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FACILITIES**

**Health and Safety Plan
for the Removal Action
at the Former YS-860 Firing Ranges,
Oak Ridge Y-12 Plant,
Oak Ridge, Tennessee**

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BECHTEL JACOBS COMPANY LLC
FOR THE UNITED STATES
DEPARTMENT OF ENERGY

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**Health and Safety Plan
for the Removal Action
at the Former YS-860 Firing Ranges,
Oak Ridge Y-12 Plant,
Oak Ridge, Tennessee**

Date Issued—April 1998

**Prepared by
ENTECH, Inc.
Oak Ridge, Tennessee
under subcontract 1CK-AEN02V**

**Prepared for the
U.S. Department of Energy
Office of Environmental Management**

**Environmental Management Activities at the
OAK RIDGE Y-12 PLANT
Oak Ridge, Tennessee 37831
managed by
BECHTEL JACOBS COMPANY LLC
for the
U.S. DEPARTMENT OF ENERGY
under contract DE-AC05-98OR22700**

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APPROVALS

**Health and Safety Plan for the Removal Action
at the Former YS-860 Firing Ranges,
Oak Ridge Y-12 Plant,
Oak Ridge, Tennessee**

(BJC/OR-16)

April 1998




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4/20/98
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4/28/98
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PREFACE

This Health and Safety Plan for Removal Action at the Former YS-860 Firing Ranges, Oak Ridge Y-12 Plant, Oak Ridge, Tennessee (BJC/OR-16), was previously issued under document number Y/ER-313.

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ABBREVIATIONS

CFR	Code of Federal Regulations
DOE	U.S. Department of Energy
DOT	Department of Transportation
GET	General Employee Training
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response Training
HP	Health Physics
IH	Industrial Hygiene
PEL	permissible exposure limit
PPE	personal protective equipment
ppm	parts per million
PSS	Plant Shift Superintendent
QA	quality assurance
RCO	Radiological Control Organization
RCT	Radiological Control Technician
RWP	Radiological Work Permit
SHSO	Site Health and Safety Officer
SWP	Safety Work Permit
TLV	threshold limit value

EXECUTIVE SUMMARY

This health and safety plan sets forth the requirements and procedures to protect the personnel involved in the Lead Source Removal Project at the Former YS-860 Firing Ranges. This project will be conducted in a manner that ensures the protection of the safety and health of workers, the public, and the environment.

The purpose of this removal action is to address lead -contaminated soil and reduce a potential risk to human health and the environment. This site is an operable unit within the Upper East Fork Poplar Creek watershed. The removal action will contribute to early source actions within the watershed. The project will accomplish this through the removal of lead-contaminated soil in the target areas of the two small arms firing ranges.

This plan covers the removal actions at the Former YS-860 Firing Ranges. These actions involve the excavation of lead-contaminated soils, the removal of the concrete trench and macadam (asphalt) paths, verification/confirmation sampling, grading and revegetation.

The primary hazards include temperature extremes, equipment operation, noise, potential lead exposure, uneven and slippery working surfaces, and insects.

Methods of control for these hazards include the application of general and specific hazard controls such as pre-job planning, work/rest regimens to control temperature stress, hearing protection, work gloves, and avoidance of wildlife.

1. INTRODUCTION

The mission of the Lead Source Removal Project at the Former YS-860 Firing Ranges is to remove lead-contaminated soils in the target areas of the two small arms firing ranges, thereby reducing a potential risk to human health and the environment. This will be accomplished through the excavation of lead contaminated soil, the removal of a concrete trench and macadam paths, verification sampling, and grading and revegetation. The target berm soil will be excavated and placed in trucks for shipment to a recycling and/or disposal facility. The concrete trench and macadam paths removal will involve excavating approximately 6 inches of concrete and asphalt material at and below the ground surface.

At the conclusion of the removal actions, verification sampling will be conducted after the removal of soil from the target berms and will confirm that the removal action objectives have been met. After removal of the concrete trench and the macadam paths, the entire area will be filled and graded with soils from the nontarget berms on the east and west sides of the firing range site and then revegetated. Confirmatory sampling will be conducted after regrading but before revegetation to ensure that any remaining lead contamination in surface soil is below the action level.

This health and safety plan (HASP) has been written to meet the requirements of Title 29, Code of Federal Regulations (CFR) Part 1910.120 for use in conjunction with the project work plan for removal action at the former YS-860 Firing Ranges. This plan provides guidance and requirements to protect personnel while conducting this work.

2. KEY PERSONNEL

Table 2.1 shows key personnel and affiliations for this project. The ultimate responsibility for meeting goals and implementing this project rests with the Environmental Restoration Program.

Table 2.1. Key project personnel and affiliations

Responsibility	Name	Telephone
Bechtel Jacobs Company LLC Project Manager	J. F. Hensley	574-2930
Bechtel Jacobs Company LLC ES&H Supervisor	E. Kelley	241-1271
Bechtel Jacobs Company LLC Radiological Operation Supervisor	J. Hampshire	241-1272
ENTECH Inc. Project Manager	R. K. Adkisson	481-3231
ENTECH Inc. Field Manager	K. Bane	481-3231
ENTECH Inc. Alternate Field Manager	D. McCartney	481-3231
ENTECH Inc. Project Site Health and Safety Officer	K. W. Keever	481-3231

Table 2.1 (continued)

ENTECH Inc. Alternate Project Site Health and Safety Officer	K. Booth	481-3231
Plant Shift Superintendent	N/A	574-7172

2.1 BECHTEL JACOBS COMPANY PROJECT MANAGER

The Bechtel Jacobs Company Project Manager has overall responsibility for project design and direction. This includes the following:

- maintaining project costs and schedule;
- coordinating efforts with various plant organizations;
- providing budget forecasts and resource commitments;
- notifying the Plant Shift Superintendent (PSS) of plans and scheduled activities for the site;
- ensuring adherence to the HASP throughout the project;
- ensuring that all necessary permits such as penetration/excavation permits and planning documents such as the HASP have been generated and approved;
- ensuring that readiness reviews are conducted, as required;
- maintaining required records; and
- ensuring that the appropriate safety documentation (i.e., Safety Reviews or Safety Assessment) is prepared for this project.

2.2 BECHTEL JACOBS COMPANY HEALTH AND SAFETY MANAGER

The Bechtel Jacobs Company Health and Safety Manager serves as a liaison between the installation health and safety disciplines and field operations personnel to address health and safety compliance and related issues. Responsibilities also include ensuring that appropriate logistical support is provided and providing assistance in resolving problems, as well as the following:

- review of appropriate project documents (e.g., HASP addenda, and field change orders);
- field surveillance as appropriate;
- on-site initial and/or periodic monitoring for verification of subcontractor monitoring results;
- on-site auditing for compliance with federal, state, and installation regulations, standards, and orders;

- arranging for collection and analysis of air samples for Bechtel Jacobs Company personnel or for personal exposure modeling, when required;
- reporting of exposure monitoring results to employees and project management; and
- interpretation of federal, state, and installation regulations, standards, and orders.

2.3 BECHTEL JACOBS COMPANY RADIOLOGICAL CONTROL ORGANIZATION

In accordance with the Implementation Plan for U.S. Department of Energy (DOE) Notice 5480.6, the Bechtel Jacobs Company Radiological Control Organization (RCO) will perform the following tasks:

- conduct routine and special surveys of locations and operations associated with this project to determine radiological conditions;
- verify area radiological classifications and maintain records of surveys;
- designate controlled and radiological areas and determine or enact appropriate controls;
- survey any potentially contaminated materials that leave the site;
- review and approve operating procedures, work plans, technical documents, HASP addenda, field change orders, and Radiological Work Permits (RWPs) (if required) to ensure that the radiological controls are appropriate to the operations;
- conduct on-site auditing for compliance with federal, state, and installation regulations, standards, and orders;
- provide on-site monitoring of personnel or ensure instrumentation is available for personnel to monitor themselves;
- survey and tag/label materials being moved from radiological areas, collect and analyze air samples and/or smears, and perform routine surveys to verify radiological conditions;
- provide personal dosimeters and analyze them upon return;
- report results of exposure monitoring, air sample analysis, smears, etc., to project management and individual employees, when requested;
- ensure qualified Radiological Control Technician (RCT) support is available for field work when required; and
- interpret federal, state, and installation regulations, standards, and orders concerning radiation protection.

2.4 ENTECH PROJECT MANAGER

The ENTECH Project Manager is responsible for overall project execution. The responsibilities of the ENTECH Project Manager include the following:

- coordinating with Bechtel Jacobs Company personnel during the project;
- ensuring that all changes to this project (e.g., operational, procedural, or maintenance) are reviewed for Unreviewed Safety Questions per DOE Order 5480.21, *Unreviewed Safety Questions* (USQ);
- ensuring implementation of the HASP and other project plans and permits;
- maintaining auditable project documentation of all required records;
- ensuring that a qualified Site Health and Safety Officer (SHSO) is designated; and
- maintaining a current copy of the HASP.

