such as Lyme disease and allergic reactions to bee stings, may result in death in extreme cases. Exposure pathways include inhalation, ingestion, dermal contact, or puncture.

The incidence of Lyme disease has increased, particularly in the eastern United States. Lyme disease is carried by ticks, which are likely to be encountered in high grass and wooded areas. Use of repellents and Tyvek (taped cuffs) in these areas, along with careful inspection while showering, will greatly reduce the risk of contracting Lyme disease. Symptoms of Lyme disease mimic those of less serious illnesses. In the early stages, the symptoms are achy muscles and joints, similar to the flu. Often, but not always, there will be a rash at the point of the bite. Later stages involve symptoms similar to arthritis and the

disease may be fatal. The key to the cure is early detection and treatment. If there is a reasonable suspicion of a bite, a blood test will be needed to identify the disease.

All stings and bites should be taken seriously. Personnel visiting or working at the AOC who are known to be allergic to insect stings will notify the SHSC and make available their prescribed treatment to first aid trained personnel. Personnel should report all insect stings or bites and should be observed for severe swelling of the affected area, shortness of breath, nausea, or shock. If these signs and symptoms are noted, personnel should seek immediate medical attention.

4.1.13. Electrical Hazards

Electrical hazards at each AOC will vary depending on the availability of electricity. Overhead power lines, downed electrical wires, and buried cable are generally associated with areas known to have electricity available. Before site activities take place, the locations and the voltage of any electrical conductors present should be identified. Procedures should be incorporated for preventing electrocution from contact with or severance of electrical conductors. Where electricity is not available, the use of portable power sources could introduce hazards.

Electrical equipment such as power tools and extension cords introduce arcing, heat generation, and possible electrocution through ground faults. Arcing and heating may be ignition sources for flammable or combustible materials, gases, or atmospheres. Arcing can occur when plugging or unplugging equipment, from contacts within the equipment, and from ground faults. Excessive heat can be generated from worn-out equipment, improper wiring, use of the wrong tool for the job, or misuse. To reduce the shock hazards, the use of ground fault circuit interrupters (GFCI) is required for electrical at construction projects.

Portable electrical hand tools and power sources will be connected to GFCIs. Electrical hand tools and extension cords will be inspected for obvious defects such as bent or broken plug parts, exposed conductors, or damaged insulation. Defective tools will be removed from service, tagged with "Danger - Do Not Use" tags, and segregated to prevent their use in the field. The potential for other electrical hazards will be determined on a case-by-case basis.

Hazardous Location Classifications are described in 29 CFR 1910.307, 1910.399, 1926.407, and 1926.449. When conditions meet the definitions of this classification scheme, the use of intrinsically safe, non-sparking equipment designed for the specific class of atmosphere will be required [29 CFR 1910.307(b)

and 1926.407(b)]. The EG&G Mound Plant Lock Out/Tag Out requirements, M-3 SAIC Lock Out/Tag Out Program and 29CFR1910.147 requirements will be followed.

Employees will not work directly on or in close proximity to any part of an electrical power circuit unless the circuit has been deenergized and grounded or an insulating barrier or other means is used to protect the employee from electric shock [29 CFR 1926.416(a)(1)].

When the exact location of buried electric power lines is not known and hand tools will be used for digging, insulated protective gloves will be provided to employees [29 CFR 1926.416(a)(2)].

4.2. TASK-BY-TASK RISK ANALYSIS

This subsection lists each proposed task, identifies potential hazards, and estimates likelihood of exposure. Modified Level D personal protective equipment (PPE) will be worn for all tasks (Refer to Section 6 of this plan). Upgrades will be based upon the results of monitoring or as determined by the SHSC.

Heat or cold stress problems may occur during OU5 field work. Dependent upon the temperature, humidity, wind speed, and worker activity levels, the appropriate number of breaks for warm-up or cool down and fluid replenishment will be established.

Task: Soil Sampling/Drilling

Likelihood of Exposure: Moderate to High

Potential Hazards:

A drill rig has several moving parts which may allow for entanglement and pinch points. The wire cables may fail under extreme stress or misuse and act as a whip, severely injuring workers. Impacts noises are a concern and may require the use of hearing protection. Vehicular traffic may present a hazard to the workers. Signs, cones or barrels and the buddy system will be used to increase worker protection. Low and high voltage utilities may present a problem. EG&G Mound Plan construction officials will scan the area for utilities and provide a clearance to drill. Radiological and chemical hazards may occur when drilling disturbs the soil. The rig can stir up dust, increasing the possibility of worker exposure through inhalation. An EG&G Mound Plant health physics surveyor will monitor worker exposures to radiation and will make recommendations for increased levels of radiological protection. Chemical contaminants are expected in OU5, the likelihood of exposure to them is moderate.

TASK: Groundwater Sampling

Likelihood of Exposure: Low

Potential Hazards:

In groundwater sampling there is a possibility for physical injury. Possible injuries are limited to bruised, cut, or burned fingers and possible back or muscle strain associated with the lifting/operation of a gasoline-powered air compressor, which drives dedicated bladder pumps. Signs, cones or barrels and the buddy system will be used to increase worker protection in areas of vehicular traffic. Chemical and radiological hazards may occur when well water containing low levels of VOCs and tritium is brought to the ground surface and may come in contact with field personnel through inhalation, ingestion, or skin contact.

Task: Hand Auguring

Likelihood of Exposure: Moderate

Potential Hazards:

The hazards are similar to those for a drilling operation. A powered hand auger presents the operator with entanglement and pinch point hazards but to a lesser degree than a drill rig. A nonpowered hand auger reduces the probability of physical injury greatly. Vehicular hazards in the work area should be monitored. Signs, cones or barrels and the buddy system will be used to increase worker protection. Low and high voltage utilities are a major concern. The area will be scanned for presence of utilities by an EG&G Mound Plant construction official who will issue a drilling clearance for subsurface drilling. Exposure to noise above OSHA limits for unprotected workers should not occur, except near the hollow stem drill rig. The hand auger can generate dusts increasing the likelihood for inhalation of radiological and chemical contamination.

Task: Surface Water and Sediment Sampling

Likelihood of Exposure: Moderate to high

Potential Hazards:

Working near contaminated water presents field personnel with a variety of chemical, radiological, and physical hazards, but the likelihood for exposure to these hazards depends upon the precautions taken by field personnel. Surface water samples may be taken both on land near the water's edge and from a boat. Potential physical hazards of this activity are cuts, bruises, slips, trips, falls, and drowning. Chemical and radiological hazards are also likely. Contact with the contaminants in water carries the highest risk. Falling out of the boat would cause total immersion in the contaminated water, and the degree of hazard from this accident would depend on the amount of chemical or radiological contamination. Precautions

have been developed to prevent this and are outlined in subsection 4.1.1 of this document. Risk-avoidance techniques and personnel protective equipment can provide the best defense against these hazards.

TASK: Decontamination

Likelihood of Exposure: Low

Potential Hazards:

A potential exists for direct contact with the radioactive contaminants which may enter the body through accidental ingestion or dermal absorption. Precautions should be exercised during decontamination activities to prevent contact with the decontamination solutions and runoff.

TASK: Geophysical Testing

Likelihood of Exposure: Low

Potential Hazards:

Geophysical testing is non-intrusive, so there is little possibility of exposure to chemical or radiological hazards. Potential physical hazards of this activity include cuts, bruises, trips, slips, and falls.

TASK: Ecological Assessment

Likelihood of Exposure: Low

Potential Hazards:

Potential physical hazards include slips, trips, falls, cuts, bruises, electrical shock and drowning. Handling of small animals may result in bites and scratches.

TASK: Air Sampling

Likelihood of Exposure: Low

Potential Hazards:

Exposure to impact noises may occur if the individual samples at the drill rig while the auger is in motion. Entanglement hazards may exist if the individual samples at the drill rig while the auger is in motion. Therefore, jewelry, tags, long hair, and loose clothing should be secured against the body while working at the drill rig. Exposure to vehicular traffic hazards will be controlled with the use of signs, cones or barrels and the buddy system. A slight possibility for exposure to contaminants through inhalation of chemically and radioactively contaminated dusts exists.

5. WORKER TRAINING

As in all field activities at hazardous waste sites, site personnel must meet certain criteria before entering a potentially hazardous area. The criteria outlined in OSHA regulations 29 CFR 1910.120 (CFR 1990) state that general site workers should receive:

- 40 hours of H&S indoctrination training,
- Three 8-hour days of supervised on-the-job training,
- 8-hour annual OSHA refresher training,
- Hazard Communication training per 29 CFR 1910.1200.

Occasional site workers (such as biologists) should receive:

- 24 hours of H&S indoctrination training,
- One 8-hour day of supervised on-the-job training,
- 8-hour annual OSHA refresher training,
- Hazard Communication training per 29 CFR 1910.1200.

Supervisors should receive an additional 8 hours of training. Workers that may require upgrading to Level C protection require the participation in an annual respirator fit-test and training program.

The following DOE training may be required and should be covered by attending a Mound training session:

- DOE/EH-0227P (DOE 1991) visitor training,
- DOE Occurrence Reporting Training, DOE Order 5000.3B,
- General Employee Radiological Training.

Pre-entry, site-specific H&S training (i.e. confined space entry and lock out/tag out training) should be conducted when applicable and documented for all members of the field team. Information in this plan will be presented to the field team members by the SHSC during a site-specific health and safety training session before the investigations begin. An outline of the site-specific training is provided in Table V.1.

At least two onsite members of the field team will have current Red Cross or equivalent certification in first aid and cardiopulmonary resuscitation.

Table V.1. Training Outline

I. Purpose and Objectives of Training

II. Names of Personnel and Alternatives Responsible for Site H&S

III. Recognizing, Eliminating and Controlling H&S Hazards at Mound Plant
- A. Physical hazards
  - structures
  - noise
  - equipment
  - terrain
  - heat
  - cold
- B. Chemical hazards
  - heavy metals
  - volatile organics
  - flammable materials
  - other (polychlorinated biphenyls, asbestos, etc.)
- C. Radiological hazards
  - internal
  - external
- D. Biological hazards
  - insect
  - snake
  - plant
  - mammal
- E. Potential health effects
  - recognition of the signs and symptoms of overexposure to the physical hazards of cold or heat
  - recognition of the signs and symptoms of overexposure to site contaminants

IV. Safety and Monitoring Requirements
- A. Controlled area restrictions
  - eating/drinking/smoking
  - access control points
- B. Protective equipment requirements
  - clothing: hard hats, steel-toed boots, gloves, coveralls
  - respiratory protection training
- C. Procedures for using protective equipment
  - respirator fit-test, use, and maintenance
  - impermeable clothing
- D. Personnel contamination monitoring and decontamination
- E. Lockout/Tagout requirements
- F. Confined space entry requirements

V. Emergency Response Requirements
- A. Getting emergency assistance
- B. Emergency notification procedures
- C. Spill containment

VI. Communicating Information on Hazards (Right to Know)
- A. Hazardous materials inventory
- B. Material safety data sheets (MSDSs)
  - as applicable from the site safety evaluation form (Appendix B)
- C. Labelling requirements.

The SHSC (or designate) will conduct daily H&S briefings for the field investigation team. The content of the briefings should include the following topics:

1. Environmental hazards
   - poisonous plants
   - animals
   - adverse weather
   - noise
   - heat/cold

2. Hazardous Working Conditions
   - exposure to hazardous materials
   - uneven/elevated/slippery work surfaces
   - fall protection
   - review of MSDS's
   - adequate illumination
   - overhead hazards

3. Operating Equipment Hazards
   - high voltage
   - toxic emissions
   - rotating machinery

4. Sampling Operations
   - handling
   - labelling
   - packaging
   - storing
   - transporting

5. Personal Hygiene

6. Personal Protection Equipment

7. On-site H&S Monitoring

8. Emergency Procedures
   - location of communication equipment
   - location of first aid

9. Decontamination Operations

Records of the briefings, including signed attendance sheets, will be kept in the project file.

6. PERSONNEL PROTECTION REQUIREMENTS

Modified Level D protection will be used for OU5 investigation activities on the basis of the soil gas sampling (HGC 1987) and the expectation that little contamination is present. However, if levels of organic vapors approaching 1 unit above background, as measured by a photoionization detector (PID), or a flame ionization detector (FID) are detected in the breathing zone, the AOC will be evacuated and further action will be reevaluated by the OTM and the SHSC, as necessary, to avoid the inhalation of toxic vapors. The following protective equipment levels were taken from 29 CFR 1910.120 Appendix B. Also refer to Appendix D of the OU5 HSP for SAIC's personnel protective equipment (PPE) program.

Modified Level D protective equipment will include the following:

- Tyvek or another type of coverall, when dusty or dirty operations are being performed,
- Saranex, when muddy or wet conditions are present,
- nitrile gloves,
- steel-toed safety boots,
- disposable boot covers, where appropriate,
- hard hats, safety glasses, and hearing protection, as needed, and
- hip waders and life jackets, as necessary.

If needed, Level C protective equipment will include the following:

- full-face, air-purifying, cartridge-equipped (GMC-H) respirators,
- chemical-resistant clothing (overalls and long-sleeved jacket, hooded one or two piece chemical splash suit); disposable chemical-resistant one-piece suit,
- Saranex, when muddy or wet conditions are present,
- latex inner gloves,
- nitrile outer gloves,
- steel-toed safety boots with disposable latex or polyvinyl chloride boot covers,
- hard hats and hearing protection, as necessary, and

- hip waders and life jackets, as necessary.

If needed, Level B protective equipment will include the following:

- positive pressure, full-facepiece SCBA or supplied-air respirator with escape SCBA,
- chemical-resistant clothing (overalls and long-sleeved jacket, hooded one or two piece chemical splash suit); disposable chemical-resistant one-piece suit,
- latex inner gloves,
- nitrile outer gloves,
- steel-toed boots with disposable latex or polyvinyl chloride boot covers,
- hard hats and hearing protection (as necessary), and
- hip waders and life jackets (as necessary).

If Level B or Level C protection is required, the SHSC will be present to oversee the Level B and Level C activities. Subcontractors must follow all H&S requirements given in this HSP and will provide their own protective equipment. The Mound Plant Health Physics department will provide the appropriate respirators, medical examination, and respirator fit test and training as needed.

