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ROCKY FLATS

Site-Specific Health & Safety Plan OU11 - West Spray Field

Implementation of the Combined Phases
RFI/RI Work Plan for Rocky Flats Plant



August 1994

ADMIN RECORD

A-OU11-000082

Site-Specific Health and Safety Plan

Implementation of the Combined Phases RFI/RI Work Plan
for Rocky Flats Plant Operable Unit No. 11 West Spray Field

Task Order MTS 351302TB3
Master Task Agreement No. MTS 225440SG

August 23, 1994

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ONLY

HEALTH AND SAFETY PLAN

REVIEW AND APPROVAL

The following signatures document that this Project Health and Safety Plan (HASP) has been reviewed and approved by appropriate Departments and the applicable federal, state, and local regulations and RFP policies and practices have been incorporated.

Health and Safety Plan Title

Site-Specific Health and Safety Plan, Implementation of the Combined Phases RFI/RI Work Plan for Rocky Flats Plant Operable Unit No. 11, West Spray Field

This site specific health and safety plan has been written for the use of The S. M. Stoller Corporation, its employees and subcontractors. All EG&G personnel associated with this Project will comply with RFP applicable aspects of the plan.

REVIEW AND APPROVAL

K. K. Orpail 6-10-94
EG&G Project Manager Date

L. A. Lambert 6-10-94
Health and Safety Liaison Officer Date

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Approved By:

K.K. O'Neill

8/25/94

Name

Date

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1. INTRODUCTION

1.1 Policy

This health and safety plan has been developed for the implementation of activities associated with the Resource Conservation and Recovery Act (RCRA) Facility Investigation/Remedial Investigation (RFI/RI) at Operable Unit 11 (OU11), West Spray Field (WSF) (Individual Hazardous Substance Site [IHSS] 168). This site-specific Health and Safety Plan (HASP) has been developed for compliance with Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response Regulations 29 Code of Federal Regulations (CFR) 1910.120 for hazardous waste site workers at the Rocky Flats site. The intent of the HASP is to define the hazards that may be present and identify the procedures that will be followed to protect all project personnel from those hazards. This HASP shall also apply to all subcontractors of Stoller who are participating in the field activities at OU11. This HASP addresses the requirements for personnel who manage, monitor, and perform activities associated with the RFI/RI at OU11. All EG&G, Stoller, and Stoller subcontractor personnel assigned to this project will follow this HASP and all appropriate site procedures and policies when conducting work at OU11 sites. A signature sheet will be maintained to document that all site workers read, understand, and comply with all aspects of this plan.

1.2 Regulations and Guidelines

Adherence to applicable federal, local, and national consensus organization health and safety standards, regulations, and guidance manuals is required during field activities at OU11. These include, but may not be limited to, the following:

- CFR 1910, Occupational Safety and Health Standards, General Industry (latest edition);
- CFR 1926, Occupational Safety and Health Standards, Construction Industry (latest edition);
- Nuclear Regulatory Commission 10 CFR 20 (latest edition);
- U.S. Department of Energy (DOE) Order 5480.1B (with revisions);

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- DOE Order 5483.1A;
- Radiological Operating Instructions (ROI), EG&G Rocky Flats, Inc. (with revisions);
- Environmental Management Radiological Guidelines (EMRG) Manual, EG&G Rocky Flats, Inc. (with revisions);
- Health and Safety Practices Manual (HSP), EG&G Rocky Flats, Inc. (with revisions);
- Threshold Limit Values (TLVs) for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists (ACGIH) (latest edition);
- Occupational Safety and Health Guidance for Hazardous Waste Site Activities, U.S. Department of Health and Human Services, et al., October 1985;
- Radiological Control Manual, DOE, June 1992;
- Rocky Flats Environmental Restoration Health and Safety Programs Plan Workbook, October 26, 1990; and
- Section 01700, Subcontractor Safety and Health Requirements for Service Subcontracts.

1.3 Contents of Plan

This HASP describes known hazardous materials and work operations associated with the RFI/RI activities at OU11. The plan specifies responsibilities and authorities of Stoller and Stoller subcontractors involved in the supervision of activities at this site. This plan further describes the requirements for medical surveillance, personal protective equipment (PPE), hazard communication, training, monitoring, decontamination, site control, and emergency response procedures.

The potential hazards associated with the activities at OU11 sites have been assessed by reviewing historical activities and previously performed studies within OU11. Based on the hazard assessment, plans for PPE, monitoring, decontamination, site control, and emergency response have been developed.

1.4 Background

A comprehensive, phased program of site characterization, remedial investigations, feasibility studies, and remedial/corrective actions is in progress at Rocky Flats. These investigations are being conducted pursuant to the 1986 Compliance Agreement between DOE, the U.S.

Environmental Protection Agency (EPA), and the Colorado Department of Health, which addresses hazardous and radioactive mixed waste management at Rocky Flats. The RFI/RI at OU11 is part of this program.

1.5 Location and Description

The WSF is located on the west side of the Rocky Flats and covers an area of approximately 105.1 acres. From April 1982 until October 1985, the WSF area was used for periodic spray application of excess liquids pumped from the Solar Evaporation Ponds 207-B North and 207-B Center (DOE, 1993). Pond 207-B Center was a repository for treated sanitary effluent, whereas Pond 207-B North was a repository for water from the interceptor trench system (ITS). The ITS was installed to collect groundwater and seepage from the hillside north of the solar evaporation ponds and water from Buildings 771 and 774 footing drains.

The total combined area of direct application is approximately 14.1 acres and is divided into three areas. Area 1 is approximately 35.6 acres in size and accommodated three fixed spray lines (two were previously portable lines) with a width of 80 feet and an average length of 1,524 feet. The resulting spray area for all three lines was 8.4 acres. Area 2 covers approximately 2.5 acres and accommodated a single fixed irrigation line. A spray impulse cannon with a maximum spray radius of 100 feet was used on an east-west trend in Area 3 (3.2 acres). Figure 1-1 illustrates the three areas of spray application.

Based on the total volumes applied between April 1982 and October 1985—and the estimated areas of application of 8.4, 2.5, and 3.2 acres for areas 1, 2, and 3—a total average application was estimated. The estimated total application of Pond 207-B North water is about 40 inches of liquids applied in Area 1. The estimated total application of Pond 207-B Center liquids is roughly 150 inches, applied in areas 1, 2, and 3. Because liquid from both ponds was applied to Area 1, the maximum total application could have been as much as 190 inches per unit area for all four years of operation (approximately 66,000,000 gallons) (DOE, 1994).

The water collected from the ITS and pumped to Pond 207-B North has been characterized (DOE, 1992) as containing elevated nitrate, chloride, and sulfate. The most prevalent metals were sodium, potassium, calcium, and magnesium.

Radionuclides were analyzed in soil samples and showed levels of uranium-233, 234, uranium-238, and plutonium above background. The only organic compound detected was ethylene chloride. This compound was also noted in blanks and its presence is attributed to laboratory contamination.

Liquids from Pond 207-B Center were applied to all three application areas. This water consisted of treated sanitary effluent from the Rocky Flats sanitary wastewater treatment plant, which was effluent characterized by elevated nitrate concentrations.

1.6 Purpose

The purpose of the investigations at OU11 is to characterize potential contamination at OU11 and determine the need for additional investigation and remedial action. The objectives of the RFI/RI for OU11 are to characterize the physical features of the site, define contaminant sources, determine the nature and extent of contamination, describe the fate and transport of the contaminants, and conduct a human health risk assessment.

These objectives will be reached by conducting a streamlined program that combines the Phase I and Phase II investigations. The Phase I investigation examines the nature and extent of contamination within the source and soils and evaluates the risks from air pathways and direct contact. The Phase II investigation examines the potential fate and transport of the contamination and evaluates the risks.

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Health and Safety Responsibilities

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2. HEALTH AND SAFETY RESPONSIBILITIES

2.1 Introduction

Health and safety is the responsibility of all contractors working on the site. Stoller has provided a strong commitment to ensuring a safe work environment for all workers on the project. Individual project personnel responsibilities are identified in the following sections. The Stoller Project Manager, Field Implementation Manager, Site Manager, Assistant Site Manager, Site Safety Officer, and Health and Safety Specialist (HSS) have authority to stop work in an unsafe work condition.

2.2 Assignment of Responsibilities

2.2.1 *Stoller Project Manager*

The Stoller Project Manager (PM) for OU11 has overall responsibility for work performed by Stoller and Stoller subcontractors at the site. The Stoller PM, through line management and supervisors, has responsibility for implementing and abiding by the HASP. The Stoller PM will assign a Field Implementation Manager (FIM) to coordinate offsite and onsite activities. The Stoller PM will appoint an HSS. Stoller subcontractors will review and comply with this HASP prior to initiating work at the site.

2.2.2 *Stoller Site Manager/Field Operations Lead*

The Stoller Site Manager/Field Operations Lead (SM/FOL) for OU11 has responsibility for day-to-day management of fieldwork performed by Stoller and Stoller subcontractors. The SM/FOL, in coordination with line management, has responsibility for ensuring that qualified personnel are assigned to perform field activities in a manner consistent with the HASP. The SM/FOL, with support from the health- and safety-related disciplines, will assist the HSS in coordinating implementation of the HASP.

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2.2.3 *Responsibilities of the Subcontractor Site Safety Officer*

The position of Site Safety Officer (SSO) will be filled by an individual who meets the subcontractor's requirements for that position and must be approved by EG&G Radiological Engineering and Industrial Hygiene. In addition, the EMRE must approve the SSO to complete those responsibilities assigned to HSSs.

The SSO will:

- Implement the applicable SSHP and verify compliance with all applicable health and safety requirements;
- Ensure that updated copies of the HSP, applicable HASP, EMRGs, and all documents referenced by the EMRGs are available to subcontractor employees;
- Supervise HSSs in performance of their responsibilities;
- Ensure HSSs and subcontractor employees are advised of the radiological hazards, both expected and suspected, by posting and controlling radiological areas according to EMRG instructions;
- Ensure that the guidelines in HSP 18.19, "Criteria and Actions for Potential Intakes," are adhered to for the duration of the project;
- Verify that performance testing of EG&G and subcontractor-owned instruments has been conducted in accordance with the manufacturer's recommendations. The SSO will also ensure that the test results are recorded daily in a calibration log specific to each instrument;
- Review and approve completed survey reports/forms. If an unsatisfactory report/form is received, it will be returned to the appropriate individual(s) for correction. When conducting this review, the SSO will ensure that
 - the correct report/form is complete,
 - the entries are reasonable, and
 - the required signatures are affixed to the report;
- Forward approved survey reports/forms to the EMRE and maintain a file of all completed radiological survey forms. This file will be organized by survey areas, with an index placed in the front of the file;
- Immediately telephone the EMRE when survey results indicate radiation levels exceeding 5 millirems/hour (mrem/h). For contaminant radiation levels requiring access controls not

already established, or levels exceeding and established action level, the EMRE will also be notified; and

- Maintain an instrumentation field logbook that documents the specific equipment used at the work site.

2.2.4 *Responsibilities of the Subcontractor Health and Safety Specialist*

The HSS will be approved by EG&G Radiological Engineering and Industrial Hygiene to complete the following assigned responsibilities:

- Conduct surveys and document the results required by the EMRGs, the applicable SSHSP, and the EG&G sitewide standard operating procedures (SOPs);
- Supervise Health and Safety Specialist in training (HSST) during field activities;
- Countersign all reports/forms completed by the HSST;
- Forward completed survey reports/forms to the SSO;
- Notify the SSO of survey that indicate radiation levels exceeding 5 mrem/h, levels requiring access controls not already established, or levels exceeding an established action level;
- Control access and advise all personnel when radiological precautions are required;
- Complete performance and operational checks required for radiation instruments and make entries in the instrumental field logbook; and
- Maintain all required accident/incident records.

2.2.5 *Responsibilities of the Subcontractor Health and Safety Specialist in Training*

The HSST will perform the following responsibilities:

- Participate in a formal training program designed to qualify subcontractor employees to be designated as Health and Safety Specialists by the EMRE;
- Conduct surveys and document the results as required by the EMRGs, the applicable SSHSP, and the EG&G sitewide SOPs;
- Notify the HSS of unanticipated radiation and contamination levels such as a lack of radioactivity where radioactivity is known to be present, or radiation or contamination levels exceeding anticipated levels;
- Request HSS countersignatures on all survey reports; and

- Post required signs according to EMRG instructions.

2.2.6 *Field Team Leaders*

The Field Team Leaders (FTLs) are responsible for implementing and abiding to the HASP and ensuring that all site workers have reviewed and will comply with requirements of the HASP. Examples of the FTLs include the Well Installation Manager, Subsurface Soil Sampling Manager, and Groundwater Sampling Manager.

2.2.7 *Fire Protection Representative*

The fire potential during environmental investigations does not justify the cost of providing an independent Fire Protection Representative. Fire prevention is expected to be largely a matter of good housekeeping. In the event of a fire, the EG&G Fire Department will be notified and Stoller personnel will withdraw from the area. Should any personnel sustain injury, Rocky Flats Emergency Medical Services will be immediately notified by dialing 2911 on the field radio. The EG&G emergency number is 966-2911.

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2.3 Stoller OU11 Personnel

Project Title	Name (Company)	Phone
PM	Greg Davis, Stoller	(303) 449-7220
FIM	Brian Myller, Watkins/Johnson	(303) 449-7220
SM/FOL	Steve Lynn, Stoller	(303) 449-7220
HSS/SSO	Larry Erwin, Ogden	(303) 843-6210
HSST	Virgil Palencia, Stoller	(303) 449-7220
Alternate HSST	Michelle Hanson, Stoller	(303) 449-7220

2.4 EG&G Personnel

	Name	Extension
Radiological Engineering	R.C. Gentry	8349
Industrial Safety	K.E. Dryer	2190
Radiological Operations	M. Brown	2062
Occupational Health	F.J. Furman	2895
Environmental Management	T.J. O'Rourke	8577
Fire Protection	T.J. Parker	6043
Health and Safety Administrator	P.A. Stephens	4831
Health and Safety Liaison Officer	L.A. Nelowet	5471
Environmental Restoration	K.D. Anderson	6979
Health and Safety Officer		

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Hazard Assessment

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3. HAZARD ASSESSMENT

3.1 Introduction

The fieldwork that will be conducted at OU11 includes potential chemical, radiological, physical, biological, and mechanical hazards. These potential hazards were identified by reviewing site histories, previous sampling results, and work plans for the operable unit. This RFI/RI is designed to provide additional information concerning potential hazards associated with the IHSS; therefore, it is not possible to identify all chemical and radiological hazards associated with fieldwork at the present time. The use of standard measures such as PPE, work site chemical and radiological monitoring, work practice controls, and training should assist in identifying, evaluating, and controlling potential hazards at the work site that are not currently known.