2.5 ENTECH FIELD MANAGER

The ENTECH Field Manager will oversee the field activities associated with this project and will be responsible for site accessibility, safety, and Quality Assurance (QA). He/She is responsible for implementing and enforcing the field requirements of this HASP. Specific responsibilities include the following:

- implementing the WP and HASP;
- coordinating on-site operations, including logistics;
- interfacing with project personnel; and
- ensuring auditable documentation of all required.

2.6 PROJECT SHSO

The SHSO is responsible for making health and safety decisions and for specific health and safety activities. The SHSO has primary responsibility for the following:

- verifying compliance with this HASP and advising the Project Manager on health and safety issues;
- stopping work and/or upgrading protective health and safety measures [e.g., personal protective equipment (PPE), respiratory protection, etc.] in the event that uncontrolled or unanticipated health and safety hazards are encountered in the field;

- reporting any incidents or deviations from anticipated conditions to the Field Team Leader, Project Manager, ER Health and Safety Manager, and where appropriate, applicable environmental, health and safety disciplines;
- ensuring that site personnel have access to this plan and are aware of its provisions;
- conducting a pre-entry health and safety briefing and appropriate follow-on briefings, as required, to address pertinent health and safety information (e.g., known or suspected hazards safety precautions, emergency actions) including the contents of this HASP;
- confirming that all on-site personnel have received the training listed in this HASP and maintaining on-site copies of current training records;
- maintaining on-site copies of Material Safety Data Sheets for applicable materials used at the site and ensuring that all chemicals are in appropriate, properly labeled containers;
- ensuring that a qualified substitute is on-site when the SHSO is absent during field operations;
- updating the HASP (through field change orders or addenda) to ensure that it adequately identifies any new tasks or hazards at the site and notifying the project personnel and Bechtel Jacobs Company organizations that approved the plan of any changes;
- ensuring that all monitoring equipment is calibrated (or calibration checked) prior to each day's use and is operating according to the manufacturer's specifications and instructions;
- maintaining, or ensuring the maintenance of, a log listing site visitors;
- verifying that all required project permits have been generated and that signed copies are available on site before field work begins;
- controlling visitor access to the site.

2.7 PROJECT PERSONNEL

Project personnel are responsible for the following:

- performing only those tasks that they believe they can do safely;
- stopping work activities for any of the following reasons:
 - inadequate health and safety controls,
 - controls not being implemented,
 - Radiological Control Hold Point not being satisfied, or
 - any imminent danger associated with the work activity;
- notifying their supervisor of any medical conditions (e.g., allergies, diabetes, or pregnancy) that require special consideration;
- reporting all symptoms of exposure to chemical and physical hazards to their supervisor the SHSO, and the Site Health Services Department;

- abiding by a buddy system so that each on-site worker is responsible for keeping track of his or her partner in the event of an incident;
- reporting to the RCT for frisking or monitoring themselves for radioactive contamination prior to exiting the control zone;
- wearing PPE and personnel monitoring devices where required by RWPs, signs, procedures, this HASP, or by RCO personnel and reporting immediately the loss, damage, or unexpected exposure of personnel monitoring devices or off-scale readings of self-reading dosimeters to their supervisor;
- maintaining radiological exposure as low as reasonably achievable;
- notifying RCO personnel and their supervisor of off-site occupational radiation exposures, any medically administered radiological exposures, and avoiding exceeding radiological Administrative Control Levels; and
- discussing health and safety concerns with their supervisor and the SHSO.

3. HAZARD ASSESSMENT

The purpose of the hazard assessment is to identify and assess potential hazards that may be encountered by site personnel conducting removal action field activities and to prescribe controls for these activities. The scheduled tasks include excavation of lead-contaminated soil, removal of the concrete trench and macadam paths, verification sampling, grading and revegetation.

The primary hazards associated with this work at Former YS-860 Firing Ranges are lead contaminated soil and physical hazards associated with equipment. Chemical and radiological hazard potential is very low. The primary contaminant is lead and no other contaminants or media have been detected on the firing range site. Table 3.1 provides a complete listing of potential hazards, Table 3.2 list the permits required for the project, Table 3.3 provides a detailed hazard analysis, and Table 3.4 provides a complete listing of potential contaminants. Material safety data sheets will be obtained for any chemical or other hazardous material brought on-site solely for these activities and each material will be included in the Hazard Communication training session for workers involved in the tasks described in this HASP. Personnel shall be informed of project hazards and the contents of this HASP prior to beginning work.

3.1 POTENTIAL CONTAMINANTS

The potential site contaminants and the hazardous chemicals to be used on site are listed in Table 3.4. If additional contaminants or hazardous chemicals, which pose a new or significant hazard, are identified prior to or during site activities, they will be addressed in Field Change Orders. Contaminants listed are based on historical data and existing characterization and monitoring data. Contaminants listed in Table 3.4 were selected based on the following criteria:

- known human carcinogen;
- radiation contamination not likely to be encountered; however as a contingency, during Waste

Acceptance Criteria sampling and excavation, periodic scanning of soil will be performed. Due to the nature of the site, RCT coverage will be required at the direction of the SHSO for delivery and exit of equipment for excavation. RWP will not be required unless radiological contamination is encountered at levels in which a permit is needed.

- known or suspected, due to operational reports or burial records, to be present in significant quantity, and having a permissible exposure limit (PEL) or a threshold limit value (TLV) of <200 parts per million (ppm) or 10 mg/m³;
- detected in previous water samples at >1 mg/L greater than background and with a PEL or TLV of <200 ppm or 10 mg/m³; or
- detected in previous soil samples at > 1000 µg/kg greater than background and with a PEL or TLV of <200 ppm or 10 mg/m³.

3.2 TASK-SPECIFIC HAZARD EVALUATIONS

3.2.1 Excavation of Soil

The primary hazards associated with the excavation of soil is the potential for exposure to or contact with lead in the soil, equipment operations, using hand tools, and material handling. Heavy powered excavating equipment will be used to remove lead contaminated soil at the Former YS-860 Firing Ranges. The unique potential hazards in the use of this equipment include operation of the equipment, potential noise exposure and working around others. Instructions and requirements of the work crew's written procedures and plans for the excavation of soil shall be followed at all times. Hearing protection may be required during equipment operation as determined by the SHSO. An approved excavation/penetration permit shall be obtained prior to beginning field activities for soil excavation. Engineering controls will be used to protect workers from emissions of dust, (i.e. close cab on equipment, windows up on trucks, ground crew stand away and upwind when loading trucks). The SHSO has the option of upgrading PPE at his direction. No excavation activities will be conducted during Health Physics survey activities. See Table 3.3 for hazards analysis information associated with this task.

3.2.2 Removal of the Concrete Trench and Macadam Paths

The primary hazards associated with the removal of the concrete trench and macadam paths is the potential for exposure to or contact with lead in the soil, equipment operations, using hand tools, and material handling. Heavy powered excavating equipment will be used to remove the concrete trench and macadam paths at the Former YS-860 Firing Ranges. The unique potential hazards in the removal of the concrete trench and the macadam paths are the operation of the equipment, potential noise exposure, dust and working around others. Instructions and requirements of the work crew's written procedures and plans for the removal of the concrete trench and macadam paths shall be followed at all times. Hearing protection may be required during equipment operation as determined by the SHSO. Engineering controls will be used to protect workers from emissions of dust, (i.e. close cab on equipment, windows up on trucks, ground crew stand away and upwind when loading trucks). The SHSO has the option of upgrading PPE at his direction. No excavation activities will be conducted during Health Physics survey activities. See Table 3.3 for hazards analysis information associated with these tasks.

3.2.3 Verification/Sampling

The primary hazards associated with visual inspection and collecting verification samples from the Former YS-860 Firing Ranges are the potential for lead exposure and physical hazards associated with sampling activities. Potential contact with chemical contamination from the soil is extremely low. See Table 3.3 for hazards analysis information associated with these tasks.

3.2.4 Grading and Revegetation

The primary hazards associated with grading, clearing, grubbing, and revegetation of the Former YS-860 Firing Ranges are equipment operations, using hand tools, and material handling. Heavy powered excavating equipment will be used to grade and fill the entire area of the Former YS-860 Firing Ranges with soils from the nontarget berms on the east and west sides of the YS-860 site. The unique potential hazards in the use of this equipment include operation of the equipment, potential noise exposure, handling of materials and working around others. Instructions and requirements of the work crew's written procedures and plans for grading and revegetation shall be followed at all times. Hearing protection may be required during equipment operation as determined by the SHSO. An approved excavation/penetration permit shall be obtained prior to beginning field activities for grading activities. Engineering controls will be used to protect workers from emissions of dust, (i.e. close cab on equipment, windows up on trucks, ground crew stand away and upwind when loading trucks). The SHSO has the option of upgrading PPE at his direction. No excavation activities will be conducted during Health Physics survey activities. See Table 3.3 for hazards analysis information associated with these tasks.