The radionuclide concentrations may exceed background levels during the investigation of OU5. Plutonium and thorium represent inhalation hazards, so engineering controls such as dust suppression should be used, as necessary, to prevent the inhalation of particulates, especially during drilling or dust-producing activities. Chemical-resistant clothing and disposable gloves will be worn as required. In wet areas, Saranex coveralls and overboots or hip waders will be worn. All protective clothing will be decontaminated, if necessary, and disposed of in accordance with SOP 1.15 Guide to Management of Investigation-Derived Material (Rev. 3).

When dust levels reach 5 mg/m^3, radioactively contaminated particulates may approach levels of concern if soil concentrations of plutonium-238 or thorium-230 are greatly elevated. Therefore, at 5 mg/m^3 on the real-time aerosol monitor (RAM), the level of protection will be upgraded to Level C, and additional air sampling will be implemented. A downgrade to Level D can occur only when air sampling results indicate that airborne radioactively contaminated particulate levels are below a third of the most restrictive DAC $1x10^{-12}$µCi/mL. Air sampling to allow downgrading based upon radiological contamination will require the collection of air particles on a filter and gross alpha analysis using a portable alpha sample counter. Gross alpha results will be compared to the DAC for the radionuclide of concern in the area

where activities are being conducted. Refer to the DOE's Radiological Control Manual (RCM) for additional information relevant to contractor work at DOE facilities.

The levels of protection will also be based on the total organic levels for a 1-minute sustained reading in the breathing zone, as measured with the PID, flame ionization detector (FID), colorimetric tubes, or the RAM (Table VI.1).

High concentrations of radioactive contamination in soils, in the range of 600 pCi/g, would be necessary to exceed the DAC for thorium or plutonium, if $5mg/m^3$ of respirable dust (< 10 microns) are generated. This is verified by the following calculation:

$$C=\frac{(DAC)\ F_1F_2}{g\ F_3}$$

Where:

C=Concentration of contaminant in soil
DAC= 3×10^{-12}uCi/mL for plutonium - 238 and thorium - 232

$g=5mg/m^3$ limit for particulates in air
$F_1=10^6$pCi/uCi
$F_2=10^6 mL/m^3$
$F_3=10^{-3}$g/mg

Therefore: C=600pCi/g

6.1. JUSTIFICATION FOR PROPOSED LEVELS OF PROTECTION

The concentration ranges for each level of protection prescribed in this document are applicable to the Mound Plant. The proposed concentration ranges are for Levels D, C, and B protection and are supported by the following information:

- The most restrictive numerical exposure limit value of the known volatile contaminants is 1 ppm for benzene (NIOSH 1990);

- The lower detection limit of a PID is approximately 0.1 unit. The actual value is dependent upon the substance(s) detected and their ionization potentials. The OSHA ceiling concentration is 5 ppm for vinyl chloride for a 15-minute period. This ceiling concentration is not to be exceeded without adequate protection;

- Air-purifying cartridges do not provide sufficient protection from vinyl chloride because of rapid breakthrough. In addition, the odor threshold of benzene is greater than the exposure limit, which also prevents the use of air-purifying cartridges as protection;

Table VI.1. Levels of Protection vs. Concentration

Protection Level	Concentration Range
Level D	< 2 mg/m^3 cyanide with colorimetric tubes
	< 1 unit above background on PID or FID
	< 5 mg/m^3 dust levels
Level C	1-5 unit above background on PID or FID without benzene or vinyl chloride present
	> 5 mg/m^3 dust levels
	100 times the values on Table VIII.2 of this HSP or one tenth the DAC on the air filters which ever is less
Level B	> 1 unit above background on PID or FID with benzene or vinyl chloride present on the colorimetric tubes
	> 20% lower explosive limit on the combustible gas indicator (CGI)
	DAC on air filters
	> 3 times background or 1 mR/hr
	> 5 ppm above background on PID or FID
	> 2 mg/m^3 cyanide on colorimetric tubes

- Benzene and vinyl chloride, the most restrictive exposure limit contaminants, have ionization potentials and relative responses that allow detection by photoionization with a 10.2 eV lamp;

- Air-purifying respirators (GMC-H cartridges) will provide respiratory protection if dust levels are elevated or airborne radioactive contamination is present.

If benzene or vinyl chloride are present at concentrations greater than 1 unit above background, work will stop until appropriate equipment and personnel can be mobilized to the Site.

Surveys will be performed with a FID or PID that has a 11.7 eV lamp to confirm levels of organic contaminants at all work locations. Colorimetric tube measurements will be taken for vinyl chloride and benzene if FID or PID readings reach 1 unit above background in the breathing zone. Measurements will be performed according to applicable SOPs for H&S monitoring and recorded in the appropriate logbook and SOP forms. The level of protection worn will be documented in the appropriate logbook.

6.2. PROTECTIVE EQUIPMENT

Emergency equipment, such as fire extinguishers, first aid kits, blankets, and eye wash kits, will be available for immediate response and treatment. Emergency equipment should be clearly marked and the locations pointed out during the H&S training.

7. MEDICAL SURVEILLANCE

OSHA requires medical surveillance for "employees who are or may be exposed to hazardous substances or health hazards at or above the permissible exposure limits or, if there is no permissible exposure limit, above the published exposure levels for these substances without regard to the use of respirators, for 30 days or more a year" (29 CFR 1910.120, paragraph f) (CFR 1991).

This medical surveillance will include the following:

- baseline medical examination, which includes an evaluation of fitness to wear a respirator and identification of any preexisting conditions that would prevent work with hazardous substances,
- periodic examination (required yearly),
- successful completion of a respirator fit test,
- examination upon termination of employment, and
- examinations when incidents or exposures occur.

Medical examinations will include a medical and work history with emphasis on symptoms related to the handling of hazardous substances and health hazards and a fitness for duty statement documenting the worker's ability to wear any required PPE under expected work conditions.

This medical examination will be of no cost to the worker, without loss of pay, and at a reasonable time and place.

The attending physician will be provided a copy of 29 CFR 1910.120 and its appendices in addition to the following for each worker:

- description of the worker's duties as related to the exposures,
- worker's anticipated exposure levels,
- description of PPE to be used,
- information from previous medical examinations which is not readily available to the physician, and
- respiratory protection requirements listed in 29 CFR 1910.134.

The worker will be furnished a copy of the physician's written opinion and results of the medical examination and tests. Medical surveillance records will be retained as required in 29 CFR 1910.20.

All personnel participating in field activities under the ER Program will have proof of participation in a medical monitoring program that complies with OSHA requirements and proof that they are certified to work with hazardous substances. This certification includes the pulmonary function capability for each worker. Field personnel should also provide proof of successful completion of a respirator fit test. These proofs will be provided to the SHSC before field activities begin and will be kept on file at the AOC support office until activities are completed.

Additional medical monitoring of all field team members may be performed as required by EG&G Mound Plant when work is to be performed at radioactively contaminated areas. This may include baseline whole-body counts to be performed onsite by Mound Plant EG&G staff, urinalysis before the project begins, and whole-body counts and/or urinalysis after the project is completed. If use of Mound Plant respirators is dictated by Mound Plant EG&G officials, EG&G will provide the respirators, medical examinations, and respirator fit tests.

In addition to any emergency reporting requirements, injuries to field workers in OU5 will be reported to Mound and SAIC H&S officials and in accordance with OSHA and workers' compensation regulations. SAIC's "Supervisor Accident Investigation Report" (Appendix C) and "Release to Return to Work" forms will be completed prior to permitting an injured worker to return.

8. FREQUENCY AND TYPES OF MONITORING

The SHSC will coordinate monitoring of exposure of field personnel to physical, chemical, radiological, biological, and electrical hazards described in this plan. Pre-entry monitoring should be conducted prior to sampling activities to identify immediately dangerous to life or health (IDLH) or elevated conditions. Monitoring will also be conducted prior to new sampling activities. Measurement data should be recorded on appropriate Mound Plant ER Program SOP forms (DOE 1992). Applicable SOPs are listed in Table VIII.1. and may be located in the latest revision of the OU9 Quality Assurance Project Plan. A supply of the appropriate forms will be kept at the work site by the SHSC. Completed forms will be filed in the Contractor document control files. Copies of these forms should be transmitted to Mound Plant.

The following instruments will be used as required:

- Photoionization Detector (PID). When the contaminants are unknown, the 11.7 eV probe will be used. If the contaminants are known and have ionization potentials below 10.2 eV, the 10.2 eV probe is permissible. One exception when the PID is not required is where there will be no intrusive activity;

- Alpha scintillometer. The alpha scintillometer will be used to screen personnel prior to their leaving an area of suspected alpha contamination;

- Real-time aerosol meter (RAM). The RAM may be used to determine total dust levels during activities where dusts are anticipated to be a problem;

- Combustible gas indicator (CGI). The CGI will be used to detect the presence of combustible gases at areas where any intrusive activity deeper than 5 ft below ground surface takes place or when there is an enclosed space such as the head-space in a monitoring well. The activities that include intrusive sampling are the drilling and soil boring;

- Flame ionization detector (FID). The FID will be required if a compound is identified that the PID will not read. The FID is better at detecting shorter chain compounds;

- FIDLER or NaI μR meter. Either of these must be used when elevated radioactive levels are anticipated or suspected. The general action level is three times background. All

Table VIII.1. Mound Plant ER Program Standard Operating Procedures for Health and Safety Monitoring

SOP No.	Title
1.1	General Instructions for Field Personnel (Rev. 2)
1.6	General Equipment Decontamination (Rev. 2)
1.7	Sampling for Removable Alpha Contamination (Rev. 1)
1.8	Personnel Decontamination--Level D Protection (Rev. 1)
1.9	Personnel Decontamination--Level C Protection (Rev. 1)
1.10	Personal Decontamination--Level B Protection
1.12	Air Particulate Sampling with a Real-Time Aerosol Monitor (Rev. 0)
1.15	Guide to Management of Investigative-Derived Material (Rev. 3)
6.1	Health and Safety Monitoring of Combustible Gas Levels (Rev. 1)
6.2	Health and Safety Monitoring of Organic Vapors with a Photoionization Detector (Rev. 1)
6.3	Health and Safety Monitoring of Organic Vapors with a Flame Ionization Detector (Rev. 2)
6.4	Total Alpha Surface Contamination Measurements (Rev. 1)
6.7	Near Surface and Soil Sample Screening for Low-Energy Gamma Radiation Using the FIDLER (Rev. 0)
6.11	Beta-Gamma Radiation Measurements Using a Geiger-Mueller Detector (Rev. 0)
6.15	Measurement of Gamma-Ray Fields Using a Sodium Iodide (NaI) Detector (Rev. 0)
6.16	Heat Stress Monitoring (Rev. 0)

Reference: DOE 1992

FIDLER - Field instrument for the detection of low-energy radiation

drilling, soil boring, and soil sampling activities will require use of the FIDLER or NaI μR meter;

- Geiger-Mueller (G-M) detector with pancake probe. This must be used for onsite intrusive work where elevated radioactive levels of gamma and beta activity are suspected. The general action level is three times background. All drilling, soil boring, and soil sampling activities will require use of the G-M detector;

- Air sampling pumps and filters. Medium volume (80L/m) portable air samplers are to be used when the RAM reading exceeds 5 mg/m^3 or when airborne alpha contamination is expected. A portable gross alpha counter will be used to analyze the glass fiber acetate filters. Total maximum measurements are based on instrument surveys for alpha contamination over a 100-cm^2 area (SOP 1.17);

- Colorimetric tubes. These tubes will be used to confirm the presence of benzene, vinyl chloride, cyanide, and dichloromethane.

Each work location will be surveyed with the appropriate instrument before sampling begins and while sampling continues. These surveys will include the use of a PID that has either an 11.7 eV lamp or a 10.2 eV lamp, as appropriate, or a FID to confirm levels of organic contaminants. PID or FID measurements will be taken periodically in the breathing zone during all remedial investigation activities to confirm the level of personal protection is adequate. During drilling, monitoring will be performed after every drilling depth increment, not to exceed a maximum of 10 feet. PID measurements will be performed according to SOP 6.2, Health and Safety Monitoring of Organic Vapors with a Photoionization Detector (Rev. 1) (DOE 1992), and recorded on the appropriate SOP forms. CGI, G-M, and FIDLER measurements will also be performed as necessary. Discovering of new contaminants may trigger PPE selection as indicated in Section 6. Measurements will be documented on the appropriate forms. The level of protection will be documented in the appropriate logbook. At the completion of each field investigation, these forms will be filed at the contractor field office. Copies should be transmitted to the Mound Plant.

Field team members working in potentially radioactive contaminated areas will be monitored or surveyed for radioactive contamination using an alpha scintillometer at the point of exit from the exclusion zone zone (See Section 9, Site Control Measures).

Several types of radiation monitoring/screening may be performed during the RI/FS activities at Mound Plant. The types of instruments used and their frequency of use are as follows:

- Personnel and equipment will be monitored every time a member of the field team leaves a potentially contaminated area or every time potentially contaminated equipment is removed from a work area. In addition, Mound Plant requires final monitoring of equipment prior to removal from the plant security boundary at the end of a job;

- Each general work area or zone will be screened using appropriate radiological instruments before work begins to identify any widespread radioactive contamination sources or hazards. If unexpected contamination is detected, no work will begin until the situation is discussed with a health physicist and Mound Plant representatives, the probable source is identified, and the decision to proceed with appropriate protection is authorized;

- FIDLER screening will be performed during all intrusive activities (soil sampling and drilling). Samples, drill cuttings, and newly exposed soil will be screened as necessary;

- Air sampling and filter analysis may also be performed when potential dust-producing activities are performed and contamination is known to be present (as evidenced by past data or by screening of work areas, samples, or cuttings). When air monitoring is performed, portable air samplers with filter(s) attached will be placed at the worst-case exposure location (on the drill rig or backhoe) and operated for 4 to 6 hours. The filters should be analyzed (counted) each night;

- Every member of the field team will wear a thermoluminescent dosimeter during all field activities where exposure to radioactive contaminants are possible. Thermoluminescent dosimeters can record external exposures from gamma and beta radiation. The personal dosimetry program is managed by the Mound Health Physics Department. This department changes and issues dosimeters on a quarterly basis;

- When intrusive work is performed in areas with the potential for removable radioactive contamination, bioassay samples may be taken before the work begins and at the completion of the task. These samples will be analyzed for the radionuclides of concern, typically plutonium-238, to document any internal exposures that may have occurred. Additional analytes such as tritium may be sampled for as necessary. Small releases of tritium do occur and may result in slightly elevated tritium levels in bioassay samples. EG&G Mound Plant policy will dictate the performances of these tests;

- In areas with the potential for radioactive contamination, Mound Plant may require analyses of 24-hour urine samples before work begins and when the work is completed. This 24-hour urinalyses document baseline and exit internal contamination including tritium levels;

The decision to upgrade personal protection levels based on radiation levels can be the result of several occurrences, which are listed below. This decision is the discretion of the health physicist or SHSC.