Based on available information about the site, most of the work will be conducted in areas where severity of potential hazards is expected to be low. The potential for encountering chemical or radiological hazards will depend on what work is being performed. Environmental, physical, and biological hazards such as insects, heat and cold stress, and noise will likely be encountered to some degree while working in the IHSS. The degree of mechanical hazards resulting from use of motor vehicles, heavy equipment, and power tools will also depend on the work being performed. A summary of site activities, hazards, monitoring requirements, and control methods for OU11 is presented in Table 3-1. The rationale for monitoring and PPE is presented in Sections 9 and 6, respectively.

RFI/RI activities at OU11 will involve the following operations:

- Nonintrusive operations such as assisting in radiological surveys, overseeing geophysical testing, and performing visual inspections. These operations do not disturb the soil and are not expected to approach occupational exposure limits.

**Table 3-1
 Operable Unit 11 Hazards Summary Table**

Site Activities	Known or Suspected Hazards	Monitoring Requirements	Initial Level of Protection	Comments
All. These hazards are presumed to be present at all hazardous substance sites even when activities are not present. Site activities may increase the magnitude or number of hazards.	Heat stress Cold stress	Core temperature, wet bulb globe temperature (WBGT) when ambient temperature is above 80 degrees F and pulse.	Wear adequate thermal clothing in cold temperatures	Adjust work/rest cycles and fluid intake to maintain normal body temperature.
	Fugitive dusts that may be contaminated with heavy metals or radionuclides	Particulate dust monitoring (miniram). See Section 9.0	Level D.	Work upwind of dusty area if possible.
	Ticks	Visual inspection	Wear long-legged pants and work boots	Suppress dust to less than 2.5 mg/m ³ with water whenever the water will not interfere with analysis. Wear coveralls with wrists and ankles taped to gloves/boots if ticks are reported.
	Prairie rattlesnake	Visual inspection	Wear long-legged pants and work boots	Use tick repellent containing over 30 percent DEET on exposed skin areas and hair.
All	Black widow spider	Visual inspection	None	Make noise and probe areas with long stick before stepping. Wear gloves.
Nonintrusive activities such as radiological and geographical surveys; surface sampling.	Common hazards listed above	Particulate dust monitoring	Level D	None

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Site Activities	Known or Suspected Hazards	Monitoring Requirements	Initial Level of Protection	Comments
	Radionuclides	Alpha monitoring: Bicron Frisk-Tech with A-100 probe Beta/gamma monitoring: Ludlum Model 12 with 44-9 probe or Bicron Frisk-Tech with B-50 probe	Level D	None
Intrusive activities such as borings, monitoring well installations, and subsurface sampling	Underground utilities	Check with plant or public utility location	N/A	Offset borings/wells by at least 10 feet.
	Overhead hazards	Visual inspection	N/A	De-energize high voltage lines in accordance with lock-out/tag-out regulations or maintain safe distances as specified by OSHA.
Intrusive activities such as borings, monitoring well installations, and subsurface sampling.	Potential for elevated concentrations of radionuclides	Alpha monitoring: Bicron Frisk-Tech with A-100 probe Beta/gamma monitoring: Ludlum Model 12 with 44-9 probe	Modified Level D	Dust suppression using water spray.
	Fugitive dusts that may be contaminated with heavy metals or radionuclides	Particulate dust monitoring	Wear modified Level D until direct reading instrument action levels are exceeded, then Level C	Dust suppression using water spray.

Intrusive operations such as sampling surface and subsurface soils and installation of monitoring wells. These operations disturb soil and have the potential to resuspend contaminated subsurface soils. The quantity of soils disturbed will be minimized by misting soils with water and by shoveling spoils into containers periodically. The Plan for the Prevention of Contaminant Dispersion (PPCD), developed by EG&G, will address dust emissions, and Stoller will comply with the PPCD.

3.2 Potential Chemical and Radiological Hazards

3.2.1 Pathways and Exposure Routes

Pathways of exposure to chemical and radiological hazards are directly dependent upon investigative activities performed at OU11. Exposure to potential health hazards may occur during activities involving subsurface soil sampling, drilling activities, groundwater sampling and measurement efforts, and other intrusive activities. Exposure pathways include the following:

- Inhalation of fugitive dust containing metals and fugitive dust contaminated with radionuclides;
- Inadvertent ingestion of fugitive dust contaminated with metals and/or radionuclides; and
- Injection of radionuclides, metals, or other chemical compounds into the body through the skin.

3.2.2 Radiological Hazards

Airborne Exposures to Radiological Hazards

Exposure to radiological hazards could occur through inhalation of fugitive dust contaminated with radiological materials. The degree of potential exposure to airborne radiological hazards is considered unlikely or low depending on the individual work site and amount of airborne dust created at the site. OU11 reportedly has low or slightly elevated background levels of radionuclides, and the unobtrusive activities to be performed usually generate low quantities of airborne dust. Unknown radiological contamination at the site could lead to unexpected generation of airborne radiological hazards. The use of initial site surveys, radiological monitoring, work practice controls (e.g., minimizing dust generation), dust control practices, and

proper use of PPE will be the primary evaluation and control measures used to prevent inhalation of radioactive materials.

Skin Exposures to Radiological Hazards

Radioactive materials identified at sites in OU11 are not readily absorbed through unbroken skin. Contamination avoidance, decontamination, and proper use of protective clothing and gloves will be the primary control methods used to prevent skin contamination.

Inadvertent Ingestion of Radionuclides

Ingestion of radionuclides is possible during OU11 site work. The potential for exposure via this pathway is considered to be remote if good personal hygiene practices are followed prior to eating, drinking, or smoking. No eating, drinking, smoking, or chewing of tobacco or chewing gum will be allowed in the contamination reduction zone (CRZ) or the exclusion zone (EZ).

Puncture Wounds

Radiological materials could enter the body through breaks in the skin caused by a cut, laceration, puncture, abrasion, or burn. This route of entry can be controlled by complying with safe work practices to prevent accidents. If accidents occur possibly leading to radiation exposure—wounds and skin contamination—EMRG 2.3 procedure will be implemented. All injuries must be reported to Occupational Health, Building 122.

3.2.3 *Metal Contamination Hazards*

Workers could be exposed through inhalation or inadvertent ingestion of fugitive dust contaminated with metals during intrusive activities. These activities, along with weather conditions, could cause dust entrainment into the air and subsequently into the workers' breathing zone. Metals can be ingested into the body by poor personal hygiene practices prior to eating, drinking, or smoking.

The degree of potential exposure from contact with metal contaminants during investigation activities in OU11 is believed unlikely or low, depending on the work activity and individual work location. The use of air monitoring, work practice controls (e.g., minimizing dust generation and

personal hygiene), and proper use of PPE and respirators will be used as the primary control method to prevent inhalation or ingestion of metals.

3.3 Physical Hazards

Workers at sites within OU11 are potentially subjected to physical stresses, including cold and heat stress and noise exposure. Investigative activities may take place during a wide range of weather conditions leading to possible heat or cold stress conditions. Unacclimatized workers or workers wearing impermeable personal protective clothing during warm weather may be susceptible to heat stress. The "buddy" system will be used and all personnel shall be aware of the signs and symptoms of heat/cold stress on themselves or their "buddy." High noise exposure is possible when operating power tools and mechanized equipment such as drill rigs. No confined space work is anticipated for this OU11 project.

3.3.1 Cold Exposure

When working outdoors in temperatures below freezing, workers are susceptible to frostbite. Exposure to extreme cold can cause severe injury to the body surface or can result in profound generalized cooling, causing death. In cold weather, precautions should be taken to prevent cold exposure by wearing properly insulated garments and taking warm-up breaks in temperature-controlled areas when necessary. Symptoms of cold exposure include the following:

- Incipient frostbite or frost nip, characterized by sudden blanching or whitening of the skin;
- Superficial frostbite, which causes the skin to become waxy or white and superficially firm, but resilient beneath;
- Deep frostbite, characterized by cold, pale, solid skin tissues; and
- Systemic hypothermia, caused by exposure to freezing or rapidly dropping temperature. Symptoms are usually exhibited in stages. These include shivering, apathy, listlessness, sleepiness, rapid cooling of the body temperature to less than 95 degrees Fahrenheit (°F), unconsciousness, glassy stare, slow pulse and slow respiratory rate, freezing of the extremities, and death.

Field activities shall be terminated by the HSST if initial signs of frostbite or hypothermia exist or if the equivalent chill temperature is below 0°F. All affected personnel shall be kept warm and receive immediate medical care.

3.3.2 *Heat Stress*

A worker's risk for developing heat stress is greatly increased when wearing impermeable, personal protection clothing. This type of clothing limits the body's normal heat exchange mechanisms and increases energy expenditure. A program to recognize potential heat stress situations, prevent episodes, and control hazards will be implemented where necessary. The program will include heat stress monitoring, adequate rest breaks, fluid replacement, acclimatization, and personal cooling systems. Heat stress can cause health effects that range from heat fatigue to serious illness or death. Signs and symptoms of heat stress include the following:

- Heat rash, which may result from continuous exposure to heat or humid air;
- Heat cramps, caused by heavy sweating with inadequate electrolyte replacement; signs and symptoms include muscle spasms or pain in hands, feet, or abdomen; and
- Heat exhaustion, which occurs from increased stress on various body organs or system, including inadequate blood circulation due to cardiovascular system inefficiency or dehydration; signs and symptoms include pale, cool, moist skin; heavy sweating; dizziness; nausea; or fainting.

Personnel having symptoms of heat exhaustion will be immediately removed from fieldwork. Protective equipment will be removed and vital signs monitored. If body temperature exceeds 101°F, the individual will be transported to the Occupational Health for evaluation.

Heat stroke is the most serious form of heat stress. The body's temperature regulation system fails, and body temperature rises to critical levels. Immediate action must be taken to cool the body before the onset of serious injury or death. Signs and symptoms of heat stroke are red, hot, usually dry skin; reduced or lack of perspiration; nausea; dizziness and confusion; strong, rapid pulse; or coma. The body temperature often exceeds 102°F.

If signs of heat stroke are detected, the emergency should be immediately reported by calling 2911. The individual's protective clothing will be removed and the individual will be cooled by

flushing with water that is close to body temperature. The individual will be transported for further evaluation/treatment to the Occupational Health determined by the responding emergency medical technicians. Appendix A provides additional guidance for the prevention, monitoring, and treatment of heat stress.

3.3.3 Noise Exposure

Workers may be exposed to high noise levels during investigative activities at OU11 primarily from drill rigs and other mechanized equipment in use at the site. Noise exposure will be controlled to levels below those stipulated in Table 3-2, or adequate hearing protection will be required for exposed personnel. Workers shall adhere to the Hearing Conservation Program as defined by HSP 7.06.

**Table 3-2
TLVs for Noise¹**

Duration per Day (Hours)	Sound Level dBA ²
16	80
8	85
4 ¹	90
2	95
1	100
1/2	105
1/4	110
1/8	115 ³

¹ From "Threshold Limit Values and Biological Exposure Indices for 1990-1991," ACGIH, Cincinnati, Ohio.

² Sound levels in decibels (dBA) are measured on a sound meter, conforming as a minimum to the requirements of the American National Standards Institute (ANSI) Specification for Sound Level Meters, S1.4 (1971 Type S2A, and set to use the A-weighted network with slow meter response).

³ No exposure to continuous or intermittent noise in excess of 115 dBA.

3.3.4 Drill Rig Operations

The following paragraphs describe the hazards associated with operation of drill rigs. Although Stoller personnel will not be operating drill rigs, it is necessary that those personnel who will be

performing other activities in the proximity of a drill rig be aware of the hazards associated with drilling operations.

Drill Rig Maintenance/Condition

Drill rig maintenance is the responsibility of the Stoller subcontractor. Stoller subcontractors must use only equipment that complies with manufacturers' safety and maintenance requirements. Inspection of the drilling will be conducted by EG&G Occupational Safety (OS)/Construction Safety (CS) prior to it being brought on the site. The HSS will perform a detailed visual inspection to determine that

- cables are not seriously frayed,
- hydraulic lines are not leaking, and
- auger guides are present on rigs designed to use them.

The driller/driller's helper (drillers) will also be required to demonstrate that all of the kill switch(es) are operational (must be painted red per 29 CFR 1910.144 [a] [i] [iii]) and the back-up warning device is operational.

Equipment that does not meet the above requirements is deemed to be unsafe and is not approved for use. If other items appear to be a hazard, they will be brought to the attention of the drillers for assessment. Notification will be documented in the logbook along with actions taken (including no action).

Special Considerations

The Stoller Well Installation Manager is responsible for examining the rig to determine if grease, oil, or other materials commonly used for drilling may interfere with the environmental analyses that are to be performed on collected samples. Special greases made from vegetable fat may be required in some instances.

Underground Hazards

Prior to initiating drilling operations, Stoller will clear borehole locations in accordance with EG&G SOP GT.10 and 1-B37-HSP 12.08, REV. 0, Excavation and Trenching, and Section 01700, Subcontractor Safety and Health Requirements for Service Subcontracts.

Fire and explosion hazards may be present if containerized chemicals are present underground (geophysical testing will be performed if there is doubt about the presence or location of underground structures or containers). All soil disturbance must be approved by an excavation specialist. No drilling is permitted in areas where explosion potential exists (i.e., metal masses have been detected using geophysical methods).

If there is potential for drums to be buried more than 8 feet below the surface, periodic down-hole tests will be required to prevent drilling into metallic containers.

Clothing

Loose-fitting or bulky clothing should not be used in the immediate vicinity of the rotating auger. The auger can snag the clothing and pull the operator into the rig.

Grout

Grouts often use volclay or other materials containing crystalline silica. Drillers are expected to use respiratory protection while mixing grout unless the drilling company has documentation that indicates that crystalline silica concentrations do not exceed $.05 \text{ mg/m}^3$ as an 8-hour time-weighted average (TWA). The National Institute of Occupational Safety and Health (NIOSH) lists crystalline silica as a carcinogen and recommends that exposures be kept as low as practical.

Lightning

Drill rigs act as lightning rods. If lightning is seen anywhere on the horizon, drilling operations will be discontinued.

Noise

Noise may be in excess of the levels set by OSHA during certain operations such as driving a split spoon. Noise monitoring will be conducted to determine if noise levels exceed action levels of 85 dBA continuous or 140 dBA impulse. Hearing protection is required to be worn when noise levels exceed 85 dBA. Ear plugs and ear muffs will be worn when impulse noise exceeds 140 dBA impulse (Table 3-2).

If the noise levels are not documented to be below 85 dBA during normal operations and 140 dBA during hammering operations, noise levels will be assumed to exceed acceptable levels. Ear muffs or foam ear plugs will be worn during normal drilling, and a combination of ear plugs and ear muffs will be worn during hammering operations. Hammering operations include split spoon sampling.

Extra effort should be used to remain aware of heavy machinery operations when working with hearing protection, because verbal warnings will be difficult to hear.

Overhead Hazards

The following minimum clearances are required when working near energized power lines:

- 10 feet from a 50 KV or less line,
- 20 feet from a 50 KV to 345 KV line, and
- 34 feet from a 345 KV to 750 KV line.

