1 of 1

Martin Marietta Energy Systems Environmental Restoration Program
ORNL Environmental Restoration Program

**Health and Safety Plan for the Remedial Investigation
and Site Investigation of Waste Area Grouping 2
at the Oak Ridge National Laboratory,
Oak Ridge, Tennessee**

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**Environmental Safety and Health Plan for the Remedial Investigation
and Site Investigation of Waste Area Grouping 2
at the Oak Ridge National Laboratory,
Oak Ridge, Tennessee**

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ACRONYMS

ACGIH	American Conference of Governmental Industrial Hygienists
DOE	Department of Energy
ER	Environmental Restoration
ES&H	Environmental, Safety, and Health
ESD	Environmental Sciences Division
FID	flame ionization detector
FSC	Field Sampling Coordinator
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
HP	Health Physics
HPC	HAZWOPER Program Coordinator
IH	Industrial Hygiene
ORNL	Oak Ridge National Laboratory
OSHA	Occupational Safety and Health Administration
PA	public address
PEL	permissible exposure limit
PID	photoionization detector
PM	Project Manager
PPE	personal protective equipment
QA	Quality Assurance
QAC	QA Coordinator
QC	quality control
RCO	Radiation Control Officer
RI	Remedial Investigation
SARA	Superfund Amendments and Reauthorization Act
SSHO	Site Safety and Health Officer
STL	Sampling Team Leader
TLV	threshold limit value
WAG	Waste Area Grouping
WAG 2 RI&SI	WAG 2 Remedial Investigation/Feasibility Study and Site Investigations Program
WBC	whole body count
WBGT	wet-bulb globe temperature
WOC	White Oak Creek
WP/HSC	Work Plan/Health and Safety Checklist

1. INTRODUCTION

This health and safety plan (HASP) was developed by the members of the Measurement Applications and Development Group of the Health Science Research Division at the Oak Ridge National Laboratory (ORNL). This plan was prepared to ensure that health and safety related items for the Waste Area Grouping (WAG) 2 Remedial Investigation (RI)/Feasibility Study and Site Investigation projects conform with the requirements of 29 CFR 1910.120 (April 18, 1992). The RI Plan calls for the characterization, monitoring, risk assessment, and identification of remedial needs and alternatives that have been structured and staged with short-term and long-term objectives. In early FY 1992, the WAG 2 RI was integrated with the ORNL Environmental Restoration (ER) Site Investigations program in order to achieve the complimentary objectives of the projects more effectively by providing an integrated basis of support. The combined effort was named the WAG 2 Remedial Investigation and Site Investigations Program (WAG 2 RI&SI). The Site Investigation activities are a series of monitoring efforts and directed investigations that support other ER activities by providing information about (1) watershed hydrogeology; (2) contaminants, pathways, and fluxes for groundwater at ORNL; (3) shallow subsurface areas that can act as secondary sources of contaminants; and (4) biological populations and contaminants in biota, in addition to other support and coordination activities.

The White Oak Creek (WOC) system (WAG 2) is a contaminated *natural system* that links discharges and releases from ORNL and other contaminant source areas with off-site areas. The WOC system consists of WOC, its tributaries, White Oak Lake, and the WOC Embayment on the Clinch River. It is the primary surface drainage for ORNL on the Department of Energy's (DOE's) Oak Ridge Reservation. Although this project is referred to as WAG 2 RI&SI, some work sites will be located outside the boundary of WAG 2 proper. All contaminants for these sites/areas will be considered possible contaminants for the WAG 2 RI&SI sites.

This document serves as a *general* HASP for the WAG 2 RI&SI projects. *It is not intended to function as a stand-alone document.* Title 29 CFR 1910.120 requires that each separate and independent job site have its own site-specific work plan/health and safety checklist (WP/HSC). Specific contaminants, hazards, and requirements must be addressed for each WAG 2 RI&SI site on a site-by-site or task-by-task basis. Therefore, *a site-specific WP/HSC must be completed for each WAG 2 RI&SI task work site*; each checklist will identify contaminants and hazards on a site-specific basis. *Together, this general HASP and the completed site-specific WP/HSC for a given specific task or site comprise the site-specific HASP for that task and/or site*, which will be kept on site and distributed to field personnel as required. This HASP along with the site-specific WP/HSC will conform to 29 CFR 1910.120, as defined by the final rule of March 1989 and supplement to the final rule, April 18, 1991, and will conform to the DOE Radiation Contamination Manual and the ORNL Hazardous Waste Operations and Emergency Response (HAZWOPER) Program Manual.

An example of the site-specific checklist to be used is included in the HASP as Appendix A. A separate checklist addressing site- or task-specific health and safety hazards will be completed for each WAG 2 RI&SI project. Each site- or task-specific checklist shall

go through the proper review, approval, and sign-off process before any WAG 2 RI&SI activities are initiated for that task or at that site.

Field changes to the WP/HSC specifications will be documented in accordance with ER procedure ER/C-P1719, "Controlling and Documenting Field Work Changes to Approved Sampling Plans," using the "ER Field Change Control Log" and "ER Field Change Order," forms, examples of which are included in Appendix B. When work is being conducted in an area outside of WAG 2 that has its own HASP, the WAG 2 RI&SI personnel will be required to adhere to all the guidelines and recommendations in that area's HASP.

Major components of this plan and the accompanying site-specific checklist include but are not limited to: (1) the names, telephone numbers, and responsibilities of key individuals in project health and safety-related positions; (2) a table or list identifying safety and health risks or hazard analysis for each site task; (3) personnel protection specifications; (4) mandatory safety and training requirements for each specific site; (5) medical surveillance requirements; (6) frequency and types of monitoring required (personal and environmental) and the instrumentation to be used; (7) site control measures; (8) decontamination procedures; and (9) emergency information for contingencies that may arise during any phase of field activities.

2. PROJECT ORGANIZATION

This section describes the health and safety roles and responsibilities of project personnel. A table of key site-specific health and safety personnel for the specific WAG 2 RI&SI project, their affiliations, and their telephone numbers must be completed and included for review as part of the site-specific WP/HSC. Backups for key project personnel should be listed where appropriate. The Sampling Team Leader (STL) or Site Safety and Health Officer (SSHO) may designate qualified and previously-approved alternates who are not identified in the site-specific WP/HSC to conduct their respective duties in the field; any such designation will be documented in the field logbook, and the HAZWOPER Program Coordinator (HPC) must be notified. Ultimately, the responsibility for health and safety of project personnel lies with each individual.

General responsibilities of all WAG 2 RI&SI staff include:

- adhering to proper health and safety practices;
- safeguarding record materials including, but not limited to, field logbooks, raw data sheets, and chain-of-custody forms;
- maintaining complete, factual, detailed, and objective program notes;
- retaining records of all analyses and procedures used for the WAG 2 RI&SI projects;
- ensuring that proper waste management procedures are followed; and
- ensuring that the requirements of the Sampling and Analysis Plan,¹ Quality Assurance (QA) Plan,² HASP, and site-specific WP/HSC are satisfied, as well as applicable data management requirements.

2.1 PROJECT MANAGER

The Project Manager (PM) oversees all efforts of the WAG 2 RI&SI projects and provides guidance to project personnel. Responsibilities of the PM include:

- managing the WAG 2 RI&SI projects and overseeing the technical and programmatic activities of the health and safety program;
- assigning sufficient resources to maintain and implement the health and safety program; and
- ensuring that adequate health and safety systems (policies, plans, procedures, materials, etc.) are in place and operational.

2.2 SAMPLING TEAM LEADER

The STL is responsible for oversight of the each individual site-specific WAG 2 RI&SI project. The STL will be responsible for site accessibility, safety, QA, and waste management and may delegate further responsibilities to other team members. Specific responsibilities of the STL include:

- coordinating site operations, including logistics;
- interfacing with plant and project personnel;
- assisting the SSHO when necessary;
- ensuring that all quality-related activities are conducted in accordance with the group or division's QA procedures and the WAG 2 RI Plan;³
- notifying appropriate personnel of work schedules;
- maintaining and controlling all site records;
- determining appropriate variations in field procedures in response to site conditions;
- documenting and reporting unforeseen changes in field conditions and the respective corrective actions;
- establishing engineering controls to protect against environmental insults;
- coordinating waste disposal following procedures established by the *Guidance Document for the Preparation of Waste Management Plans for the Environmental Restoration Program at Oak Ridge National Laboratory*;⁴ and
- establishing a liaison with the Laboratory Shift Superintendent's organization to facilitate emergency response.

2.3 SITE SAFETY AND HEALTH OFFICER

The WAG 2 RI&SI projects will designate a qualified SSHO and alternates, who will implement, monitor, and enforce the HASP and site-specific WP/HSC. The SSHO and alternates must be approved by the HPC and all criteria for approval of WAG 2 RI&SI SSHOs shall be sent to the ORNL ER Environmental, Safety, and Health (ES&H) Manager for review only. The SSHO, with the support of the STL, has the following primary responsibilities:

1. Prior to initiation of site activities, the SSHO will conduct a pre-entry briefing to ensure that personnel receive a copy of the site-specific and are aware of its provisions; are instructed on how the work will be accomplished and how to ensure workers' safety;

are familiar with potential hazards, routes of entry, and health effects that could be hazardous during this project; and are familiar with planned emergency procedures.

2. The SSHO will ensure that all prospective site personnel sign and date a statement in a site-specific field logbook, or an attendance sheet (which must be maintained with project files), to verify that item 1 was completed.
3. The SSHO will notify the HPC (see Sect. 2.7) of ORNL employees and subcontractors who may be participating in site activities. The SSHO will request that individuals volunteer any medical information that would necessitate special considerations (e.g., allergies, diabetes), keeping confidential the medical information provided. Although it is not mandatory, it is highly recommended the employees notify the SSHO if they are pregnant. The HPC will review worker, task, and site conditions to determine if workers meet the criteria under 29 CFR 1910.120 for inclusion in the ORNL Hazardous Waste Worker Medical Surveillance Program.
4. The SSHO will confirm with the Technical Resources and Training Section that ORNL personnel accessing the site areas have received the health and safety training that qualifies them to work at this site. Note: ORNL special access badges may be used as proof of training.
5. The SSHO will implement health and safety requirements, including monitoring site conditions at a frequency determined by existing hazards and potential for worker exposure, and will report to the STL any deviations from anticipated conditions. If unsafe conditions or hazards arise during the investigation, the SSHO orders operations to cease, safeguards personnel, and re-establishes safe working conditions upon obtaining guidance from the ORNL ER ES&H Manager and appropriate ORNL departments. These departments may include Industrial Hygiene (IH), Radiation Protection, or Industrial Safety.
6. The SSHO will maintain on-site documentation of current training records for all site personnel in order to verify compliance with 29 CFR 1910.120 and other training requirements. If task-specific training is required for site workers, the SSHO shall verify whether site workers have received the required training by asking either the site workers themselves or the support person responsible for securing their services. If individuals possess an ORNL special access badge, the SSHO will ensure that each worker has the required training and that the expiration dates have not been exceeded; this documentation will suffice instead of training certificates. If individuals do not have an ORNL special access badge, photocopies of training certificates must be made and kept on site. Subcontractors without special access badges must supply copies of their training records or certificates to verify compliance for specific required training. Training received from outside sources must be reviewed and approved by the Technical Resources and Training Section at ORNL.
7. The SSHO will ensure that each site worker (if required) has an up-to-date respirator card, indicating proper training and quantitative fit-testing for the level of respiratory protection required.