3.2.5 Equipment Cleaning

Extensive decontamination of tools and vehicles is not expected to be required. Simple washing to remove soil is anticipated. Equipment cleaning will be limited to washing soil from equipment. Decontamination of sampling equipment will be conducted using on-site cleaning equipment at a designated field decontamination area. Field equipment rinsate blanks will be analyzed for quality control as indicated. Suitable measures will be taken to contain all wash and rinse water(s) as necessary. Wastewater will be transferred from the 5-gal decontamination buckets using a designated drum funnel to a DOT - 17E drum. The wastewater container will remain in a fixed location for the duration of the project. See the Waste Management Plan (WMP) for further details of waste management.

Table 3.1. Listing of potential hazards for project tasks

PHYSICAL HAZARDS							
	Compressed gases/Cylinders	X	Ergonomics	X	Noise	X	Tripping/Falling
			Explosive/Flammables		Oxygen deficiency	X	Vibration
	Confined space	X	High pressure		Oxygen enrichment		Work in boat/above water
	Enclosed space	X	Manual lifting	X	Temperature extremes		Other:
SAFETY AND CONSTRUCTION HAZARDS							
X	Demolition		Elevated work	X	Excavation/Penetration		Trenching/Shoring
X	Drum handling		Hazardous energy sources (Lockout/Tagout)		Hoisting/Rigging	X	Underground hazards
	Electrical				Overhead hazards		Welding/Cutting/Burning
CHEMICAL HAZARDS (See also Table 3.4)							
	Asbestos	X	Lead		Mutagen		Reproductive toxin
	Carcinogen(s)		Man-made mineral fibers		OSHA-specific :		Volatile organic
	Corrosive		Mercury		Polychlorinated biphenyls (PCBs)		Other:
	Inorganics		Metals				Other:
IONIZING RADIOLOGICAL HAZARDS (See also Table 3.4)							
	Airborne		Radiation		Contamination		Other:
NON-IONIZING RADIOLOGICAL HAZARDS							
	High voltage		Laser		Ultraviolet (UV)		Other:
BIOLOGICAL/VECTOR HAZARDS							
	Bacterial		Medical wastes	X	Plants (Allergens)		Other:
X	Insects		Parasites	X	Wildlife		Other:

Table 3.2. Required permits and project documents

REQUIRED PERMITS			OTHER REQUIRED DOCUMENTS	
X	Excavation/Penetration Permit(s)		Safety Work Permit(s)	Safety Review
	Lockout/Tagout Permit(s)		Welding/Hot Work Permit(s)	Hoisting and Rigging Plan
	Permit-Access Confined Space Evaluation(s)		Other:	Unresolved Safety Question Determination (USQD)
	Radiation Work Permit (s)		None	Other:

Table 3.3. Hazards analysis for the Lead Source Removal at the Former YS-860 Firing Ranges

Safety and Health Hazards	Controls	Monitoring	Probability
	Excavation of Soil		
General hazards (e.g., trips, slips, falls, and material handling)	Minimum PPE for the task (modified Level D or as specified by the RWP): <ul style="list-style-type: none"> • work clothes, • coveralls or insulated clothing (as required), • steel-toed safety boots, • latex or disposable nitrile gloves for sample collection or work gloves (as required), • safety glasses, and • hard hat where overhead hazards are present. • visor for truck and heavy equipment cleaner • good ergonomic work practices • determination of physical hazards prior to material(s) handling 	Visual survey of terrain and other obstacles.	Low

Table 3.3 (continued)

Safety and Health Hazards	Controls	Monitoring	Probability
Heavy Equipment	<ul style="list-style-type: none"> • Licensed Operators • Trained personnel to avoid swing radius of track hoe, do not work under live loads, wear hearing protection, 20 lb. fire extinguisher on track hoe. • Flag off work area • All required permits issued • Orange vests for ground crews 	Ensure all controls are in place	Moderate
Exposure to chemicals (See Table 3.4)	<p>PPE (modified Level D or as specified by the RWP). Minimize contact. Wash hands before eating or drinking Engineering controls (i.e., close cab on equipment, windows up on trucks, ground crew stand away and upwind when loading trucks). The SHSO has the option of upgrading PPE at his direction. No excavation activities during Health Physics survey activities.</p>	Visual survey for lead fragments as appropriate.	Low
Animal/insect hazards (e.g., bees, ticks, wasps, spiders, and snakes)	<p>PPE (boots and work clothes). Insect repellent.</p>	Visual survey for presence or signs of animals/insects.	Low
Temperature extremes	Administrative controls.	Heart rate monitoring, as appropriate; WBGT measurements, as necessary.	Low to moderate
Noise	Hearing protection where noise levels \geq 85 dbA.	Sound level monitoring to establish need for hearing protection.	Moderate

Table 3.3 (continued)

Safety and Health Hazards	Controls	Monitoring	Probability
Removal of the Concrete Trench and Macadam Paths			
General hazards (e.g., trips, slips, falls, and material handling)	<p>Minimum PPE for the task (modified Level D or as specified by the RWP):</p> <ul style="list-style-type: none"> • work clothes, • coveralls or insulated clothing (as required), • steel-toed safety boots, • latex or disposable nitrile gloves for sample collection or work gloves (as required), • safety glasses, and • hard hat where overhead hazards are present. • visor for truck and heavy equipment cleaner • good ergonomic work practices • determination of physical hazards prior to material(s) handling 	Visual survey of terrain and other obstacles.	Low
Heavy Equipment	<ul style="list-style-type: none"> • Licensed Operators • Trained personnel at to avoid swing radius of track hoe, do not work under live loads, wear hearing protection, 20 lb. fire extinguisher on track hoe. • Flag off work area • All required permits issued • Orange vest for ground crew 	Ensure all controls are in place	Moderate
Exposure to chemicals See Table 3.4)	<p>PPE (modified Level D or as specified by the RWP). Minimize contact. Wash hands before eating or drinking Engineering controls (i.e., close cab on equipment, windows up on trucks, ground crew stand away and upwind when loading trucks). The SHSO has the option of upgrading PPE at his direction. No excavation activities during Health Physics survey activities.</p>	Visual survey for lead fragments as appropriate.	Low

Table 3.3 (continued)

Safety and Health Hazards	Controls	Monitoring	Probability
Animal/insect hazards (e.g., bees, ticks, wasps, spiders, and snakes)	PPE (boots and work clothes). Insect repellent.	Visual survey for presence or signs of animals/insects.	Low
Temperature extremes	Administrative controls.	Heart rate monitoring, as appropriate; WBGT measurements, as necessary.	Low to moderate
Noise	Hearing protection where noise levels \geq 85 dbA.	Sound level monitoring to establish need for hearing protection.	Moderate
Verification/Sampling			
General hazards (e.g., trips, slips, falls, and material handling)	Minimum PPE for the task (modified Level D or as specified on the RWP): <ul style="list-style-type: none"> • work clothes, • coveralls or insulated clothing (as required), • steel-toed safety boots, • latex or disposable nitrile gloves for sample collection or work gloves (as required), • safety glasses, and • hard hat where overhead hazards are present. (i.e. work around heavy equipment) 	Visual survey of terrain and other obstacles.	Low
Exposure to chemicals (See Table A-3.4)	PPE (modified Level D or as specified on the RWP). Minimize contact.	Visual survey for lead fragments as appropriate.	Low
Animal/insect hazards (e.g., bees, ticks, wasps, spiders, bats, and snakes)	PPE (boots and work clothes). Insect repellent.	Visual survey for presence or signs of animals/insects.	Low
Temperature extremes	Administrative controls.	Heart rate monitoring, as appropriate; WBGT measurements, as necessary.	Low to moderate

Table 3.3 (continued)

Safety and Health Hazards	Controls	Monitoring	Probability
Grading, Clearing, Grubbing and Revegetation			
General hazards (e.g., trips, slips, falls, and material handling)	Minimum PPE for the task (modified Level D or as specified on the RWP): <ul style="list-style-type: none"> • work clothes, • coveralls or insulated clothing (as required), • steel-toed safety boots, • latex or disposable nitrile gloves for sample collection or work gloves (as required), • safety glasses or face shield, and • hard hat where overhead hazards are present. • visor for truck and heavy equipment cleaner. 	Visual survey of terrain and other obstacles.	Low
Heavy Equipment	<ul style="list-style-type: none"> • Licensed Operators • Trained personnel at to avoid swing radius of track hoe, do not work under live loads, wear hearing protection, 20 lb. fire extinguisher on track hoe. • Flag off work area • All required permits issued • Orange vest for ground crews 	Ensure all controls are in place	Moderate
Exposure to chemicals (See Table A-3.4)	PPE (modified Level D or as specified on the RWP). Minimize contact. Engineering controls (i.e., close cab on equipment, windows up on trucks, ground crew stand away and upwind when loading trucks). The SHSO has the option of upgrading PPE at his direction. No excavation activities during Health Physics survey activities.	Visual survey for lead fragments as appropriate.	Low
Animal/insect hazards (e.g., bees, ticks, wasps, spiders, bats, and snakes)	PPE (boots and work clothes). Insect repellent.	Visual survey for presence or signs of animals/insects.	Low