- The radionuclide concentrations in the air (as measured and calculated using air sampling and filter analysis) exceed one-tenth of the DAC. The problem with applying this action level is that the air sampling is not real time. Results are not available until filters are counted that evening. This sampling is more useful as a way of documenting conditions in the work area;

- Significant levels of radioactive contamination are found during screening of samples, drill cuttings, or work areas, and an activity is being performed that may produce dust;

- RAM readings are in excess of 5 mg/m^3.

Equipment and personnel will be screened for radioactive contamination before release from the AOC and periodically during field work using an alpha scintillometer to detect alpha-emitting radionuclides such as plutonium-238, according to Mound Plant ER Program SOPs 1.7, Sampling for Removable Alpha Contamination (Rev. 1); and 6.4, Total Alpha Surface Contamination Measurement (Rev. 1) (DOE 1992); and the release limits specified in the DOE Radiological Control Manual (RCM) (See Table V111.2). If release limits are not met initially, additional decontamination may be required. Equipment that cannot meet the release limits may be confiscated and disposed of by Mound Plant health physics personnel. Field personnel who are unable to remove contamination below the release limit should contact the Mound Plant health physics group.

Air sampling may also be performed if AOC information or past data indicate the possibility of airborne (particulate) contaminant levels. The filter(s) will be counted using an alpha scintillometer. If the radioactivity levels of the filter(s) exceed one-tenth of the DAC, Level C protection will be used.

8.1. Calibration and Maintenance

Calibration and maintenance of instruments should be performed according to the manufacturer's specifications and Mound Plant ER Program applicable SOPs. Instruments requiring daily calibration should be calibrated before and after each day of field use. Records of calibration should be retained in the daily logbook.

Table V111.2. Summary of Contamination Values

NUCLIDE (See Note 1)	REMOVABLE ($dpm/100\ cm^2$) (See Notes 2 & 3)	TOTAL (FIXED + REMOVABLE) ($dpm/100\ cm^2$)
U-natural, U-235, U-238 and associated decay products	1,000 alpha	5,000 alpha
Transuranics, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125,I-129	20	500
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	200	1,000
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above. Includes mixed fission products containing Sr-90.	1,000 beta-gamma	5, beta-gamma
Tritium organic compounds, surfaces contaminated by HT, HTO and metal tritide aerosols	10,000	10,000

Notes:

1. The values in this table apply to radioactive contamination deposited on, but not incorporated into the interior of the contaminated item. Where contamination by both alpha-and beta-gamma-emitting nuclides exists, the limits established for the alpha-and betagamma-emitting nuclides apply independently.

2. The amount of removable radioactive material per 100 cm^2 of surface area should be determined by swiping the area with dry filter or soft absorbent paper while applying moderate pressure and then assessing the amount of radioactive material on the swipe with an appropriate instrument of known efficiency. For objects with a surface area less than 100 cm^2, the entire surface should be swiped, and the activity per unit area should be based on the actual surface area. Except for transurancis, Ra-228, Ac-227, th-228, Pa-231 and alpha emitters, it is not necessary to use swiping techniques to measure removable contamination levels if direct scan surveys indicate that the total residual contamination levels are below the values for removable contamination.

3. The levels may be averaged over 1 square meter provided the maximum activity in any area of 100 cm^2 is less than three times the values given in the table.

Source: DOE N 5480.6, U.S. DOE Radiological Control Manual, Table 2-2

9. SITE CONTROL MEASURES

Control zones will be established before work begins at potentially contaminated work areas to protect employees and the general public from unnecessary exposure to toxic materials and radiation and to prevent the spread of contamination. Figure 9.1 shows a typical layout of the three control zones; these include: (1) the exclusion zone, (2) the contamination reduction zone, and (3) the support zone. Figure 9.2 shows the initial proposed work areas in OU5. The control zones will be designated at each work area based on the nature, magnitude, and extent of contamination and on the potential for contaminant migration. Decontamination may be required for personnel, equipment, and vehicles moving from the exclusion zone to the contamination reduction zone.

Additional control zones may also be established for safety considerations other than contamination, including hard hat, eye protection, and ear protection zones; particularly during the operation of heavy machinery and drilling. These control zones, unlike those used for contamination control, may consist of a single exclusion zone. During drilling, the control zone will be at least 25 feet or one boom length in diameter.

The contamination reduction zone is a corridor surrounding the exclusion zone and should be established for final decontamination activities. The size and location of the contamination reduction corridor will depend on the number of stations required for decontamination activities and wind direction. The SHSC will determine the location with the approval of appropriate Mound Plant representatives.

For immediate response and treatment, emergency equipment such as fire extinguishers, first aid kits, blankets, and eye wash kits should be available in the contamination reduction zone adjacent to the exclusion zone. Emergency equipment should be clearly marked, and the locations will be pointed out during the health and safety training described in Section 5 of this HSP.

Egress from the exclusion zone will normally be allowed only through an access station manned by the SHSC, if the area has been designated as Level C, or by a designated safety person specifically trained to conduct contamination monitoring. All personnel and equipment leaving the restricted work area or contacting potentially contaminated materials will be monitored and decontaminated, if necessary.

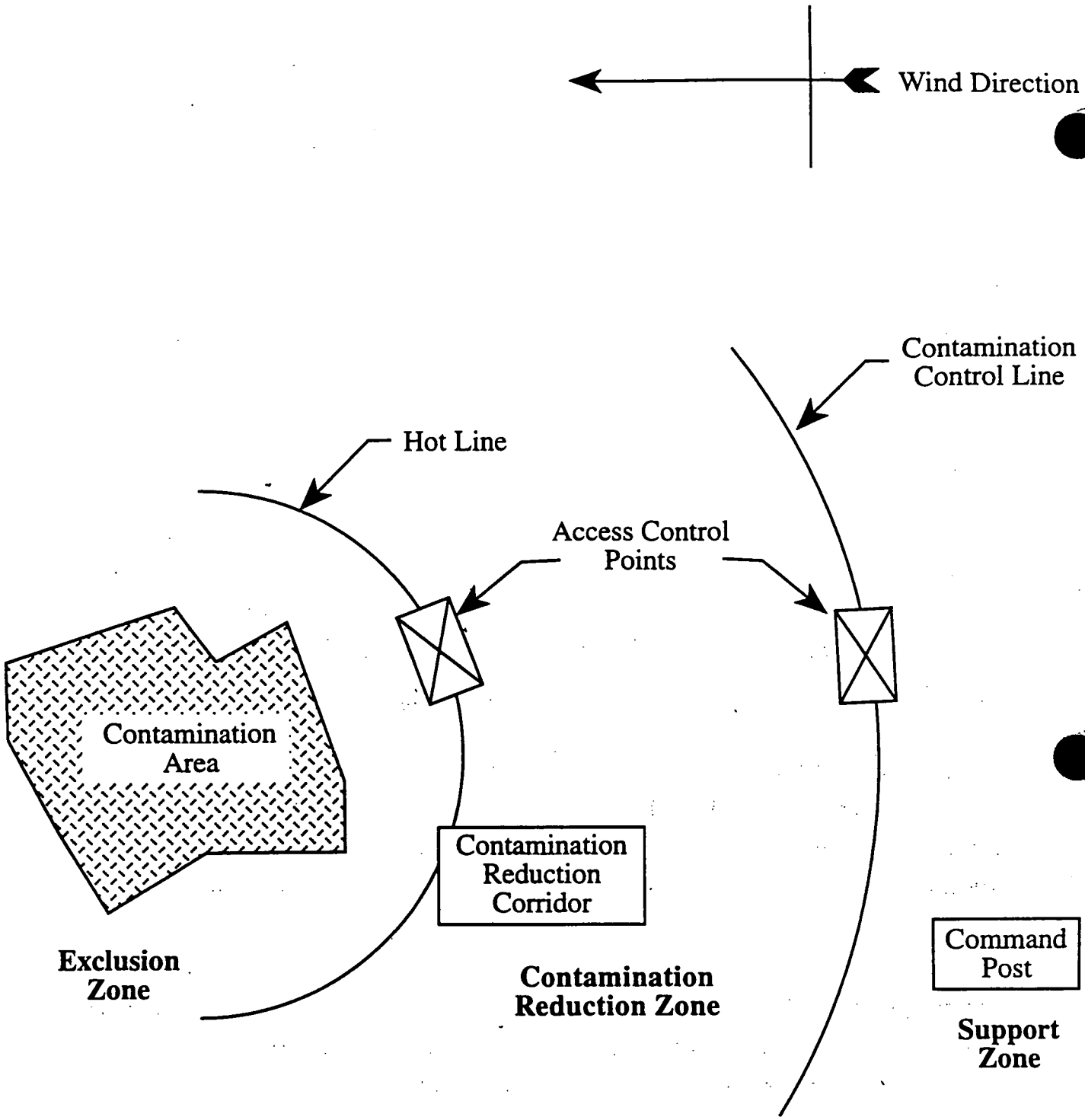

Figure 9.1. Control Zones

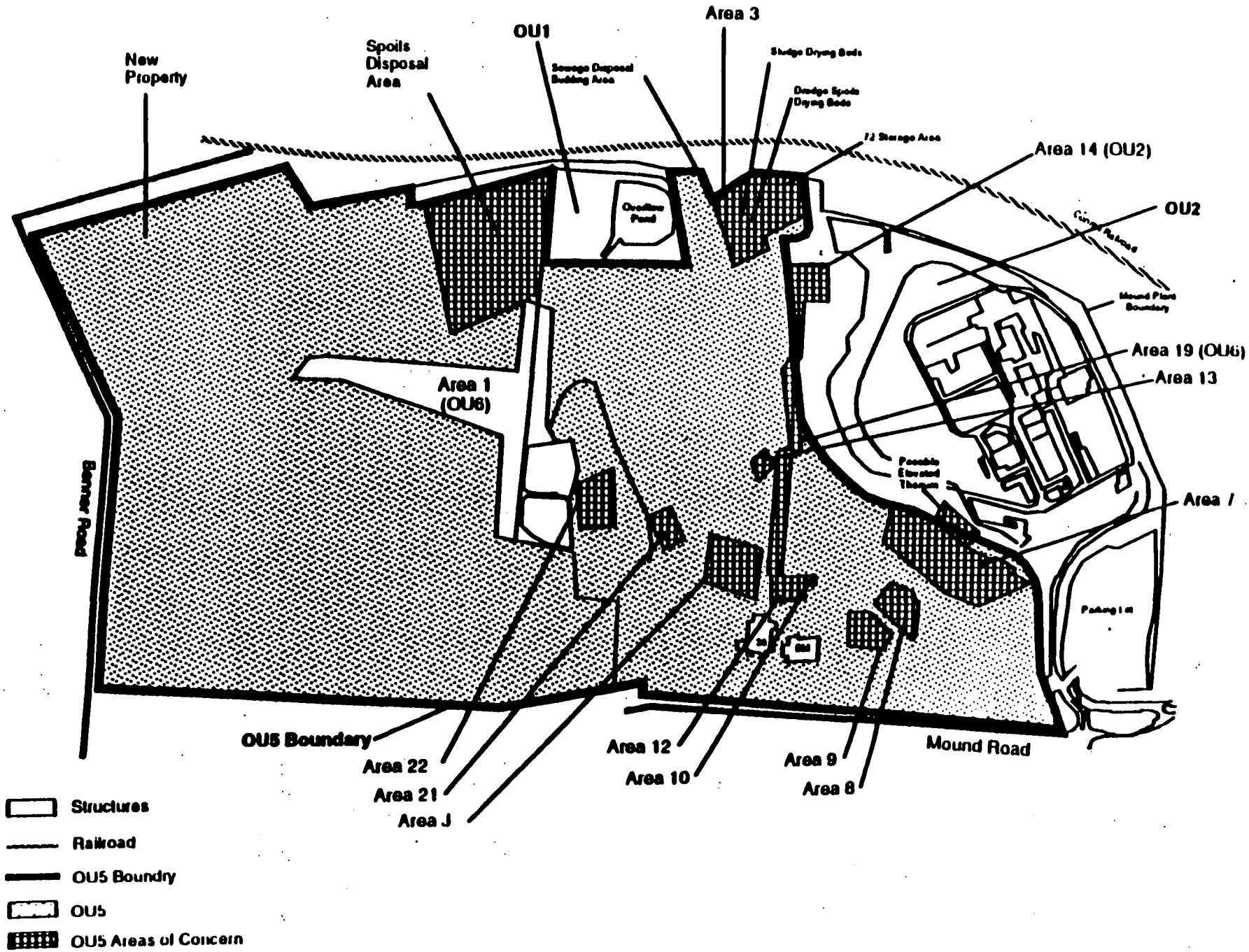

Figure 9.2. Operable Unit 5 Boundaries and Areas of Concern

Personnel assisting in decontamination activities will wear the appropriate protective clothing. Protection levels for decontamination workers will be modified Level D or Level C, depending on the area requirements, as defined in Section 6.1. A personnel contamination log will be maintained by the SHSC to record contamination levels and decontamination measures taken. Audits may be conducted by SAIC to ensure compliance with decontamination procedures (See Appendix C for form).