8. The SSHO will establish site work areas and/or zones with assistance from ORNL Radiation Protection (if deemed necessary) and required levels of protection, will establish personal decontamination stations, and will instruct personnel in their use (see Sect. 8). These efforts shall be coordinated with Health Physics (HP) and IH.
9. The SSHO will establish and make available at the site emergency response instructions and contacts, with telephone numbers and appropriate radio communication information (see Sect. 10); will identify assembly points; and will coordinate emergency response action plans and any spill response activities.
10. The SSHO will identify key plant personnel (and alternates) who are responsible for specific safety-related areas, such as health, plant safety, radiation protection, and IH.
11. The SSHO will minimize the number of personnel and the amount of equipment in the controlled areas in order to remain consistent with safe site operations.
12. If monitoring equipment is needed, the SSHO will ensure the performance of daily response checks and/or calibration of monitoring equipment (see Sect. 7) to be used and will ensure that results are recorded in the field logbook or on the Daily Instrument Calibration/Response Check Form.
13. The SSHO will ensure that all monitoring equipment is operating according to the manufacturer's specifications and instructions and will arrange for maintenance, if warranted (see Sect. 7).
14. Prior to commencing sampling activities, the SSHO will ensure that the appropriate permits have been generated and approved and that signed copies of each have been provided to the STL and are available on site.
15. The SSHO will ensure that personnel comply with regulations concerning clearance distances from overhead obstructions (i.e., booms or masts of heavy equipment and temporarily suspended equipment).
16. The SSHO will ensure that personnel and equipment are frisked before egress from the controlled areas where warranted.
17. The SSHO will ensure that any injury or illness related to performance of work is reported to the Facility Manager, PM, the ORNL ER ES&H Manager, and the ORNL Medical Division.
18. The SSHO will assist personnel with the completion of report forms, including those required in the event of an accident. The SSHO must notify the Industrial Safety Section when an accident occurs. The SSHO will ensure that completed forms, either originals or copies, are returned to the STL. The SSHO will assist with the ensuing investigation following an accident.
19. The SSHO will ensure that site visitors with no official business stay outside the controlled areas and the contamination reduction zone. The SSHO will conduct a pre-entry briefing for any qualified visitors who must access the controlled areas and will

confirm whether they meet all access requirements; the SSHO will ensure proper documentation of visitors' training records and will ensure that visitors sign and date a statement in the field logbook verifying that item 1 was fulfilled.

20. The SSHO will remain at the project site at all times while workers are performing their duties.
21. The SSHO will ensure that all samples and materials leaving controlled areas have been properly labeled, frisked smeared, and containerized for radiological and visible contamination.
22. The SSHO will notify the STL and PM of any possible environmental impacts.
23. The SSHO will conduct periodic assessments for safety and health issues.
24. The SSHO will conduct daily safety meetings.

2.4 FIELD SAMPLING COORDINATOR

The Field Sampling Coordinator (FSC) will coordinate security and access to the sampling site and advise contractors of proper access and security procedures. The FSC is also responsible for obtaining all applicable permits and ensuring compliance with the HASP and site-specific WP/HSC. When present in the field, the FSC will ensure that all proper contamination control procedures are followed. The FSC reports to the PM and coordinates sampling events with the STL.

2.5 QUALITY ASSURANCE COORDINATOR

The QA Coordinator (QAC) will review the site-specific WP/HSC to ensure it addresses all necessary and appropriate QA/quality control (QC) requirements. The QAC will also perform and document periodic surveillance of laboratory and field activities to assess the implementation of these QA/QC requirements and will forward copies of the documentation to the ORNL ER Program QA Specialist.

2.6 ENVIRONMENTAL SCIENCES DIVISION RADIATION CONTROL OFFICER

The Environmental Sciences Division (ESD) Radiation Control Officer (RCO) will obtain an annual copy of all dosimetry results from the Dosimetry Data Management Group for WAG 2 RI&SI personnel. The RCO will evaluate exposure data to verify that exposures are kept as low as reasonably achievable. The RCO will also provide technical support regarding health and safety issues pertaining to radiation protection.

2.7 HEALTH PHYSICS TECHNICIAN

The HP technician is responsible for developing HP-related procedures, performing radiation hazard analysis and radiation exposure assessments, and maintaining the quality of radiation field instrumentation and exposure records. The HP technician will provide all HP-related equipment and is responsible for verifying the calibration of HP instrumentation, documentation, and records. The HP technician has stop-work authority if conditions arise that jeopardize the health and safety of workers, the public, and/or the environment. The HP technician shall also be responsible for surveying samples, equipment, and/or waste for appropriate tagging for transportation.

2.8 FIELD PROJECT PERSONNEL

Project personnel involved in WAG 2 RI&SI project activities are responsible for:

1. taking all reasonable precautions to prevent injury to themselves and their fellow employees and using *all of their senses* to alert them to potentially harmful situations;
2. performing only those tasks that the personnel believe they can do safely, and immediately reporting any accidents and/or unsafe conditions to the SSHO and the STL;
3. notifying the SSHO of medical conditions (e.g., allergies, diabetes) that require special consideration (Health Division approval and/or a physician's recommendation may be required before an individual with a medical condition can be assigned a specific field task);
4. avoiding unnecessary contact with any potentially contaminated substances (i.e., walking through puddles, pools, and mud) and avoiding placement of tools, radios, or instruments on potentially contaminated surfaces;
5. preventing spillage of waste water whenever possible during the equipment cleaning process and, if a spill occurs, containing the liquid if possible and notifying the STL;
6. avoiding splashing of contaminated materials;
7. being familiar with the physical characteristics of the site, including:
 - wind direction in relation to ground zero;
 - accessibility to associates, equipment, and vehicles;
 - communications (fire alarm boxes and telephones);
 - hot zones (areas of known or suspected contamination);
 - site access;
 - nearest site resources (rest rooms, break rooms);
 - possible overhead lines; and

- buried electrical lines and underground piping systems;
8. ensuring proper containerization of all wastes generated during site activities;
 9. reporting all injuries, no matter how minor, to the SSHO and/or the STL (personnel incurring injury or illness related to performance of work are required to report in person to the ORNL Health Center);
 10. abiding by a "buddy system," so that each site worker is responsible for keeping track of his/her partner in the event of an incident;
 11. reporting to the site HP technician or a qualified member of a health-related organization that has been approved by ORNL Radiation Protection for frisking prior to egress from the contamination reduction areas if the activities are located in a radiological controlled area;
 12. becoming familiar with the required procedures of the WAG 2 RI&SI projects and conducting all activities in accordance with their standards and with this plan;
 13. being aware of personnel responsibilities and required actions in the event of an emergency; and
 14. abiding by all posted HP, IH, and personal protective equipment (PPE) requirements.

2.9 ORNL INDUSTRIAL HYGIENE AND HAZWOPER

The ORNL IH Section shall be responsible for the oversight and approval of field investigation efforts related to IH and the requirements of 29 CFR 1910.120. In addition, the IH representative shall have stop-work authority and may be consulted regarding PPE as well as IH monitoring and sampling. The ORNL ER ES&H Manager will be notified whenever a stop-work order is issued. The ORNL HPC or a representative may perform on-site inspections to ensure that all documentation and requirements of the ORNL HAZWOPER Program Manual are being met and that procedures and recommendations are being followed.

The HPC, who is a representative of the ORNL IH Section, shall approve all plans prior to mobilization and the commencement of field activities. The SSHO must provide the HPC with a list of ORNL employees and subcontractors who may be participating in site activities. Based on criteria specified in 29 CFR 1910.120 and the HAZWOPER Program Manual, such as site location and potential exposure of the employee involved, the HPC will determine which individuals must be placed on the hazardous waste worker medical monitoring program. The HPC will then provide the ORNL Medical Division with a list of individuals who are to be included in the hazardous waste worker program.

2.10 ORNL RADIATION PROTECTION

ORNL Radiation Protection shall be responsible for the oversight of personnel protection requirements related to radiation protection. ORNL Radiation Protection shall

approve all plans prior to mobilization and commencement of field activities. ORNL Radiation Protection has the authority to designate qualified individuals the responsibilities of performing HP-related tasks such as personnel frisking when circumstances require. ORNL Radiation Protection must be notified any time readings above background levels are observed. Tools may be checked by WAG 2 RI&SI personnel in radiological areas, but any tools leaving radiological areas must be cleared by ORNL Radiation Protection.

2.11 ORNL SAFETY

The ORNL Safety Department shall be responsible for oversight and approval of field investigation efforts relating to safety. The ORNL Safety Department shall review and comment on all work plans and will sign the approval page prior to the mobilization and commencement of field activities. Safety shall also have stop-work and continuation authority and may be consulted regarding safety-related issues relevant to personnel and equipment.

2.12 ORNL ER ES&H MANAGER

The ORNL ER ES&H Manager is a designated Martin Marietta Energy Systems, Inc., employee who is responsible for the oversight of all ORNL ER activities. The responsibilities of the ORNL ER ES&H Manager include the following:

- reviewing and approving all HASPs and site-specific WP/HSCs,
- reviewing all self-assessment and surveillance reports,
- interfacing between ER project personnel and the HPC, and
- reviewing the qualifications of all WAG 2 RI&SI SSHOs.

3. SITE TASK HAZARD EVALUATION

This section of the HASP discusses the general radiological, chemical, and physical hazards that may be encountered during any given WAG 2 RI&SI task. This hazard evaluation, which is based on information available from existing documents, site history, and the WAG 2 RI Plan (1990),² outlines the general health and safety measures necessary to protect on-site workers, the public, and the environment. Specific potential hazards associated with any given specific site/task (such as specific contaminants of concern, physical hazards, etc.) will be identified in the site-specific WP/HSC. A list of contaminants and their characteristics that pose potential health and safety risk to personnel shall be completed as a part of the site-specific WP/HSC. A list of equipment to be used and the hazards associated with that equipment will also be included in each site-specific WP/HSC. Additional information to be gathered during initial site surveys will be used as a basis for personnel protective requirements and work limitations applicable to each task.