When working near buildings, branches, and bridges the drill rig must have enough room for the mast to be raised safely. The minimum safe radius is equal to the maximum mast height plus at least 5 feet. If buildings or pipes are directly overhead, additional height may be required to provide safe clearance while raising A-rods and augers above the mast height. The team leader should coordinate with the drilling company to determine the clearance requirements for the specific rigs to be used.

Rain

Rain on the cathead makes the cathead slippery and dangerous. Outdoor operation of catheads is not permitted in rain.

Wind

If sustained winds reach 15 miles per hour (mph), all materials and/or debris will be secured. Drilling will continue if determined safe by EG&G health and safety personnel. If sustained winds reach speeds at or above 35 mph, drilling activities will be discontinued until winds calm.

Slippery Surfaces

Slippery surfaces may be present in the immediate vicinity of the auger. The slippery surfaces are due to clay-like particulates that have been wet by groundwater and/or rainwater. Mesh stages on drill rigs that can reduce the slip hazards substantially will be used.

Volatile Chemical Hazards

Based on historical data, volatile chemical hazards are not anticipated during intrusive operations.

Nonvolatile Chemical Hazards

Nonvolatile chemical hazards will be conservatively estimated using real-time instruments, or assumed to be present, for the purposes of selecting PPE. Nonvolatile chemicals include heavy metals.

If the nonvolatile chemical concentration exceeds one-half of the occupational exposure limit, industrial hygiene sampling will be required to determine the actual concentration present.

Exclusion Zone

Workers are not authorized to enter the EZ unless their job requires them to be present and they meet or exceed the requirements specified in the site-specific safety plan for medical monitoring, training, and personal protection.

The EZ for drilling rig operations has three components: the area of chemical hazards, the area near the moving parts, and the area where cables and augers are being moved. As a minimum, the EZ extends to a radius equal to the length of the extended mast, plus the length that rods or augers extend beyond the mast.

All unessential personnel should be excluded from areas where high levels of contamination exist and/or PPE is required.

All personnel except the driller and the driller's helper should be excluded from the area behind the rig where augers are "run out" and placed on the ground or on devices that keep the augers off the ground.

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Procedures

These procedures must be followed during drill rig operations:

- No drilling is permitted until utility locators (or testing) have determined that utilities are not located in the area to be penetrated.
- Drilling is not permitted in areas having buried drums or tanks until geophysical testing has confirmed that they are absent in the area to be drilled. Procedures are available to extend the depth of the detection.
- Drill rigs with inoperable or disabled safety equipment will not be used.
- Only experienced drill rig operators are authorized to operate the drill rig.
- No one but the drillers should be within 4 feet of the rotating auger.
- The drilling crew is responsible for maintaining the drill rig and stopping work if unsafe conditions develop.
- The EZ will include the area immediately behind the rig. This area is used by drillers to run-out auger flights as they are being added or removed from the rig.

Personal Protective Equipment

PPE will include:

- hard hat,
- respiratory protection as needed,
- eye protection such as safety glasses with side shields or goggles (if full-face respirator is not used),
- hearing protection as needed,
- company coveralls (cotton),
- appropriate foot protection (safety boots), and
- gloves.

Monitoring

Monitoring will be conducted to determine radioactive contaminant levels.

Decontamination

Decontamination of all drilling equipment will be performed in accordance with EG&G SOPs FO.09, FO.10, FO.11, and FO.18. All Stoller personnel and Stoller subcontractors performing decontamination at the main decontamination facility will receive documented training in the use of this facility.

3.4 Biological Hazards

Biological hazards that may be present at Rocky Flats include plants, insects, and snakes. Considerations for potential biological hazards may be necessary when workers are required to enter remote or seldom-visited locations.

The potential exists for contact with snakes or insects that may cause injury or disease when performing investigative activities at Rocky Flats. The site does not host any plants that are poisonous to humans, other than poison ivy. There are some plants that may be mechanically injurious (i.e., thorns). Field personnel will wear sturdy work clothes and shoes to help prevent injuries.

There is one type of venomous snake present in the Rocky Flats area: the prairie rattlesnake. Personnel should be aware that snakes may be present in the area and exercise caution, especially when working in previously undisturbed areas and locations with animal dens.

Black widow spiders and scorpions may be present on site. They are usually found in shady places or under rocks or wood. The black widow spider has a shiny black body about the size of a pea with a red or yellow hourglass-shaped mark on its abdomen. It weaves shapeless webs in undisturbed areas. A bite may result in severe pain, illness, and possible death from complications, but usually not from the bite itself.

There are several types of scorpions native to Colorado. Scorpions may be brown to yellowish in color and range from one-half inch to 8 inches in length. Their bodies are divided into two parts: a short, thick upper body and a long abdomen with a six-segmented tail. A scorpion has six pairs of jointed appendages: one pair of pinchers, one pair of long claws, and four pairs of jointed legs. They are most active at night. The scorpion sting is very painful but usually will not result in death.

In addition to spiders and scorpions, ticks, chiggers, bees, and wasps may be nuisances to field personnel. Bites from wood ticks may result in the transmission of viral diseases, including Rocky Mountain Spotted Fever, a serious and potentially fatal viral disease. The virus infects wood ticks, mostly in the late spring and early summer and is characterized by chills, fever, severe pain in leg muscles and joints, and a body rash. Lyme Disease is not prevalent in Colorado. Some protection will be offered by PPE, but the use of insect repellent (containing at least 30 percent DEET) on outside clothing also may be warranted. Personnel should perform self-searches after each day to check for ticks and chiggers. Bees or wasps can be considerable hazards for those people with allergic reactions to venom. The HSS should be notified if any worker is sensitive to these insects. Properly trained personnel will administer first aid should a bee or wasp sting occur.

3.5 Mechanical Hazards

Workers may be exposed to potential mechanical hazards during investigative activities at OU11. Hazards and methods of hazard control may be detailed in SOPs and operational safety analyses for specific tasks performed during environmental restoration site activities. Site inspections will be conducted periodically by the HSS to assess hazards according to standard health and safety protocols.

3.6 Potential Chemical or Radiological Hazards and Control Methods Summary

Site background summaries are compiled from existing data in the OU11 Revised Field Sampling Plan and previous sampling reports. Potential chemical and radiological hazards listed are based only on these data or known past use of the site. The control measures listed are meant to be the minimum control measures required for initial work at the site. Additional control measures may be necessary as determined by site health and safety personnel. As additional site data may become available through site monitoring or investigations, the control measures may need to be altered. The decision to alter the control measures should be made only by knowledgeable health or safety professionals responsible for site activities.

3.6.1 Potential Chemical or Radiological Hazards

The primary hazards associated with environmental contamination at this site are anticipated to be dermal exposure or inhalation of inorganic analytes and metals or possible inhalation of

radionuclides. The potential for this occurring is considered to be low based on the work activities to be performed, work practices, probable low concentration of contaminants in the soils, and known low concentration of contaminants in the groundwater.

3.6.2 *Control Measures*

Level D protection, including cotton coveralls, safety boots, eye protection, and hard hats (when overhead hazards are present) will be worn during work for all non-intrusive site activities and surface soil sampling. Leather gloves over latex inner gloves will be worn when handling dry materials to prevent cuts/abrasions. In addition to the Level D protection listed above, latex inner gloves, nitrile outer gloves and tyvek or PE coated tyvek also include modified Level D boots and shall be worn during intrusive activities, excluding surface soil sampling, at the site when chemical contamination is a concern. White coveralls over surgical scrubs may be worn when there is a potential radiological concern and no chemical exposure concern. Monitoring for total dust with a real-time particulate dust monitor (PDM) will be conducted during intrusive activities at the site. Radiological screening and monitoring in accordance with EG&G SOP FO.16 will be performed before intrusive work. Decontamination procedures as discussed in Section 7 will be followed for general and heavy equipment. Face, hands, and boots will be washed after leaving the site and before eating, drinking, or smoking.

3.7 **Electrical Hazards**

All electrical shocks are accidents and must be reported to supervision and Occupational Health. Supervisors shall notify the shift superintendent at extension 2914.

3.8 **Confined Space**

No confined space entry is anticipated in this project. In the event that a confined space is required, all requirements of procedure 1- 5310-HSP 6.04, Confined Space Entry, will be met.

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Hazard Communication

Approved By:

K.K. O'Neill

8/25/94

Name

Date

4. HAZARD COMMUNICATION

4.1 Introduction

Stoller personnel and all Stoller subcontractors must follow established work practices to safely handle hazardous chemicals. A hazardous chemical is broadly defined as "a chemical that is either a health hazard, a physical hazard, or both" (29 CFR 1910.1200). Implementation of a hazard communication program is also required by 29 CFR 1910.120 for RCRA treatment, storage, and disposal facilities. An inventory will be maintained of hazardous chemicals stored on site. Material safety data sheets (MSDSs) for those chemicals will be readily available to employees at the site.

4.2 Hazardous Materials Inventory

Stoller will compile an inventory of hazardous chemicals present at work sites or trailer areas and provide this information to the EG&G Industrial Hygiene Department. The inventory may be requested by emergency response personnel to aid in identifying hazards associated with a spill or accident at the site. Radiological check sources and/or reference sources must also be included in this inventory, including applicable calibration certificates.

4.3 Material Safety Data Sheets

The MSDS must be readily available to employees for hazardous chemicals used or stored at the site. Information found on an MSDS includes identification of the product's hazardous chemical constituents, its physical characteristics, applicable exposure limits, symptoms of overexposure, recommended PPE, fire and explosion hazards, and spill response actions. This information is provided by the manufacturer and is typically included with shipment of the chemical. The EG&G Industrial Hygiene Department maintains a master file of MSDSs for materials stored or used at the site. A complete file of MSDSs for hazardous chemicals used at OU11 will be kept at the Stoller project trailers and readily available to site employees.

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4.4 Training

Stoller personnel and all Stoller subcontractors are required to complete hazard communication training as part of their 40-hour OSHA training. Specific training on the information provided in the MSDS will be conducted by the HSS or, if necessary, by a representative of the EG&G Industrial Hygiene Department. Specific hazards associated with the project will be communicated to workers at the site-specific briefing and then at the weekly safety meetings.

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Title:
Site Control

Approved By:

K. K. O'Dell

8 / 25 / 94

Name

Date

5. SITE CONTROL

5.1 Objectives

The purpose of this site control plan is to protect workers, the public, and the environment from potential hazards associated with OU11 RF/RI work. The terms "site control" and "controlled" versus "uncontrolled" are used in this section in the context of hazardous waste sites. This OSHA terminology does not necessarily apply to formal radiological definitions used in Rocky Flats production facilities.

5.2 Site Control Designations

Two site control designations are used for potentially hazardous locations at OU11. The work location itself is designated as an EZ, and the staging area outside a work location is designated as a CRZ. Access to these areas will be controlled. Personnel working in the areas must meet specific training requirements, be participants in a medical surveillance program, and wear required PPE. Minimum requirements for access to these designated areas are summarized below. Detailed PPE, training, and decontamination requirements are presented in the respective sections of this HASP.

5.3 Exclusion Zone

During investigative activities at OU11, an EZ will be established by Stoller personnel conducting work at the site. The EZ will be established using fence posts and perimeter fencing, which may include but not be limited to tape, ribbons, rope, and temporary barricades. An entire IHSS may be designated as an EZ during investigations if necessary. As a minimum, individual work areas (drill sites, excavation sites, sample areas) inside the IHSS will be designated as an EZ. The limits of these zones and the PPE requirements within the zones will be based on the hazards of the work being conducted, as determined by the appropriate health and safety representative. Environmental samples collected at these sites may contain elevated levels of radiological and/or chemical contaminants. Personnel entering these areas will be required to wear appropriate PPE. When leaving these areas, decontamination

procedures (described in Section 7) will be followed where required, including clearance by approved health and safety personnel.

5.3.1 *Contaminant Reduction Zone*

Adjacent to the site or task-specific EZ will be the CRZ, where appropriate measures will be in effect to reduce the potential for spreading contamination via the workers and equipment. The entrance, exit, and decontamination area adjacent to the EZ will be designated as a CRZ. All personnel conducting or supervising activities in this area are required to have appropriate training.

5.3.2 *Support Zone*

The support zone will be outside the CRZ and will be the area where support workers will provide assistance to workers inside the EZ and CRZ. The support zone will begin at the exit from the decontamination line. Only clean and appropriately containerized equipment or material will be allowed to exit into the support zone from the CRZ. Visitors and observers will comply with the site control designations and the zone requirements established at the work site. Visitors will not be allowed to enter the EZ and/or the CRZ without training as required in Section 10 of this HASP.

5.4 **Communication within Control Zones**

Personnel will not conduct work activities at OU11 alone. They will be accompanied by either another Stoller employee or Stoller subcontractor. The buddy system, as specified in 29 CFR 1910.120 (d)(3), will be implemented at the site. The buddy teams working at the site will maintain visual and audible contact so they can provide emergency assistance to each other, if needed. Both members of the buddy team need not be in the same site zone, but each member must be wearing adequate PPE to assist each other, if necessary.

The communication system at the site consists of telephones and hand-held radios. Stoller personnel will have access to telephones in the Stoller project trailers in the Stoller-subcontractor trailer area, and when at OU11, they will rely on the hand-held radio system used by personnel performing the investigative work.

5.5 Plan for Prevention of Contaminant Dispersion

5.5.1 Objective

The objective of the PPCD is to establish procedural requirements to mitigate potential hazards to the general public as a result of contact with emissions resulting from intrusive RFI/RI activities.

5.5.2 Scope

Procedural requirements for the prevention of contaminant dispersion, applicable to intrusive actions conducted at OU11 work sites as part of the RFI/RI activities described in the Interagency Agreement (IAG), are described in the PPCD prepared by EG&G. Intrusive activities that fall within the scope of this PPCD are those with the potential for producing suspended particulate, primarily through mechanical actions. Intrusive activities susceptible to producing appreciable quantities of suspended particulate include monitor well and soil/rock borehole installation and excavations (such as trenching and test pitting) using powered equipment.

Additionally, heavy vehicular traffic associated with RFI/RI activities will be considered susceptible to producing appreciable quantities of suspended particulate. By contrast, activities such as surface soil sampling with hand implements may not be considered susceptible to producing appreciable quantities of suspended particulate.

Dust suppression will be achieved by wetting the soil produced during intrusive activities. Dust generation is anticipated to be minimal due to the nature of sonic drilling and scheduled season of field activity (spring).

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6. PERSONAL PROTECTIVE EQUIPMENT

6.1 Introduction

Section 6 addresses standard procedures for selection, inspection, and use of PPE at OU11. The criteria used to determine appropriate levels of PPE include evaluation of the tasks being performed; potential chemical, radiological, physical, and mechanical hazards at the site; results of air monitoring data; effectiveness of engineering controls; and applicable regulations.

Use of PPE and respirators is required when engineering and administrative controls are insufficient to prevent worker exposures to hazardous chemical and radioactive materials. Due to the nature of work performed at OU11, there is potential for release of chemical vapors and contaminated particulates that cannot be completely controlled at the source. Engineering and administrative controls will be used, when appropriate, to minimize potential worker exposures to the site contaminants; however, the use of PPE will be necessary for maintaining as low reasonably achievable (ALARA) exposure.