Some hazards can be minimized through implementation of specific safety procedures, use of special equipment, training of personnel, and availability of emergency response equipment. The following requirements should be enforced during all field activities at Mound Plant:

- Daily pre-activity safety meetings (i.e., tailgate safety meetings) will be held for all personnel involved in field activities to discuss H&S concerns related to the planned activities and to refresh personnel on emergency response plans;

- Eating, drinking, smoking, and chewing gum or tobacco are prohibited in any area designated as contaminated. Hands and face should be washed before eating, drinking, smoking, or chewing;

- Workers should shower as soon as possible after field work and during field work if directed to do so by the SHSC;

- Restricted-access zones should be established according to the field activity and level of protection. For drilling activities, access should be controlled within a minimum 25-feet or one boom length in diameter from all equipment. This control zone should be established for safety considerations and contamination control. The actual dimensions of the control zone should include the space required for the safe operation of equipment and any Mound Plant security requirements.

Containers of hazardous materials will have the original label or replacement labels showing the following information:

- material name,

- chemical rating (toxicity, reactivity, flammability),

- emergency procedures,

- handling precautions,

- associated hazards, and

- name/address/phone number of manufacturer or supplier.

An inventory of AOC hazardous field materials will be maintained at the work area. The inventory will include the following information:

- product name,
- quantity on hand, and
- location.

The inventory will be updated as hazardous materials are added or removed from the field.

Worker activities in contaminated and otherwise hazardous areas will be conducted utilizing a buddy system. The buddy should be able to do the following:

- assist his or her partner,
- observe his or her partner for signs of exposure,
- periodically check the integrity of his or her partner's PPE, and
- call for help in the event of an emergency.

10. DECONTAMINATION PROCEDURES

Personnel and equipment will be decontaminated during all field investigations at Mound Plant according to the following SOPs (DOE 1992):

- 1.6, General Equipment Decontamination (Rev. 2),
- 1.8, Personnel Decontamination - Level D Protection (Rev. 1),
- 1.9, Personnel Decontamination - Level C Protection (Rev. 1), and
- 1.10, Personnel Decontamination - Level B Protection (Rev. 0).

Any waste materials generated as a result of field investigations, such as decontamination activities are known as Investigative Derived Material (IDM). IDM will be managed in accordance with SOP 1.15, Guide to Management of Investigative-Derived Material (Rev. 3). In addition to the requirements of this procedure, an IDM accountability log (Table XIV.1, Section 14) should be maintained onsite by the SHSC.

11. STANDARD OPERATING PROCEDURES

As discussed in Section 4., ER Program investigations at Mound Plant will be performed according to established SOPs (DOE, 1992).

12. CONTINGENCY PLANS

12.1. EMERGENCY CONTACTS

Persons and organizations to contact in case of emergencies at Mound Plant are given in Figure 12.1. This emergency contact form should be posted in prominent locations at the work area. An emergency notification flowchart is given in Figure 3.1. In an emergency, contacts and evacuation should be coordinated through the security or health physics escort, who will be carrying a two-way radio. A telephone should also be available in the support zone. Mound Plant emergency personnel will be contacted to contain and clean up spills and releases (Section 12.3).

12.2. EVACUATIONS

Evacuations may be required under certain circumstances, (e.g., fire, explosion, release of toxic or hazardous materials, multiple injuries, or tornadoes). If an evacuation becomes necessary, personnel will be alerted by a vehicle horn, portable air horn, or other effective device. The SHSC will instruct personnel where to meet. In most circumstances, the evacuation rendezvous will be upwind of the potential hazard. A head count will be taken, and applicable emergency procedures should be followed.

12.3. SPILLS

In the event of a hazardous material spill, notify the Mound Plant fire department at 865-4040 immediately. The subcontractor OTM is responsible for notifying the proper authorities and overseeing emergency response actions during an emergency, until response teams arrive. The subcontractor OTM will complete a spill accident report. Refer to Mound Plant, ER Program SOP 1.1.5, Guide to Management of Investigative Derived Material (Rev. 3) for additional information. If possible, the SHSC may direct field workers trained in spill response to take additional steps (below) to mitigate or cleanup the spill if no life threatening hazards exist:

1. <u>Mitigation</u>

- Seal open or leaking container (e.g., turn drum upright, replace container lid);
- Place protective barriers over or adjacent to spill area;
- Assure that workers and anyone in the vicinity are a safe distance away from the spill area;
- Perform lifesaving methods on injured persons.

Site Health and Safety Coordinator:

Name: Teresa Fort Call: (513) 429-6756

SAIC Trailer At Mound Plant - Call: (513) 866-0299

Installation Radiological and Industrial
Safety, Environment, Safety and Health
Manager

Name: John Lemming Call: (513) 865-3689

Installation ER Program Manager

Name: Charles Freidman Call: (513) 865-4541

FIRE - Call: 865-4040 Coordinate Through The Mound Escort

AMBULANCE - Call: 865-4040 Coordinate Through The Mound Escort

POISON CENTER - Call: (404) 588-4400 National Poison Control Center

SECURITY - Call: 865-4040 Coordinate Through The Mound Escort

POLICE - Call: 865-4040 Coordinate Through The Mound Escort

YOU ARE LOCATED AT: To Be Discussed At Each Site

THE NEAREST TELEPHONE IS LOCATED AT: Mound Escort

THE NEAREST EMERGENCY MEDICAL SERVICES ARE LOCATED AT:

Medical Services On-site, Call: 865-4040 Coordinate Through The Mound Escort

Sycamore Hospital - Call: 865-8721 or 865-8791

Figure 12.1. Emergency Contacts

2. Cleanup (preliminary)

- Put on appropriate protective equipment before attempting cleanup;
- Obtain a container for disposal of cleanup materials;
- Use appropriate aids (absorbent cloths, sponges, blankets, etc.) to remove the spilled material and place into disposal container.

The Mound Plant fire department will be responsible for final cleanup of the spill.

12.4. CONTINGENCY PLANS

Emergency-response contingency plans should be followed during field investigations. Personnel working onsite should be familiar with these plans. Evacuation plans and routes will be established by the SHSC on a AOC-specific basis and discussed with field personnel before field activities begin.

12.4.1. Fire/Explosion

A fire emergency will be handled by evacuating the work area and immediately notifying the Mound Plant fire department at 865-4040. Only if a fire appears to be small and easily extinguishable will field personnel attempt to put out the fire with available fire extinguishers. The Mound Plant fire department will be notified of all fires. If an explosion occurs, all personnel will be evacuated, and no one will reenter the work area until it has been cleared by the Mound Plant fire department personnel.

12.4.2. Personnel Injuries

In case of minor injuries to personnel, first aid treatment may be initiated by trained personnel in the field. First-aid treatment is available from Mound Plant paramedics at 865-4040. In case of serious injuries, the victim should be transported to Sycamore Hospital. The subcontractor OTM should coordinate the transportation of victims with the emergency response teams before the project begins. Directions to the hospital will be posted with the emergency contact form at prominent locations at the work areas.

Injuries in contaminated areas require additional steps to address possible contamination of the injured person. The SHSC will contact Mound Plant paramedics for injuries in potentially contaminated areas. Responses will vary, depending on the severity of the injury and the extent of contamination, and will be determined initially by the SHSC and later by Mound Plant paramedics. Personal injuries to SAIC employees will be reported on SAIC's Supervisor's Accident Investigation Report. A copy of this report may be found in Appendix C. Injuries will also be reported in accordance with the OSHA and Workers'

Compensation requirements and "Release to Return to Work" forms will be completed prior to permitting an injured employee to return to work.

In accordance with OSHA's Bloodborne Pathogens Rule (29 CFR 1910.1030), first-aid personnel will wear protective equipment to minimize their exposure to bleeding injuries. All clothing and equipment contaminated with blood will be properly disposed or decontaminated. All incidents involving exposures to blood should be documented.

12.4.3. Emergency Equipment

The field investigation teams at each AOC should have available the following types of emergency equipment:

- fire extinguishers,
- communication (cellular phones),
- first-aid supplies (including snake bite and bee sting kit),
- disposable gloves,
- CPR face mask,
- blankets,
- flashlights,
- rope, and
- emergency eye wash (as appropriate).

Field personnel should be familiar in the use of emergency equipment. (See Section 5.)

13. ENTRY PROCEDURE FOR CONFINED SPACES

Additional safety precautions will be taken when investigations involve entry into confined spaces such as tanks and trenches (See 29 CFR 1910.146 and Mound Safety and Hygiene Manual, M-11). Should this situation arise during investigations at Mound Plant, a Mound Plant Vessel (confined space) Entry Permit will be completed.

Confined Space Definition - The SHSC in coordination with Mound Plant H&S officials will identify areas within the AOC that are considered to be confined spaces. A confined space is any area which is so enclosed that natural ventilation will not maintain an adequate oxygen concentration (20%) or remove toxic or combustible gases or vapors sufficiently to remove risk of illness or explosion. Other areas can be defined by designated H&S officials based on AOC inspections or observations from the field. The types of confined spaces that would be expected to exist in the field are pits, ditches, underpasses, excavations, tunnels, and tanks.

Training - Field workers will be trained before entry into a confined space (See Section 5). Training will address operating within a confined space, hazard awareness and precautions, rescue procedures, and first aid.

Attendant - An attendant will be posted outside of the confined space to monitor worker activities and to aid in rescue operations in the confined space. The attendant will not enter a confined space unless another qualified attendant is immediately available to take over. The attendant will have received training equivalent to the field worker confined space entry training session.

Pre-entry Sampling - Various pre-entry actions are required, including sampling to verify/quantify the presence of hazardous substances and/or oxygen deficiencies prior to entering a confined space. Sampling will be performed using appropriate instrumentation, as defined in Section 8.

Lock-out/Tag-out - Potential energy sources specific to OU5 activities that may require locking and tagging include underground lines, pipes, cables, and sampling equipment requiring repair. Deactivation controls such as blanking pipes, disconnecting power sources and blocking are required prior to performing "hands on" work. (See Section 4.1.5. and the Mound Safety and Hygiene Manual, M-3 for additional information).

Safety Equipment - As part of the training, workers will be informed, trained on, and capable of operating safety equipment required for access to confined spaces. Examples include respirators, clothing, air supply, monitors, safety harnesses, and communicators.

Procedure - A confined space entry permit will be prepared for all entries to any confined space. It is the responsibility of the SHSC to coordinate this permit with the Mound Plant Industrial Hygiene Department through the assigned Mound Plant Construction Inspector. The Mound Plant Confined Space Entry Procedures, M-11 and 29CFR1910.146 will be followed for each confined space entry. Copies of approved permits will be kept on-site.

Rescue - Rescue of workers inside a confined space will be performed by properly trained individuals only. These individuals may not enter the space unless an SCBA or a supplied air line with escape SCBA is utilized unless atmospheric testing indicates no hazards exist. A replacement attendant will be available to take over before a rescuer enters the space. Contact EG&G Mound Plant emergency personal before entering the space. Where appropriate, tripod retrieval/rescue lines will be used to retrieve downed workers.

14. WASTE MANAGEMENT

A variety of ER activities at Mound, including the following, may generate wastes:

- site characterization,
- decontamination of facilities, personnel, and equipment,
- sampling of contaminated soil and water, and
- removal of contaminated materials for storage and disposal.

A management plan of the wastes generated by ER activities should include characterization, packaging, manifesting, documenting and tracking. All waste generation, transportation, treatment, and storage will be performed in accordance with state, federal, DOE and Mound Plant requirements. An IDM accountability log (Table XIV.1) will be maintained on-site by the SHSC.

14.1. WASTE GENERATION

Waste generated during ER activities may include soil cuttings, decontamination solutions, well development and purge wastes, and contaminated personal protective equipment. Miscellaneous trash produced on-site that has not contacted contaminated materials should not be treated as hazardous waste. Containers will be provided by the ER subcontractor to collect the wastes produced by ER activities. These containers should be constructed of materials able to withstand weather and a reasonable amount of handling. Metal 55-gallon drums with bolting bungs and rings are best suited to this purpose. Containers of project-generated waste will be labeled as "Investigative-Derived Material" (IDM) in accordance with SOP 1.15. The Mound Waste Management Department will be contacted for guidance in moving or disposing of these materials.

All field activities will be planned and conducted in a manner that minimizes the quantity of waste generated.

Table XIV.1. IDM ACCOUNTABILITY LOG

Drum Number	Drum Size/Type	Accumulation Start Date	Accumulation End Date	Date Staged	Contents	Estimated Volume	Estimated Weight	Project

15. RECORDS MANAGEMENT

Proper record-keeping is important for accurate communication; quality assurance; providing the basis for safety decisions; and establishing evidence for possible legal actions. 29 CFR 1910.120 requires the following types of records for hazardous waste operations and emergency response:

- site information,
- daily monitoring,
- training, and
- medical surveillances.

All records should be readily accessible and maintained in accordance with Mound and regulatory requirements such as DOE Order 1324.2A, Records Disposition.

15.1. SITE INFORMATION RECORDS

Site information consists of information about the site itself, such as types of hazardous and who may be at risk; safety instructions; standard operating procedures; emergency response plans; and safety/radiation work permits. This information should be readily accessible on-site.

15.2. DAILY MONITORING RECORDS

Field personnel should record all on-site activities and observations, including those made during daily safety inspections, in a field logbook that is maintained by the field operations manager. Entries should be made during or just after a task is completed to ensure thoroughness and accuracy. Daily monitoring records should also include field data such as personal sampling results, radiation survey results, waste documentation forms, incident reports, and lockout/tagout logs. Specific monitoring requirements are contained in the site-specific checklists. Site access records such as sign-in logs are required for visitors and persons working on-site each day and should be maintained by the cognizant site supervisor.

15.3. TRAINING RECORDS

Training records will be maintained on site in accordance with 29 CFR 1910.120(e) to confirm that an employee assigned to a task has had the required training and that the training is up-to-date. General employee training records should show that the employee has had a minimum of 40 hours of initial

training as well as 3 days of field experience, and training records for the site supervisor/manager should show an additional 8 hours of specialized training.