3.1 PURPOSE

The site task hazard evaluation identifies both health and safety concerns that may be encountered by site personnel during any site activity. The site task hazard analysis also describes the PPE required for each site task. The SSHO in conjunction with HP, IH, and Safety has the authority to raise or lower the level of PPE worn by the team members, depending on hazards encountered in the field. The site task hazard analysis is based upon both known hazards, such as noise, and possible hazards that could be encountered. This section of the HASP is intended as a general guideline; specific requirements for a given site or task will be detailed in the site-specific WP/HSC. Donning and doffing procedures are outlined in Sect. 6 of this HASP. Donning and doffing procedures must be explained and possibly demonstrated during the pre-entry briefing, and documentation of this training must be recorded in the site-specific logbook. Personal decontamination requirements are outlined in Sect. 9.1. Site-specific action limits for radiation release limits are defined in the tables in Sect. 9.

3.2 HAZARD EVALUATION

A hazard evaluation for each specific job site and task must be completed prior to commencement of any WAG 2 RI&SI activities, and the hazard evaluation information must be included in the appropriate section of the site-specific WP/HSC. The hazard evaluation should include, but not be limited to: type of project, type of location, type of contaminants, type of waste generated, its characterizations (i.e., corrosiveness, flammability), its form, and whether it is radiologically contaminated. The level of personnel protection required for the specific tasks throughout the project with regard to these hazards should be elaborated on within the hazard evaluation section of the site-specific WP/HSC.

3.2.1 Sampling Team Leader

The STL is responsible for the general oversight of sampling activities for a specific task. The STL may be required to access all site areas and, therefore, may be exposed to hazards associated with any duties performed within any area. Before entering an area, the STL shall don the appropriate protective equipment required by the project or by the SSHO for activities within that area of the site.

3.2.2 Site Safety and Health Officer

The SSHO is responsible for the safety and health of personnel involved in every aspect of site activities. Depending on the site and/or task, a major portion of the SSHO's time may be spent providing continuous or periodic monitoring for potential contaminants at the site. The SSHO must have the proper qualifications and background in environmental, health, and safety instrumentation and have the approval of the HPC. The SSHO shall have access to and control of all the site areas within the site and may be exposed to all potential hazards to which any site personnel may be exposed.

Action limits must be established by the SSHO and approved by a representative from the associated health departments (i.e., HP or IH) prior to beginning any job. Action limits may also be set by the IH or HP departments for any site. Action limits are derived by reviewing known contaminants at the site, as well as any historical data that can be obtained, and are set at one half of the permissible exposure limit (PEL) or threshold limit value (TLV) for a specific contaminant. If the site must be evacuated because of elevated readings exceeding predetermined action limits, the site must be cleared of all workers and a representative from the appropriate department must be notified. Obvious safety concerns will also be observed, and the SSHO will re-enter the site after consultation with the appropriate departments (IH, HP, or Safety). If it is determined that it is safe for the team members to re-enter the site, authorization to return to work must be obtained from the appropriate organization.

3.2.3 Equipment Operators

Personnel operating heavy equipment will use the appropriate specified PPE, although changing field conditions or positioning within or outside of the site boundaries may require an upgrade of PPE by the SSHO. Personnel must observe safety precautions when operating around the site. Personnel working around heavy equipment should be aware that operators have blind spots in their field of vision. All hoisting and rigging will be done in accordance with established Plant and Equipment procedure M-3.20, "General Rigging Requirements--ORNL," and shall be consistent with the requirements of ORNL Industrial Safety procedure IS-7.1, "Hoisting Equipment" and the DOE Hoisting and Rigging Manual.

3.2.4 Physical Hazards

Prior to commencement of any WAG 2 RI&SI activities, the site must be reviewed for both above- and below-ground hazards and obstacles. This review will be accomplished by consulting area engineering plans and maps and by communication with appropriate knowledgeable personnel who are familiar with the potential hazards and obstacles at a given site. A site walk-over with all involved parties will be performed prior to any site excavation,

and the excavation scheme will be agreed upon prior to starting. A signed penetration permit (if applicable) that identifies all potential underground/overhead hazards shall be obtained by the STL.

3.3 SPECIAL HAZARDS

In addition to the expected hazards associated with WAG 2 RI&SI sites, other potential hazards must be identified. Examples of some of these hazards are: physical, chemical, radiological, underground and overhead hazards; heat or cold stress; noise; illumination and ergonomic hazards; and biological factors. Each one of these items must be addressed in the site-specific WP/HSC, as specified by 29 CFR 1920.120. Each of the aforementioned hazards as well as any other site-specific hazards must be defined and methods of protecting the team from these hazards explained in the site-specific WP/HSC.

All site investigation and excavation personnel may be exposed to the hazards outlined below.

3.3.1 Heat Stress

Activities being conducted at WAG 2 RI&SI sites may be physically demanding at times, and the difficulty may be compounded by the use of protective clothing and equipment, moderate to heavy work loads, ambient air temperatures, relative humidity, and exposure to nonionizing radiation.

Two important measures will help personnel function in hot environments: acclimatization and consumption of fluids. Acclimatization is a physical and psychological adjustment that workers experience during the first 1 or 2 weeks of work in hot environmental conditions. Especially during this period, workers should concentrate on maintaining a balanced diet, consuming plenty of fluids throughout the day, and remaining aware of tell-tale signs of heat-related stress, such as headaches, dizziness, high body temperature, and increased heart rate. It is imperative that the SSHO be informed if a worker experiences these signs.

All activities that take place at the WAG 2 RI&SI sites require the use of a buddy system. As field activities continue, all personnel should be aware of their buddy's condition and of signs of heat-related stress. The SSHO will institute a work and rest regimen when conditions make it difficult to combat heat-related disorders, according to his or her best professional judgement and guidelines published by the American Conference of Governmental Industrial Hygienists (ACGIH).⁵

3.3.2 Cold Stress

Activities being conducted at any WAG 2 RI&SI site may be physically demanding during winter months, and this difficulty may be compounded by the use of protective clothing and equipment, moderate to heavy work loads, ambient air temperatures, relative humidity, wet or rainy conditions, wind speed, and exposure to nonionizing radiation.

Two important factors will help personnel function in cold environments: acclimatization and proper clothing. Acclimatization is a physical and psychological adjustment that workers experience during the first 1 or 2 weeks of work in cold environmental conditions. Especially during this period, workers should concentrate on maintaining a balanced diet, consuming plenty of fluids throughout the day, and remaining aware of tell-tale signs of cold-related stress, such as headaches, numbness in digits or extremities, dizziness, low body temperature, and decreased heart rate. It is imperative that the SSHO be informed if a worker experiences these symptoms.

All activities that take place at the WAG 2 RI&SI sites require the use of a buddy system. As field activities continue, all personnel should be aware of their buddy's condition and of signs of cold-related stress. The SSHO will institute a work and rest regimen to combat cold-related disorders, according to his or her best professional judgement and guidelines published by the ACGIH,⁵ when those conditions arise.

3.3.3 Biological Stress

Field conditions may present a variety of biological stresses, and it is the responsibility of WAG 2 RI&SI personnel to inform the SSHO of health conditions they have that may be affected by site conditions. Examples of these stresses may be, but are not limited to, insect bites or stings, ticks, poison ivy, pollens and grasses, snakes, etc.

3.3.4 Illumination

Activities at any WAG 2 RI&SI sites normally will be conducted during daylight hours, and a minimum of 5 ft-c will be required to conduct operations. [A foot-candle (ft-c) is a unit of illumination equal to one lumen per square foot when measured at a surface that is everywhere one foot from a source of light of one candle power.] Actual field measurements of illumination will not usually be collected. A conservative guideline may be that work will commence 15 minutes after sunrise and conclude 15 minutes prior to sunset. Adherence to the minimum 5-ft-c requirement will be based on the SSHO's best professional judgement.

If work is to be conducted after sunset, adequate lighting shall be provided.

3.3.5 Dust

The generation of respirable dust shall be kept to a minimum. A rule of thumb is that a visible cloud of dust will constitute an action limit. An engineering control may be employed, such as wetting the area with deionized or potable water, sprayed as a fine mist from a garden sprayer. In the unlikely event that engineering controls are unsuccessful, the IH Department will be summoned to assess the situation and provide guidance.

3.3.6 Ergonomics

The interaction of personnel with their working environment also may present potential hazards at this site. For example, personnel may incur hazards by incorrectly lifting heavy loads, by improperly positioning their bodies, or in negotiating physical obstacles when traversing ditches and brush, and vibrating equipment may cause hazards. Personnel should always position themselves properly and lift from the legs when lifting equipment or heavy

objects and should rely on the buddy system for assistance in lifting loads that are too heavy for one person. *Back strain, the most common ergonomic hazard in the field, may be easily avoided, provided that site workers ask for assistance when they need it.*

Heavy equipment operators may encounter hazards due to equipment vibration. If operators experience tingling of the digits, the SSHO will apply his or her best professional judgement to institute appropriate controls and/or work and rest regimens. If any ergonomic symptoms are encountered in the field, the SSHO must be notified immediately.

3.3.7 Physical Location Hazards

Location hazards may include, but are not limited to, movement of equipment around the site, mechanical equipment malfunctions, nonestablished roads, noise hazards, and personal movement around the site. Personal hazards, such as tripping or falling, can also have an adverse effect on the health and safety of personnel.

Overhead electrical transmission lines may cross portions of the site. Prior to placement of the equipment at the site, the STL or his or her designee shall ensure that the equipment will not be operated when any part of the machinery enters within a minimal radial distance of 10 ft from electrical transmission lines. (See Table 1.) All personnel should stay clear of overhead work and temporarily suspended or moving equipment whenever possible.

3.3.8 Fire Hazards (Prevention and Control)

ORNL has provided maximum facilities for prevention of and protection against fire, explosion, release of toxic materials, and other types of accidents. Also, well-trained emergency service groups and emergency equipment are maintained on all shifts. Therefore, all field personnel shall become familiar with the following items concerning fire protection:

1. A fire or other emergency should be reported by the appropriate method. Reporting emergencies is covered in Sect. 10.
2. Several different types of fire extinguishers are used throughout the facility. Each type of extinguisher is designed for use on a particular type of fire. Instructions for operation and use are posted on each extinguisher.
3. Automatic fire detection and extinguishing systems are provided in numerous areas for protection of employees and equipment. Personnel should learn the location and type provided in their area of work.
4. Flammable liquids should not be stored in operating buildings. Safety cans with flame arresters and flammable liquid storage cabinets are recommended where small quantities are required inside of buildings. Safety cans with flame arresters shall be used to transport and store flammable liquids in the field.
5. For safety and health reasons, use of tobacco products is permitted only in designated areas.

Table 1. Safe working distances from electrical transmission lines for machinery

Normal voltage (phase-to-phase) (kV)	Minimum clearance required (ft)
<i>When operating near high voltage power lines</i>	
0 to 50	10
50 to 200	17
200 to 350	22
350 to 500	27
500 to 750	35
750 to 1000	44
<i>While in transit with mast lowered</i>	
All voltages	10

Source: 29 CFR 1910.180j(1), "Crawler locomotive and truck cranes."