Numerous federal agencies dictate the need and use of PPE at hazardous waste sites, including OSHA, EPA, and DOE. Table 6.1 lists the specific OSHA standards that affect the manufacture, selection, and use of PPE. These regulations should be consulted for general information and specific requirements regarding the use and application of PPE.

This PPE program defines the initial levels of protection that have been selected and designed for each of the site activities proposed on this project. In addition, higher or lower levels of protection may be appropriate based on site conditions. The contingency protective equipment requirements are also defined. The PPE requirements will be re-evaluated by the site HSS as the work proceeds, and recommendations for modifications to this program will be made to the Stoller PM by the project HSS as required. If Level C or higher PPE is required, the Stoller PM must receive approval to downgrade PPE from EG&G Industrial Hygiene and Radiological Engineering dependent upon the hazard.

EG&G personnel, DOE representatives, or other authorized site visitors requiring access into areas zoned as restricted or exclusionary will follow the PPE requirements set in this plan.

**Table 6-1
 OSHA Standards for Use of PPE**

Type of Protection	Regulation	Source
General	29 CFR Part 1910.132 General Requirements for PPE 29 CFR Part 1910.1000 29 CFR Part 1910.1001-1045	41 CFR Part 50-204.7 OSHA Rulemaking OSHA Rulemaking
Eye and Face	29 CFR Part 1910.133 (a)	ANSI Z87.1-1968* Eye & Face Protection
Noise Exposure	29 CFR Part 1910.95	41 CFR Part 50-204.10 & OSHA Rulemaking
Respiratory	29 CFR Part 1910.134	ANSI Z88.2-1969* Standard Practice for Respiratory Protection
Head	29 CFR Part 1910.135	ANSI Z89.1-1969* Safety Requirements for Industrial Head Protection
Foot	29 CFR Part 1910.136	ANSI Z41.1-1967* Men's Safety Toe Footwear

*ANSI, 1430 Broadway, New York, NY 10018. ANSI regularly updates its standards. The ANSI standards in this table are those that OSHA adopted in 1971. Since the ANSI standards which were then adopted had been set in 1967-1969, those standards, now required under OSHA, may be less stringent than the most recent standards.

6.2 PPE Issues Applicable to All Site Personnel

All personnel assigned to OU11 must be trained in the proper inspection and use of the PPE used on this project before beginning work on the site. This training requirement is fulfilled through completion of the 40-hour OSHA course discussed in Section 10 Training, but site-specific training will cover the PPE requirements of this project.

All personnel working on this project who may be required to wear an air-purifying respirator must have a current medical clearance issued by a qualified physician and a fit test certificate for the size and make of respirator used. This clearance will be updated annually with the employee's physical exam as described in Section 9 of this HASP.

The HSS and individual team members are responsible for the inspection of their own and their team member's equipment during donning and field use. The following list identifies proper clothing and equipment requirements. Personnel who are having equipment difficulties or

experiencing tears in their suits should proceed directly to the CRZ for repairs or replacement of their equipment. If an exposure to site contaminants is suspected as a result of equipment failure, personnel will immediately contact the HSS or the EG&G Industrial Hygiene Department.

CLOTHING

Before use

- Determine that the clothing material is correct for the specified task at hand
- Visually inspect for:
 - imperfect seams
 - non-uniform coatings
 - tears
 - malfunctioning closures
- Hold up to light and check for pinholes
- Flex product:
 - observe for cracks
 - observe for other signs of shelf deterioration
- If the product has been used previously, inspect inside and out for signs of chemical degradation:
 - discoloration
 - swelling
 - stiffness

During the work task, periodically inspect for

- Evidence of chemical attack such as discoloration, swelling, stiffening, and softening. Keep in mind, however, that chemical permeation can occur without any visible effects.
 - closure failure
 - tears
 - punctures
 - seam discontinuities

AIR-PURIFYING RESPIRATORS

- Inspect air-purifying respirators
 - before each use (before using a newly supplied respirator, ensure that the storage bag is sealed)
 - after each use
- Check mask for

- pliability
- signs of deterioration
- distortion
- missing or broken parts
- Examine cartridges or canisters to ensure that they are the proper type for the intended use.
- Check face shields and lenses for
 - cracks
 - crazing
 - fogginess
- Perform positive and negative pressure fit tests prior to each use

6.3 Components of Protection Levels

OSHA and the EPA define four levels of protective equipment ensembles in the 29 CFR 1910.120 regulations: Levels A, B, C, and D. Levels A and B specifying the use of self-contained breathing apparatus (SCBA) are not addressed in this HASP. If either of these levels of protection is required due to the presence of extreme site hazards, this situation will be handled as a separate amendment to this plan.

The levels of protection that are defined for this project include Level C, Level D, and a modified Level D. The specific equipment that is identified for each of these general ensembles is listed in Table 6-2.

6.4 Levels of Protection for Site Activities

The minimum safety equipment required for all personnel on this project site includes a hard hat, EG&G coveralls, safety glasses, and safety shoes. Modified Level D PPE shall be worn during intrusive activities excluding surface soil sampling. No workers, visitors, or other personnel will be allowed on this project without these safety items even in the nonhazardous areas. The specific equipment required within each level of protection is listed in Table 6-2. Minimum levels of PPE by activity are listed in Table 6-3.

This section also specifies the acceptable concentrations of air contaminants that workers can be exposed to without respiratory protection and the action levels for upgrading or downgrading the levels of protection.

**Table 6-2
 Specific Requirements for Each Level of Protection¹**

Level of Protection	Equipment	Protection Provided	Should Be Used When	Limiting Criteria
D	<p>REQUIRED:</p> <ul style="list-style-type: none"> • Steel-toed boots or shoes • Long-legged pants • Coveralls • Safety glasses or chemical splash goggles <p>OPTIONAL AS REQUIRED:</p> <ul style="list-style-type: none"> • Work gloves • Hearing protection • Hard hat 	No respiratory protection; Minimal skin protection	<ul style="list-style-type: none"> • The atmosphere contains no known hazard • Work functions preclude splashes, immersion, or the potential for unexpected inhalation of or contact with hazardous levels of any chemicals 	<ul style="list-style-type: none"> • May be worn in support of the CRZ • This level should not be worn in the EZ during intrusive activities • The atmosphere must contain at least 19.5 percent oxygen
Modified D	<p>REQUIRED:</p> <p>All requirements of Level D plus:</p> <ul style="list-style-type: none"> • Tyvek/PE coated Tyvek • White coveralls over surgical scrubs • Inner and outer gloves • Eye protection <p>OPTIONAL AS REQUIRED:</p> <ul style="list-style-type: none"> • Splash shield • Hearing protection 	Increased skin and splash protection, but no respiratory protection	<ul style="list-style-type: none"> • Working in dusty areas or in areas with splash potential • Tyvek/PE Tyvek shall be worn when chemical contamination is a concern • White coveralls over scrubs shall be worn when radiological contamination is a concern 	<ul style="list-style-type: none"> • Shall be worn in the exclusion zone if the area has been demonstrated to be free of air contaminants above the action levels • The atmosphere must contain at least 19.5 percent oxygen

¹ Specific procedures recommended by equipment manufacturers should be followed.

**Table 6-3
 Minimum Levels of PPE by Activity**

Work Activity	Initial Level of Protection	Additional Comments	Contingency PPE
Project activities in nonhazardous areas: <ul style="list-style-type: none"> • Work in support zone • Initial visual site survey • Initial radiological screening • Surface soil sampling • Survey of sample locations 	Level D	No contact or access to contaminated areas is permitted for personnel in this level of protection	No significant exposures to any of the site contamination is expected
Intrusive and nonintrusive site activities: <ul style="list-style-type: none"> • Decontamination of personnel • Drilling activities • Creek sampling 	Modified Level D	Gloves are required for all access into the EZ regardless of activity	Upgrade to Level C if air monitoring action levels are exceeded (see Section 9)

6.5 Reuse of PPE

All disposable protective equipment (Tyvek suits, gloves, etc.) must be removed and disposed of during decontamination each time a worker leaves the EZ or CRZ. All white cotton coveralls must be removed and placed in appropriately marked bags each time a worker leaves the EZ. This includes leaving the site after five minutes or a full half day. The length of the service life of a respirator cartridge, with activated carbon or other chemical adsorbing element, will be determined by the following criteria:

- Breathing resistance becomes excessive
- Chemical odors are detected by the wearer
- Chemical respirator has been used for a minimum of 7 days

Containers will be provided for the disposal of PPE used on the site in the decontamination area. Procedures for the use and disposal of PPE are given in SOP FO.6, Handling of PPE, and shall be strictly followed.

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Approved By:

K. K. O'Neill
Name

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Date

7. DECONTAMINATION

7.1 Introduction

The objective of decontamination is to remove potential hazardous substances from workers and equipment, to assure compliance with DOE Order 5480.11 and OSHA standard 29 CFR 1920, to prevent the spread of contamination from the site, and to prevent potential adverse health effects that could be caused by contact with hazardous materials by unprotected workers.

Decontamination requirements and procedures at OU11 will vary according to the task and the hazardous materials encountered. It is not expected that workers on the site will directly encounter hazardous materials during the remedial investigation activities on this site. Safe work practices and engineering controls shall be undertaken to prevent equipment and personnel from becoming contaminated during the work on this site. All equipment and samples leaving the EZ will be checked for radiological contamination, and appropriate decontamination procedures will be undertaken to remove any contamination prior to release of the equipment from the site.

Decontamination of the personnel and equipment will be performed in the CRZ at the exit to the EZ. Facilities to doff protective equipment and for respirator and personnel washing will be provided in this area. Containers will be provided for collection of disposable protective clothing. An equipment wash station will also be prepared to spray clean all vehicles, drill rigs, and augers in the decontamination area.

7.2 Decontamination Procedures

7.2.1 Personnel and Small Equipment Decontamination

Decontamination procedures for the various phases of work at OU11 will be determined by the hazardous materials present at each site. The hazardous materials known to be present thus far include organic solvents, metals, and radionuclides. It is the responsibility of the HSS, or

designee, to determine whether radiological contamination of personnel or equipment exists and to prescribe the decontamination procedures that will be required.

Requirements for chemical decontamination will depend on the type of chemical present. An outline of the general procedure for decontamination of personnel performing work at Modified Level D is presented in Figure 7-1. Tables 7-1 and 7-2 describe Level C and Level D decontamination procedures, respectively. Safe work practices shall be exercised at all times to prevent or minimize personnel and equipment contamination. Appropriate PPE will be used during decontamination operations as an additional measure to prevent direct employee exposure to hazardous substances.

Current EG&G SOPs should be consulted for specific decontamination requirements. These procedures include SOP FO.03, General Equipment Decontamination; SOP FO.06, Handling of PPE; and SOP FO.07, Handling of Decontamination Water and Wash Water.

Respirators will be frisked and smeared for contamination prior to removal and cleaning. If radiological contamination is discovered on the exterior of the respirator, it should be removed before washing or disinfecting the face piece. (Head should also be frisked if respirator is found to be contaminated.) Respirators shall be wiped clean by site personnel as they are removed. They must be stored in a plastic bag, with the cartridge side down, so that distortion of the face piece does not occur.

7.2.2 *Heavy Equipment Decontamination*

Subcontractors will be providing or operating heavy equipment such as drill rigs at OU11. Any such heavy equipment used at the site must be checked for contamination and decontaminated (if necessary) prior to leaving the area. Large pieces of equipment will be frisked with radiological survey instruments and smears will be collected as needed to meet radiological decontamination standards. Surface contamination surveys and release of equipment shall be performed in accordance with EMRGs 3.1 and 3.02, respectively. Such equipment will be decontaminated in accordance with SOP FO.04, Heavy Equipment Decontamination.