15.4. MEDICAL RECORDS

Medical records are essential for hazardous waste sites because of the nature of the work and the risks involved. Individual workers' medical files will include the name and social security number of the worker; physician letters of approval to perform hazardous waste site work based on physical examinations and respiratory fit tests; results of examinations and tests; any employee medical complaint related to exposure to hazardous substances; and a copy of the information provided to the examining physician by the employer. Employees may work at several sites during their careers, and the effects from multiple short-term exposures or other occupations injuries or illnesses may not become apparent for many years. Adequate medical records enable subsequent medical care providers to have needed information about a worker's occupational history.

16. REFERENCES

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NIOSH 1990."Pocket Guide to Chemical Hazards." National Institute for Occupational Safety and Health. Report 78-210. June 1990.

APPENDIX A

HSP Documentation Approval Sheet

HSP Documentation Approval Sheet

The following attest to having read the Mound Plant OU5 HSP.

DATE	NAME (Printed)	SIGNATURE	SOCIAL SECURITY NUMBER	HSP VERSION

APPENDIX B

AOC-Specific HSP Worksheet

Guidelines for completing the site-specific Health Safety Checklists

The checklist is intended to serve as the lower-tier document for identifying, assessing, planing and control of task specific hazards. The check list will be completed prior to writing the SSHSP.

Instructions for Completion:

Sections 1 and 2

A brief site description and site history must be provided. The site description and history should be detailed enough to verify the identity and location of the site and its previous uses. The sources of information in this section must be identified.

Section 3 - Health and Safety Hazard Evaluation

This section serves to identify potential site hazards. Place an x within the parentheses next to any hazard that appears to be reasonably likely. Note that the hazards depend on site conditions (weather, terrain, other activities), tasks (drilling, soil sampling, etc.), contaminants (chemical and radiological), chemicals brought on site by crew, and equipment in use.

Section 4 - Previous Sampling Results

This section should describe the results of previous sampling and analysis relevant to the task and location. For example, if tasks include 20' borings and collection of groundwater samples, then any previous measurements of ambient air, soil, and groundwater would be relevant. If the task to be performed is a walkover visual survey, then air and surface sampling results will be relevant. The maximum concentration of each contaminant should be provided to characterize site conditions.

Section 5 - Environmental Contaminants

This section should include basic information on environmental contaminants present at the site. A material should be included in this list if it has been shown to be present in significant quantities by previous sampling or by disposal records or site history and it poses a potential risk to personnel. This list should not include every contaminant for which analyses have been conducted. If extensive prior sampling has been conducted and the number of analytes is great, a system for prioritizing the contaminants should be used and documented in a footnote. One example of this approach is to include contaminants that are present in soil samples at greater than 500 micrograms/kilogram and with a TLV or PEL less than 200 ppm, or in water samples at greater

than 100 micrograms/liter and with a TLV or PEL less than 200 ppm. Note that this is an example and not a requirement. Other factors (i.e. vapor pressure) must be considered and may take precedence.

Section 6 - Decontamination and Other Materials

This section should identify information for decontamination materials, or other chemicals used on-site in significant quantity. Note that material safety data sheets must be on-site for all the chemicals listed.

Section 7 - Task Hazard Analysis

The Task Hazard Analysis section will identify hazards associated with the planned tasks. An x will be entered next to planned tasks and each category of potential hazard identified. If hazards, other than those in the checklist, are expected, an assessment of these will be attached.

Section 8 - Sanitation

This section will address sanitation needs for the project. Generally potable (drinking) water and toilet facilities (such as port-a-potties) will be required on-site, if not readily available in a nearby building. If toilet facilities are required, the minimum number is based on the number of workers and can be obtained from 29 CFR 1910. Washing facilities and change rooms will be required if the project continues for more than 6 months and involves significant contamination and if washing/change facilities are not available nearby.

Section 9 - Personal Protective Equipment

This section will be used to specify the minimum protective equipment required for a particular task. If multiple tasks will be performed and the same PPE will be used for each task, this will be indicated. If different levels or types of PPE will be used, then this section will be repeated for each level or type and will specify what task(s) it applies to.

Section 10 - Monitoring Requirements

This Section will specify what monitoring will be conducted during the project. Text will be added, as necessary, to clarify where and when monitoring will be conducted. Text will also be added to identify action levels and what action(s) will be taken when an action Level(s) is reached. For example, upgrade PPE, evacuate, re-assess etc.

An entry must be made in the Monitoring Frequency column for each instrument listed. This entry will either specify the frequency or specific time frame (eg. continuously during intrusive work) or will be N/R.

Section 11 - Emergency Response

This section will include information necessary for site personnel to evacuate the site and notification of emergency personnel.

HEALTH AND SAFETY CHECKLIST

FOR

Characterization of Hazards at Hazardous Waste Sites

1.0 SITE DESCRIPTION

Site Name: _____

The Site is located _____ (Attach Site Map) _____

_____

_____

2.0 SITE HISTORY

_____

_____

_____

_____

_____

_____

3.0 HEALTH AND SAFETY HAZARDS

[Place an X in each () to indicate presence of hazard]

3.1 Physical Hazards

() Heat Stress*	() Cold Stress	() Noise
() Confined Spaces	() Electrical	() Heavy Lifting
() Tripping/Falling	() Utility Lines	() Vibration
() Oxygen Deficiency	() Explosive/Flammable Atmosphere	() Other Activities (specify: _____)
() On/Over Water		

3.2 Construction Hazards

() Trenching
() Demolition
() Portable Ladders/ Scaffolding
() Excavating
() High Work
() _____
() Heavy Equipment Op.
() Welding/Cutting
() _____

3.3 Chemical Hazard

() Organic Chemical
() Corrosive
() Mutagen
() Inorganic Chemical
() Reactive
() Teratogen
() Carcinogen

3.4 Ionizing Radiation Hazards

() Internal Exposure
() External Exposure

3.5 Non-Ionizing Radiation Hazards

() UV
() Laser
() RF
() Radar
() Microwave

3.6 Biological/Vector Hazards

() Wildlife
() Bacterial
() Plants
() Parasites
() Medical Waste
() Sewage

4.0 PREVIOUS SAMPLING RESULTS

Contaminant	Source (Water, Sediment, Sludge, etc.)	Maximum Reported Concent-ration	Minimum Reported Concent-ration

5.0 Environmental Contaminants

Contaminant	PEL (Mg/m^3)	TLV (Mg/m^3)	Skin Notation (Yes/No)	Vapor Pressure @ 23 deg. C and 760 mm Hg	% LFL	Flash Point (deg F)

NOTE: Averaging time for short term exposure limits must be specified (eg. 5 or 15 minutes)

6.0 Decontamination Materials

MSDS must be obtained and included in the SSHSP for each hazardous substance brought on-site (e.g. methanol, hexane, hydrochloric acid).

List decontamination materials that will be brought on-site.

1. _____
2. _____
3. _____
4. _____
5. _____

7.0 TASK HAZARD ANALYSIS

(Provide detailed description, controls, and requirements for each task to be performed, i.e., drilling, sampling, etc.)

Task Descriptions

Surface Soil Sampling	Intrusive ()	Non-intrusive ()
Soil Gas Sampling	Intrusive ()	Non-intrusive ()
Radiation Survey	Intrusive ()	Non-intrusive ()
Monitoring Well Installation	Intrusive ()	Non-intrusive ()

Fire/Explosion Hazards

Flammable liquids present? Yes/No

Description _____

_____

Location _____

_____

Quantity _____

_____

_____

Welding, Cutting or Brazing? Yes/No

Is a Welding Permit required for welding, cutting, or brazing?

Yes/No

Confined Spaces

Will confined space entry be required? Yes/No

Ionising Radiation

Will this task expose personnel to sources of ionizing radiation?
Yes/No

Primary isotopes(s) _____

Location on site _____

Contaminant/storage method _____

Radiation Type Alpha/Beta/Gamma/Neutron

Dose rate (maximum) ____ mR/h @ ____ meter(s)
(average) ____ mR/h

Worker dose limit ____ mR/h

Contamination level (fixed) _____dpm/100cm^2
(removable) _____dpm/100cm^2

Airborne contamination concentration _____µCi/ml

Water contamination potential? Yes/No

Unrestricted airborne contamination potential release
Yes/No

Radiation work permit required? Yes/No

Health physics coverage? Continuous/Intermittent/Conditional

Non-Ionizing Radiation

High-voltage (>100 Kv) electrical transmission lines nearby?
Yes/No

Location, distance, and voltage: _____

_____

Radio frequency radiation sources (AM and/or FM broadcast towers, r-f sealers) nearby? Yes/No

Location and distance: _____

_____

_____

Microwave sources in use on site? Yes/No

Location and description: _____

_____

_____

Lasers in use nearby? Yes/No

Location and laser class: _____

_____

_____

Are workers potentially exposed to sunlight (ultraviolet radiation)? Yes/No

Are ultrasound sources in use on site? Yes/No

Electrical Hazards

____ Overhead power lines
____ Underground power lines
____ Other (describe)

Location of hazard: _____

_____

Temperature Extremes

Temperature extremes (hot/cold)? Yes/No

___ Average daily high temperature (during work shift) °F
___ Average daily low temperature (during work shift) °F
___ Average wind speed MPH cloudy/sunny
___ Temperature WBGT °F

Work load:
___ Light
___ Moderate
___ Heavy

Work/Rest regimen:
___ % work
___ % rest

Precautions (specify): _____

_____

_____

Cooling/Heating equipment needed: _____

_____

Noise

Noise extremes? Yes/No

Maximum Anticpated Sound Level __dB(A)

Noise source(s): _____

Hearing protection required? Yes/No

Precautions (specify): _____

_____

_____

Vibration

Vibration extremes? Yes/No

Vibration frequency __Hz

Source(s) of vibration: _____

_____

_____

Illumination

Work performed at night? Yes/No

Work performed in tanks, tunnels, culverts, etc.? Yes/No

Additional illumination needed? Yes/No

Geological Hazards

Unstable Slopes? Yes/No
Subsidence? Yes/No
Earthquake hazard area? Yes/No
Excavations? Yes/No
Navigable waterways? Yes/No

Attach a brief description for each "yes" response above.

_____

_____

_____

_____

_____

_____

_____

_____

_____

Site Access/Control

Area Fenced? Yes/No

Site security guard required? Yes/No/NA

Access control required? Yes/No

Unique site access/control requirements? Yes/No
(discuss)

_____

_____

_____

_____

Safety Hazards

Compressed gas cylinders? Yes/No

Gases:
Location: _____

Storage requirements: _____

Work at elevations? Yes/No

Natural gas or other pipe lines? Yes/No

Active industrial equipment or activities? Yes/No

Traffic? Yes/No

Flammable material storage? Yes/No

Unexploded ordinance? Yes/No

Other unique safety hazards (discuss):

_____

_____

_____

_____

7.0 Sanitation

Potable water required? Yes/No

Non-potable water used? Yes/No

Eating, drinking, and smoking permitted? Yes/No

Where? _____

Toilet facilities required? Yes/No

Location and number: _____

Washing facilities required? Yes/No

Location: _____

Change rooms required? Yes/No

Specify: _____

8.0 Personnel Protective Equipment

	Primary	Contingency	NA
Respiratory Protection[1]			
Protective Clothing[2]			
Head Protection			
Eye Protection			
Foot Protection			
Hand Protection[2]			
Hearing Protection[3]			
Tape-up Required			

[1]Specify cartridge or canister type
[2]Specify material of construction
[3]Specify noise reduction rating (NRR) required

9.0 Monitoring Requirements and Action Levels

9.A. Monitoring Requirements

Specify recommended frequency of each type of monitoring. Put N/R where monitoring is not required.

9.A. Monitoring Requirements (Continued)

Type of Monitoring	Method of Monitoring	Location of Monitoring	Recommended Frequency of Monitoring
Metals	Personal 37mm cassette sample as per total dust. Bulk soil samples for analyte list.	Breathing zone of workers subject to highest levels. Soils Representative of the area where dusts are generated.	
Organic Vapors	1) PID, FID 2) Various integrated sampling methods	Breathing zone of workers subject to highest levels.	
Silica	10mm cyclone	Breathing zone of workers subject to highest levels.	
Total Dust	Miniram	Area sampling representative of the worker breathing zone.	
Heat Stress	WBGT or Questemp I	Area or personal	
Cold Stress	Area Thermometer	Area	
Noise	Sound level meter or dosimeter	Area or personal	

9.B. Actions Required for Specific Exposure Monitoring Results

Parameter	Action Level	Action Required

Parameter	Action Level	Action Required

10.0 EMERGENCY RESPONSE

Emergency Assistance Service	Emergency Phone	Non-Emergency Phone
Police	_____	_____
Ambulance	_____	_____
Fire and Rescue	_____	_____
Hospital	_____	_____
Clinic	_____	_____
Doctor	_____	_____

Other

APPENDIX C

Site Review Form (revised)
Supervisor's Accident Investigation Report

SITE INSPECTION CHECKLIST

PROJECT _____

LOCATION _____

DATE _____

I. TRAINING AND MEDICAL RECORDS

Documentation available on site to show workers have received the following

Y	N	NA	
☐	☐	☐	40 Hour HAZWOPER Training
☐	☐	☐	24 Hour HAZWOPER Training
☐	☐	☐	8 Hour HAZWOPER Refresher Training
☐	☐	☐	8 Hour HAZWOPER Supervisor's Training
☐	☐	☐	Required Medical Examination
☐	☐	☐	Respirator Fit Test and Training
☐	☐	☐	Rad Worker Training
☐	☐	☐	Confined Space Entry Training
☐	☐	☐	Site-Specific Health and Safety Briefing (Including hazards associated with the site ie., fire, explosion, safety, health, radiological) at the beginning of the task
☐	☐	☐	Hazard Communication Standard Training
☐	☐	☐	First Aid/CPR Training
☐	☐	☐	Daily Health and Safety Briefings
☐	☐	☐	Visitor Briefing
☐	☐	☐	Other _____