4. PERSONNEL TRAINING REQUIREMENTS

All personnel involved in WAG 2 RI&SI projects are subject to training requirements as specified by 29 CFR 1910.120 and Energy Systems procedures and policies. Training requirements shall be determined by the SSHO, HP, IH, Industrial Safety and the ORNL HPC. Some examples of training that may be required are listed below. For specific training requirements for each WAG 2 RI&SI projects, refer to the site-specific WP/HSC.

ORNL Radiation Worker I. This course entails basic fundamentals of radiological control principles.

ORNL Radiation Worker II. This course entails basic fundamentals of radiological control principles as well as extensive time devoted to practical considerations, including dress-out, frisking contamination control, emergency preparedness, and lessons learned.

ORNL Radiation Worker II Retraining. This course reviews the trainees' existing knowledge of requirements and provides updates on any changes in the radiological program in the preceding 2 years and on lessons learned.

ORNL Site-Specific Radiological Worker Training. This course covers ORNL site-specific radiological control information. This course is for workers who have completed radiological worker training at other DOE facilities.

Forty-Hour Superfund Amendments and Reauthorization Act (SARA)/Occupational Safety and Health Administration (OSHA) Training.* This course addresses the training requirements of 29 CFR 1910.120 for workers, nonworkers, and visitors to hazardous waste operations/activities sites. Personnel engaged in hazardous waste operations or activities where permissible exposure levels may be exceeded, respiratory protection is required, or the site has not been characterized are required to take this course.

Twenty-Four-Hour SARA/OSHA Training.* This course addresses the training requirements of 29 CFR 1910.120 for workers, nonworkers, and visitors to hazardous waste operations/activities sites. Personnel engaged in hazardous waste operations or activities where permissible exposure levels are not expected to be exceeded are required to take this course.

Sixteen-Hour SARA/OSHA Training.* This course addresses the training requirements of 29 CFR 1910.120 for workers, nonworkers and visitors to hazardous waste operations/activities sites. It is a supplement to the 24-Hour SARA/OSHA Training and is required for personnel engaged in hazardous waste operations or activities where permissible exposure levels may be exceeded, respiratory protection is required, or the site has not been characterized.

*"SARA/OSHA" training is also known as HAZWOPER training.

Eight-Hour SARA/OSHA Managers and Supervisors Training.* This course entails 8 h of specialized training in such topics as Energy Systems and applicable ORNL safety and health discipline procedures and programs and associated employee training, PPE program, spill containment, and health hazards monitoring.

Eight-Hour SARA/OSHA Annual Refresher Training.* This course entails 8 h of specialized training as an annual refresher for the 24-h and 40-h courses.

Waste Generator Training for Solid Low-Level Waste. This course covers programmatic requirements for generator certification of solid low-level wastes.

Waste Generator Training for Satellite Accumulation. This course provides an overview of RCRA characterization of hazardous waste and ORNL guidelines for satellite accumulation. This training is required for all generators of hazardous waste.

Waste Generator Training for 90-Day Accumulation Areas. This course provides an overview of RCRA and ORNL requirements for persons operating 90-day accumulation areas.

*"SARA/OSHA" training is also known as HAZWOPER training.

5. MEDICAL SURVEILLANCE

5.1 PHYSICAL EXAMINATION

Most WAG 2 RI&SI personnel will not meet the criteria listed in 29 CFR 1910.120 for inclusion in the Hazardous Waste Worker Medical Surveillance Program. However, all WAG 2 RI&SI field personnel are participants in the bioassay program because of their potential to be exposed to radioactive contaminants.

If field conditions should change, personnel who meet the criteria in 29 CFR 1910.120(f) will be included in the ORNL Hazardous Waste Worker Medical Surveillance Program.

5.2 MEDICAL RECORDS

Medical and personnel exposure records will be maintained in accordance with the requirements of 29 CFR 1910.120 for 30 years after employee termination. Employee confidentiality will be maintained.

5.3 INJURY AND ILLNESS TREATMENT

All work-related injuries or illnesses require the completion of a "Supervisor's Incident Report" (Fig. 1). Any injury requires that the STL and/or the SSHO notify the PM and the Medical Division immediately.

Any employee or subcontractor who is suspected of having an overexposure to contaminants on site will be given another complete physical examination. Any personnel who develops a lost-time illness will be required to have an re-examination before returning to work. The physician will certify in writing that the worker is fit to return to work by completing the "Request for Preplacement/Health Evaluation/Medical Restriction" form (Fig. 2). If necessary, work restrictions will be specified on this form as required by ORNL Medical.

5.4 BIOASSAY PROGRAM

WAG 2 RI&SI personnel will seldom be exposed to significant quantities of radioactive or hazardous chemical contaminants. However, some field personnel will have the potential to be exposed to some radioactive contaminants during some of the WAG 2 RI&SI projects. Because of this potential for exposure to radionuclides, an internal monitoring program is necessary.

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Fig. 1. Supervisor's Incident Report.

MARTIN MARIETTA
MARTIN MARIETTA ENERGY SYSTEMS, INC.

REQUEST FOR PREPLACEMENT/HEALTH EVALUATION/MEDICAL RESTRICTION

☐ K-25 ☐ ORNL ☐ PGDP ☐ PORTS ☐ Y-12 ☐ OTHER

☐ New Applicant ☐ Former Employee ☐ Transfer ☐ Return from Disability/Leave ☐ Periodic/Health/Restriction Evaluation

NAME: (LAST) (FIRST) (MIDDLE)

SOCIAL SECURITY NUMBER: BADGE NUMBER: DATE OF BIRTH: AGE: SEX: ☐ M ☐ F WORK TELEPHONE NO.:

HOME ADDRESS: (Street, City, State, Zip Code) HOME TELEPHONE NO.:

DEPARTMENT/DIVISION: BUILDING: SUPERVISOR'S NAME WORK TELEPHONE NO.:

SENT REPORT TO: NOTIFIED: DATE: TIME: ☐ A.M. ☐ P.M.

MEDICAL RECOMMENDATIONS

☐ Fit for placement or return to work without restrictions ☐ Fit for placement or return to work with restrictions noted below:

Refer	Status	Type	Restrictions	Refer	Status	Type	Restrictions
			No prolonged or strenuous exertion				No work requiring normal corrected vision
			No excessive walking or standing				No work requiring normal depth perception
			No excessive pulling or pushing				No work requiring normal peripheral vision
			No repeated squatting or bending				No work requiring normal color perception
			No lifting over _____ pounds				No work requiring normal corrected hearing
			No prolonged sitting				No driving of Government vehicles
			No running or participation in security exercises				No night driving of Government vehicles
			No physical fitness testing				No driving of Gov't vehicles requiring DOT test.
			Must not be a member of Tactical Response Team				No driving of Gov't vehicle w/o hearing aid
			Must not carry or use firearms				No driving of Gov't vehicle w/o corrective lenses
			Work should be limited to (area): _____				Avoid skin irritants
			Must not work in: _____				Avoid pulmonary irritants
			No overhead work				No working alone
			No rung ladder climbing				No working in confined space
			No use of ladder over _____ feet				No working at heights over _____ feet
			Minimize use of stairs				No overtime work
			No work at unprotected elevation				No rotating shifts
			No work around free-moving machinery				Only part-time work of _____ hours daily
			No use of _____ arm and/or _____ hand				No respirator use
			Avoid hand/arm vibrations				Limit respirator use to (time/type) _____
			Minimize repetitive motion of: _____				Other _____
			Avoid excessive noise ≥ 85 dB				
			Avoid temperatures over _____ under _____ degrees				

- ☐ No change from (continue) previous restrictions
☐ Must be reevaluated prior to future reassignment
☐ Temporary and indefinite restrictions expire if not reevaluated prior to:

- ☐ Recommend employment or return to work be deferred (do not specify diagnosis)
 Reason: _____
☐ Not fit for employment or return to work (specify extent and permanence of problem)
 Reason: _____
☐ Reevaluation may be scheduled in (specify time): _____

Informed of detected medical conditions and exposure relevance, if any? ☐ YES ☐ NO

DATE: _____ SIGNED: _____ MD/PARN CODE

DISTRIBUTION:

- GREEN - HEALTH SERVICES
- WHITE - EMPLOYEE
- BLUE - SUPERVISOR/EMPLOYMENT/HUMAN RESOURCES
- PINK - SAFETY OR INDUSTRIAL HYGIENE
- YELLOW - BENEFITS

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RESTRICTION NOTES:

PREPUP IS A CODE FOR THE MEDICAL RECORD WHICH IS THE SOURCE OF THE RESTRICTION:

1 - OCCUP. INJURY	3 - NON-OCCUP. INJURY	5 - HEALTH EVALUATION
2 - OCCUP. ILLNESS	4 - NON-OCCUP. ILLNESS	6 - OTHER

STATUS CODE: N = NEW; M = MODIFIED; C = CONTINUED; D = DISCONTINUED

TYPE CODE: T = TEMPORARY; P = PERMANENT

Fig. 2. Request for Preplacement/Health Evaluation/Medical Restriction.

5.4.1 Baseline Bioassay

Personnel performing field activities that have the potential for involving exposure to radioactive contaminants must undergo baseline bioassay by submitting urine samples and having a whole body count (WBC) performed before they participate in these field activities. Results of the baseline bioassay are evaluated by the HP technician for evidence of previous exposures. Individuals exhibiting evidence of previous internal contamination will not be permitted to enter controlled access areas until an evaluation of the previous exposure indicates that additional radiation exposure will not result in doses in excess of applicable regulatory limits.

5.4.2 Routine Bioassay Program

The routine bioassay program will be used as a measure of the effectiveness of the contamination control programs. The frequency of the bioassay depends on the degree of field activities, contaminant of concern, and the potential to be exposed to a radioactive contaminant. The appropriate type and frequency of testing required will be determined by the Radiation Protection Section in accordance with RP-3.7.

5.4.3 Diagnostic Bioassay

Diagnostic bioassay is used to quantify internal depositions that could result in an annual dose equivalent of 100 mrem or an annual organ or tissue dose equivalent of 5 rem. The need for diagnostic bioassay is based on the routine bioassay action limits.

5.4.4 Termination Bioassay

All individuals participating in the bioassay program are required to submit excreta samples and to submit to a WBC prior to termination from the project. Results of the termination bioassay are reviewed by the HP technician. Individuals may be recalled for diagnostic bioassay if they exhibit unexpectedly high results that indicate a potential for exposure in excess of the regulatory limits.