Decontamination Station Modified Level D

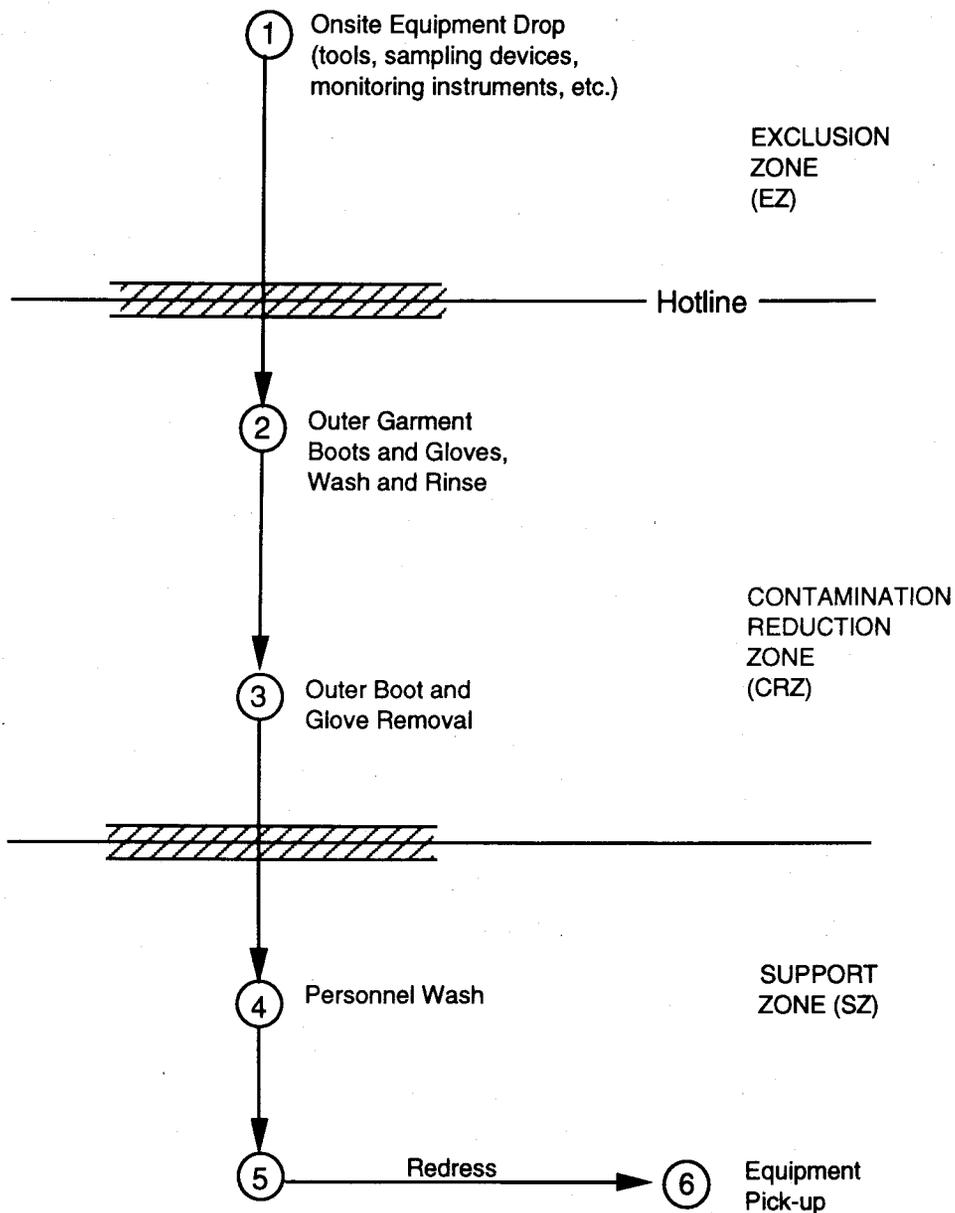


Figure 7-1
Decontamination Station
Modified Level D

**Table 7-1
 Level C Decontamination Procedure**

Activity	Procedure	Items Suggested
1. Equipment drop	Drop equipment (hard hats, tools, samples, etc.) on plastic labeled "EQUIP". Decontamination Technician will decontaminate equipment.	1. Plastic sheet (10 ft. x 10 ft.) labeled "EQUIP."
2. Personnel survey (frisking)	Place the survey instrument probe within 1/2 inch of the body surface and move gradually to check the body. A rate of 1 to 2 inches per second is considered acceptable.	
3. Glove and boot wash/rinse*	Enter "HOT" side of decontamination zone. Wash/rinse gloves and boots by spraying with detergent solution and rinse solution while standing in appropriate tubs. Scrub as needed.	1. Plastic sheet (15 ft. x 30 ft.) divided in half and labeled "HOT" and "COLD" 2. Wash tubs (2) 3. Pump sprayer (2) 4. Detergent 5. Scrub brush 6. Duct tape 7. Trash can
4. Tape removal	Remove tape from wrists, face piece, and boots.	
5. Outer boot, glove, and suit removal	Remove outer boots, gloves, and suit with inside-out method. Drop into "CONTAMINATED" trash can.	
6. Respirator removal and decontamination	Hand respirator to Decontamination Technician for decontamination.	
7. Inner glove removal	Remove inner gloves.	
8. Personnel wash	Wash/rinse face and hands in wash basin. Use hand cleaner, if preferred.	1. Wash basin 2. Paper towels 3. Portable shower 4. Soap 5. Hand cleaner
9. Redress	Change into street clothes.	
10. Equipment pick-up	Equipment decontaminated by Decontamination Technician may be picked up.	

* This step may be omitted if disposable outer garments are worn. Proceed directly to Step 4

**Table 7-2
 Level D Decontamination Procedure**

Activity	Procedure	Items Suggested
1. Equipment drop	Drop equipment (hard hats, tools, samples, etc.) on plastic labeled "EQUIP." Decontamination Technician will decontaminate equipment.	1. Plastic sheet (10 ft. x 10 ft.) labeled "EQUIP."
2. Personnel survey (frisking)	Place the survey instrument probe within 1/2 inch of the body surface and move gradually to check the body. A rate of 1 to 2 inches per second is considered acceptable.	
3. Glove and boot wash/rinse*	Enter "HOT" side of decontamination zone. Wash/rinse gloves and boots by spraying with detergent solution and rinse solution while standing in appropriate tubs. Scrub as needed.	1. Plastic sheet (15 ft. x 30 ft.) divided in half and labeled "HOT" and "COLD" 2. Wash tubs (2) 3. Pump sprayer (2) 4. Detergent 5. Scrub brush 6. Duct tape 7. Trash can
4. Outer boot, glove, and suit removal	Remove outer boots, gloves, and suit with inside-out method. Drop into "CONTAMINATED" trash can.	
5. Personnel wash	Wash/rinse face and hands in wash basin. Use hand cleaner, if preferred.	1. Wash basin 2. Paper towels 3. Portable shower 4. Soap 5. Hand cleaner
9. Redress	Change into street clothes.	
10. Equipment pick-up	Equipment decontaminated by Decontamination Technician may be picked up.	

* This step may be omitted if disposable outer garments are worn. Proceed directly to Step 4.

The main elements of SOP FO.04 include:

- monitoring,
- movement of contaminated heavy equipment, and
- main decontamination facility near the 903 Pad.

7.2.3 *Surface Contamination Surveys*

The purpose of the surface contamination surveys will be to control and document all property/material to be released from radiation control areas (RCAs) and specified uncontrolled areas (e.g., any IHSS). All equipment that leaves an RCA must be surveyed and comply with the property release evaluation forms as attached in Appendix B. Contamination control limits are listed in Table 7-3. Radiological screening will be performed by the project HSS or by project personnel trained in performing this function (HSST). Table 7-3 outlines the maximum residual surface radiation contamination allowed for equipment leaving the EZ. These control limits are specified in the Radiation Control Manual, HSP 18.10, and EMRG 3.02.

7.2.4 *Decontamination Water and Wash Water*

All water used both in the EZ and during decontamination procedures will be disposed of according to SOP FO.07. The main elements include handling of decontamination water and handling of wash water.

Table 7-3
Radioactive Surface Contamination Limits for Unrestricted Release⁽⁹⁾

Radionuclides ⁽²⁾	Average Total ^(3,4) (Fixed + Removable) (dpm/100 cm ²) ⁽¹⁾	Maximum Total ^(4,5) (Fixed + Removable) (dpm/100 cm ²) ⁽¹⁾	Removable ^(4,6) (dpm/100 cm ²) ⁽¹⁾
Transuranics, I-125, I-129, Ra-226, Ac-227, Ra-228, Th- 228, Th-230, Pa-231	100 ⁽⁸⁾	300	20
Th-Natural, Sr-90, I-131, I- 133, Ra-223, Ra-224, U-232, Th-232	1,000	3,000	200
U-Natural, U-235, U-238, and associated decay product, alpha emitters	5,000	15,000	1,000
Beta-gamma emitters (radionuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and others noted above. ⁽⁷⁾	5,000	15,000	1,000

- ¹ As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute measured by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.
- ² Where surface contamination by both alpha and beta-gamma emitting radionuclides exists, the limits established for alpha and beta-gamma-emitting radionuclides should apply independently.
- ³ Measurements of average contamination should not be averaged over an area of more than 1 m². For objects of less surface area, the average should be derived for each object.
- ⁴ The average and maximum dose rates associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 mrad/h and 1.0 mrad/h, respectively at 1 cm.
- ⁵ The maximum contamination level applies to an area of not more than 100 cm².
- ⁶ The amount of removable material per 100 cm² of surface area should be determined by wiping an area of that size with a dry filter or soft absorbent paper, applying moderate pressure, and measuring the amount of radioactive material on the wiping with an appropriate instrument of known efficiency. When removable contamination on objects of surface area less than 100 cm² is determined, the activity per unit area should be based on the actual area and the entire surface should be wiped. It is not necessary to use wiping techniques to measure removable contamination if direct scan surveys indicate that the total residual surface contamination levels are within the limits for removable contamination.
- ⁷ This category of radionuclides includes mixed fission products, including the Sr-90 that is present in them. It does not apply to Sr-90, which has been separated from other fission products or mixtures where the Sr-90 has been enriched.
- ⁸ Average total alpha is obtained by dividing the sums of dpm/100 cm² of all 1-minute counts by "N," the number of 1-minute readings taken. If all of the 1-minute readings were less than 100 dpm/100 cm², then averaging is not required.
- ⁹ These limits are promulgated by DOE 5400.5, Table IV-1, and NRC Regulatory Guide 1.86. In certain cases, the limits established for unrestricted release are above the conditional release limits in Appendix 2. However, it should be understood that the limits in Appendix 1 are upper limits, and to which the ALARA process is also applied prior to the unrestricted release of any item.

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Title: Medical Surveillance	Approved By: <u>K.K. O'Neill</u> Name	<u>8/25/94</u> Date
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8. MEDICAL SURVEILLANCE

8.1 Medical Monitoring Requirements

All Stoller field personnel and all Stoller subcontractors are participants in a medical monitoring program that fulfills the requirements of 29 CFR 1910.120. The program includes:

- Baseline medical examination, including bioassay for radionuclides;
- Annual medical examination;
- Exit medical examination; and
- Incident-specific examination.

8.2 Availability of Medical Service

The EG&G Occupational Health Department is located in Building 122. The full staff is on duty from 7:30 a.m. to 4:00 p.m. Monday through Friday. The registered nursing staff is on duty from 6:30 a.m. to 11:00 p.m. Monday through Thursday and 6:30 a.m. to 10:00 p.m. Friday. A physician and a nurse are always on call for any emergency during off hours. Weekend coverage (Friday from 10:00 p.m. through Monday at 6:30 a.m. and midnight shift coverage) is provided by emergency medical technicians. They can be contacted at extension 4336 and will meet employees in the Occupational Health Department or respond to the site of any emergency. For life threatening emergencies, personnel must call 2911.

8.3 Transportation for Medical Reasons

Stoller and all Stoller subcontractors will be provided transportation for medical reasons (if it is medically safe, as determined by the EG&G Occupational Health staff) to their home or to an appropriate medical facility for the following reasons:

- An emergency: EG&G Occupational Health will determine the appropriate mode of transportation for illness/injury requiring air or ground ambulance transport.

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- A non-emergency: If there is no medical necessity for ambulance transport, supervisors will be asked to arrange transportation.

In a situation where an employee is injured and requires non-ambulance transport to an offsite medical facility, the Stoller SM/FOL or designee will accompany that person as a representative of Stoller and be available to interact with outside authorities (if necessary) and to provide further transportation for the employee as appropriate. If Stoller personnel are unable to arrange transportation on weekends or during night work, they will contact the EG&G Shift Superintendent (Rocky Flats Incident Commander [IC]) at extension 2914 for assistance.

8.4 Medical Records

Stoller and all Stoller subcontractors are required to keep medical information in an individual's file. The medical records of all field personnel will remain in the possession of their corporate headquarters and will not be taken from the premises except for the purpose of answering subpoenas. Copies of the medical record will be released to the employee, insurance companies, attorneys, hospitals, and/or physicians when a written authorization has been presented to Stoller. A written authorization must:

- Specify that the company is to release the information;
- Be dated within the last 60 days;
- Specify to whom the information is to be released;
- Be completed in ink; and
- Be signed by the employee.

Medical information may not be released to anyone else without written authorization from the employee. Release of records associated with work-related or alleged work-related illness or injury may not require signed consent. A release may be requested to expedite communication with attending physicians.

If respiratory protection is required at the site, the physician must provide authorization that the employee is medically qualified to wear a respirator. Stoller and Stoller subcontractors who are required to wear a respirator will be fit tested annually.

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9. AIR MONITORING

9.1 Introduction

This air monitoring program specifies equipment and procedures to identify and quantify airborne chemical and radiological contaminants during field activities within the OU11 project area if it becomes necessary. Objectives of this program include:

- Characterization of the airborne concentrations of dusts and radionuclides present in the OU11 work areas;
- Acquisition of quantitative data to be used to verify the appropriate levels of PPE, site control measures and boundaries, work practices, and decontamination procedures;
- Compliance with applicable airborne radiological exposure levels;
- Identification of conditions that may be immediately dangerous to life or health; and
- Assurance that no significant levels of contamination migrate off site.

9.2 Dust Monitoring

A PDM will be used to provide direct real-time monitoring for dust during all intrusive activities. The PDM will be used, calibrated, and maintained according to the manufacturer's instruction. The PDM will be calibrated at the beginning of each shift and recharged at the end of the shift or when it is no longer needed for the day.

A trained and qualified person will be responsible for performing monitoring activities. All monitoring data such as calibration times, personnel performing the calibration, maintenance logs, and site monitoring results will be logged and recorded in the field logbooks.

Table 9-1 lists the action levels to be applied to the PDM. These action levels list the particular level of protection or emergency response action that must be taken if certain readings are recorded on any of the instruments.

- A Ludlum Model 12 with 44-9 pancake probe will be used to monitor equipment and PPE for the presence of beta- and gamma-emitting radioisotopes,
- Bicron Frisk-Tech with B-50 (optional), and
- Bicron Analyst Meter with G-5 probe.

9.3.1 *Real-Time Chemical Monitoring*

In the event that chemical contaminants are discovered during intrusive activities, chemical monitoring shall be implemented. The instruments will be used, calibrated, and maintained according to the manufacturers' instruction. Each monitor will be calibrated at the beginning of each shift and recharged at the end of the shift or when it is no longer needed for the day.

A trained and qualified person will be responsible for performing the monitoring activities. One of the HSSs will perform the monitoring during the drilling and soil borings, and a trained representative will perform this activity during other intrusive site activities. All monitoring data such as calibration times, personnel performing calibration, maintenance logs, and site monitoring results will be logged and recorded in the field logbooks.

Table 9-1 lists the action levels to be applied to each direct reading instrument. These action levels identify the particular level of protection or emergency response action that must be taken if certain readings are recorded on any of the instruments.

9.3.2 *Real-Time Radiological Monitoring*

Radiological monitoring involves the detection and measurement of alpha, beta gamma, or neutron radiation. Radiological monitoring is established in accordance with appropriate and relevant requirements and policies. The goal of the radiation monitoring program is to maintain ALARA personnel exposure. Personnel and equipment contamination surveys will be performed in accordance with the appropriate EMRGs. All radiological instruments shall be routinely calibrated as specified in ANSI N323-1978 "Radiation Protection Instrument Test and Calibration." The calibration label shall be affixed to the instrument. Any required instrument maintenance will be referred to Health Physics Instrumentation, a certified vendor, or the subcontractor for service. If radiological hazards are identified at action levels specified in Table 9-1 through personnel and equipment surveys conducted during site work, air monitoring will be performed.

A Bicon Frisk-Tech with A-100 probe shall be used to measure total fixed plus removable alpha contamination. A Bicon Frisk-Tech with B-50 probe shall be used to measure total fixed plus removable beta-gamma contamination. The Bicon Fidler (field instrument for the detection of low-energy radiation) provides a qualitative response to the presence or absence of low-energy gamma and x-ray emitting radiation sources. The Bicon Fidler shall be calibrated daily. A performance instrument check shall be performed prior to instrument operation. The detector is held over the check sources approved by Radiological Engineering. An acceptance instrument response is confirmed by an increase in audible sound and upscale meter movement. The performance checks shall be performed daily.

Surfaces or items that have the potential for fixed contamination shall be surveyed by a Bicon Frisk-Tech A-100 and/or B-50. The detector shall sweep over the surface at a maximum rate of 2 inches per second, holding the detector within approximately one-quarter inch of the surface for alpha and within one-half inch of the surface for beta/gamma surveys. The instrument probe shall avoid contact with a potentially contaminated surface.

Monitoring of personnel and equipment for radiological contamination will be performed in the following situations:

- Whenever exiting a contaminated area;
- During and after work where the potential exists for release of radioactive material;
- Whenever passing through an RCA;
- After personnel decontamination;
- When required by EG&G SOPs;
- When required by a radiation work permit; or
- When required by the EG&G HSP, Section 18.10 "Release of Property for Conditional and Unrestricted Use."