II. DOCUMENTS AND EQUIPMENT

Documents and Equipment available for worker review and use

Y	N	NA	
☐	☐	☐	Health and Safety Plan
☐	☐	☐	Health and Safety Briefing Agenda
☐	☐	☐	Pre-work Site Survey Report
☐	☐	☐	MSDS's
☐	☐	☐	SOPs
☐	☐	☐	NIOSH Pocket Guide to Chemical Hazards
☐	☐	☐	Emergency numbers
☐	☐	☐	Communications (ie. radio, telephone)
☐	☐	☐	Emergency PPE
☐	☐	☐	Fire Extinguisher
☐	☐	☐	First Aid Kit
☐	☐	☐	Eye Wash Station

III. SITE CONTROL

Y	N	NA	
☐	☐	☐	Is site map available for use by workers
☐	☐	☐	Are site boundaries clearly defined
☐	☐	☐	Are work zones clearly defined by roping banners, etc
☐	☐	☐	Is a guard posted at the site entrance
☐	☐	☐	Is there a visitor log

IV. PERSONAL PROTECTIVE EQUIPMENT

Level(s) of Protection being used

☐ Level A ☐ Level B

☐ Level C ☐ Level D

Y	N	NA	
☐	☐	☐	Level of PPE selected according to HSP
☐	☐	☐	PPE properly stored and maintained
☐	☐	☐	PPE inspected by workers prior to use
☐	☐	☐	PPE in use, in accordance with Site Health and Safety Plan and PPE Program
☐	☐	☐	Proper decontamination and disposal of PPE
☐	☐	☐	Respirator cartridges changed after maximum usage or every 30 days whichever is less

SITE INSPECTION CHECKLIST

V. DECONTAMINATION

Y	N	NA	
☐	☐	☐	Written decontamination procedures available on site
☐	☐	☐	Workers appropriately trained in decontamination procedures
☐	☐	☐	Decontamination areas situated to minimize contamination outside of the decontamination zone
☐	☐	☐	Is all equipment properly decontaminated prior to leaving the contaminated zone
☐	☐	☐	Is deconned equipment properly stored
☐	☐	☐	Is all decontamination liquid properly contained and disposed
☐	☐	☐	Where applicable are showers and change rooms, soap, hot and cold running water and separate storage areas for street and work clothes available

VI. FIELD SANITATION

Y	N	NA	
☐	☐	☐	Is potable water available to site workers for drinking and washing
☐	☐	☐	If potable water is not available, have provisions been made to afford site workers access to washing and drinking facilities
☐	☐	☐	Are any nonpotable water sources labeled as being unfit for drinking and washing
☐	☐	☐	Are toilets readily available on site
☐	☐	☐	If toilets are not available, have provisions been made to transport workers to suitable toilet facilities
☐	☐	☐	Are washing facilities removed from hazardous substances
☐	☐	☐	Are washing facilities adequate to permit employees to remove hazardous substances from their bodies
☐	☐	☐	Is an area away form hazardous substances available to site workers for eating and drinking

VII. HOUSEKEEPING

Y	N	NA	
☐	☐	☐	Area kept clean
☐	☐	☐	Aisles kept clear
☐	☐	☐	Exits marked and not blocked
☐	☐	☐	Walking/Working surfaces in good condition (not slippery, cracked, no tripping hazards)
☐	☐	☐	No sharp edges, splinters, or burrs exposed
☐	☐	☐	No overhead falling hazards
☐	☐	☐	Is there sufficient illumination
☐	☐	☐	Fire extinguisher available and ready for use

VIII. ELECTRICAL

Y	N	NA	
☐	☐	☐	Electrical panels kept clear and accessible (minimum 36" clearance)
☐	☐	☐	All extension cords have three-pronged plugs
☐	☐	☐	Equipment in use is U.L. approved
☐	☐	☐	Electrical cords free of splices and other defects
☐	☐	☐	Electrical panels covered
☐	☐	☐	Circuit breaker switches clearly identified and capable of being tagged or locked out
☐	☐	☐	Coffee pots, heaters, etc not plugged into extension cords
☐	☐	☐	Outlet plates in good condition
☐	☐	☐	Work area is a safe distance from high voltage sources
☐	☐	☐	Sources of high voltage properly locked out/tagged out if hands on work is involved

IX. STORAGE

Y	N	NA	
☐	☐	☐	Equipment stored safely
☐	☐	☐	Shelving not overloaded or overcrowded
☐	☐	☐	Storage kept at least 36" away from lighting fixtures
☐	☐	☐	Are Flammable Substances stored in approved Flammable Cabinet
☐	☐	☐	Are Acids stored in approved Acid Cabinet
☐	☐	☐	Are Hazardous substances labeled properly

X. EMERGENCY RESPONSE

Y	N	NA	
☐	☐	☐	Emergency Response Procedures in place and available
☐	☐	☐	Is the person who would be in charge during an emergency situation clearly identifiable in HSP
☐	☐	☐	Is a list of emergency contacts and telephone numbers readily available to all site workers
☐	☐	☐	Are communications (radios, telephones, etc.) available and operable to contact individuals on the emergency contact list
☐	☐	☐	Is a primary and alternate escape route clearly shown on the site map
☐	☐	☐	If inside structure, are emergency exits marked
☐	☐	☐	Are site workers aware and knowledgeable of the escape routes
☐	☐	☐	Is an alerting system available to notify site workers in the event of an emergency situation
☐	☐	☐	Are site workers aware of their responsibilities in the event of an emergency situation
☐	☐	☐	Is emergency equipment and PPE readily available at the site

SITE INSPECTION CHECKLIST

XI. MONITORING

Y	N	NA	
☐	☐	☐	Is monitoring being conducted to identify quantity of airborne levels of hazardous substances
☐	☐	☐	Is monitoring being conducted to identify IDLH levels of hazardous substances
☐	☐	☐	Is Sound level monitoring being conducted to measure impact and continuous noise levels
☐	☐	☐	Is monitoring being conducted at the start of different operations
☐	☐	☐	Is monitoring conducted continuously or periodically to ensure levels continue to be safe
☐	☐	☐	Have the monitoring instruments been properly calibrated
☐	☐	☐	Are monitoring equipment calibration logs being kept

List Monitoring equipment being used on site

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____

XII. PERMIT REQUIREMENTS

Documents available for worker use

Y	N	NA	
☐	☐	☐	Confined Space
☐	☐	☐	Lockout/Taggout
☐	☐	☐	Hot work permit
☐	☐	☐	Excavation
☐	☐	☐	Radiation work permit
☐	☐	☐	Other _____

XIII. DRUM/CONTAINER HANDLING

Y	N	NA	
☐	☐	☐	Are drums/containers being used for the site clean up or operations
☐	☐	☐	Do the drums/containers meet DOE/DOT/OSHA/EPA criteria for the waste they contain
☐	☐	☐	Are drums properly labeled
☐	☐	☐	Are empty drums marked empty
☐	☐	☐	Are drums properly sealed and closed when not in use
☐	☐	☐	Are all drums/containers inspected for structural integrity prior to their being moved
☐	☐	☐	Is there a spill plan in place
☐	☐	☐	Is a detailed instruction available instructing site workers in the procedure for drum/container opening
☐	☐	☐	Are workers who are not involved with the drum/container opening at a safe distance from the operation
☐	☐	☐	Does drum/container opening occur with pressure relief or is there a shield between the workers and the drum/container being opened
☐	☐	☐	Is all proper documentation (COCs, manifests, etc) completed if material is shipped off site

XIV. GENERAL COMMENTS AND OBSERVATIONS

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

The results of this inspection have been reviewed with the Field Operations Manager and/or the Project Manager on _____.

_____

Inspector | Phone Number | Signature | Date

Exhibit 4-1. Supervisor's Accident Investigation Report

Instructions for Parts III and IV are given on the following page. If more space is needed in completing the report, use additional pages. Complete and return this report to the Local EC&HS Official no later than the next working day after the accident.

Location: _____

Part I— General Information

Name of Injured: _____ Division: _____

Date of Accident: _____ Hour: _____AM/PM Exact Location:_____

Name of Witness: _____ Division: _____

Part II—Description of Accident *(Summarize the accident, providing specific detail.)*

_____

_____

_____

_____

_____

_____

_____

_____

Part III—Causes of Accident *(Determine the cause by analyzing all involved factors, including those listed in the instructions.)*

A. Describe Any Unsafe Acts:_____

_____

_____

_____

_____

_____

_____

Exhibit 4-1. Supervisor's Accident Investigation Report (continued)

B. Describe Any Unsafe Conditions: _____

_____

_____

_____

_____

_____

_____

Part IV—Corrective Action Taken *(Summarize actions taken and recommendations made to prevent a similar accident or recurrence of the same accident. Before completing this section, study the steps identified in the instructions.)*

_____

_____

_____

_____

_____

_____

_____

If no actions have been taken, give the reason(s _____

_____

_____

_____

_____

_____

Signatures: _____ _____

Supervisor Local EC&HS Official

Date Report Prepared: _____

Exhibit 4-1. Supervisor's Accident Investigation Report Instructions

Part III—Accident Causes. Use the following lists in determining the cause(s) of the accident.

Selected Unsafe Acts—Personal Factors

Making safety devices inoperable

Failure to use guards provided

Using defective equipment

Servicing equipment in motion

Failure to use proper tools or equipment

Operating machinery or equipment at unsafe speed

Failure to use personal protective equipment

Operating without authority

Lack of skill or knowledge

Unsafe loading or placing

Improper lifting, lowering, or carrying

Taking unsafe position

Unnecessary haste

Influence of alcohol or drugs

Physical limitation or mental attitude

Unaware of hazards

Unsafe act of other

Selected Unsafe Conditions

Inadequate guards or protection

Defective tools or equipment

Unsafe condition of machine

Congested work area

Poor housekeeping

Unsafe floors, ramps, stairways, platforms

Improper material storage

Inadequate warning system

Fire or explosion hazards

Hazardous atmosphere: gases, dust, fumes, vapors

Hazardous substances

Inadequate ventilation

Radiation exposures

Excessive noise

Inadequate illumination

Exhibit 4-1. Supervisor's Accident Investigation Report Instructions (continued)

Part IV—Corrective Action Taken. Take the following steps to prevent a similar accident or recurrence of the same accident.

1. Discuss the accident with the employee involved and with any witnesses. Be sure to question the what-where-when-who-how-why aspects of the accident.

2. Inspect the equipment or materials involved for conditions that can be made safer.

3. Study the job setup and manner of doing the work and decide if improvements can be made.

4. Determine if the employee involved is suited for the job he or she is doing, if the employee received adequate training, and if there are any other problems.

5. Develop practical recommendations to correct the problem. Be sure your recommendations will not create other situations that could result in injury to employees.

APPENDIX D

SAIC's PPE PROGRAM

9. Respiratory Protection Program

9.1 Purpose

A. The objective of this procedure is to assure that all employees who may be exposed to harmful levels of air-borne contaminants are properly trained in the selection, use, and maintenance of air-purifying respirators and are medically capable of using those respirators.

B. This procedure establishes a program that satisfies the requirements of the Code of Federal Regulations, Title 29, Part 1910, Section 1910.134. It is based on the recommendations of the National Institute for Occupational Safety and Health (NIOSH), Industrial Respiratory Protection, dated September 1987, and the Occupational Safety and Health Administration, CPL 2-2.20, CH-1, October 1984.

9.2 Definitions

A. Air-purifying respirators, generally called "dust, fume, or mist" respirators, use a filtering action to remove particulates from the ambient air before they can be inhaled.

B. Air-purifying chemical cartridge respirators are vapor- and gas-removing respirators that use sorbent material to trap or react with specific vapors or gases to remove them from the ambient air before they can be inhaled.

C. Supplied-air respirators provide clean air from a compressed air cylinder or air compressor to the respirator by a hose, rather than by removing the contaminant from the air.

9.3 General

A. Engineering controls, such as local exhaust ventilation, process enclosure, and substitution with a less toxic material, are the primary means used to eliminate or reduce employee exposure to a level that respirators are not required. If engineering controls are not feasible or completely effective, personnel who are physically and psychologically capable and properly trained use appropriate respirators.

B. All respiratory protection equipment and procedures for use are approved by the Local EC&HS Official and must meet applicable Federal regulations. Only respirators certified by the Mine Safety and Health Administration (MSHA) and NIOSH will be used.

C. Employees shall not be assigned to tasks requiring the use of respirators until they have been trained and fit-tested and until a physician has determined they are physically and psychologically able to use a respirator.

9.4 Responsibilities

A. Supervisor

1. Requests assistance of Local EC&HS Official to evaluate operations that use or generate hazardous substances. Evaluations should be performed during planning/pilot stages.
2. Assures employees are not assigned to tasks requiring respirators until they have completed required medical examination, training, and fit-testing.
3. Monitors respirator use to ensure that:
   - Proper respirators are being used.
   - Respirators are being worn properly.
   - Respirators are properly stored, cleaned, and maintained.
4. Reports all problems in respirator use to the Local EC&HS Official.

B. Local EC&HS Official

1. Evaluates operations that use or generate hazardous substance to determine the need for respiratory protection and the level required.
2. For processes requiring respiratory protection, evaluates the feasibility and effectiveness of engineering controls to reduce employee exposure to a level that does not require respiratory protection.
3. Provides a copy of Section 9 to the examining physician before sending employees for medical examination.
4. Maintains records of hazard assessment, training, fit-testing, and the results of annual program evaluation.
5. Maintains a record of medical examinations and ensures that the examining physician has determined that employees using respirators are physically able to wear respirators.
6. Educates and trains employees in the use and care of respirators, their limitations, and the content of the written respiratory protection program. Assures annual retraining is completed.

C. Employees

1. Inspect their respirators before and after each use to assure they are in good repair.
2. Clean their respirators after use and store them in plastic bags or containers provided for respirator storage.
3. Immediately stop work and go to an area of "clean" air should their respirators malfunction.

4. Report all malfunctions, damage, or difficulties incurred because of respirator use to supervision or the Local EC&HS Official.
5. Obtain medical examinations to confirm that they are capable of wearing respirators.