6. PERSONAL PROTECTION EQUIPMENT

The SSHO, in conjunction with the HP, IH, and/or Industrial Safety will determine the level of PPE required for each WAG 2 RI&SI site. This determination will be based on possible site contaminants, health and safety hazards, and OSHA guidelines. **The level of PPE for the project must be stated in the site-specific WP/HSC for each specific site.** Each individual who has responsibilities in or who could require entrance into the site controlled areas must use the level of PPE required. It is the responsibility of the SSHO, HP, or IH to instruct and possibly demonstrate the proper techniques for donning and doffing of each level of PPE. Personnel should also be familiar with decontamination procedures discussed and illustrated in Sect. 9.

All PPE for site activities, tasks, and work areas is based upon potential site-specific contaminants and may involve conservative additions to personnel protection by the SSHO, IH, or HP technician. All PPE for the controlled areas is based upon OSHA requirements. General guidelines for Level C, Level D, and Level D+ PPE are listed below; more specific guidelines for the most common specific tasks are provided in Table 2. Actual site- and/or task-specific PPE requirements are to be determined by the SSHO, HP technician, and IH and specified in the site-specific WP/HSC.

1. Level C PPE
 - a. full- or half-face air-purifying cartridge respirator with appropriate cartridge, depending on potential hazards
 - b. hooded chemical-resistant clothing (Tyvek®) with all seams and openings taped
 - c. gloves (chemical-resistant inside and outside)
 - d. safety-toed footwear
 - e. hard hats
 - f. nitrile or butyl rubber over-boots
2. Level D+ PPE
 - a. chemical-resistant (polyethylene-lined) Tyvek® clothing or C-Zone coveralls
 - b. chemical-resistant disposable gloves with cotton liners
 - c. safety-toed footwear with rubber over-boots
 - d. hard hats
 - e. safety glasses
 - f. nitrile or butyl rubber over-boots
3. Level D PPE
 - a. coveralls/field clothes
 - b. safety-toed footwear
 - c. safety glasses
 - d. hard hats

The outer protective garment will be made of a chemical-resistant woven material (Tyvek® or equivalent) or company-provided contamination-zone coveralls, which will form a protective barrier against detrimental chemicals and/or radioactive contaminants for a

Table 2. Protective equipment for on-site activities^a

Activity	Level	Protective equipment
Equipment decontamination and water sampling ^b	D	Hard hat ^c Safety glasses Safety-toed footwear Company-issued work clothes Face shield ^d
Excavation and environmental soil sampling under normal conditions	D+	Level D equipment plus: Chemical-resistant polyethylene-lined Tyvek® clothing or contamination-zone coveralls Chemical-resistant disposable gloves with cotton glove liners Nitrile or butyl rubber outer boots
Excavation and environmental sampling at action limits	C	Level D and D+ protection plus: Full-faced respirator with the appropriate cartridge

^aProcedures and recommended types of PPE may be revised by HP, IH, and/or the SSHO to meet any changes in field conditions. All site personnel and visitors must contact the SSHO to confirm actual personnel protection requirements prior to entering an investigation site.

^bChemical-resistant gloves, outer boots, and Tyvek® clothing may be worn by personnel to reduce the danger of potential splashing and to maintain personal hygiene. However, personnel are not required to conform to this practice when only Level D protection is required.

^cRequired only when there are overhead hazards.

^dFull face shield with safety glasses may be required during the equipment decontamination process.

specific period of time, depending on the contaminant in question. **Each contaminant has its own permeating ability and/or penetration ability, and the resistance of the protective clothing will vary with each contaminant.** For some contaminants, the risk of chemical permeation increases when an outer protective garment becomes damp from soil or water contact. Field personnel whose outer protective suit becomes wet should replace the wet garment as soon as possible with a new suit.

All respiratory equipment will be approved by the National Institute for Occupational Safety and Health and by the Mine Safety and Health Administration. All personnel required to use respiratory protection shall have an up-to-date quantitative respirator fit test and will wear only those respirators approved by the quantitative fit test. In addition, site personnel will use a single respirator per shift.

6.1 PROTECTIVE CLOTHING DONNING PROCEDURE

The protective clothing donning procedure ensures that on-site personnel are instructed in the proper way to don protective clothing. Failure to adhere to this procedure may result

in the protective clothing being ineffective against a potential contaminant. The following donning procedure is given as a guide and may be altered by the SSHO, HP, and/or IH if improvements can be made to the procedure and if changes are warranted in the field. In addition, some articles of protective clothing/equipment detailed below may not be necessary for the particular site task. Personnel should consult the SSHO for the appropriate protective equipment combination.

1. Inspect clothing and respiratory equipment before donning.
2. Adjust hard hat to fit head.
3. Standing or sitting, place legs in suit, pull safety boots through, gather up at the waist, place arms in sleeves, pull upper portion of the suit over the shoulders, and zip the suit closed.
4. Place boot covers over the safety boots if required. Tape the boot covers to the leg of the suit, providing a seal, and tab the tape to permit removal.
5. Don the respirator after performing the initial qualitative checks of the respirator's integrity. All personnel who may be required to wear respirators should familiarize themselves with Sect. 6.1.3.
6. Perform the necessary qualitative respirator fit test under the direct supervision of the SSHO.
7. Draw hood up around the respirator. Seal exposed facial areas between the suit and the respirator with duct tape.
8. Don chemical-resistant gloves; pull the sleeve of the suit over the cuff of the glove and seal it to the glove with tape. A tab should be provided on the tape to ease removal of gloves during decontamination procedures.

6.2 PROTECTIVE CLOTHING DOFFING PROCEDURE

The protective clothing doffing procedure ensures that all on-site personnel are instructed in the removal of protective equipment. Failure to adhere to this procedure may result in unnecessary exposure to a potential on-site contaminant. The following doffing procedure is given as a guide and may be altered by the SSHO, HP, and/or IH if improvements can be made to the procedure and the changes are warranted in the field. In addition, some protective equipment/clothing listed below may not be required for a specific site task. Personnel should consult the SSHO for the appropriate protective equipment combination.

1. Remove any extraneous disposable clothing/equipment (e.g., outer gloves, hard hat, boot covers, and tape) and dispose of it in the appropriate receptacle.
2. Unzip protective suit.

3. Remove one arm at a time from the suit, turning the suit inside out. Inner gloves should still be worn at this time.
4. Sitting, if possible, remove one leg from the suit at a time, turning the suit inside out.
5. Dispose of the suit in the appropriate receptacle.
6. Remove respiratory equipment.
7. Remove inner disposable gloves by rolling them off each hand, inside out, and dispose of them in the appropriate receptacle.

Personnel should familiarize themselves with this guidance and with the personnel decontamination procedures in Sect. 9, as both procedures need to work in harmony.

6.3 RESPIRATORY PROTECTION

Personnel at the WAG 2 RI&SI sites will be covered by the ORNL Respirator Program. The ORNL respiratory protection program meets the legal requirements of 29 CFR 1910.134.

The following policies should also be adhered to in the fitting and use of respirators:

1. An employee must have passed the quantitative fit test and medical evaluation to use a respirator and must present a respirator card prior to being issued a respirator.
2. If an employee cannot obtain a good respirator-to-face seal because of facial or medical characteristics, that employee will not use a respirator or enter an atmosphere that requires the use of a respirator.
3. Facial hair such as beards, sideburns, or certain mustaches that may interfere with the fit test are not allowed.
4. Persons requiring corrective lenses shall be provided with specially mounted lenses inside the full-face mask. Under no circumstances will contact lenses or normal glasses be worn while using full-face respirators.
5. A person may use only the specific make(s) and model(s) of air-purifying respirators for which he/she has obtained a satisfactory fit via the quantitative fit-testing procedures. Under no circumstances shall a person be allowed to use any make or model respirator for which he has not passed a fit test.

7. MONITORING

Real-time assessment of potentially hazardous chemical concentrations and radiological contaminants will be performed while operations are conducted at any WAG 2 RI&SI sites as required by 29 CFR 1910.120. These measurements must be obtained from a trained and qualified health professional. Chemical instrumentation and monitoring frequency shall be selected based on the hazards that may be encountered. Each instrument used during the activity must be identified and will be addressed in the site-specific WP/HSC. **Calibration as well as operating procedures for each instrument that is to be used can be found in the IH Section standard operating procedures or Measurement Applications and Development group procedures.** The monitoring frequency of each instrument, daily calibration/response checks, and the specific calibration gases and sources used must be documented on a daily bases. This can be documented in the site-specific logbook.

Action limits must be established for each instrument used at the site. Generally, action limits will be set at 50% of the lowest PEL among all of the relevant contaminants of concern. If contaminants are not known, IH will be contacted for guidance. A stop-work order will be issued at 50% of the lowest PEL among contaminants of concern, and IH will be contacted to investigate the source and determine what actions must be taken to resume work safely.

Radiological instruments are subject to the same criteria as the chemical instruments. Types of instruments, monitoring frequencies, and release limits must be included in the site-specific WP/HSC. **Calibration as well as operating procedures for each instrument to be used must also be included in the site-specific WP/HSC.** If a representative from the ORNL Radiation Protection Department oversees a particular site, those procedures need only be referenced in the site-specific WP/HSC. Personal thermoluminescent dosimeters, which measure dose from beta, gamma, or neutron radiation with a high degree of accuracy, will be worn by all on-site personnel.

8. SITE AND CONTAMINATION CONTROL

WAG 2 RI&SI activities will be performed in a manner that will control site access and minimize the potential for the spread of contamination. Site control measures include electrical boundary fences and warning signs and tape for the contaminated and radioactive work sites. ORNL provides 24-h armed intrusion protection and patrol for WAG 2. Project personnel will be required to have an ORNL-approved access badge. An external dosimeter and either the 24- or 40-h SARA/OSHA training (as required by 29 CFR 1910.120) are required to obtain a badge for access into WAG 2. Visitors will be allowed in WAG 2 under the direct supervision of an individual authorized to enter only after they have the appropriate documentation, training, and a site briefing.

A site map will be provided at each work site for each activity. The map will be marked by the STL, SSHO, or designee to indicate the shortest evacuation route from the individual work location to a predesignated assembly area and the location of the nearest medical assistance, which is ORNL Medical, located in Building 4500 North.

Site areas will be established where different types of operations occur, and the flow of personnel and equipment will be controlled. The establishment of site controlled areas by the SSHO and/or ORNL HP technician will help ensure that personnel are properly protected against hazards present where they are working. Site controlled areas will also ensure that work activities and contamination are confined to the appropriate area and that personnel can be located and evacuated in an emergency.

8.1 ACCESS

Access to controlled/exclusion areas and contamination reduction areas will be regulated and limited to authorized persons. Entrances and exits from a controlled areas will be made through a specified point. If the areas are restricted, in order to control radioactive contamination, a portable instrument will be used to frisk personnel clothing, hands, and feet before exiting. The HP Department will select the appropriate instrument based on the type of radiation, detection limits, and radiation background, and the instrumentation will be identified in the site-specific WP/HSC.