Table 3.3 (continued)

Safety and Health Hazards		Controls		Monitoring		Probability
Temperature extremes		Administrative controls.		Heart rate monitoring, as appropriate; WBGT measurements, as necessary.		Low to moderate
Noise		Hearing protection where noise levels \geq 85 dbA.		Sound level monitoring to establish need for hearing protection.		Low

CFR	Code of Federal Regulations	PID	photoionization detector	RWP	Radiological Work Permit
HASP	health and safety plan	PPE	personal protective equipment	WBGT	Wet Bulb Globe Temperature

Table 3.4. Potential Chemical/Radiological Exposures

CHEMICAL ^a	TLV/PEL/Activity or DAC/IDLH ^b	Health effects/ potential hazard ^d	Chemical and physical properties ^e	Exposure route(s) ^c
Lead	PEL: 0.05 ppm TLV: 0.15 ppm IDLH: 100 ppm	Weak lassitude, insomnia, facial pallor, anorexia, low weight, malnutrition, constipation, abdominal pain, colic, anemia, gingival lead line, tremor, paralysis in wrist and ankles, encephalopathy, kidney disease, irritated eyes, hypertension; eyes, GI track, CNS, kidneys, blood, gingival tissue	Heavy ductile soft gray solid; FP: NA; IP: NA: LEL: NA	Inhalation Ingestion Contact

^aThe potential chemicals were obtained from historical data.

^bFrom the American Conference of Governmental Industrial Hygienists' 1995-1996 *Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices*, the National Institutes of Safety and Health (NIOSH) *Pocket Guide to Chemical Hazards* (June 1990), and the International Commission on Radiological Protection Publication 30.

^cFrom NIOSH *Pocket Guide to Chemical Hazards*.

CNS	central nervous system
IDLH	immediately dangerous to life and health
PCBs	polychlorinated biphenyls
VP	vapor pressure
DAC	derived air concentration
IP	ionization potential
PEL	permissible exposure limit
FP	flashpoint
LEL	lower explosive limit
TLV	threshold limit value
GI	gastrointestinal
NA	not available
UEL	upper explosive limit

3.3 GENERAL HAZARD CONTROLS

In addition to the physical and chemical hazards of the contaminants listed in Table 3.3, other types of potential hazards may be present on site. Personnel may encounter the hazards outlined in the following sections.

3.3.1 Temperature Extremes

Field activities conducted during the summer or winter pose a hazard because of temperature extremes. The physical demands placed on site personnel may be compounded by the use of protective clothing/equipment, moderate to heavy workloads, ambient air temperatures, relative humidity, and exposure to non-ionizing radiation. The pre-entry briefing will include information on control measures for temperature extremes and the signs and symptoms of temperature-related health effects.

Two important factors will help personnel function in hot environments: acclimatization and fluid consumption. Acclimatization of workers to hot environmental conditions may require up to a week. During this period especially, workers should concentrate on maintaining a balanced diet, consuming plenty of fluids (while outside contaminated areas) throughout the day, and remaining aware of signs of heat-related illness. Headaches, dizziness, high body temperature, and increased heart rate are all early warning signals of heat stress. Work will be self-paced and any employee who experiences these symptoms is encouraged to take a break to allow adequate cooling. It is imperative that the SHSO be informed if a worker experiences these signs. All activities that take place at the work site require the use of a buddy system, and as field activities continue, all personnel should be apprised of their buddy's condition with respect to heat stress.

If necessary, in the judgment of the SHSO, a work/rest regimen will be instituted to help in combating heat-related disorders. Physiologic monitoring will be conducted if ambient temperatures exceed 75°F. If physiologic monitoring is conducted, it will be conducted during rest periods to minimize the potential for chemical or radiological contamination. No employee may resume work following a break unless that employee's pulse rate is less than 100 beats/minute.

Critical factors in preventing cold-stress disorders are adequate clothing and staying dry. The SHSO will ensure that individuals who become wet are moved to a sheltered, warm area quickly, and that personnel are appropriately dressed for site conditions. The SHSO will also ensure that a warm, sheltered area is immediately available.

3.3.2 Animal Hazards and Vectors

Field conditions may present a variety of hazards associated with insects and animals such as bees, ticks, poisonous snakes, and rodents. Wildlife can cause bodily injury to site personnel or may serve as vectors that transmit diseases. To reduce contact with animal hazards, employees will avoid heavy cover whenever possible and look for snakes or animals before disturbing potential habitats. Insect repellent may be applied to the lower body to prevent tick attachment. Employees will not handle or otherwise disturb wildlife.

3.3.3 Illumination

Outside operations will begin no earlier than 15 min after sunrise and conclude no later than 15 min before sunset. Because most activities will be conducted during daylight hours, field illumination measurements will not normally be required. However, if activities require outside work to be done at night, a minimum of 5 ft-c will be required.

3.3.4 Ergonomics

Potential hazards related to the interaction of personnel with their working environment may be present at the site. The primary ergonomic hazards that may exist are lifting heavy loads, and physical obstacles associated with traversing rough ground. Personnel should always position themselves properly and lift from the legs when attempting to lift equipment. Each employee should rely on his/her buddy to assist in lifting loads that are too heavy for one person to properly lift and carry. Back strain, the most common ergonomic hazard in the field, can be easily avoided, provided the on-site workers always ask for assistance when they need it.

4. TRAINING REQUIREMENTS

4.1 GENERAL TRAINING REQUIREMENTS

Personnel who enter the site during this project are subject to the following training requirements. Training records should be available on site for review when requested. These summaries include a course description and guidance on who must take each course. Table 4.1 presents the requirements in condensed format.

DOT Certification is required for employees who transport hazardous materials on public highways. Bechtel Jacobs Company transportation should be contacted to identify the appropriate level of training required.

Lead Awareness Training is required for all employees involved with the sampling and excavation of lead-contaminated soil in accordance with the Lead Compliance Plan.

General Employee Training (GET) is required for all employees and any visitor who enters the controlled area of the Y-12 Plant to perform work for more than 10 working days per year. This training addresses general site features and hazards, alarm signals, and evacuation.

Radiological Worker II Training (Rad Worker II) is required for unescorted entry into radiological areas, however no radiological areas have been identified at the Firing Ranges. This training is designed to enable attendees to work safely within a radiologically contaminated area. It is 18 hours in duration and includes donning/doffing, frisking, and general techniques for contamination control. Certification must be kept current through the Refresher (required reading) and requalification modules.

General Hazard Communication Training is required for all site workers. This training must communicate the risks and protective measures for chemicals that employees may encounter. This requirement is met by taking GET and attending the site access briefing. This training must be refreshed as needed to maintain currency with the chemical hazards present on the job site.

The *Hazardous Waste Operations and Emergency Response (HAZWOPER) 40-h Training* course is required for routine and occasional site workers who enter an exclusion (contamination) or contamination reduction (buffer) zones or other area where level A, B, or C PPE is required. Non-workers and visitors who enter an exclusion (contamination) or contamination reduction (buffer) zones or other area where level A or B PPE must have 40-h training. Twenty-four hours of relevant field experience is required in conjunction with this training.

Table 4.1. Training requirements

Training	Worker	Supervisor	Site visitor (unescorted)	Site visitor (escorted)
DOT Training (for workers transporting hazardous materials)	✓	x	x	x
Lead Awareness	✓	✓	x	x
General Employee Training	✓	✓	✓	✓
General Hazard Communication Training (contained in GET)	✓	✓	✓	✓
40-h HAZWOPER (24-h OJT)	✓	✓	x	x
8-h HAZWOPER Refresher	✓	✓	x	x
HAZWOPER Supervisors Training (8-h)	x	✓	x	x
Hearing Conservation (for workers in a hearing conservation program)	✓	✓	x	x
Radiological Worker II (required if entering a radiological area)	x	x	x	x
Site Access Briefing	✓	✓	✓	✓
Site-Specific Hazard Communication	✓	✓	✓	✓
Safety Briefing (daily)	✓	✓	✓	✓
Respiratory Protection (required only if respirators are worn)	x	x	x	x
Respirator Issue (required for respirator issuers)	x	x	x	x
Waste Generator [selected employee(s)]	✓	x	x	x

✓ = Required

x = Not required

OJT - on-the-job training

The *HAZWOPER 8-h Annual Refresher* course is required to maintain currency in the 40-h and 24-h courses. It must be repeated annually by anyone who is required to have either of the HAZWOPER courses.

The *HAZWOPER Supervisors Training* is required for all personnel who directly supervise hands-on workers. This is an 8-h course that must be taken once. Note that the HAZWOPER 40-h course is a prerequisite.

Respiratory Protection Training is required for all individuals who wear respirators. It includes the basic procedures for proper respirator use. This training must be refreshed on an annual basis. Respirator users must also have medical clearance to wear respirators and must have passed a respirator fit test with the size and type of respirator to be used.