9.5 Respirator Selection

A. Hazard Assessment—The Local EC&HS Official and/or Corporate EC&HS Official will analyze the following factors, as necessary, to determine the need for respiratory protection and the level required for a specific task:

1. General conditions, including equipment and materials used.
2. Identification of hazardous substances that may become airborne and the concentration of these substances in the employee's breathing zone.
3. Physical, chemical, and toxicological properties of the contaminant(s).
4. Odor threshold data.
5. OSHA-permissible exposure limit or other applicable exposure limit.
6. Immediately Dangerous To Life or Health (IDLH) concentration.
7. Eye or respiratory irritation potential.
8. Skin absorption potential.
9. Measured or estimated concentration of the contaminant(s) in the employee's breathing zone.
10. Oxygen concentration in the atmosphere or the potential for oxygen-deficient or oxygen-rich atmosphere being credited.
11. Minimum protection factor required. If the measured or estimated concentration exceeds the applicable exposure limit, divide the concentration by the exposure limit to determine this factor.
12. Feasibility of engineering controls to reduce employee exposure below the exposure limit.
13. Sorbent efficiency of cartridge or canister.
14. Reactivity of contaminant(s) with sorbent material in the cartridge or canister.
15. Respirator protection factor or degree of protection provided by the respirator.

B. Respiratory Protection for Routine Use of Respirators—Once the process has been evaluated and the need and level of protection

determined, the following will be used to specify the class of respirator needed:

1. Oxygen deficiency (atmospheres containing less than or equal to 19 percent oxygen)
   - Pressure demand (self-contained breathing apparatus [SCBA])
   - Supplied-air respirator with escape provisions
2. Toxic contaminant—IDLH
   - Pressure demand (SCBA)
   - Supplied-air respirator with escape provisions
3. Carcinogen
   - Supplied-air respirator
4. Contaminant—not IDLH
   - Gas or vapor
     - Supplied-air respirator
     - Chemical cartridge respirator (see Exhibit 9-2)
   - Particulate
     - Supplied-air respirator
     - Filter respirator (i.e., dust, fume, mist respirator)
   - Gas or vapor and particulate
     - Supplied-air respirator
     - Chemical cartridge respirator plus filter (see Exhibit 9-2).

9.6 Respirator Issuance

A. The employee being assigned to a task requiring respiratory protection is referred, by his or her supervisor, to the Local EC&HS Official.

B. The Local EC&HS Official will ensure that a physician has determined the employee is physically and psychologically fit to use a respirator. Negative pressure respirators will not be issued to employees with facial hair (i.e., beards and sideburns) that interferes with the facepiece-to-face seal of the respirator.

C. The Local EC&HS Official will select the proper MSHA/NIOSH certified respirator based on the hazard involved.

D. After selection of the proper respirator, the employee will be fitted with the style and size that fits best.

E. The Local EC&HS Official will instruct the employee in the need, use, and care of respirators, their limitations, how to test the fit, and content of the written respiratory protection program.

F. Respirators are not issued to or worn by employees who are unable to obtain an acceptable fit or have not received medical approval or training.

9.7 Training and Education

A. Training in the need, use, and maintenance of respirators is mandatory.

B. The Local EC&HS Official is responsible for providing instruction in and documentation of respirator training.

C. Training is provided to each employee who is assigned a task that requires a respirator and the supervisor of the employee using the respirator. Retraining is provided annually (see Exhibit 8-1).

9.8 Inspection and Maintenance

A. Employees inspect their respirators before and after each use and during cleaning. At a minimum, respirators are inspected monthly, even though not in use.

B. Employees inspect and maintain their respirators as described in Respirator User Training (Exhibit 9-1) and in accordance with manufacturer's instructions.

C. A record of the most recent inspection (inspector's initials, date, and respirator identification number) must be maintained on the respirator or its storage container for a respirator maintained for emergency use.

9.9 Storage

A. The respirator user is responsible for storing the respirator to protect against dust, sunlight, heat, extreme cold, excessive moisture, and damaging chemicals.

B. Plastic bags capable of being sealed, plastic containers, or cans with tight-fitting lids are the measures that can be used to protect the respirator from damage during storage.

9.10 Medical Surveillance

A. A medical evaluation is required to determine if an individual is physically and psychologically capable of using respiratory protection. SAIC requires that the individual's medical status be reviewed prior to respirator issuance and reexamined annually. The following factors may be pertinent for this determination.

1. Facial deformities or facial hair that would prevent a proper respirator seal.

2. Use of prescription eyeglasses or contact lenses. Use of eyeglasses may restrict the type of respirator the individual may be permitted to wear. Contact lenses will not be permitted for respirator use.

3. Ruptured ear drums. Persons with ruptured ear drums cannot wear respirators in hazardous areas where toxic materials or vapors can enter the body through the perforation.

4. Respiratory diseases that affect pulmonary function. Special tests shall be required when perfusion disorders are suspected.

5. Cardiovascular diseases. Symptomatic coronary artery disease, significant arrhythmics, or a history of myocardial infarction shall disqualify a person from respirator use. The examiner shall decide if persons with premature ventricular contractions or uncontrolled hypertension and if individuals with blood pressure or on cardiovascular medications may wear respirators.

6. Endocrinal disorders. If a person may suffer sudden loss of consciousness or response capability, the examiner shall determine whether a respirator may be worn.

7. Neurological disabilities. The inability to perform coordinated movements or conditions affecting response and consciousness shall disqualify a person from wearing a respirator. Epilepsy, when controlled by medicine and when a person has not had a seizure within a year and shows no adverse reaction to medicine, should not be disqualifying.

8. Medications. A history of excessive use or problems related to prescriptions or nonprescription drugs (including alcohol) that affect judgment, performance, or reliability or that alter the state of awareness or consciousness may be considered disqualifying.

9. Psychological conditions. A person with a condition that results in poor judgement or reliability should be disqualified. Claustrophobia or severe anxiety shall be considered in determining if an individual is fit for respirator use.

B. The Local EC&HS Official is to provide a copy of Section 9.10 to the examining physician.

9.11 Respirator Program Evaluation

A. The Local EC&HS Official is responsible for annually evaluating the respiratory protection program and documenting the results and any program adjustments. This evaluation is to be provided by February 1 of each year to the Corporate EC&HS Official.

B. The evaluation will address program administration and operations related to each task (e.g., increases or decreases in exposure concentration or the introduction of other contaminants).

Exhibit 9-1. Respirator User Training

Purpose/Need

Respirators are designed to provide respiratory protection against gases, chemical vapors, and particulates. The degree of protection depends upon the type of respirator, facepiece-to-face seal, condition of the respirator , and if the respirator is worn properly. This exhibit has been developed to provide the training required under OSHA 29 CFR 1910.134 for employees using respirators.

Respiratory Hazards

Toxic materials can enter the body through four pathways: (a) injection, (b) ingestion, (c) skin absorption, and (d) inhalation. In the work environment, inhalation is the primary route of concern because of the respiratory system's intimate association with the circulatory system.

Respiratory hazards may be classified as having:

A. Oxygen deficiency (atmospheres containing less than or equal to 19.5 percent oxygen) or oxygen rich conditions (atmospheres containing greater than or equal to 25 percent oxygen)

B. Gas or vapor contaminants
   1. Immediately dangerous to life or health (IDLH)
   2. Not IDLH

C. Particulate contaminants (aerosols including dust, fume, or mist)
   1. IDLH
   2. Not IDLH

D. Combination of gas or vapor and particulate contaminants
   1. IDLH
   2. Not IDLH.

Hazard control should always start at the process equipment and plant design levels, where contaminants can be controlled at their point of generation. Since it is not always feasible to provide and maintain effective engineering controls, proper respiratory protection will be made available and required as described in this instruction.

Exhibit 9-1. Respirator User Training (continued)

Respirator Types

Respirators can be divided into two general categories:

A. Air-purifying respirators that remove contaminant(s) from inhaled air

1. Particulate removing (i.e., single-use disposable and powered air-purifying respirators)
2. Vapor and gas removing (i.e., chemical cartridge respirators)
3. Combination of 1 and 2 above (i.e., chemical cartridge respirators equipped with an approved dust, fume, mist, or high-efficiency particulate air prefilter)

B. Air-supplying respirators that provide breathable air to the user from a source other than the surrounding atmosphere

1. Supplied-air respirators (i.e., loose fitting hood, helmet, or full facepiece)
2. Self-contained breathing apparatus.

Note: The use of SCBA is not covered in this instruction.

How the Respirator Works

A. Chemical Cartridge Respirators

Chemical cartridge respirators remove specific gas or vapor contaminants by adsorption onto the surface of the sorbent, absorption in the sorbent, or by chemical reaction to a less toxic contaminant.

1. Adsorption is the binding of the contaminant on the surface of the sorbent by physical or chemical attraction (e.g., activated charcoal).
2. Absorption is the binding of the contaminant into the sorbent's pores, where it is chemically bound (e.g., mixtures of hydroxides with lime and/or caustic silicates).
3. Chemical reaction of the contaminant with a catalyst forms a less toxic product (e.g., hopcalite [mixture of copper and manganese oxides]), used to speed the reaction of toxic carbon monoxide and oxygen to form carbon dioxide.

B. Dust, Fume, Mist Respirators

Dust masks remove particulate contaminants by sedimentation, impaction, diffusion, and electrostatic capture before they can be inhaled. The filter contains fibers with pores larger than particles to be removed

and traps particles by a combination of filtration mechanisms. Single use disposable dust/fume/mist and powered air-purifying respirators are examples of this type.

C. Airline Respirators

The supplied-air respirator operates in a continuous, demand, or pressure demand mode to supply the user with breathable air through a hose or compressed airline. Continuous-flow airline respirators (i.e., loose fitting hoods, helmets) supply respirable air at all times. Demand airline respirators supply respirable air when the wearer inhales, thereby activating a diaphragm and its levers and allowing air into the facepiece. Pressure-demand airline respirators have an extra spring that holds the admission valve slightly open to maintain a constant slight positive pressure in the facepiece.

Respirator Advantages and Disadvantages

Chemical cartridges, mechanical filters, full facepieces, half facepieces, supplied air, and SCBA's are all examples of respiratory protective equipment that do not have the same capabilities. For example, gas- and vapor-removing respirators provide no protection against particulate contaminants unless specified on the chemical cartridge label. Likewise, particulate-removing respirators provide protection against nonvolatile particulates only.

Respirators in general are limited in that they:

A. Do nothing to reduce or eliminate contaminants at the point of generation
B. Vary from individual to individual in providing protection
C. Cannot be worn by all workers
D. Cause communication problems
E. Create vision problems
F. Cause fatigue (reduced work efficiency).

Chemical cartridge respirators have the following advantages and disadvantages:

A. Advantages
   1. Small, lightweight
   2. Easily maintained
   3. Least restrictive to wearer

Exhibit 9-1. Respirator User Training (continued)

B. Disadvantages

1. Cannot be used for protection against gases or vapors that have poor warning properties (e.g., are colorless, odorless, tasteless)
2. Have maximum use concentrations above which they cannot be used
3. Are limited in useful service life
4. Cannot be used in IDLH or oxygen-deficient atmospheres
5. Provide protection only against a given class of contaminants (e.g., organic vapors) or single contaminant (see Exhibit 9-2)
6. Provide no protection against particulate contaminants unless specified on the chemical cartridge label or equipped with a dust/fume/mist or high-efficiency particulate air (HEPA) prefilter.

Dust, fume, and mist respirators (e.g., single use disposable respirators) have the following advantages and disadvantages:

A. Advantages

1. Small, lightweight
2. Easily maintained
3. Least restrictive to wearer
4. Inexpensive

B. Disadvantages

1. Cannot be used in IDLH or oxygen-deficient atmospheres
2. Provide no protection against gases and vapors
3. May be adversely affected by humidity (>80 percent) or mists
4. Increase breathing resistance as filter becomes loaded
5. Have maximum use concentrations above which they cannot be used.

Airline respirators have the following advantages and disadvantages:

A. Advantages

1. Can be used in IDLH atmospheres with escape provisions (i.e., auxiliary SCBA)
2. Can be used for contaminants with poor warning properties
3. Can be used in oxygen-deficient atmospheres.

Exhibit 9-1. Respirator User Training (continued)

B. Disadvantages

1. Cannot be used in IDLH or oxygen-deficient atmospheres without escape provisions (i.e., auxiliary SCBA)
2. Restrict worker mobility because of trailing air-supply hose
3. May result in a loss of respirable air supply through cutting, kinking, or crushing air supply hose, compressor failure or depletion of respirable air in storage cylinder
4. Have possibilities for equipment failure
5. Are expensive
6. Require regular maintenance and testing of air supply quality.

Respirator Fit

For negative pressure respirators, initial fit-testing is performed by the Local EC&HS Official to determine if a user can obtain a good facepiece-to-face seal. This test is conducted by using isoamyl acetate/oil of wintergreen, saccharin, or irritant smoke qualitative fit-test procedures, whichever is appropriate. After the initial fit-test, the user ensures a good facepiece-to-face seal each time he or she uses a respirator by performing "user" fit-testing, as outlined below.

Respirators that rely on a facepiece-to-face seal to protect the worker shall not be worn when factors, such as the following, prevent a good facepiece-to-face seal:

- Facial hair (beards and sideburns)
- Temple pieces on glasses
- Jaw misalignment from dental or other problems.

User fit-testing is performed as follows:

A. For chemical cartridge respirators:

1. Don the respirator and adjust head straps in accordance with the manufacturer's instructions.
2. Next, perform one of the following two fit-tests just before entering a contaminated atmosphere:
   - Positive Pressure Test—With a card or the palm of your hand, cover the exhalation valve, exhale gently into the facepiece, and hold your breath for 10 seconds. The fit is considered satisfactory if a slight positive pressure is built up with no

apparent outward leakage around the seal. If leakage is detected, readjust the respirator on the face and repeat the fit check.

- Negative Pressure Test—With a card or the palm of your hand, cover the inhalation valve(s), inhale gently, and hold your breath for 10 seconds. The fit is considered satisfactory if the facepiece remains slightly collapsed with no apparent inward leakage around the seal. If leakage is detected, readjust the respirator on the face and repeat the fit check.

NOTE: Quantitative fit-tests may be required in cases of lead or asbestos exposure above their respective action levels.