8.2 POSTING

8.2.1 Posting for Radiation Protection

Areas will be posted in accordance with the ORNL HAZWOPER Program Manual. Warning signs will be affixed in readily visible locations in or near contaminated work areas. Provisions for posting areas for radiation protection purposes are specified in ORNL procedure RP-2.3. Where radiation contamination is of concern, the standard radiation symbol will be displayed with the appropriate colors, magenta on a yellow background.

8.2.2 Site Areas

WAG 2 RI&SI personnel have the potential to work in different types of radiological areas. Currently, there are no contamination areas designated by ORNL Radiation Protection Department in WAG 2. However, if contamination areas are designated or HAZWOPER zoning is required, the following areas will be established:

Exclusion areas. These include the actual areas of contamination. These areas have the highest exposure potential and/or the highest probability of skin contact with contaminants.

Contamination reduction areas. These include the areas immediately surrounding the contamination-reduction areas. These areas do not have a high probability of skin contact with contaminants. These are areas for decontamination to prevent transfer of contamination out of the controlled areas.

Support areas. This covers all areas outside of the contamination reduction areas. Adverse exposure to contaminants is unlikely. The support areas associated with the WAG 2 RI&SI activities, however, may not be designated as normal support areas for eating, drinking, and smoking.

The SSHO and STL will establish these areas based on the amount and nature of contamination present and the specific project. Perimeter monitoring will be conducted to ensure proper placement of zones. The criteria to establish a delineated area for purposes of radiation protection is outlined in the ORNL procedure RP-2.5. Criteria for establishing areas on a HAZWOPER site are discussed in the ORNL HAZWOPER Program Manual. In general, a regulated or exclusion area will be established when the limits given in Table 3 are exceeded or when required by the ORNL HPC. A contamination area will be established by the HP technician when these limits are exceeded by 10 times.

Table 3. Surface radioactivity guidelines

Nuclides	Removable	Total (fixed plus removable)
Natural uranium, ^{235}U , ^{238}U , and associated decay products	1,000 dpm α /100 cm^2	5,000 dpm α /100 cm^2
Transuranics, ^{226}Ra , ^{228}Ra , ^{230}Th , ^{228}Th , ^{231}Pa , ^{227}Ac , ^{125}I , ^{129}I	20 dpm/100 cm^2	300 dpm/100 cm^2
Natural thorium, ^{232}Th , ^{90}Sr , ^{223}Ra , ^{224}Ra , ^{232}U , ^{126}I , ^{131}I , ^{133}I	200 dpm/100 cm^2	1,000 dpm/100 cm^2
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except ^{90}Sr and others noted above	1,000 dpm β - γ /100 cm^2	5,000 dpm β - γ /100 cm^2

Source: DOE Order 5480.11.

9. DECONTAMINATION

Decontamination procedures are designed to eliminate or limit the amount of contaminated materials workers may encounter and to limit the spread of contaminated materials from the controlled areas. The SSHO along with the HP technician is responsible for the designation of the site areas (see Sect. 8), the construction of a site decontamination station, and the instruction of personnel on its proper use.

9.1 PERSONNEL DECONTAMINATION PROCEDURES

Personnel decontamination procedures are designed, through a step-by-step method, to eliminate contaminated materials that workers may have come into contact with and to limit the spread of contaminated materials from the contamination reduction areas. The SSHO, along with the HP technician, is responsible for the designation of the all work areas, the construction of a site decontamination station, and the instruction of personnel on its proper use. The SSHO should elicit assistance from the appropriate health and safety department concerning procedures and guidelines in the event it is necessary to decontaminate an individual. Monitoring during site activities may indicate the need for additional decontamination stations under certain conditions. Allowances must be made for the type of protective equipment being worn. Figures 3, 4, and 5 outline the basic requirements for decontamination stations, and Table 4 shows the release limits for skin.

Table 4. Release limits for skin

Item	Transferable (smear)		Direct readings	
	Alpha [Bq/100 cm ² (dpm/100 cm ²)]	Beta-gamma [Bq/100 cm ² (dpm/100 cm ²)]	Alpha [Bq/100 cm ² (dpm/100 cm ²)]	Beta-gamma [Bq/100 cm ² (dpm/100 cm ²)]
General body	0.33 (20) ^a	3.3 (200) ^a	5.0 (300)	16.67 (1000) ^b
Hands	0.33 (20) ^a	3.3 (200) ^a	5.0 (300)	16.67 (1000) ^b

^aRemovable skin contamination should be nondetectable. These values represent the lower limit of detection for the smear counting system in the field. The sensitivity of standard frisking techniques is such that only direct reading limits can be readily detected.

^bHigher limits may be used if the identity of the contaminant is known.

Source: ORNL procedure RP-2.5, "Radioactive Contamination Control."

The procedures discussed below are provided as *guidelines* and, depending on site conditions, may be modified by the SSHO if improvements are needed. These guides are worst-case scenarios; therefore, all personnel shall check with the SSHO to determine the site-specific location requirements.

Fig. 3. Segregated equipment drop and canister or cartridge change.

Fig. 4. Minimum decontamination requirements for Level D+ protection.

Fig. 5. Minimum decontamination requirements for Level C protection.

9.1.1 Level D Protection Decontamination

Station 1: Work area. This is the area with the greatest potential for exposure to on-site contaminants.

Station 2: Segregated equipment drop. Equipment used on site (tools, sampling devices, containers, monitoring equipment, clipboards, etc.) is deposited on a plastic drop cloth or a container with a plastic liner. The following equipment is needed at this station:

- containers
- plastic liners
- 55-gal compactible waste drum

Station 3: Outer garment, footwear, glove, safety glasses, and hard hat removal. Footwear, gloves, safety glasses, and hard hats are removed at this station.

Station 4: Scrubbing and rinsing tools of outer garments, footwear, gloves, hard hats, and safety glasses. Outer garments, footwear, gloves, hard hats, and safety glasses are scrubbed with a laboratory-grade detergent (Liquinox or equivalent) and rinsed with potable water. Disposable boots and gloves need not be scrubbed and may be disposed of in the compactible waste drums. If decontamination of boots is required, all decontamination should take place while personnel are standing in large wash tubs so that all decontamination solutions can be caught and drummed in accordance with Sect. 4.1.6 of this document. The following equipment and materials are necessary at this station:

- two or three wash tubs
- one hand-pump sprayer
- potable water
- detergent
- scrub brushes
- paper towels
- 55-gal drum with liner for paper towels and protective clothing

Station 5: Inner glove removal. Inner gloves are removed at this station.

Station 6: Frisking. All workers and personnel on site shall be frisked (a radiological screening) before exiting the contamination reduction zone to ensure that no radiological contamination is transferred to the support zone. The following equipment is necessary at this station:

- alpha detector
- beta/gamma detector

Station 7: Field wash. Personnel will wash hands and face thoroughly and shower as soon as possible. If contamination was detected at Station 6, return to Station 6 and repeat frisking after washing at Station 7. The following equipment and materials are necessary at this station:

- water
- wash basin or bucket
- soap

Station 8: Decontamination area boundary. After completing the steps described above, personnel may step across the decontamination area boundary and enter the designated support zone.

9.1.2 Level D+ Protection Decontamination

For Level D+ protection, the steps described above for Level D decontamination are followed; the only difference is the removal of the disposable chemical protective coverall at Station 3 and depositing of the coverall in a lined 55-gal compactible waste drum. Level D+ protective clothing is deemed necessary when sampling operations may produce excessive splashing of surface or subsurface materials but the action level does not require the use of a respirator and taped, protective chemical-resistant suits.

9.1.3 Level C Protection Decontamination

Station 1: Work area. This is the area with the greatest potential for exposure to on-site contaminants.

Station 2a: Canister/cartridge change. If a worker has left the exclusion zone for the sole purpose of changing a canister/cartridge of his/her respirator, this is the last step of the decontamination procedure. Once the worker's canister/cartridge has been replaced, the outer boots and gloves may be retaped so that all potential pathways to the skin are sealed. The following equipment is necessary at this station:

- respirator cartridges/canisters
- tape
- extra gloves
- boot covers (if worn)
- plastic trash bag

Station 2b: Segregated equipment drop. Equipment used on site (tools, sampling devices, containers, monitoring instruments, clipboards, etc.) is deposited on plastic cloths or in different containers with plastic liners. The equipment is segregated on the basis of the varying degrees of contamination required. Segregation of the equipment at the drop site reduces the possibility of cross-contamination. The following equipment is needed at this station:

- multiple containers
- plastic liners
- plastic drop cloths
- 55-gal lined compactible waste drum

Station 3: Outer garment, footwear and glove removal.* The outer garment, footwear, and outer gloves and any accompanying tape are removed. Tape and disposable gloves should be placed in a plastic trash bag and disposed of accordingly. Reusable outer garments and boots will be placed in plastic bags for HP screening. This equipment must be scanned and "green-tagged" (labelled with form UCN-14) before being reused. The following equipment is necessary at this station:

- plastic trash bag
- bench or stool
- one-hand pump sprayer

Station 4: Outer garment, footwear, and gloves scrubbing and rinsing.* The outer garment, footwear, and gloves are scrubbed with laboratory-grade detergent and water and rinsed with potable water. All wash water and rinsing solutions will be disposed of in accordance with the ORNL ER Program Waste Guidance Document.⁴ The following equipment and materials are necessary at this station:

- wash tubs
- water
- detergent
- scrub brushes

Station 5: Inner glove and respiratory protection removal. The respirator is removed next-to-last. The cartridges/canisters are placed in a plastic trash bag and disposed of in accordance with the ORNL ER Program Waste Guidance Document.* The respirator is placed in a plastic bag designated for used respirators only. Respirators that have been used in a radiological area may not be reused because of the single-use respirator policy. Respirators will be scanned and tagged by HP and returned to ORNL IH. Inner gloves will be removed last and deposited in a plastic trash bag. Plastic trash bags are the only equipment necessary at this station.

Station 6: Frisking. All workers and personnel on site shall be frisked (a radiological screening) before exiting the contamination reduction zone to ensure that no radiological contamination is transferred to the support zone. The following equipment is necessary at this station:

- alpha detector
- beta/gamma detector

*This station is not necessary when disposable PPE is used.

Station 7: Field wash. Personnel will wash hands and face thoroughly and shower as soon as possible. If contamination was detected at Station 6, return to Station 6 and repeat frisking after washing at Station 7. The following equipment and materials are necessary at this station:

- water
- wash basin or bucket
- soap

Station 8: Decontamination area boundary. After completing the steps described above, personnel may step across the decontamination area boundary and enter the designated support zone.