Respirator Issue Training is required for any individual who issues respiratory protective devices. This training includes the information in Respiratory Protection Training as well as the requirements for proper storage, issuance criteria, and use limitations.

Hearing Conservation Training is required on an annual basis by 29 CFR 1910.95 for all employees enrolled in a hearing conservation program. This will include all employees exposed to occupational noise >85 dBA on a time weighted average.

Site Access Briefing is required for all personnel entering the exclusion or contamination reduction zones. The briefing will contain information such as site hazards, hazard controls, and emergency procedures as appropriate for the work that the individual(s) receiving the briefing will be performing on-site. Signatures of those attending and a description of the briefing must be entered in the field logbook before site access will be granted. Note that at the discretion of the SHSO, casual visitors (package deliverers, observers, etc.) to the support zone will not be required to have the access briefing. The site access briefing for site entrants who will perform hands-on work will include the following site-specific information:

- names of site health and safety personnel and alternates;
- contents of the HASP;
- hazards and symptoms of contaminant exposure (chemical and radiological);
- hazards and symptoms of exposure to chemicals in the workplace (site-specific hazard communication);
- physical hazards in the workplace;
- location and availability of written hazard communication program;
- site and task PPE (including donning, doffing, proper use, etc.);
- safe work practices to minimize risks;
- safe use of engineering controls and equipment;
- medical surveillance requirements;

- site control measures;
- personnel decontamination procedures;
- emergency action plans (including emergency reporting, phone numbers, emergency exits, and assembly points);
- spill containment procedures (reporting, clean-up methods, etc.); and
- emergency equipment (fire extinguishers, spill kits, etc.).

Site-Specific Hazard Communication training is required for all personnel assigned to the project. This training is included in the site access briefing. It includes the identity of potential chemical exposures, the symptoms of exposure, and appropriate protective measures.

Safety Briefings will be held when conditions or tasks change and at least daily. These briefings will be conducted by the SHSO and/or Manager and will be attended by all site workers and supervisors. These briefings will address site-specific safety issues and will be used as an opportunity to refresh workers on specific procedures and to address new hazards and controls.

Waste Generator Training is required for personnel who are responsible for the generation and satellite storage of hazardous waste. This training addresses the legal and operational requirements for the proper storage and labeling of hazardous waste.

4.2 EMERGENCY ACTION PLAN TRAINING

Project workers will be trained in site emergency action plans, including response to incidental releases of hazardous substances that occur within the boundary of the project site. An incidental release is one that can be controlled at the time of the release by employees in the immediate release area or by maintenance personnel. Site workers will not participate in emergency response operations as defined in 29 CFR 1910.120 (a)(3). The emergency action plan for the project is Sect. 10 of this document.

4.3 SITE VISITOR TRAINING

Site visitors who enter the contamination reduction or buffer zones on an infrequent basis and have a limited potential for exposure to chemical, physical, or radiological hazards are subject to different training requirements than site workers. Escorted visitors and visitors who will not be escorted who will perform some type of hands-on work but will not wear respiratory protection are required to complete GET, Site Specific Hazard Communications, General Hazard Communication Training, the Site Access Briefing, and Daily Safety Briefing. Examples of this type of visitor may include quality control officers and health and safety personnel. Visitors who will be escorted by fully trained site workers and who will not perform any hands-on work are required to complete GET (if they will be on site at ETTP for >10 d within a calendar year) and the condensed version of the site access briefing. Examples of this type of visitor are auditors, photographers, management personnel who do not directly supervise on-site workers, technical specialists who need to gather data, etc. Site visitors who enter the support zone are subject to the training requirements for entry into the controlled area of the facility.

5. PERSONAL PROTECTIVE EQUIPMENT

The selection of PPE for tasks is based on potential site-specific physical, chemical, and radiological hazards. In cases where multiple hazards are present, a combination of protective equipment will be selected so that adequate protection is provided for each hazard. When a conflict exists with the PPE requirements, the more restrictive shall apply. For example, heavy-duty polyvinyl chloride (PVC) gloves are acceptable substitutes for leather work gloves for cut and abrasion protection; disposable coveralls are acceptable substitutes for cloth anti-C coveralls; chemical-resistant, puncture resistant, disposable gloves are acceptable substitutes for anti-C gloves; nitrile or butyl rubber boots are acceptable substitutes for anti-C shoe covers. This section emphasizes the programmatic requirements for PPE. For task-specific equipment see Sect. 3 and any task-specific work permits. Task-specific work permits take precedence over PPE selection in this HASP.

5.1 PPE SELECTION

Several general rules apply to the selection of protective clothing. The type of protection selected for a particular task is based on the following:

- potential for exposure because of work being done;
- route of exposure;
- measured or anticipated concentration in the medium of concern;
- toxicity, reactivity, or other measure of adverse effect; and
- physical hazards such as falling objects, flying projectiles, etc.

In situations where the type of chemical or radioisotope, the concentration, and the probability of contact are not known, the appropriate level of protection must be selected based on professional experience and judgment until the hazards are further evaluated. Criteria indicating a possible need for reassessment of the PPE selection include the following:

- commencement of an unplanned (hazard not previously assessed) work phase;
- working in unanticipated temperature extremes;
- encountering new hazards;
- exceeding the action limits of chemical/radiological hazards; or
- changing the work scope so that the degree of contact with contaminants changes.

5.2 LEVELS OF PROTECTION

The required levels of protection used to prevent exposure to chemical and physical hazards at this site are specified in Table 3.3 or will be identified on RWPs or SWPs. The PPE worn by the project personnel in radiological areas would at a minimum, be consistent with the installation Anti-Contamination Clothing Policy for the work area's radiological classification. Radiological areas have not been identified at the YS-860 Firing Ranges. Work activities involving wet radioactive contamination areas, contact with liquid chemical contamination, or the use of water spray for decontamination may require the use of clothing such as Saranax-coated Tyvek® or equivalent, rain suits, or rubber aprons. Anti-C coveralls cannot be worn over personal clothing for entry into High Contamination Areas or during work requiring a double set of protective clothing. Protective clothing designated for radiological control use should be yellow. Protective clothing designated for radiological control use shall not be used for non-radiological work. PPE and clothing shall not be stored with personal street clothing.

5.3 PROTECTIVE CLOTHING DORNING AND DOFFING PROCEDURES

Installation-approved donning and doffing procedures shall be followed by project personnel unless otherwise instructed by the SHSO or by RCTs.

5.4 RESPIRATORY PROTECTION

Respirator users shall be covered by a respiratory protection program that meets the requirements of 29 CFR 1910.134, *Respiratory Protection*. The following policies will be adhered to in the fitting and use of respirators:

- Facial hair such as beards, sideburns, or certain mustaches that may interfere with the respirator fit are not allowed.
- A person may use only the specific make(s) and model(s) of air-purifying respirators for which he has obtained a satisfactory fit via the quantitative fit-testing procedures.
- Each respiratory protection user will inspect the respirator and perform a qualitative face seal check (positive and negative pressure test) each time a respirator is donned.

6. MEDICAL SURVEILLANCE

The purpose of a medical surveillance program is to assess and monitor the health and physical condition of personnel working with hazardous substances or encountering health hazards at a hazardous waste site. The requirements for a medical surveillance program are specified in 29 CFR 1910.120(f). See Sect. 6 for medical monitoring requirements.

6.1 EMPLOYEES COVERED

Not all workers involved in hazardous waste operations/activities are required to participate in a hazardous waste worker medical surveillance program. Those workers meeting the criteria specified below will be required to be enrolled in a medical surveillance program:

- personnel who are exposed or potentially exposed to hazardous substances or health hazards above the PELs (or other published exposure limits in the absence of PELs) for 30 d or more a year;
- personnel working in hazardous waste operations/activities who wear respirators for 30 d or more a year;
- personnel who are injured, become ill, or develop signs or symptoms due to possible overexposure involving hazardous substances or health hazards from an emergency response or hazardous waste operation; and
- members of hazardous materials response teams.

6.2 FREQUENCY OF MEDICAL EVALUATION

All employees who are in the medical surveillance program shall receive a medical examination prior to assignment, annually, and at termination unless the attending physician believes a shorter or longer interval (not to exceed 2 years) is appropriate. Additionally, those who are suspected of being exposed to unexpected releases of hazardous waste shall receive an examination and consultation as soon as possible following the emergency incident or the development of signs or symptoms of exposure and at additional times as the examining physician determines that follow-up examinations or consultations are medically necessary.

6.3 MEDICAL EXAM CONTENT

Medical examinations shall include a medical and work history evaluation, a complete physical examination, and necessary tests, in accordance with the protocol of the medical organization providing the service. Employees shall have access to the results of the medical examination and to any necessary explanations of the tests and findings.

No blood lead monitoring will be performed unless initial air samples result lead levels of at least 30 $\mu\text{g}/\text{m}^3$.

6.4 MEDICAL SUPPORT

The Y-12 Plant Fire Department, which operates an ambulance service staffed by emergency medical technicians 24 h a day, will provide medical support. A medical staff of physicians and nurses are available during the day shift for additional support. Injured personnel will be transported to the Oak Ridge Methodist Medical Center by ambulance during evening work shifts.