B. For single-use disposable dust, fume, mist respirators:

1. Don the respirator and adjust head straps according to the manufacturer's instructions. Using both hands, mold the metal nose piece to the shape of the nose (3M respirator only). Cup both hands completely over the respirator and exhale; if air leaks around the edges, readjust the respirator on the face and repeat the fit check.
2. After removing the respirator, immediately examine the user's face for traces of dust inside the seal area resulting from inward leakage from the environment.

C. For airline respirators (full facepiece only):

1. Don the respirator and adjust straps in accordance with the manufacturer's instructions.
2. With one free hand, hold the mask in place. With the other hand, cover the exhalation valve, exhale gently into the facepiece, and hold your breath for 10 seconds. The fit is considered satisfactory if a slight positive pressure is built up with no apparent outward leakage around the seal. If leakage is detected, readjust the facepiece on the face and recheck the fit.

Maintenance of Respiratory Protective Equipment

If you wear a respirator, it must be cleaned, inspected, and stored in a convenient location after use.

Cleaning and Storage

A. At the end of the task or work shift, whichever occurs first, the respirator shall be cleaned and stored in a convenient, clean location. Respirator users are expected to clean and store their own respirators as follows:

Exhibit 9-1. Respirator User Training (continued)

For chemical cartridge respirators, fullface supplied-air respirators, and a facepiece/breathing tube of SCBA:

1. Remove and discard any filter or cartridges if they are expired.
2. Immerse the facepiece and breathing tube in detergent (such as soap from restroom dispensers) and warm water. Use a soft brush or paper towel to facilitate dirt removal.
3. Rinse thoroughly in clean, warm water to remove detergent.
4. Air dry in a clean area or dry with a lint-free cloth.

However, disinfection is required whenever individual respirator issue is impractical and, in all cases, should be done annually. Disinfection is accomplished as follows:

1. Follow steps 1 and 2 outlined in cleaning procedure.
2. Add 2 tablespoons of chlorine bleach to 1 gallon of cool water (hypochlorite solution, 50 ppm).
3. Immerse the facepiece and breathing tube in water/bleach solution for 2 minutes.
4. Rinse completely in clean, warm water.
5. Air dry in a clean area or dry with a lint-free cloth.

NOTE: Gloves should be worn during the disinfection procedure.

All respirators must be stored:

1. In a convenient, clean, and sanitary location.
2. To provide protection against dust, excessive moisture, extreme temperatures, direct sunlight, or damaging chemicals.
3. In sealed plastic bags when not in use.

Inspection

Inspection of the respirator is the most important part of respirator maintenance. Wearing a poorly maintained or malfunctioning respirator may be more dangerous than not wearing one at all. The respirator user is responsible for inspecting the respirator before and after each use and during cleaning as follows:

A. Disposable dust, fume, mist respirators—check for:
   1. Integrity of the filter (for holes)
   2. Elasticity and deterioration of straps
   3. Deterioration of metal nose clip (if applicable)

Exhibit 9-1. Respirator User Training (continued)

B. Chemical cartridge respirators—check for:

1. Facepiece—check for:
   - Excessive dirt
   - Cracks, tears, holes, or distortion from improper storage
   - Cracked, or badly scratched, or loose-fitting lens (full facepiece)
   - Cracked or broken air-purifying cartridge holders, badly worn threads, or missing gaskets.

2. Headstraps—check for:
   - Breaks
   - Loss of elasticity
   - Broken or malfunctioning buckles
   - Excessively worn serrations on the head harness that may allow slippage (full facepiece only).

3. Inhalation/Exhalation valves—check for:
   - Residue, dust, or dirt on valve or valve seat
   - Cracks, tears, or distortion in valve material
   - Valve(s) not sealing properly.

4. Air-purifying elements—check for:
   - Incorrect cartridge or filter for the contaminant(s)
   - NIOSH/MSHA approval label (TC-#)
   - Worn threads—both filter and facepiece threads
   - Cracks or dents in filter housing.

A. Supplied-air respirators.

1. Check facepiece, headstraps, and valves as previously discussed. Additionally, check corrugated breathing tube for:
   - Missing or loose hose clamps
   - Deterioration, determined by stretching the tube and looking for cracks.

2. Air supply system—check for:
   - Breaks or kinks in air supply hoses and fittings
   - Tightness of fitting connections
   - Proper setting of regulators and valves
   - Breathing air quality (maintenance-quarterly)
   - Air-purifying elements, high temperature, and carbon monoxide alarms (maintenance)

3. For hoods, helmets, blouses, or full suits—check for:
   - Condition of all rubber and straps
   - Rips, tears, and seam integrity
   - Suspension inside headgear to assure proper adjustment
   - Cracks or bad scratches in the faceshield.

   If defects are observed in a respirator, it must be removed from use until adequately repaired.

Repair

Sooner or later your respirator will need a new part or some other repair. The law requires that replacement or repairs be done by experienced persons with parts designed for the respirator. It is imperative that everyone realize that respirator parts from different manufacturers are not interchangeable. The MSHA/NIOSH approval will be invalidated if any part has been replaced by one from a different brand or respirator and the respirator user will be in violation of the OSHA requirement. This is true even if the respirator seems to work well with the substitute part. NOTE: Air-supplied respirator equipment is repaired by the manufacturer's representative or by an SAIC employee trained by the manufacturer.

Employee Responsibilities and Emergency Situations

As a respirator user, you must:

A. Not wear contact lenses while wearing a respirator in a contaminated atmosphere

B. Inspect your respirator before each use and during cleaning

C. Use respirators as instructed

D. Check the facepiece-to-face seal each time, prior to entry into a contaminated atmosphere

Exhibit 9-1. Respirator User Training (continued)

E. Guard against damaging the respirator

F. Go immediately to an area of "clean" air if your respirator malfunctions

G. Report any respirator malfunctioning and resulting symptoms, including the following, to your supervisor:

   1. Damage to any part of the system
   2. Occurrence of taste or smell of the contaminant(s) or irritation
   3. Fatigue due to respirator usage
   4. Breathing difficulty
   5. Dizziness or other distress.

It is impossible to cover all the considerations you should be familiar with because of the many types of respirators and conditions of use. However, to have any of this information be of value, it must be read, understood, and applied. The bottom line is, report unusual situations resulting from respirator use immediately to your supervisor.

Exhibit 9.2. Air-Purifying Chemical Cartridge and Gas Mask Color Code

Air Contaminants to Be Protected Against	Colors Assigned
Acid Gases	White
Hydrocyanic Gas	White with 1/2" green stripe completely around bottom of cartridge
Organic Vapors	Black
Ammonia Gas	Green
Acid Gas and Organic Vapor	Yellow
Acid and Ammonia Gases	Green with 1/2" white stripe completely around bottom of cartridge
Carbon Monoxide	Blue
Acid and Ammonia Gases and Organic Vapors	Brown
Radioactive Materials	Purple (Magenta)
Acid Gases, Ammonia, Carbon Monoxide, and Organic Vapors	Red
Particulate (Dust, Fume, Mist)	Color as above with 1/2" gray stripe completely around bottom of cartridge

Exhibit 9.2. Air-Purifying Chemical Cartridge and Gas Mask Color Code (continued)

Notes on Air-Purifying Cartridge and Gas Mask Canisters

1. A purple (magenta) stripe is used to identify cartridges that provide protection against radioactive materials as well as the protection indicated by the basic color.
2. An orange stripe or body is used to identify cartridges that provide protection against gases not included in this table. The user will need to refer to the canister label to determine the protection provided.
3. Where labels only are colored, as noted above, the cartridge or canister will either be gray or a natural metallic color.

The color-coded label also specifies the maximum contaminant concentration that a cartridge or canister is approved to protect against. For example, a label may read:

> Do not wear in atmosphere immediately dangerous to life. Must be used in areas containing at least 20 percent oxygen. Do not wear in atmospheres containing more than one-tenth percent organic vapors by volume. Refer to complete label on respirators or cartridge container for assembly, maintenance, and use.

13. Personal Protective Equipment

13.1 Purpose

To outline company policies and procedures for the provision and use of personal protective equipment (PPE).

13.2 Definition

Personal protective equipment includes devices and clothing designed to be worn or used for the protection or safety of an individual while in potentially hazardous areas or performing potentially hazardous operations.

13.3 Policy

A. To protect employees from potential hazards in the workplace, SAIC will provide PPE appropriate to the task. The Local Environmental Compliance & Health and Safety Official will advise on PPE required for an operation. Each division through its supervisors is responsible, however, for obtaining the equipment and enforcing its use.

B. PPE is not a substitute for adequate engineering controls. It provides a "last line of defense." Equipment failure or misuse exposes the employee to potential hazard(s).

13.4 Responsibilities

A. Local EC&HS official

1. Evaluates operations/work areas to determine PPE requirements.
2. Ensures recommended PPE conforms to applicable standards (i.e., American National Standards Institute, National Institute of Occupational Safety and Health).

B. Supervisor

1. Ensures required PPE is readily available to employees working in areas or performing operations that require PPE for protection.
2. Enforces the mandatory use of PPE when required to protect employee health and safety.
3. Ensures PPE is properly stored and maintained.

C. Employees

1. Use, maintain, and store PPE in accordance with this procedure and instructions provided by the supervisor or Local EC&HS Official.
2. Report all problems associated with PPE (i.e., damaged, worn, or inadequate) to the supervisor or the Local EC&HS Official.

13.5 Eye Protection Program

A. Policy

SAIC will provide required protective eyewear to employees working in areas in which an employee could cause injury to himself or herself or to another employee (eye hazard area) or performing tasks that present a potential for eye injury to the employee doing the task (eye hazard operation). The use of contact lenses is prohibited in any operation involving hazardous chemicals.

B. Definitions

1. Eye protection equipment is used to prevent injury to the eyes from flying objects, hazardous chemicals, or injurious light rays. Such equipment includes safety glasses, chemical goggles, and face shields.

2. Safety glasses are prescription and non-prescription lenses and frames conforming to American National Standards Institute (ANSI) Z87-1968. Lenses of safety glasses are distinctly marked with the monogram of the manufacturer, and frames have an identification mark (Z87.1) on both the front and temples.

3. The following are designated eye hazard areas, as identified in 13.5A, at _____ (insert location name):

_____

_____

_____

_____

4. Eye hazard operations are tasks that present a potential eye injury hazard to the employee performing the task. The following are designated eye hazard operations at _____ (insert location name):

_____

_____

_____

_____

C. Responsibilities

1. Local EC&HS Official

- Implements and administers the eye protection program.
- Maintains technical data on eye protection to ensure it meets Federal standards.
- Assists supervisor in identifying eye hazard areas and operations and in selecting proper eye protection.

2. Supervisor

   - Identifies eye hazard areas and operations and solicits assistance from the Local EC&HS Official, as necessary, to ensure selection of the proper type of eye protection.
   - Enforces the sue of eye protection in designated eye hazard areas and while employees perform designated eye hazard operations.
   - Ensures that employees are provided with appropriate eye protection and that eye protection is available for visitors to designated eye hazard areas.
   - Ensures that all entrances into eye hazard areas are posted with a sign (i.e., CAUTION—Eye Hazard Area—Do Not Enter Without Eye Protection).

3. Employees

   - Use approved eye protection as instructed and provided for in this section.

D. Eye Protection Issuance Replacement

1. Full-time employees who are assigned to eye hazard areas or who as a regular part of their job perform eye hazard operations are eligible to obtain prescription safety glasses at the expense of their divisions.
2. The area supervisor and Local EC&HS Official determine the need for and type of eye protection required.
3. Eye protection devices are issued as followed:

   - Prescription safety glasses through the Local EC&HS Official.
   - Goggles, face shields, safety glasses, and visitor safety glasses through the area supervisor.
   - Laser safety eyewear through the Laser Safety Officer or Local EC&HS Official.

4. Prescription safety glasses are provided by the employee's division as follows:

   - Supervisor submits written request to the Local EC&HS Official identifying the employee for whom prescription safety glasses are required.
   - Once the request is signed by both the employee's supervisor and the Local EC&HS Official, the employee is authorized to choose from an approved source and selection of lenses/frames the desired style of safety glass frames and lenses.
   - The employee is responsible for obtaining a prescription from his or her own physician. The fee for the services of this physician and any fitting fees must be paid by the employee. In

general, safety glasses may be ordered from a prescription less than 2 years old.

- Division-furnished prescription safety glasses damaged by occupational wear will be repaired or replaced at the division's expense.
- New lenses or safety glasses will be provided at the Division's expense, if the employee's prescription significantly changes.

E. Emergency eyewash and shower equipment

1. Emergency eyewash and shower equipment meeting the requirements of ANSI Z358.1-1981 will be provided in all areas where hazardous chemicals are used in such a manner that an employee's eyes or body may be exposed. This equipment will be located within the work area where it is easily accessible for emergency use.
2. Emergency showers and eyewashes will be tested monthly to flush the line and verify proper operation. A record of this inspection will be maintained on a card attached to the unit and will include the date and inspector's initials. The exception is self-contained eyewash equipment, which will be filled with a commercially available bacteriostatic additive; maintenance will be performed at intervals recommended by the manufacturer (i.e, every 6 months the unit will be drained and refilled).

13.6 Foot Protection

A. Policy

1. Employees performing tasks that pose a recognized foot injury hazard, such as handling equipment or working on construction, will be required to wear safety shoes.

B. Definitions

1. Safety shoes conform to ANSI Z41-1983. The inner lining of safety shoes are stamped with the ANSI Z41 identification mark.

C. Responsibilities

1. Local EC&HS Official
   - Implements and administers the foot protection program.
   - Assists the supervisor in identifying tasks that pose a recognized foot injury hazard.
2. Supervisor
   - Identifies tasks requiring foot protection and, when required, enforces its use.

3. Employees

   - Wear appropriate foot protection, as instructed by the supervisor.

D. Foot Protection Issuance/Replacement

1. A division may contribute an amount for the purchase of safety shoes. Contact your supervisor or Local EC&HS Official for information on reimbursement (if any) provided by your division for the purchase of safety shoes.
2. Lost or stolen safety shoes will be replaced at employee expense.
3. Worn or damaged safety shoes will be replaced in accordance with the division's policy.

13.7 Respiratory Protection

See Section 9, Respiratory Protection Program.

A. The Local EC&HS Official will identify an approved source for safety shoes.