9.2 EQUIPMENT DECONTAMINATION

Tools and small pieces of equipment used during site activities must be scanned for possible radiological contamination before they can be removed from the contamination reduction area. Scanning of tools and equipment is the sole responsibility of the HP technician. If no contamination is detected, the tool or equipment can be "green-tagged" (labelled with form UCN-14) and removed from the site as well as from the ORNL reservation. If contamination is detected, that piece of equipment must be cleaned by ORNL HP procedures and/or guidelines.

The following procedure has been developed as a guide, and dependent upon site conditions, may be modified by the PM, STL, or SSHO. This guideline applies to all equipment that comes in contact with surface and subsurface sample material, such as telescoping pole samplers, water dippers, sample mixing pans, scoops and trowels, and hand augers.

9.2.1 Equipment

The following equipment is required for equipment decontamination:

- PPE
- potable water
- plastic tubs or buckets
- scrub brushes
- wire brush
- disposable wipes
- laboratory detergent (such as Liquinox or equivalent, phosphate free)
- plastic bags
- deionized water in stainless-steel sprayers
- ultrapure isopropyl alcohol
- hot-water washer with washing trough
- 55-gal drums (to containerize all wash water)
- sheet plastic
- aluminum foil
- Ziploc-type bags

9.2.2 Procedure

All sampling equipment should either be washed in a bucket containing laboratory-grade detergent or in the decontamination trough. However, if sampling equipment is muddy, it should be rinsed with high-pressure hot water/steam prior to washing. The decontamination trough is designed to collect all spoils from sampling equipment and drain them into a containment reservoir. The wash solutions are transferred to a 55-gal drum. Steps 4 and 5 in the decontamination sequence below will be performed in a dedicated containment reservoir in order to segregate those solutions for waste minimization purposes.

The following steps will be followed to decontaminate sampling equipment:

1. Equipment will be washed and scrubbed with laboratory-grade detergent and potable water.
2. Equipment will be high-pressure-rinsed with water to remove soil, etc.
3. Equipment will be rinsed with deionized water.
4. Equipment will be moved to isopropyl rinsing trough.
5. Equipment will be rinsed with ultrapure isopropyl alcohol, at ~70% concentration.
6. Equipment will be rinsed with deionized water.
7. All drilling spoils and associated solutions will be drained or captured in a 55-gal drum. A 17E drum is used to contain fluids from the decontamination trough. A separate poly-lined 17E drum is used to contain isopropyl trough rinse water.
8. Equipment will be moved to a drying area/table and allowed to air dry.
9. If not to be used immediately, equipment will be wrapped in aluminum foil or sealed in Ziploc-type bags.

The liquid generated by the cleaning operation must be containerized with other decontamination waste for appropriate disposal. All decontamination should take place in a separate staging area. Cleaned equipment may be temporarily placed on a polyethylene sheet away from high-traffic areas in order to avoid contamination. Care must be taken in the selection of the staging decontamination area to avoid fugitive dust, fuel oils, gasoline, organic solvents, and other sources of airborne contamination. All sampling equipment must be cleaned and washed prior to use. These instruments may be wrapped in aluminum foil or placed in Ziploc-type bags or plastic for protection from possible contamination prior to their use.

9.3 HEAVY EQUIPMENT DECONTAMINATION

If a piece of heavy equipment becomes radiologically contaminated due to any excavation effort, that piece of equipment must be decontaminated before it can leave the site. The HP technician shall scan the equipment and locate the areas of elevated contamination. The equipment will be placed in a diked area and cleaned until the contamination has been removed. This process will be supervised and guided by a representative of ORNL Radiation Protection. Disposal of waste generated from this process will be the responsibility of the WAG 2 RI&SI PM.

9.4 DECONTAMINATION CLEARANCE LIMITS

The radioactive materials contamination limits/guidelines used for release for unrestricted use are shown in Tables 5, 6, and 7. The limits shown in Table 5 may be used if the nuclides have been identified. For unidentified nuclides, the more restrictive limits shown in Table 6 shall be used. The release limits for equipment, shoes, and clothing are addressed in Table 7. Tools and equipment released from a Controlled Access Area shall be accompanied by an ORNL Form UCN-14 ("Green Tag").

9.5 DISPOSAL OF CONTAMINATED FLUIDS AND MATERIALS

Fluids and materials resulting from decontamination processes will be containerized, sampled, and analyzed for the site-specific contaminants of concern. Those materials determined to be contaminated in excess of the appropriate limits will be packaged in ORNL-approved containers and disposed of in accordance with the *Oak Ridge National Laboratory Waste Management Plan*⁶ and ESD Mini Waste Management Plans.

Table 5. Surface radioactivity release guidelines

Nuclide ^a	Removable (dpm/100 cm ²) ^{b,c}	Total (dpm/100 cm ²) ^{b,d}
Natural uranium, ²³⁵ U, ²³⁸ U, and associated decay products	1000 α	5000 α
Transuranics, ²²⁶ Ra, ²²⁸ Ra, ²³⁰ Th, ²²⁸ Th, ²³¹ Pa, ²²⁷ Ac, ¹²⁵ I, and ¹²⁹ I	20	300
Natural thorium, ²³² Th, ⁹⁰ Sr, ²²³ Ra, ²²⁴ Ra, ²³² U, ¹²⁶ Ac, ¹³¹ I, and ¹³³ I	200	1000
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except ⁹⁰ Sr and others listed above ^e	1000 β - γ	5000 β - γ

^aWhere surface contamination by both alpha- and beta-gamma-emitting nuclides exists, the limits established for alpha- and beta-gamma-emitting nuclides should apply independently.

^bAs used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive materials as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

^cThe amount of removable radioactive material per 100 cm² of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. (Note: The use of dry material may not be appropriate for tritium.) When removable contamination on objects of a surface 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 out. Except for transuranics and ²²⁶Ra, ²²⁸Ra, ²²⁷Ac, ²²⁸Th, ²³⁰Th, and ²³¹Pa alpha emitters, it is not necessary to use wiping techniques to measure removable contamination levels if direct scan surveys indicate that the total residual surface contamination levels are within the limits for removable contamination.

^dThe level may be averaged over 1 m² provided the maximum surface activity in any area of 100 cm² is less than 3 times the guideline values. For purposes of averaging, any square meter of surface will be considered above the activity guide G if: (1) from measurements of a representative number n of sections it is determined that $1/n \sum S_i \geq G$, where S_i is the dpm/100 cm² determined from measurement of section i ; or (2) it is determined that the sum of the activity of all isolated spots or particles in any 100 cm² area exceeds $3G$.

^eThis category of radionuclides includes mixed fission products, including the ⁹⁰Sr which is present in them. It does not apply to ⁹⁰Sr that has been separated from the other fission products or mixtures where the ⁹⁰Sr has been enriched.

Source: adapted from DOE Order 5480.11, "Radiation Protection for Occupational Workers."

**Table 6. Recommended maximum contamination guidelines
for items given radiation or contamination clearance^a**

Direct reading		Transferable (smear)	
Alpha [Bq/100 cm ² (dpm/100 cm ²)]	Beta-gamma [Bq/100 cm ² (dpm/100 cm ²)]	Alpha [Bq/100 cm ² (dpm/100 cm ²)]	Beta-gamma [Bq/100 cm ² (dpm/100 cm ²)]
5.0 (300)	17 (1000)	0.33 (20)	3.3 (200) ^b

^aThese levels may be averaged over 1 m², provided activity in any area of 100 cm² is less than 3 times the direct value.

^bExcept ¹²⁵I, ¹²⁹I, and ²²⁷Ac, which have a limit of 20 dpm/100 cm², and ³H and ¹⁴C, which have a limit of 1000 dpm/100 cm².

Source: ORNL Health Physics Procedure RP-2.5.

Table 7. Contamination release guidelines^a

Item	Direct survey		Transferable (smear)	
	Alpha [Bq/100 cm ² (dpm/100 cm ²)]	Beta-gamma [Bq/100 cm ² (dpm/100 cm ²)]	Alpha [Bq/100 cm ² (dpm/100 cm ²)]	Beta-gamma [Bq/100 cm ² (dpm/100 cm ²)]
Areas, work surfaces, tools, and equipment	5.0 (300)	16.7 (1000)	0.3 (20)	3.3 (200)
Shoes (C-Area) ^b	5.0 (300)	167.0 (10,000)	0.3 (20)	16.7 (1000)
Shoes (personal)	5.0 (300)	16.7 (1000)	0.3 (20)	3.3 (200) ^c
Clothing (C-Area) ^b	50.1 (3000)	250.0 (15,000)	n/a	n/a
Clothing (personal and company)	5.0 (300)	16.7 (1000)	n/a	n/a

^aThese guidelines for alpha are based on the limit for transuranics, while the beta-gamma guides are based on the limit for ⁹⁰Sr. In those cases where specific nuclides are known, these values may be adjusted by ORNL Radiation Protection personnel in accordance with established internal procedures.

^bC-Area clothing and C-Area shoes are not to be worn outside Regulated Areas.

^cExcept for ¹²⁵I, ¹²⁹I, and ²²⁷Ac, for which the guideline is 20 dpm/100 cm².

Source: ORNL procedure RP-2.5, "Radioactive Contamination Control."

10. EMERGENCY RESPONSE PLAN

The Laboratory Shift Superintendent at ORNL coordinates 24-h emergency response coverage from the Shift Superintendent's Department of the Laboratory Protection Division. The on-duty Laboratory Shift Superintendent, assisted by a well-trained plant emergency squad, directs the response to emergencies such as fires, major equipment failure, hazardous materials releases or spills, natural disasters, and sabotage. All spills must be reported to the Office of Environmental Compliance and Documentation. Should a spill occur during operations, all site personnel will evacuate the area unless the spill can be contained with materials in the immediate work area. A spill control kit will be located on the site.

10.1 EMERGENCY PHONE NUMBERS

- To report an emergency from a plant telephone: 911
- To report an emergency from a cellular telephone: 574-6606
- To report an emergency by radio: Station 103 or 403

Contact the Laboratory Shift Superintendent first (by dialing 911 from a plant telephone or 574-6606 from a cellular telephone). The Superintendent is the trained emergency response director.

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

Environmental Management	574-6670
Security Control	574-6646
Radiation Protection	574-6690
Industrial Hygiene	574-6165
Medical	574-7431
Public Relations	574-1640
Safety (Industrial)	574-6679
Security Patrol	574-6277

10.2 EMERGENCY PREPAREDNESS

In case of emergency, the SSHO or the STL will notify, or assign someone to notify, the Laboratory Shift Superintendent as soon as possible, using the following procedures.

10.2.1 Reporting an Emergency

10.2.1.1 Telephone

At the entrance to each WAG is a plant telephone. **The closest telephone and security assistance must be identified and listed in the site-specific WP/HSC for each specific site.** The following instructions should be observed when an emergency is reported by telephone.

- If a plant telephone is accessible, dial **911**. On a cellular telephone, dial **574-6606**.
- Describe the emergency.
- Identify the location of the emergency.
- Identify yourself.
- ***In case of an injury, state whether an ambulance is needed.***
- Listen to and follow any instructions that are given.
- Do not hang up until the emergency response coordinator disconnects first.