7. EXPOSURE MONITORING AND AIR SAMPLING

Air monitoring of potential airborne chemical concentrations was performed during previous investigation at the YS-860 Firing Ranges. This monitoring indicated no significant airborne hazards. Due to the nature of the work only initial air monitoring will be performed. The need for additional monitoring will be based on the initial air monitoring results. If levels are at least 30 ug/m³, full air monitoring will be performed along with blood lead monitoring. No VOCs are expected in the area of operation.

The action levels for site monitoring measurements listed in Table 7.1 have been set conservatively to compensate for monitoring instrument limitations. These instruments will be calibrated in accordance with manufacturer recommendations and requirements.

Both historical site data and current well monitoring data indicate that there is limited potential for exposure or contamination of site personnel within the scope of this project. The primary potential for contamination would be from lead in the soil to be removed. Although no radiological exposure is anticipated during planned site activities, project team members should conduct radiological screening of their hands and equipment periodically.

A Y-12 Plant HP technician will periodically monitor site operations and the site equipment for radiological contamination. If the HP technician determines the area requires radiological posting, work will cease until the area is appropriately posted or decontaminated. If required, the level of PPE will be upgraded by the SHSO and the HP technician. If a radiological area is established, all workers entering the area will be required to have completed Radiological Worker II training. The following types of routine monitoring will be required.

- All equipment and materials will be monitored for radiological contamination before entering the site.
- Periodic screening for radiological contamination.
- Persons entering known or suspected contaminated areas will monitor or be monitored for contamination prior to exiting those areas.
- All personnel entering the site will participate in the installation's Dosimetry Program. Thermoluminescent dosimeters shall be worn at all times while on-site.
- All equipment and materials will be monitored for radiological contamination before being removed from radiological contamination areas.
- The following types of monitoring will be performed by the SHSO during this project:
- Visual monitoring for potential exposure to lead.
- Potential high noise areas will be surveyed to determine sound levels using a Type 2 sound level meter on the dBA scale.
- Heat stress and cold will be determined by contacting the IH to request WBGT readings.

Calibration and maintenance of all sampling and survey equipment shall be in accordance with manufacturer's guidelines, following written procedures, where available.

Table 7.1. Site monitoring action limits

Hazard or measured parameter	Area	Interval	Limit	Action	Tasks
Beta/Gamma radiation (Beta/Gamma survey and whole body dosimetry)	Area other than posted radiation area	Continuous dosimetry; surveys prior to site work, and at appropriate intervals	2 × ambient background	Notify RCO area supervisor	Applicable to all tasks
Personnel radiological contamination	Area other than posted contamination area	As determined by RCT	Detectable above background	Notify RCO area supervisor; monitor all personnel; survey area for surface radioactivity	Applicable to all tasks
Surface radiological contamination	Area other than posted contamination area	As determined by RCT	As determined by RCT	Stop work; monitor personnel; notify RCO area supervisor; do not re-enter until authorized by RCO	Applicable to all tasks
Noise	In suspected high noise areas	Initially for each noisy task	>85 dBA	Post as high noise area Require hearing protection	Any task that appears noisy
Lead	In suspected high airborne lead areas	Initially for WAC sampling and excavation activities	>30 ug/m ³	Proper breathing protection as specified in the Lead Compliance Plan and blood lead monitoring	WAC sampling and excavation activities

DAC derived air concentration
 ER Environmental Restoration
 IH Industrial Hygiene
 LAW large area wipe

LEL lower explosive limit
 RCO Office of Radiation Protection
 RCT Radiological Control Technician
 RPP Radiation Protection Procedure

TBD to be determined

8. SITE CONTROL

Site control zones will be established, as necessary, around areas that present physical, chemical, and/or radiological hazards. The SHSO will consult with the RCT prior to establishing work zones when radioactive material/contamination is involved. The SHSO will monitor the implementation of the required site control work rules and will report any deviations from the prescribed practices to the Project Manager or stop work, as appropriate.

The work area of operations for this project will be controlled to prevent unauthorized entry. "HAZWOPER" signs will be erected to warn unauthorized personnel that access to the work site is limited. The following sections describe the situations that will require the establishment of site control zones. For a map of the site, see the associated WP.

8.1 EXCLUSION ZONE

The exclusion zone is the area where the greatest potential exists for exposure to site chemical, radiological, and physical hazards. Exclusion zones will be established by each field crew around the well(s), areas of heavy equipment use, all activities where chemical/radiological contamination is a potential hazard support vehicle(s), and the equipment cleaning area. Traffic cones may be used to designate the work zones in areas where there is limited potential for entry by unauthorized persons. Formal barricaded work zones will be established when required to prohibit non-project personnel from entering the area. Traffic cones will be placed around parked vehicles on roadways if field operations may obstruct the road. An entry and exit checkpoint will be visually defined to identify the area as a HAZWOPER site and to regulate the flow of personnel and equipment. Additional signs may include "High Noise Area," as appropriate. The number of people and equipment will be minimized to control physical hazards and the spread of contamination.

The following standard rules will apply to all entries into the work area:

- All personnel will wear the prescribed level of protective clothing.
- All items and related paraphernalia intended to be placed on the face or in the mouth (e.g., cigarettes, lighters, matches, chewing tobacco, food, or cosmetics.) are prohibited.
- All personnel will follow the buddy system.

8.2 CONTAMINATION REDUCTION ZONE

A contamination reduction zone will be established, as necessary, outside the exclusion zone to provide a transition from and a buffer between the contamination area and the clean area. An entry and exit checkpoint will be visually defined at the periphery of the zone to regulate the flow of personnel and equipment. The entry and exit checkpoint and the perimeter of the zone will be delineated with the use of cones, ropes or barricade tape and signs.

8.3 SUPPORT ZONE (CLEAN AREA)

The clean area (or support zone) is the area surrounding exclusion and contamination reduction zones. Entry requirements for the clean area consist of those required for entry into the general area of ETPP. Primary functions of the clean area are a staging area for clean equipment and supplies and a location for support services (e.g., office trailers, laboratory trailers, eating area, toilet facilities, parking, and visitor area).

8.4 SITE VISITORS

Visitors to the site shall abide by the following rules:

- Visitors must have approval from the SHSO to enter the project area and must receive an access briefing prior to entry.
- The names of visitors will be entered in a site access logbook.
- Visitors shall be instructed to stay outside active work areas and remain within the clean area during the extent of their stay, unless entry has been approved by the SHSO.
- Visitors requesting to enter hazardous areas must wear all appropriate PPE for entry and abide by the appropriate work rules. If respiratory protection equipment is necessary, visitors must produce evidence that they have medical approval for respirator use, had respirator training, and been fit tested for the type and size respirator to be used within the past 12 months. See Sect. 4 for visitor training requirements.

9. DECONTAMINATION

9.1 PERSONNEL DECONTAMINATION

The potential for personnel contamination is very low for this project. Should radioactive contamination be detected on an individual, the SHSO or the individual contaminated will contact HP immediately. Health Physics (HP) personnel will supervise and assist in decontaminating the individual in accordance with Y-12 Plant HP procedures.

9.2 EQUIPMENT DECONTAMINATION

Decontamination of tools, heavy equipment, and vehicles is not expected to be required. Simple washing to remove soil is anticipated. If decontamination becomes necessary, suitable measures will be taken to contain all wash and rinse water, such as with the wash and rinse buckets located in baby pools in the decontamination area(s). Wastewater will be transferred from the 5-gal decontamination buckets using a designated drum funnel to a DOT 17E drum. The wastewater container will remain in a fixed location for the duration of the project. See Appendix C of the RmAWP for further details of the Waste Management Plan. Any loose soil on the sides of the trucks and heavy equipment will be removed prior to exiting the site. A spill kit will be on site at all times.

Sampling equipment decontamination will be performed following ESP-801 (formerly ESP-900) procedures for stainless steel or metal sampling equipment with the exceptions indicated below. The cleaning will be performed in the field at a lined temporary decontamination pad erected at the site. Cleaning solutions used during equipment decontamination, with the exception of the solvent rinsate, will be disposed on site. The solvent rinsate will be collected and containerized for offsite disposal.

The revised cleaning procedure will consist of the following steps:

1. Thoroughly scrub and wash the equipment in a solution of potable water and an environmentally benign laboratory detergent (e.g., Liquinox).
2. Rinse the equipment with potable water.
3. Rinse the equipment with deionized water.
4. Rinse the equipment with laboratory grade isopropyl alcohol
5. Allow to air dry for as long as practical (a minimum of 15 minutes).
6. If the equipment is to be stored for more than 24 hours before use, it will be wrapped in foil or clean plastic.

10. EMERGENCY RESPONSE/ACTION PLAN

In the event of an emergency, all site personnel shall follow the requirements and provisions of the *Oak Ridge Y-12 Plant Emergency Plan*. Emergency response shall be provided by the Y-12 Plant emergency response organization. The SHSO will be in charge of personnel accountability during emergency activities. All personnel working on site will be trained to recognize and report emergencies to the SHSO or Field Team Leader. The SHSO or Field Team Leader will be responsible to notify the Y-12 Plant emergency response organization. This section serves as an emergency action plan for the project.