9.3.3 *Action Levels*

All decisions regarding application of action levels for nonradioactive substances will be based on air monitoring guidelines (refer to Table 9-1 for action level). The action level for measurements of radioisotopes will be based on surface measurements of dry soil, equipment,

or PPE. The HSS will notify the SM/FOL, who will in turn notify the EG&G PM immediately after any upgrade in PPE. The Health and Safety Liaison Officer and the Environmental Restoration Health and Safety Officer will also be notified. Table 9-2 identifies potential contaminants of concern.

**Table 9-2
Potential Contaminants of Concern (PCOC) at OU11***

Contaminant	Location	Concentration (highest detected)	Exposure Limit (TLV/PEL)
Aluminum	Alluvial Groundwater	208,000 mg/l	10 mg/m3
Manganese	Alluvial Groundwater	2,710 mg/l	5 mg/m3

*From "Technical Memorandum, Revised Field Sampling Plan and Data Quality Objectives, the West Spray Field (IHSS 168), Operable Unit No. 11." U.S. Department of Energy. 1993.

9.4 Personal Radiation Monitoring

Field personnel on this project will not be required to use personal radiation dosimeters during site activities according to JLA-006-94.

9.5 Action Levels for Radionuclides

The action level for measurements of radionuclides will be based on surface measurements of dry soil, equipment, or PPE. Table 9-3 lists derived air concentrations (DACs) for radiation exposures to workers.

**Table 9-3
 Local Air Monitoring Trigger Levels for Selected Radionuclides in Soils**

Soil Activity pCi/gram	Americium-241 or Plutonium-239 DAC/10 TSP mg/m ³	Uranium 233/234 or Uranium-238 DAC/10 TSP mg/m ³	Strontium-90 DAC/10 TSP mg/m ³
0.001	200,000	30,000,000	200,000,000
0.01	20,000	3,000,000	20,000,000
0.1	2,000	300,000	2,000,000
1	200	30,000	200,000
5	40	6,000	40,000
10	20	3,000	20,000
20	10	1,500	10,000
40	5	750	5,000
60	3	500	3,333
80	3	375	2,500
100	2	300	2,000
200	1	150	1,000
400	0.5	75	500
600	0.3	50	333
800	0.3	40	250
1,000	0.2	30	200
1,500	0.13	20	133
2,000	0.10	15	100
5,000	0.04	6	40
10,000	0.02	3	20
20,000	0.01	1.5	10
50,000	0.004	0.6	4
80,000	0.003	0.4	2.5
100,000	0.002	0.3	2

Trigger levels for total suspended particulate (TSP) matter concentrations measured in the breathing zone as 8-hour time-weighted averages. They are based on the derived air concentration (DAC)/10, which DOE recognizes as the criteria for implementing respiratory protection.

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Use of the Table

1. Identify the approximate soil activity in the area where intrusive activities are to be conducted.
2. Identify the corresponding DAC/10 trigger levels. Those values represent TSP concentrations that trigger donning respiratory protective equipment.
3. Measure TSP breathing zone concentrations during intrusive activities using a mini-RAM or comparable real-time instrument.
4. If measured TSP concentrations attain the trigger levels identified above, for a sustained period of time (15 to 30 minutes), such that the 8-hour time-weighted average could be approached, follow appropriate requirements identified above under Item 2 and notify the HSS.
5. ALARA practice dictates that reasonable measures be taken to keep exposures to radionuclides as low as reasonably achievable. This implies that routine dust avoidance mechanisms such as avoiding the dust plume path should be implemented to the extent practicable, regardless of the TSP measurements.
6. Environmental concentration measurements and estimates embody uncertainties and can vary at a given location. Thus, users of this table are encouraged to exercise conservative judgment regarding the selection of trigger levels. If several radionuclides are believed to be present at a site, the most conservative trigger level shall be used.

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Training

Approved By:

K.K. O'Neill
Name

8/25/94
Date

10. TRAINING

Stoller and all Stoller subcontractors assigned to OU11 must complete the training required by OSHA as well as site-specific health and safety training courses required by EG&G. OU11 is an environmental investigation classified as a hazardous waste operation by OSHA standard 29 CFR 1920.120; therefore, the training requirements, including the initial training, annual refresher training, and supervisor training, apply to Stoller and Stoller subcontractors working at the site. Additional training courses required by EG&G include general employee training (GET), radiation worker, level II respirator training, drum handling, U.S. Department of Transportation training, waste generator training, and RCRA training.

10.1 Training Requirements

10.1.1 Hazardous Waste Site Health and Safety

Any Stoller or Stoller subcontractors assigned to work at OU11 must complete the hazardous waste health and safety course required by OSHA in 29 CFR 1910.120(e). The length of the required course may be 40 hours or 24 hours, based on the worker's assigned tasks. The 40-hour course and 3 days of supervised field experience is mandatory for workers who may be required to use respiratory protection equipment and/or who are engaged in activities in which they may be exposed to hazardous substances and health hazards at or above the permissible exposure limits (PEL).

All hazardous waste workers must complete an annual 8-hour refresher course. The course content consists of a summary of the 40-hour course. Supervisors of hazardous waste sites or of tasks conducted on hazardous waste sites must complete an additional 8-hour supervisor health and safety training course. A summary of training requirements is given in Table 10-1.

10.1.2 Site-Specific Briefing

Stoller and all Stoller subcontractors assigned to work on OU11 must receive a briefing that introduces site safety, emergency procedures, and information contained in the HASP. The

briefing shall provide enough detail that employees can implement the HASP and safely perform their assigned tasks.

Table 10-1
1910.120 Training Requirements for OU11

Operation/Personnel	Site Safety Briefing	24-Hour	40-Hour	8-hour Supervisor	8-Hour Refresher
Routine or occasional site worker	Yes	N/A	Yes	N/A	Yes
Routine or occasional site worker (support zone)	Yes	N/A	Yes	N/A	Yes
Onsite supervisor	Yes	N/A	Yes	Yes	Yes
Visitor ^{1,2}					
• Level A or B PPE	Yes	N/A	Yes	N/A	Yes
• Level C PPE	Yes	Yes	N/A	N/A	Yes
• Level D or No PPE	Yes	N/A	N/A	N/A	N/A

- 1 All visitors should be issued and instructed on the use of required PPE, receive a site-specific briefing, and be escorted by training personnel.
- 2 Visitors are not directly involved with hazardous waste operations (e.g., management, audit, and oversight personnel). Visitors include those covered and not covered by OSHA.

10.1.3 Visitor Requirements

Visitors who do not have the required OSHA training, Rocky Flats required training, and medical certifications will not be allowed to enter the site EZ or CRZ. Prior to gaining access to the site, visitors to OU11 will receive an orientation that summarizes the HASP. This orientation does not qualify the visitor to access-controlled areas of the site. The purpose of the briefing is to provide sufficient information on the hazards and control measures at the site to prevent the visitor from unknowingly violating any site control measures. Visitors will be escorted by a trained site employee during the entire visit.

Visitors will provide verification that they have read, understand, and will comply with the requirements of the HASP. Signatures are recorded in a logbook, that is maintained at the Stoller project trailers by the SM/FOL.

10.1.4 *Safety Meetings*

Discussion at weekly meetings may include the following topics:

- Health and safety considerations and the required PPE for current operations;
- Any revisions to the OU11 HASP;
- Any new MSDS filed at the Stoller project trailers;
- Documented or observed unsafe acts committed at the work site, clarification of the safety requirements violated, and methods to prevent future violations; and
- Approved changes to the HASP.

Workers are required to attend weekly safety meetings and sign a roster (attendance sheet) that will be maintained by the HSS at the Stoller project trailers. Meeting minutes will be documented and attached to the roster. The SM/FOL or HSS will review the meeting minutes with absentees and have them sign the attendance sheet. This documentation will be filed at the work site, available to EG&G upon request, and archived when the project is completed. Safety meetings will be conducted weekly at a minimum or more frequently as necessary.

10.1.5 *Rehearsal of Emergency Response Plan*

Stoller personnel will participate in any Emergency Response Plan rehearsals conducted by EG&G Emergency Preparedness.

10.2 **Implementation of Training**

Training for Stoller and Stoller subcontractors is provided by the HSS and outside sources, which include EG&G training courses. Only trained employees will be assigned to perform fieldwork. Stoller and Stoller subcontractors will be required to complete EG&G CBT modules, including GET.

10.3 **Verification of Training**

The HSS will maintain documentation of Stoller and Stoller subcontractors training (including supervised field experience) on file at the Stoller project trailers. These records will be kept on file by the HSS.

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Title:
Emergency Notification

Approved By:

K.K. O'Neill
Name

8/25/94
Date

11. EMERGENCY NOTIFICATION

11.1 Notification

**LIFE-THREATENING EMERGENCIES
CALL EXTENSION 2911**

**NON-LIFE-THREATENING EMERGENCIES
CALL EXTENSION 2914**

Notification requirements for emergency situations at OU11 depend on the nature of the perceived emergency (e.g., spill, injury, illness, fire) and the extent to which the damage and/or injuries have progressed. Upon discovery of a release of materials or other non-life-threatening emergency situation, the Shift Superintendent will be notified at extension 2914. If there is no answer at 2914, call 2911. If the situation is life-threatening, Rocky Flats emergency response personnel will be notified as detailed below. If medical assistance is required from a non-life threatening injury, personnel shall respond to the Occupational Health Department, Building 122. Figure 11-1 illustrates the site route to Building 122.

Call extension 2911 to obtain emergency assistance for life-threatening emergencies and to simultaneously access the following:

- Incident Commander,
- Central Alarm Station,
- Fire Department Dispatch Center, and
- Occupational Health Department.

As much detail about the emergency as possible will be provided. A decision to dispatch any or all of the following equipment will be based on the provided information:

- Fire engine,

- Ambulance, and
- Hazardous material (HAZMAT) response vehicle.

Provide the following information, upon request, to the Emergency Dispatcher:

- Informant's name,
- Exact location of the emergency,
- Nature of the emergency,
- Condition of the patient if applicable (breathing, consciousness, bleeding, etc.),
- Special hazards in the area, and
- Any other information requested.

If no details are given, emergency response personnel will respond automatically.

The IC will immediately respond to emergencies. The Central Alarm Station will activate the Building Emergency Support Team by the Life Safety/Disaster Warning System. The IC will activate the Emergency Operations Center (EOC) and notify departments that have an advisory role in the situation, if applicable. The IC will determine whether additional help from offsite agencies (e.g., police, hospitals) is required.

The IC will also notify the following groups when appropriate:

- Radiological Engineering,
- Industrial Hygiene,
- Industrial Safety,
- Waste Operations,
- Waste Programs,
- Traffic,
- Operations Manager, and
- Health and Safety Administrator.

11.2 Specific Site Hazards

The response to and abatement of most emergency situations at OU11 will require the expertise of Rocky Flats emergency response personnel. Situations that will require the assistance of Rocky Flats emergency responders include, but are not limited to, the following:

- Accidents resulting in physical injury;
- Accidents resulting in chemical or radiological exposure;
- Incidents where the substance cannot be absorbed, neutralized, or otherwise controlled at the time of release;
- Situations where there is a potential for safety or health hazards (i.e., fire, explosion, or chemical/radiological exposure, etc.); and
- Accidents resulting in a radiological exposure exceeding the following limits:
 - 2 rem (whole body),
 - 7.5 rem (skin),
 - 15 rem (extremities),
 - Chemical exposures exceeding the TLV or PEL.

11.3 Fires and Explosions

**IN THE EVENT OF A FIRE OR EXPLOSION,
IMMEDIATELY CALL EXTENSION 2911**

In the event of fire, explosion, or emergency, the IC will activate the EOC and personnel will immediately evacuate the area. Evacuation will be a minimum of 300 feet upwind/crosswind of the emergency to a designated meeting area. The emergency will be handled by the Fire Department and its designees. Portable fire extinguishers are available for small, controllable incipient fires. Fires, regardless of size, are to be reported to the Fire Department.

11.4 Spills of Hazardous and Radioactive Mixed Waste and Hazardous Material

All outside spills must be reported and require HAZMAT response. Report to the IC at extension 2911 for life-threatening incidences. Where spills are non-life threatening, call extension 2914.

11.5 Accident/Incident Reporting

In the event of an accident or incident, the SSO will notify the Project Manager, the FIM, the ER H&S Officer, and the H&S Liaison Officer. Field activities shall be suspended to correct the cause of the accident/incident. The SSO will submit a completed DOE Form F 5484.X (Appendix C) for the following incidences:

1. "Recordable" occupational injuries or illnesses as defined below:
 - OCCUPATIONAL INJURY is any injury such as a cut, fracture, sprain, or amputation that results from a work accident or from an exposure involving a single incident in the work environment. NOTE: Conditions resulting from animal or insect bites, or one-time exposure to chemicals, are considered to be injuries.
 - OCCUPATIONAL ILLNESS of an employee is any abnormal condition or disorder, other than one resulting from an occupational injury, caused by exposure to environmental factors associated with employment. It includes acute and chronic illness or diseases that may be caused by inhalation, absorption, ingestion, or direct contact with a toxic material.
2. PROPERTY DAMAGE LOSSES of \$1,000 or more are reported as follows: accidents that cause damage to DOE property, regardless of fault, or accident wherein DOE may be liable for damage to a second party, are reportable if damage is \$1,000 or more. Includes damage to facilities, inventories, equipment, and properly parked motor vehicles. Excludes damage resulting from a DOE reportable vehicle accident.
3. GOVERNMENT MOTOR VEHICLE ACCIDENTS resulting in damages of \$500 or more, or involving injury, are reported unless the government vehicle is not at fault, damage of less than \$500 is sustained by the government vehicle, or no injury is inflicted on the government vehicle occupants. Accidents are all reportable to DOE if:
 - Damage to DOE property is greater than or equal to \$500 and the driver of a government vehicle is at fault,

- Damage to any private property or vehicle is greater than or equal to \$500 and the driver of a government vehicle is at fault, or
- Any person is injured and the driver of a government vehicle is at fault.

11.6 Post-Emergency Response Equipment Maintenance

Equipment used in emergency situations will be decontaminated by wiping with a soap solution. Rags used for decontamination will be disposed as low-level radioactive waste, if necessary. Contaminated heavy equipment used in emergencies will be thoroughly decontaminated prior to being released from the site. The decontamination protocols described in SOPs FO.10, Heavy Equipment Decontamination; FO.11, Handling of Decontamination Water and Wash Water; and FO.18, Decontamination Facility Operations will be followed. Equipment will not be released until monitoring indicates that contaminant levels are less than 20 disintegrations per minute/100 square centimeters (above background) and that chemical contamination is not present.

11.7 Emergency Equipment Location

A 15-minute emergency eye wash and shower will be provided for tasks where eye hazards may exist. A 15-minute eye wash will be located within 100 feet or 10 seconds of travel time from each hazard area. These items may be located in the Stoller project trailers on the site. Fire extinguishers will be located in all field vehicles and will be temporarily located at sites where there is a potential for fires (e.g., during welding operations). First aid will be provided by EG&G emergency medical technicians.