The Y-12 Plant emergency response organization and ES&H Supervisor will be contacted for emergency response to all fires, personnel injuries, chemical spills that cannot be controlled by the on-site personnel, or other significant emergencies. The PSS coordinates 24-h emergency response coverage from the Plant Protection and Shift Operations Division. The PSS is assisted by a well-trained plant emergency squad and is the overall coordinator responsible for directing the response to emergencies.

The emergency action plan will be reviewed periodically. The requirements of this section will be communicated to site workers. Any new hazards or changes in the plan will also be communicated to site workers.

10.1 POTENTIAL EMERGENCIES

Potential emergencies for this project include fires, chemical spills, and personnel injury. A local emergency manual which contains explicit instructions and information about required emergency

actions and procedures is located near the entrances of each Y-12 Plant facility. If the emergency situation is classified as an occurrence, the PSS will assist project personnel in developing the occurrence report.

10.1.1 Fires

In the event of a fire, the PSS is to be notified immediately. If it is safe to do so and they are properly trained, on-site personnel will attempt to extinguish the fire with the available fire extinguishers and isolate any nearby flammable materials. If there is any doubt about the safety of extinguishing the fire, site personnel will evacuate. The supervisor or knowledgeable employee will provide the fire department with relevant information.

10.1.2 Spills

In the event of a spill or leak, the employee making the discovery will immediately notify his/her supervisor. The supervisor will determine whether the leak is an incidental spill or whether an emergency response is required. An emergency response is defined in 29 CFR 1910.120 (a)(3) as a response effort by employees from outside the immediate release area or by other designated responders. Responses to incidental releases of hazardous substances where the substance can be absorbed, neutralized, or otherwise controlled at the time of release by employees in the immediate release area, or by maintenance personnel are not considered to be emergency response operations. Incidental releases will be contained and cleaned up by personnel in the area. Instruction will be provided in the cleanup of spills, including the use of spill kits for non-emergency spills. Spill kits will include absorbent socks and granules.

If there is a probability that the spill will extend beyond the immediate area, result in an environmental insult, or exceed the capabilities of the on-site personnel, the supervisor is to inform the PSS, who will determine whether a response by the Y-12 Plant Spill Response Team is warranted in accordance with the criteria in the *Y-12 Plant Emergency Plan*. If emergency response crews are mobilized, the supervisor or knowledgeable employee will provide the responders with relevant information.

10.1.3 Medical Emergencies

In the event of a medical emergency, the PSS is to be notified immediately. The Y-12 Plant emergency medical staff will serve as the designated first aid provider. Any event that results in potential employee exposure to bloodborne pathogens will require a post-exposure evaluation and follow up as required by 29 CFR 1910.1030. The supervisor will be notified as soon as practical after notifying the PSS. A person knowledgeable of the location and nature of the injury will meet the emergency response personnel to guide them to the injured person. Personnel with minor injuries will follow full decontamination procedures. Contaminated injured personnel will be decontaminated to the extent feasible. Personnel with serious injuries will be decontaminated by disrobing and wrapping the individual in a blanket or per the medical staff instructions. Decontamination may be by-passed in the event of life-threatening injuries or illnesses.

10.2 EMERGENCY PHONE NUMBERS

Listed in the following table are emergency groups and their telephone numbers. A cellular phone may be present in the field and available for use when workers are not in close proximity to

a plant phone or radio. *If an emergency occurs, contact the PSS first. The PSS is the trained site emergency response director. Note that 911 will not access the PSS from a cellular phone.*

Table 10.1. Emergency phone numbers

PLANT SHIFT SUPERVISOR		
Plant Phone: (Site telephone number)		911
Cellular Telephone Number:		574-7172
Environmental Management		574-8222
Security		574-7272
RCO		574-3547
IH		574-8847
Medical		576-5841
Public Relations		576-0437
Safety		574-8398
Safety & Health Organization		574-8395
ES&H	E. Kelley	241-1271
UEFPCP	M. Allen	241-1245

10.3 REPORTING AN EMERGENCY

Site personnel will be able to communicate by either a two-way hand-held radios (walkie-talkie), cellular telephone, or hard-wired phone at one of the near-by building on site.

10.3.1 Telephone

- If a plant telephone is accessible, dial 911. With a cellular phone, dial 574-7172.
- Identify the type and location of the emergency.
- Identify who is calling.
- Identify the number on the phone being used.
- *Tell whether an ambulance is needed.*
- Listen to and follow any instructions that are given.
- Do not hang up until *after* the Emergency Operations Center has hung up.

10.3.2 Fire Alarm Pull Boxes

Pulling a fire alarm box automatically transmits the location of the emergency to the Fire Department and the Emergency Operations Center. The person pulling the alarm should remain at the alarm box and supply any needed information to the emergency responders. Note that there are no pull boxes in the project area.

10.3.3 Radio

The PSS is alerted of the emergency.

- Report the type and location of the emergency.
- Identify who is calling.
- *Tell whether an ambulance is needed.*
- Listen to and follow any instructions.

10.4 ALARM SIGNALS

10.4.1 Evacuation Alarms

Facility evacuation alarms are denoted by a steady or continuous sound from the site public address system. Proceed to the predetermined assembly station as described in the *Y-12 Site Emergency Plan*. Further instructions will be provided by the assembly station director.

10.4.2 Radiation Alarms

Radiation alarms are denoted by a steady sound from a clarion horn and rotating red beacon lights. Evacuate the site or area and proceed to the predetermined assembly stations described in the *Y-12 Site Emergency Plan*. Further instruction will be given by the assembly station director.

10.4.3 Take-cover Alarms

Take-cover alarms are denoted by the intermittent or wailing siren sound from the site public address system. Seek immediate protective cover in a strong sheltered part of a building. Evacuate mobile structures to a permanent building.

10.4.4 Standard Alerting Tone

The standard alerting tone is a high/low tone from the site public address system. Listen carefully; an emergency announcement will follow.

10.5 EVACUATION PROCEDURES

- The SHSO or Field Team Leader will designate the evacuation routes.
- Familiarize yourself with the evacuation routes that are designated by the SHSO or Field Team Leader.
- In the event of an evacuation, proceed to the predetermined assembly station or other designated area and wait for further instructions.
- The SHSO or Field Manager and crew will follow instructions given by the assembly station director and/or the Emergency Response Team upon its arrival.

10.6 ON-SITE SHELTERING IN PLACE

Certain emergency conditions (i.e., chemical or radioactive material release, tornado warning, fire, security threat, etc.) may require that on-site personnel be sheltered in place. Notification of a recommendation of sheltering in place is carried out by the Y-12 Site Emergency Director on the emergency public address system. The shelter location for the project team will be the nearest building designated by the PSS. Sheltering in place calls for employees to:

- go indoors immediately (permanent building, not "mobile type" structure);
- close all windows and doors;
- turn off all sources of outdoor air (e.g., fans or air conditioners);
- shut down equipment and processes, as necessary, for safety; and
- remain indoors and listen for additional information on the public address system.

10.7 ON-SITE RELOCATION

Certain emergency conditions (i.e., chemical or radioactive material release, tornado warning, fire, or security threat.) may require that on-site personnel be relocated from their normal work stations and activities to locations more suitable to withstand the threat. Notification of on-site relocation is carried out by the Y-12 Site Emergency Director on the emergency public address system. Specific instructions on where to relocate will be given with the message to relocate.

10.8 ON-SITE FACILITY EVACUATION

Notification of on-site facility evacuation is initiated by the Y-12 Site Emergency Director over the site public address system. Assembly stations serve as gathering points for evacuated personnel. These stations are identified by an orange, disk-shaped sign with the assembly station number in black. Y-12 Site is separated into areas with one assembly station serving each area. In the event of an evacuation alarm, employees will evacuate to the nearest Assembly Station and immediately report to their supervisor or the assembly station director. The assembly station director will be identified by an orange vest. An accounting will be conducted of all personnel who have evacuated. The assembly station has a ring-down telephone to the PSS office and a local public address system. Further instructions and information about the emergency situation will be given to employees by the assembly station director or over the site public address system.

10.9 EMERGENCY EQUIPMENT

Several items of emergency equipment will be maintained at the work site. These include:

- 15-min capacity emergency eyewash;
- hard-wired or cellular telephone and/or radios;
- fire extinguisher(s); and
- basic spill kit (absorbent socks and granules) suitable to handle small spills of hydraulic fluid or fuels.