11.8 Evacuation Plan

The designated meeting area during emergency situations and evacuation exercises shall be the West Gate parking lot. Figure 11-2 illustrates the evacuation route from OU11 West Spray Fields to the West Gate parking lot. Our scheduled emergency response rehearsal, as requested by the EG&G Project Manager, shall be performed during the OU11 RFI/RI in accordance with the site-specific Emergency Response Plan. Personnel and visitors to OU11 will evacuate the area if any of the following occur:

- If an emergency (such as a fire or chemical spill) develops,
- If instructed by site supervision, or

- If instructed by the Shift Superintendent over the site radio or telephone system.

After an evacuation, each FTL will verify the location of his/her employees.

11.9 Communication

Telephones are available in the Stoller project trailers. In addition, radios will be used by field personnel to maintain contact with the SM/FOL or other designated persons in the trailers who have access to telephones. The HSS and SM/FOL will monitor the radio frequency in use by field personnel at all times during field operations. Radio frequencies are monitored by the Rocky Flats security system to ensure that response time is minimal in the event of an accident or emergency on the site. In the event of a plant emergency, Central Dispatch will notify the trailers and field personnel by telephone and radio. If Central Dispatch fails in its attempt to contact anyone onsite, a security car will be sent to alert personnel of the emergency. Any emergency warnings and instructions reported from the Life Safety/Disaster Warning System (LS/DW) shall be communicated to field personnel by radio.

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ONLY

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Title: References	Approved By: <u>K.K. O'Neill</u> Name	<u>8/25/94</u> Date
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12. REFERENCES

U.S. Department of Energy. 1994. *Revised Field Sampling Plan and Data Quality Objectives, the West Spray Field (IHSS 168), Operable Unit No. 11.* Revision 1. February 2, 1994.

U.S. Department of Energy. 1993. *Volume 1: Technical Proposal Implementation of the Combined Phases RFI/RI Work Plan for Rocky Flats Plant Operable Unit 11, West Spray Field.* December 16, 1993.

U.S. Department of Energy. 1992. *Phase I RFI/RI Work Plan for the Solar Evaporation Ponds (OU4).* Rocky Flats Plant, Golden, Colorado. January.

Appendix A
Heat and Cold Stress

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Appendix A

Approved By:

H. K. O'Neill

8/25/94

Name

Date

Introduction

When personnel work in hot environments, the safety officer and field workers shall be trained to recognize heat stress symptoms and provide first aid treatment until more qualified personnel take over. Personnel trained in advanced first aid or emergency medical technicians (EMTs) assess the degree of heat stress using more factors than provided in this guidance.

The following information is of a practical nature for field personnel and is not intended to be a treatise for medical personnel. It is intended to minimize heat stress to field workers and to provide common symptoms/first aid treatment.

Heat Stress

Heat stress occurs when the rate of heat gain is greater than the body's ability to remove it. It is therefore important to understand the factors that cause overheating and mechanisms to control those factors.

Heating of the body occurs from three sources:

- Radiant heating from heat sources or sunlight
- Convective heating from contact with a warmer object or liquid
- Metabolic heating caused by activity

Cooling occurs through three mechanisms:

- Respiration: The air we exhale is warm, as the body overheats, respiration becomes more rapid.
- Radiation: Heat is released at the surface of the skin, as the body overheats, the surficial blood vessels dilate and allow more heat to be lost.

Heat Stress Symptoms and Treatment

Condition	Common Symptoms	Treatment
Slightly elevated body temperature	<ul style="list-style-type: none"> • Temperature 100 to 101° F • Headache 	Drink cool fluids. Rest in cool place until temperature and pulse are below 100 and 110°, respectively.
Heat rash	Rash mainly on back	Shower at the end of shift.
Heat cramps	Muscle cramps or twitching often starting in abdominal area	Remove from fieldwork. Take off PPE. Encourage consumption of cool fluids designed to replenish electrolytes (i.e., Gatorade). No fieldwork for 24 to 48 hours.
Heat exhaustion*	<ul style="list-style-type: none"> • Temperature between 99 and 102° F • Elevated pulse • Profuse sweating • Pale skin • Cool wet/clammy skin • Lethargy • Nausea • Dizziness 	Remove from fieldwork. Take off PPE. Drink cool fluids. Rest in cool place. No fieldwork for at least 48 hours.
Heat stroke*	<ul style="list-style-type: none"> • Temperature greater than 102° F • Hot, dry skin • Flushed skin • Light or no sweating • Rapid pulse 	<p>LIFE THREATENING</p> <p>Remove PPE. Remove from fieldwork. Flush with cool, not cold, water.</p> <p>Drive to hospital. Written release from doctor required to return to work.</p>

* If in doubt about whether the condition is heat exhaustion or heat stroke, seek medical attention. Health care specialists have additional training to interpret pupillary response to light, blood pressure, and other factors.

Effects of Personal Protective Equipment (PPE)

Heat stress may occur with or without use of PPE. PPE normally adds layers of clothing that insulate the wearer from cooling air. Chemical protective clothing generally has a vapor barrier to keep out chemical vapors. The vapor barrier also prevents evaporative cooling of perspiration. In short, PPE increases the heat stress on workers.

Practical Methods to Reduce Heat Stress

- Evaporation: Perspiration is released to the skin surface and evaporates. The skin is cooled by evaporative cooling.
- Become acclimatized to heat for several days whenever possible. Plan work in the cooler portions of the day. Early morning hours and evening hours are cooler.
- Perform site preparation before the field team dresses out. Instrument calibrations, heat stress monitoring, sample jar labeling, etc., should be performed before dressing in chemical PPE.

- If chemical PPE has a vapor barrier, instruct personnel to dress out in stages. Dress out half way. When the team is half dressed, perform final heat stress monitoring, put them on air, and complete the dress out.
- If supplied-air operations are performed routinely in hot environments, the purchase of vortex coolers should be considered. Cool vests may also be used.
- Take frequent breaks and consume at least one pint of cool fluid every hour. Replenish electrolytes through the consumption of diluted drinks. The body loses more water than electrolytes. Concentrated salt, electrolyte, or juices can increase susceptibility to heat stress.

Occupational Exposure Standards

Heat Stress Monitoring

The U.S. Environmental Protection Agency (EPA) and the American Conference of Governmental Industrial Hygienists (ACGIH) have published heat stress monitoring recommendations. The EPA recommends heat stress monitoring at temperatures above 60° F when chemical PPE is used.

ACGIH

The tabulated information assumes that no chemical PPE is being worn. Because chemical PPE tends to increase heat stress, ACGIH has published correction factors in the same standard. OSHA enforces the ACGIH recommendation.

Heat stress prevention is emphasized. ACGIH uses an adjusted temperature called a wet bulb globe temperature (WBGT) to derive work-rest cycles based upon:

- Radiant heat loads (sunlight)
- Evaporative heat loss (perspiration)
- Ambient temperature (temperature in the shade)
- Metabolic rate

The work/rest schedules depend upon the type of PPE used and the type of work being performed. ACGIH recommendations for three types of PPE are given on the next page.

Preplanning is required to prevent undue pressure to work under conditions that exceed OSHA exposure standards.

The WBGT should be used to minimize potential for heat injuries. OSHA enforces the recommendations of the ACGIH. Although the OSHA method reduces potential for heat stress, it does not prevent heat stress. The WBGT criteria are intended to keep the deep body temperature below 38°C (100.4°F) and to prevent more serious symptoms of heat stress.

Monitoring of the deep body temperature helps to ensure that personnel do not become seriously injured from heat exposure. EPA guidance recommends that the deep body temperature (rectal or inner ear) not exceed 38°C (100.4°F), and that the heart rate (pulse) be kept below 110 beats per minute (after 5-minute rest).

Rectal temperature monitoring is impractical in a field setting and inner ear thermometers are very expensive. Oral temperatures can be used if the action limit is lowered by about one-half of a degree Fahrenheit (one-fourth degree C). If monitoring and the corresponding documentation are not maintained, the immediate supervisor and the company take on unnecessary legal liability.

Heat Stress Work/Rest Regimes

Heat stress with compensation for cotton coveralls work clothing

TEMPERATURE

Work min/hr	Rest min/hr	Light Workload WBGT° F	Moderate Workload WBGT° F	Heavy Workload WBGT° F
60	0	84	78	75
45	15	85	80	76
30	30	87	83	80
15	45	88	88	84

Heat stress with compensation for plastic coated Tyvek coveralls work clothing
 Compensation -6°C, -10.8°F

TEMPERATURE

Work min/hr	Rest min/hr	Light Workload WBGT° F	Moderate Workload WBGT° F	Heavy Workload WBGT° F
60	0	73.2	67.2	64.2
45	15	74.2	69.2	65.2
30	30	76.2	72.2	69.2
15	45	77.2	75.2	73.2

Heat stress with compensation for plastic coated Tyvek fully encapsulating suit work clothing
 Compensation -10° C, -18° F

TEMPERATURE

Work min/hr	Rest min/hr	Light Workload WBGT° F	Moderate Workload WBGT° F	Heavy Workload WBGT° F
60	0	66	60	57
45	15	67	62	58
30	30	69	65	62
15	45	70	68	66

Based on ACGIH, 1990-1991 Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.

Heat Stress Monitoring

Heat stress monitoring will be performed whenever ambient temperatures exceed 80°F.
Oral temperatures and pulse rates will be taken at the end of each break.

ORAL TEMPERATURE

98 to 99
99 to 100
Greater than 100

ACTION

Continue work
Reduce work load, increase fluid intake, increase rest
breaks
Remove from field, remove PPE, drink cool fluids, rest
in cool area until temperature returns to 99

PULSE (HEART RATE)

50 to 100
100 to 109
Greater than 110

ACTION

Continue working
Reduce work rate, drink cool fluids, take more rest
breaks, monitor every 15 minutes
Remove from field, remove PPE, rest in cool area,
drink cool fluids, no fieldwork until pulse below 100
beats per minute

If the oral temperature exceeds 100° F, or the pulse rate exceeds 110 beats per minute at rest, the person must not continue to work. These conditions have been found to prevent most heat-related illnesses. Occasionally, high heat conditions combined with poor eating, sleeping, and drinking habits have resulted in heat stroke occurring in less than 20 minutes. Continuous monitoring is therefore recommended whenever practical.

Heat stress monitoring must be performed at least once per hour for documentation, even when it is unlikely to affect the worker. As the temperature increases, the worker starts to show signs of heat stress and the monitoring frequency should be increased accordingly.

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Cold Stress

Personnel working outdoors in low temperatures, especially at or below freezing, are subject to cold stress. Exposure to extreme cold for a short time causes severe injury to the surface of the body. Areas that have a high surface area-to-volume ratio such as fingers, toes, and ears are the most susceptible.

Two factors influence the development of a cold injury: ambient temperature and wind velocity. Wind chill is used to describe the chilling effect of moving air in combination with low temperature.

Frostbite

Local injury resulting from cold is included in the generic term frostbite. Frostbite to the extremities can be categorized into:

- Frost nip or incipient frostbite is characterized by a sudden whitening of the skin
- Superficial frostbite is characterized by skin with a waxy or white appearance and is firm to the touch, but tissue beneath is resilient
- Deep frostbite is characterized by tissues that are cold, pale, and solid

Hypothermia

Systemic hypothermia is caused by exposure to freezing or rapidly dropping temperature. Its symptoms are usually exhibited in five stages:

- Shivering
- Apathy, listlessness, sleepiness, and (sometimes) rapid cooling of the body to less than 95 degrees Fahrenheit
- Unconsciousness, glassy stare, slow pulse, and respiratory rate
- Freezing of the extremities
- Death

Field activities shall be terminated by the site coordinator or HSS if initial signs of frostbite or hypothermia exist or if equivalent chill temperature is below zero degrees Fahrenheit. All affected personnel shall be kept warm and receive immediate medical care.

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Additional notes to remember:

- Do not rub the frostbitten part (this may cause gangrene)
- Do not use ice, snow, gasoline, or anything cold on the frostbitten area
- Do not use heat lamps or hot water bottles to rewarm the part
- Give a warm drink - not coffee, tea, or alcohol

Appendix B
Property Release Evaluation Form for Equipment

PROPERTY RELEASE EVALUATION

ITEM NUMBER _____

PART I

(From Record of Property Leaving The RCA)

Description of Property to be Released _____

PART II

A. Property History _____

B. User/Sender: _____

Signature _____

Employee No. _____

Date: _____

Extension: _____

Page No. _____

PART III

A. Radiological Engineering Evaluation _____

B. Survey/Sample Methods to be Used _____

C. Release Criteria _____

D. Evaluated By: _____

Radiological Eng.: Signature _____

Employee No. _____

Date: _____

Extension: _____

Appendix C
DOE Individual Accident/Incident Report

**U.S. Department of Energy
INDIVIDUAL ACCIDENT/INCIDENT REPORT
For All Type A, B, and C Investigations
Official Use Only-Privacy Act**

DOE F 5484X

Rev. 01-87

For SSC Use Only:

P.D. Accident Type: _____ Energy Flow: _____
 Enter GICS: _____ FRASE Coding: _____ Revision: [] 1st [] 2nd [] 3rd [] 4th

General Information

1. Reporting Organization _____
 Organization Code _____
 2. Case Number _____ Revision: [] Yes
 3. Multiple-Case Number _____
 4. Accident Type [] Injury/Illness [] Vehicle
 [] Property Damage [] Other
 5. Investigation Type [] A [] B [] C [] Non-Recordable
 6. Department, Division, or ID Code (Optional) _____
 7. Date of Occurrence _____
 Month Day Year
 8. Time _____ (Military Time)
 9. Accident Occurred [] Indoors [] Outdoors
 10. On Employer's Premise? [] Yes [] No
 11. Specific Location _____

Employee Information

12. Check One: [] Injured/ill Employee
 [] Operator of Equipment/Vehicle
 13. Name _____
 14. S.S./ID Number _____
 15. Age _____
 16. Sex [] Female [] Male
 17. Occupation _____
 18. Length of present employment
 [] Under 3 months [] 3 to 12 months [] Over 12 months
 19. Experience on this job/equipment
 [] Under 3 months [] 3 to 12 months [] Over 12 months

(If Property Damage or Vehicle Accident, go to Line 26)

Injury/Illness (OSHA Information)

20. [] Injury Code (10)
 [] Code 7a (21) - Skin diseases or disorders
 [] Code 7b (22) - Dust diseases of lungs
 [] Code 7c (23) - Resp. due to toxic agents
 [] Code 7d (24) - Poisoning
 [] Code 7e (25) - Disorders - Physical agents
 [] Code 7f (26) - Disorders - Repeated trauma
 [] Code 7g (29) - All Other
 21. Workdays Lost _____
 22. Workdays Restricted _____
 23. Death [] Yes [] No
 If yes, enter date _____
 Month Day Year
 24. Permanent transfer because of injury disability?
 [] Yes [] No
 Terminated because of injury disability?
 [] Yes [] No
 25. Has Employee returned to work with no further
 anticipated workdays lost or restricted?
 [] Yes [] No

Property/Vehicle Damage

26. Property [] Fire
 [] Non-Fire
 27. Vehicle [] Government
 [] Private-Driven by Government Employee
 [] Car/Pickup/Van/Motorcycle
 [] Truck (1 ton or over)
 [] Bus
 [] Other (Air, Marine, Railroad, etc.)
 28. Was Vehicle equipped with seat belts?
 [] Yes [] No
 If "Yes", was seat belt worn? [] Yes [] No
 29. Did vehicle accident involve recordable injury? [] Yes [] No
 30. \$ _____
 Total Accident Damage
 \$ _____
 DOE Property/Vehicle
 \$ _____
 Non-DOE Property/Vehicle
 31. \$ _____ \$ _____
 Claim against DOE Paid by DOE
 \$ _____ \$ _____
 Reimbursable to DOE Paid to DOE
 32. Are dollar amounts final? [] Yes [] No

Equipment/Hardware/Vehicle Involved (as applicable)

33. #1 Equipment _____
 Generic (or Brand) name and model _____ Identification Number _____
 #2 Equipment _____
 Generic (or Brand) name and model _____ Identification Number _____
 34. Did equipment design or defect contribute to accident cause or severity? [] Yes [] No

35. Activity in progress at time of accident

36. Events - Begin with initiating event and end with Nature and extent of injury/damage.

37. Accident Causes

a. Conditions

b. Actions

c. Factors influencing a or b

38. Corrective Actions

a. Actions taken

b. Actions recommended

c. To be completed by _____
Implementation Date

39. Accident Investigator _____ Date _____ FTS Telephone _____

Job Title Supervisor Safety Professional Other _____

40. Supervisor Responsible for Corrective Action _____ Date _____ FTS Telephone _____

41. Accident Investigation Contact
(If different from Line 39) _____ FTS Telephone _____

INSTRUCTIONS FOR COMPLETING DOE F 5484.X

To be used for all occurrences reportable under DOE 5484.1A, Environmental Protection, Safety, and Health Protection Information Reporting Requirements: As preliminary input for all Type A and B investigation reports, and as sufficient data for Type C accidents. Mail completed DOE F 5484.X, along with the transmittal form (DOE F 5484.Z) to SSDC, P.O. Box 1625, Idaho Falls, Idaho 83415 - Attention: CAIRS. Revisions to information on this form may be transmitted by telephone (FTS 583-9566 or Commercial 1-208-526-9566) or by mailing a copy of the revised original to the above address.

General Information

1. Indicate the reporting organization (DOE Office or DOE contractor) that experienced the accident/incident. Also, enter the seven-character Organization Code that has been assigned to that specific reporting contractor.
2. Enter the case number. All cases for a given reporting organization will be numbered in sequence, regardless of accident type, with the first two digits representing the year; (e.g., The tenth accident in 1987 is 87010). Check the YES box to indicate a revision.
3. Multiple-case accidents are those that result in more than one recordable case (a combination of two or more persons, vehicles, or property damage cases from the same accident). Report each injury/property damage/vehicle case resulting from a single accident on a separate DOE F 5484.X, with an identical multiple-case accident number to show relationship to the common accident/incident; (e.g., If the first multiple-case accident of the year resulted in two separate employees being injured in a one-car rollover of a DOE vehicle, each injury case would be reported on a separate DOE F 5484.X and assigned sequential case numbers 87005 and 87006. The vehicle accident report would be shown on a third form as number 87007. The same multiple-case number "01" should be entered on line 4 on each of the three forms. Number each additional multiple accident sequentially).
4. Check appropriate accident type: I, P, V, or O. Include in vehicle type all transportation accidents; e.g., vehicle, aircraft, marine, and railroad. Any reportable incident other than Injury/Illness, Property Damage, or Vehicle should be reported as "Other."
5. Indicate the Investigation Type: A, B, or C. The Non-recordable box is used when a previously reported case has been revised to non-recordable status; (e.g., found to be not work-related, first-aid case only, under \$500 loss for Vehicle, under \$1,000 loss for Property Damage, etc.).
6. Enter the DEPARTMENT, DIVISION, or ID code as desired. This input field is available for structuring subgroups within a reporting organization.
7. Enter the date of accident, MMDDYY.
8. Enter the time of accident, using MILITARY time.
9. Check the appropriate box, INDOORS or OUTDOORS.
10. Check the appropriate box, on Employer's Premise, YES or NO.
11. Enter the SPECIFIC LOCATION of the accident (e.g., Laboratory, Test Area 10, Office Area 615).

Employee Information

12. Check the appropriate box, Injured/Ill EMPLOYEE or OPERATOR of Equipment/Vehicle.
13. Enter the NAME of the employee or operator.
14. Enter the SOCIAL SECURITY number of other employee ID number.
15. Enter the AGE of employee/operator.
16. Check the appropriate box, FEMALE or MALE.
17. Enter the generic JOB TITLE. (e.g., Engineer, Welder, Security Guard, Pipe Fitter)
18. Check the appropriate box for LENGTH of EMPLOYMENT.
19. Check the appropriate box for LENGTH of JOB/EQUIPMENT EXPERIENCE.

Injury/Illness

(If "Injury/Illness" was checked in No. 4, complete this section; otherwise, proceed to No. 26.)

20. Check the appropriate box. (Reference: OSHA log). Injury code #10 or one of the illness codes 21 through 29; (Refer to the OSHA Log).
21. Enter the number of WORKDAYS LOST. If continuing, enter best estimate of expected days away.
22. Enter the number of RESTRICTED WORKDAYS. If continuing, enter best estimate of expected restricted days.
23. Check YES or NO if the accident/incident resulted in death. If YES, enter death date.
24. Check the appropriate box, YES or NO, whether transferred or terminated because of injury disability.
25. Check the appropriate box, YES or NO, whether the employee has returned to full work.

Property/Vehicle Damage

26. If "Property Damage" was checked in No. 4, indicate the appropriate box and proceed to the dollar loss section (No. 30).

27. If "Vehicle" was checked in No. 4, indicate whether the vehicle is Government-owned, or is a privately-owned vehicle driven by a Government employee. Government vehicles should include those owned, leased, or rented by the Federal Government; also any contractor-operated, privately-owned vehicles used in DOE contract work for which cost reporting to DOE is required. In addition, check the type of vehicle or conveyance involved.
28. Check the appropriate box for each question concerning SEAT BELTS.
29. Check the appropriate box, YES or NO whether the vehicle accident resulted in a recordable injury.
30. Enter the TOTAL ACCIDENT DAMAGE LOSS; separate the loss between DOE and non-DOE property or vehicle damage; (round to the nearest dollar amount).
31. Enter CLAIMS against DOE for damage to non-DOE vehicle/property; also include the amount actually paid by DOE, if and when available. Enter the dollar loss, if any, to DOE vehicles/property that should be reimbursable; also enter the amount actually paid to DOE, if and when available. Do not delay the report if exact losses are unknown. Submit a revised report to show final amounts; (round to the nearest dollar amount).
32. Check the appropriate box, YES or NO, if dollar amounts are final.

Equipment/Hardware/Vehicle Involved

33. Give the generic or brand name, model and, as applicable, the identification number of the equipment/hardware/vehicle involved. Identification should be adequate to alert others of potential hazards associated with a specific equipment model.
34. Check the appropriate box, YES or NO, if equipment design or defect contributed to the accident cause or severity.

Narrative Guide

35. Activity

What activity or assignment was in progress at the time of the accident?

- Example: 1) Routine housekeeping duties were being performed.
2) No activity in facility due to extended holiday weekend.
3) Employee was involved in routine security inspection.

36. Events

Describe the accident, in order of sequence, beginning with the initiating event, and followed by the secondary and tertiary events. End with nature and extent of injury/damage.

- Example: 1) Employee was pulling utility cart that was loaded with wastepaper from office area to hallway. Wheel of utility cart caught against door casing. Bags of heavy wastepaper that were in cart fell to end of cart. Cart tipped over onto foot of employee. Right foot was crushed between utility cart and door casing, resulting in severe contusion to right foot of employee.
2) No employee activity. HVAC system malfunctioned during long weekend. Upper floor of office building became excessively hot and triggered the automatic sprinkler system. Upper office area and contents were damaged by water. Extensive cleanup required.
3) Employee was driving patrol car from guard station to research facility. Patrol car struck icy section of road. Employee lost control of vehicle, which skidded across road into concrete abutment on side of road. Accident resulted in damage to right front fender, tire, headlight, and grill.

37. Accident Causes

- a. State the conditions that existed at the time of the accident (the specific control factors that were or may have been the direct or immediate cause or causes of the accident).

- Example: 1) Wheel of utility cart was worn and would not roll properly. Utility cart was overloaded with wastepaper.
2) Thermostatic control on HVAC system had been improperly installed during recent replacement.
3) Road was covered with icy spots. Weather was foggy.

- b. Enter the actions on the part of the employee that contributed to the occurrence of the accident/incident.

- Example: 1) Employee overloaded the utility cart with wastepaper.
2) Facility maintenance had not inspected the newly installed thermostatic control.
3) Employee exceeded safe speed on icy road, and was inattentive to hazard.

- c. List the influencing factors or underlying causes, either conditions or actions or both, that contributed to the accident/incident.

Example: 1) Employee had not been instructed in overloading hazards.
2) No existing supervisory review over craft-assigned repairs.
3) Employee had not been trained in driving under winter conditions. Company has no driver training program.

38. Corrective Actions

- a. Actions taken to prevent recurrence of accident/incident.

Example: 1) Wheels of utility cart were replaced with larger size wheels. All carts were inspected for safe operation.
• Maintenance employees were instructed in overloading hazards.
2) Thermostatic control was inspected and found free of defects; it was then properly rewired.
3) All security personnel were instructed at safety training meeting on driving under hazardous conditions.

- b. Recommended corrective actions are those that are planned by the line management and require time for implementation.

Example: 1) Provide human factors review of utility carts and other equipment purchases.
2) Management to review maintenance procedures and inspection process.
3) Driver training program will be implemented.

- c. Provide implementation date for recommended corrective action.

39. Enter the signature of the accident investigator who can be contacted for follow-up, the date and the FTS or commercial telephone number, and indicate the investigator's job title.
40. Enter the name and FTS or commercial telephone number of the cognizant supervisor. This should be an individual who, by his signature, concurs in and assures corrective action implementation.
41. Enter the name and FTS or commercial telephone number of the person to contact if different from No. 39.

EXPLANATION

Route from OU 11 to Building 122

Ditch

Dirt Road

Paved Road

OU 11

Lakes and Ponds



0 feet

650

1300



Rocky Flats Site, Golden, Colorado

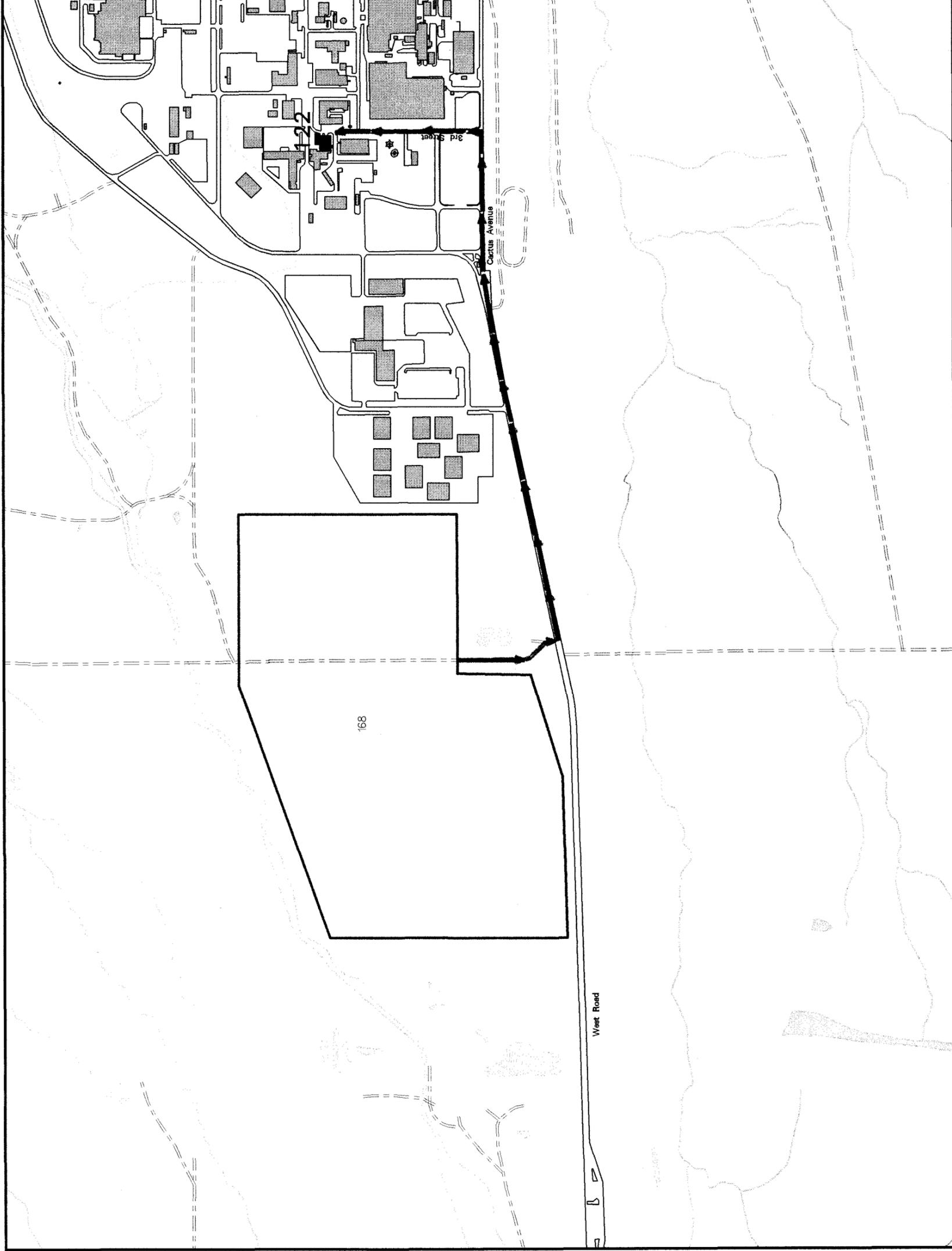
Route from OU 11 to Building 122, Rocky Flats Medical Building

Site-Specific Health and Safety Plan

Operable Unit No. 11

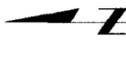
Date: June 1994

Figure 1f-1



EXPLANATION

- Route from OU 11 to the West Gate Parking Lot
- Ditch
- Dirt Road
- Paved Road
- OU 11
- Lakes and Ponds



EG&G ROCKY FLATS
Rocky Flats Site, Golden, Colorado

Route from OU 11 to the West Gate Parking Lot

Site-Specific Health and Safety Plan Operable Unit No. 11

Date: June 1994 Figure 11-2