11. REFERENCES

10 CFR 835, Occupational Radiation Protection

49 CFR, Transportation

29 CFR 1904, Recording and Reporting Occupational Injuries and Illnesses

DOE (U.S. Department of Energy) Order 225.1, Attachment 1, Dated 9-29-95, Contractor Requirements Document, Accident Investigations

DOE (U.S. Department of Energy) Order 231.1, Attachment 1, Dated 9-30-95, Contractor Requirements Document, Environment, Safety and Health Reporting

DOE (U.S. Department of Energy) Order 232.1, Attachment 1, Dated 9-25-95 Contractor Requirements Document, Occurrence Reporting and Processing of Operations Information

DOE (U.S. Department of Energy) Order 440.1, Attachment 2, Dated 9-30-95 Contractor Requirements Document, Worker Protection Management for DOE Contractor Employees (Except paragraphs 12.b, 12.c, 12.d, 12.f, and 15)

DOE (U.S. Department of Energy), 1993. Annotated Outlines for Documents Required by FFA and Energy Systems (Martin Marietta Energy Systems, Inc.) 1990. *Management Plan for the Oak Ridge Operations Environmental Restoration Program*, DOE/ORO-931, Oak Ridge, Tennessee, December.

NIOSH (National Institute for Occupational Safety and Health) 1990. *Pocket Guide to Chemical Hazards*, U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, June.

ACGIH (American Conference of Governmental Industrial Hygienists), 1995. *1995-1996 Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices*.

APPENDIX A
LEAD COMPLIANCE PLAN

A. Method of Compliance

This plan was prepared in accordance with the requirements under Title 29 Part 1926.62 of the Code of Federal Regulations (CFR). The following procedures will be utilized to comply with this code.

1. ENTECH shall make determination on employee exposure to lead based on information, observations, and calculations indicating employee exposure to lead, any previous measurements of airborne lead, or any employee complaints of symptoms attributable to exposure to lead. Initial monitoring shall occur during the first full shift for both the WAC sampling and the excavation activities. Properly calibrated personal air pumps will be placed on the employees most likely to be exposed during the WAC sampling and excavation activities (i.e., operator, one ground crew, truck cleaner, as appropriate). Additionally, during the excavation activities, two additional air monitors will be placed up and down wind of the excavation activities. If lead levels of at least 30 ug/m³ are detected, daily monitoring for each craft along with perimeter monitor, PPE as stated in Table C-1 of this Appendix, and medical surveillance requirements as stated in Section D will be enacted at the site.
2. AT NO TIME will employees eat food, drink beverages, smoke or chew tobacco, store food, or apply cosmetics in lead abatement areas. Designated clean areas or facilities for these activities will be provided or designated by ENTECH. All employees are required to wash face and hands at toilet facilities near work site.
3. To reduce and maintain employee exposure to lead below the PEL, (Personal Exposure Limit) ENTECH shall implement administrative and engineering controls such as lead paint containment with a plastic liner as described in Section B of this Plan.
4. ENTECH shall assure that no employee is exposed to lead at concentrations of thirty micrograms per cubic meter of air averaged over an eight hour period. If an employee is exposed to lead for more than eight hours in any workday, the employee's time weighted average (TWA) for that day shall be reduced according to the following formula:
 - (a) Allowable employee exposure (ug/m³)=400/hours worked that day
5. ENTECH shall collect a personnel sample representative of a full shift for each job classification in each potentially affected work area for each shift during removal and disposal of paint on beams. ENTECH employees will be informed in writing of their exposure results within 5 days of ENTECH receiving the results.
6. ENTECH shall provide frequent and regular inspections of the job site, material, and equipment by Competent Person.
7. This Compliance Program shall be updated and revised every six months.
8. ENTECH shall implement a Rotation Schedule documenting the name, social security number, duration of exposure, exposure level for each eight hour shift as an administrative control.

B. Description of Activities Involving Possible Lead Exposure

1. The scope of the project involves the collection of representative composite samples of the removal waste stream for determining hazardous waste content to satisfy waste acceptance criteria and removal of lead bullets and lead contaminated soil from the end berms of the two small arms firing ranges at the YS-860 Firing Ranges site, restoration of the site by demolition of an existing concrete trench and asphalt pathways, and regrading and revegetation of the area. To ensure the completeness and effectiveness of the removal action, verification sampling of the remaining berm areas following soil removal and confirmatory sampling of the site following regrading will be performed.

C. Personal Protective Equipment

1. If needed, ENTECH shall provide respirators with HEPA filters, company clothes, and gloves. An ENTECH employee may request a respirator at any time.
2. If needed, ENTECH will provide respirator and protective clothing according to the following table C-1:

Table C-1

Concentration	<500 ug/m ³	<1,250 ug/m ³	<2,500 ug/m ³	<50,000 ug/m ³	<100,000 ug/m ³	>100,000 ug/m ³
PPE	½ mask with HEPA filters, company clothes, gloves	helmet powered air purifying system with HEPA filters, company clothes, gloves	full face air purifying system with HEPA filters, company clothes, gloves	½ mask positive pressure respirator, company clothes, gloves	full face positive pressure respirator, company clothes, gloves	full face pressure demand SCBA, company clothes, gloves

3. ENTECH shall produce documentation of fit tests for all employees prior to start of work that may have possible exposure to lead and at least every six months.
4. Employees shall change filter cartridges whenever an increase in breathing resistance is detected.
5. If needed, ENTECH shall provide clean and dry protective clothing to employees.

D. Medical Surveillance Program

1. ENTECH will require each employee to have a blood lead baseline analysis prior to start of lead work. ENTECH shall maintain an accurate record of each employee subject to medical surveillance. Records are to include:
 - (a) Name, social security number, and description of duties.
 - (b) Copy of physician's written opinions

- (c) Results of airborne exposure monitoring done for the employee and provided to physician.
 - (d) Any employee medical complaints related to exposure to lead.
 - (e) Copy of employee medical exam results.
2. ENTECH shall make available medical surveillance to employees occupationally exposed on any day to lead at or above the action level. All medical examinations and procedures shall be performed under the supervision of a licensed physician.
3. Biological monitoring involving blood lead and ZPP level sampling and analysis within a 95 % confidence level will be performed at least every two months for the first six months and every six months thereafter. Any employee whose blood lead level is 40 ug/dl or above shall undergo blood lead analysis at least every two months until the blood lead level falls below 40 ug/dl for two consecutive months. Any employee whose blood lead level exceeds 40 ug/dl will undergo temporary medical removal from the work site. Employees who are removed from exposure to lead due to an elevated blood lead level, must undergo blood lead analysis at least monthly during the removal period. Whenever an employee's blood lead level test results require medical removal, a second blood level test must be conducted within two weeks after ENTECH receives the results from the first blood level test.
4. ENTECH shall notify the employee in writing of his/her blood lead level within 5 working days after the receipt of the monitoring results. ENTECH shall make available medical examinations and consultations to each employee:
- (a) At least annually for each employee who received a blood sampling test results of 40 ug/dl or greater at any time during the preceding 12 months.
 - (b) As soon as possible, upon notification by an employee of signs or symptoms of lead intoxication or difficulty in breathing during a respirator fit test.
 - (c) As medically appropriate for each employee removed from exposure to lead pursuant to final medical determination.
5. Medical exams for determination of blood lead level shall include:
- (a) Detailed work and medical history.
 - (b) Thorough medical examination.
 - (c) Blood pressure measurement.
 - (d) Blood sample and analysis determining:
 - 1. Blood lead level
 - 2. Hemoglobin and hematocrit determinations

3. Zinc protoporphyrin
 4. Blood urea nitrogen
 5. Serum creatinine
 6. Urinalysis with microscopic examination
6. ENTECH will notify employees of their right to request, within 15 days of receipt of opinion from initial medical physician, a second physician to review findings of the initial medical examination.
 7. ENTECH shall remove an employee from work having exposure to lead at or above the action level on each occasion that a periodic follow-up blood sampling test determines personnel exposure.
 8. ENTECH shall return an employee to his or her former job status when employee's blood lead level falls below 50 ug/dl on two consecutive tests.

E. Employee Information and Training

1. ENTECH shall communicate information concerning lead hazards to include warning signs and labels, MSDSs, and employee training. The employee Lead Training Program provides initial training prior to start of work. This program is provided at least annually to employees who have potential lead exposure at or above the action level. The Program shall consist of a pre-work training session informing employees of :
 - (a) The specific nature of operations which could result in exposure to lead above the action level.
 - (b) The purpose, proper selection, fitting, use and limitations of respirators
 - (c) The purpose and description of the corporate Medical Surveillance Program.
 - (d) Using engineering controls and good work practices.
 - (e) The possible adverse health effects associated with excessive exposure to lead.

F. Signs

1. ENTECH shall post the following warning sign in each work area where an employee has the potential of exposure to lead above the PEL.

**WARNING
CONSTRUCTION AREA
LEAD WORK AREA
POISON
NO SMOKING OR EATING**

G. Exposure Assessments and Record Keeping

1. ENTECH shall establish and maintain an accurate record of all monitoring and other data used in conducting employee exposure assessments. These records shall include:
 - (a) Date(s), duration, number, location, of each sample taken, if any, along with the sampling procedure.
 - (b) Type of respiratory protective devices worn.
 - (c) Name, social security number, and job classification of employee monitored

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