10.2.1.2 Fire alarm pull boxes

Pulling a fire alarm box automatically transmits the location of the emergency to the Fire Department and the Emergency Control Center. The person activating the alarm should remain at the alarm box and supply any needed information to the responding emergency squad, as conditions warrant. **The locations of the nearest pull boxes must be identified in the site-specific WP/HSC, and all on-site personnel must be informed of these locations.**

10.2.1.3 Radio

When **Station 103 or 403** is called, the Laboratory Shift Superintendent will be notified of the emergency. The nearest radio and security assistance must be documented in the site-specific WP/HSC. Instruction on the radio use and documentation of this training must be included in the site-specific logbook. When reporting an emergency by radio, personnel should

- confirm that an emergency situation exists;
- describe the emergency;
- identify the location of the emergency;
- identify themselves; and
- listen to and follow any instructions.

10.2.2 Alarm Signals

10.2.2.1 Evacuation alarms

Evacuation alarms are denoted by a steady or continuous sounding from the plant public address (PA) system. The SSHO or STL will designate the evacuation routes. Personnel are to evacuate the site or area, proceed to the assembly point designated by the SSHO or STL, and wait for further instructions.

10.2.2.2 Radiation alarms

Radiation alarms are denoted by rotating red beacon lights and a steady sound from a clarion horn. Personnel are to evacuate the site or area, proceed to the assembly point designated by the SSHO or STL, and wait for further instructions.

10.2.2.3 Take-cover alarms

Take-cover alarms are denoted by an intermittent or wailing siren sound from the plant PA system. Personnel are to seek immediate protective cover in a strong sheltered part of a building. Personnel should evacuate mobile structures to a permanent building.

10.2.2.4 Standard alerting tone

The standard alerting tone is a high-low tone from the plant PA system. Upon hearing this type of tone, personnel should listen carefully; an emergency announcement will follow.

10.2.3 Evacuation Procedures

The SSHO should provide the following instructions to all site personnel during the pre-entry briefing and should document that these instructions have been provided.

- All personnel are to familiarize themselves with the evacuation routes that are designated (verbally or by posting) by the SSHO or STL.
- In the event of an evacuation, personnel are to proceed to the predetermined assembly point and wait for further instructions.
- The SSHO or STL and crew will follow instructions given by the Emergency Response Team upon its arrival.

10.2.4 Important Reminders

The following items are key instructions for reporting and responding to an emergency.

- Know the telephone number of the Laboratory Shift Superintendent: **574-6606, 911, or Station 103 or 403.**
- Know how to summon an ambulance: dial **911** and give the location. Wait for the arrival of first-aid personnel.
- Know the quickest way to summon the plant emergency squad: pull a fire alarm box and wait for the arrival of the Emergency Response Team.
- **Do not hang up until the emergency response coordinator disconnects first.**
- Know where the closest rest rooms, break facilities, and water can be located.

10.3 SITE ACTION PLAN

10.3.1 Site Preparation

Provisions of this document are mandatory for all on-site employees and visitors engaged in the WAG 2 RI&SI project activities including, but not limited to, initial site reconnaissance, mobilization, project operations, sampling, and demobilization.

At the pre-entry health and safety briefing, all field investigation personnel shall receive a copy of the site-specific plan and shall complete work in accordance with this HASP and the site-specific WP/HSC. The pre-entry briefing shall be held prior to the commencement of any field operations so that field personnel may become familiar with potential hazards and mandatory field procedures. Each potential field person will be required to sign and date a designated section within the field logbook, stating that he or she has received a pre-entry health and safety briefing and a copy of the health and safety plan.

Also at the pre-entry briefing, all personnel will provide the STL with documentation of successful completion of training requirements, in accordance with 29 CFR 1910.120. The required training may change depending on the type of job, the location of the job, and the potential hazards. The types of training required are determined by the ORNL HPC and may vary from site to site. "Tailgate" meetings may be called during field activities to inform site personnel of potential health and safety concerns that may arise due to unplanned field conditions. At the discretion of the ORNL IH Department, identified individuals may be placed on a hazardous waste worker medical monitoring program, in accordance with 29 CFR 1910.120. The ORNL Health Center will be provided with the names of on-site participants by the ORNL HPC and will dispense the appropriate health care. Subcontractors will receive health care and monitoring from their employer's occupational physician. All personnel will also participate in the Energy Systems radiological dosimetry program, which requires thermoluminescent dosimeter badges to be worn on site.

10.3.2 Site Description

The "Project and Site Description" section of the site-specific WP/HSC must be completed for each specific WAG 2 RI&SI project (as well as all other sections of the WP/HSC). A description of the project noting buildings and roads associated with the site must be included to help identify the area in question. A brief description of topography and terrain will be included in this section of the site-specific WP/HSC, as well as any unusual features of known or believed obstacles that could present difficulties in completion of the project. A description of the site's history and process information, if available, should be included in this section to aid the WAG 2 RI&SI team in evaluating any hazards that could arise during the project. A description of the work tasks and objectives will also be included.

REFERENCES

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2. G. P. Atwood, *Quality Assurance Plan for the Remedial Investigation of Waste Area Grouping 2 at the Oak Ridge National Laboratory*, ORNL/ER-134, Martin Marietta Energy Systems, Inc., Oak Ridge, Tennessee, December 1992.
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5. *1992-1993 Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices*, American Conference of Governmental Industrial Hygienists, Cincinnati, Ohio, 1992.
6. *Oak Ridge National Laboratory Waste Management Plan*, ORNL/TM-11433/R2, Martin Marietta Energy Systems, Inc., Oak Ridge, Tennessee, 1992.

Appendix A

SAMPLE WAG 2 RI&SI SITE-SPECIFIC WORK PLAN/HEALTH AND SAFETY CHECKLIST

**WAG 2 REMEDIAL INVESTIGATION AND SITE INVESTIGATION
WORK PLAN/HEALTH AND SAFETY CHECKLIST**

APPROVALS

**WAG 2 RI&SI Project Safety and Health
Officer**

Date

WAG 2 RI&SI Project Manager

Date

ORNL Industrial Safety Representative

Date

ORNL Industrial Hygiene Representative

Date

ORNL Fire Protection Representative

Date

**ORNL Office of Laboratory Protection
Representative**

Date

**ORNL Office of Radiation Protection
Representative**

Date

**ORNL HAZWOPER Program
Coordinator**

Date

ORNL ER ES&H Manager

Date

**ORNL ER Program Manager, DOE
Environmental Restoration Division**

Date

ACRONYMS

ACGIH	American Conference of Governmental Industrial Hygienists
DOE	Department of Energy
ER	Environmental Restoration
ES&H	Environmental, Safety, and Health
ESD	Environmental Sciences Division
FID	flame ionization detector
FSC	Field Sampling Coordinator
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
HP	Health Physics
HPC	HAZWOPER Program Coordinator
IH	Industrial Hygiene
ORNL	Oak Ridge National Laboratory
OSHA	Occupational Safety and Health Administration
PA	public address
PEL	permissible exposure limit
PID	Photoionization detector
PM	Project Manager
PPE	personal protective equipment
QA	Quality Assurance
QAC	QA Coordinator
QC	quality control
RCO	Radiation Control Officer
RI	Remedial Investigation
SARA	Superfund Amendments and Reauthorization Act
SSHO	Site Safety and Health Officer
STL	Sampling Team Leader
TLV	threshold limit value
WAG	Waste Area Grouping
WAG 2 RI&SI	WAG 2 Remedial Investigation/Feasibility Study and Site Investigations Program
WBC	whole body count
WBGT	wet-bulb globe temperature
WOC	White Oak Creek
WP/HSC	Work Plan/Health and Safety Checklist

WAG 2 REMEDIAL INVESTIGATION AND SITE INVESTIGATION SITE-SPECIFIC WORK PLAN/ HEALTH AND SAFETY CHECKLIST FOR

1. INTRODUCTION

This site-specific Work Plan/Health and Safety Checklist (WP/HSC) is a supplement to the general health and safety plan (HASP) for Waste Area Grouping (WAG) 2 remedial investigation and site investigation (WAG 2 RI&SI) activities [*Health and Safety Plan for the Remedial Investigation and Site Investigation of Waste Area Grouping 2 at the Oak Ridge National Laboratory, Oak Ridge, Tennessee* (ORNL/ER-169)] and provides specific details and requirements for the WAG 2 RI&SI _____ task. This WP/HSC identifies specific site operations, site hazards, and any recommendations by Oak Ridge National Laboratory (ORNL) health and safety organizations [i.e., Industrial Hygiene (IH), Health Physics (HP), and/or Industrial Safety] that would contribute to the safe completion of the WAG 2 RI&SI.

Together, the general HASP for the WAG 2 RI&SI (ORNL/ER-169) and the completed site-specific WP/HSC meet the health and safety planning requirements specified by 29 CFR 1910.120 and the ORNL Hazardous Waste Operations and Emergency Response (HAZWOPER) Program Manual. In addition to the health and safety information provided in the general HASP for the WAG 2 RI&SI, details concerning the site-specific task are elaborated in this site-specific WP/HSC, and both documents, as well as all pertinent procedures referenced therein, will be reviewed by all field personnel prior to beginning operations.

2. PRE-ENTRY HEALTH AND SAFETY BRIEFING

The purpose of the pre-entry health and safety briefing is to inform all workers of (1) any and all potential safety and health hazards they may encounter while working on the task identified in the WP/HSC and (2) site-specific emergency response measures. How the work will be accomplished, who should be notified in case of an emergency, and any and all questions will be addressed by the Site Safety and Health Officer (SSHO) at this time. The SSHO will confirm with the Technical Resources and Training Section that ORNL personnel accessing the site areas have received the health and safety training that qualifies them to work at this site. (ORNL special access badges may be used as proof of training.) Each potential field person will be required to sign and date a form or designated section within the field logbook, stating that he or she has received a pre-entry briefing and has reviewed both the WAG RI&SI general HASP and this site-specific WP/HSC.

3. PROJECT AND SITE DESCRIPTION

In this section the objectives of the project must be given, the tasks to be performed must be listed, and a detailed description of the site must be given.

3.1 PROJECT OBJECTIVES

3.2 TASK TO BE PERFORMED

3.3 HISTORY AND OPERATION OF THE SITE

3.4 SITE DESCRIPTION

Location:

Topography:

4. PROJECT ORGANIZATION

This work will be performed by the WAG 2 RI&SI Program team. ORNL IH, Industrial Safety, and Radiation Protection will provide oversight for this project.

Key personnel and their project roles/responsibilities are listed below.

[illegible]

5. SITE TASK HAZARD EVALUATION

5.1 DESCRIPTION OF TASK TO BE PERFORMED

This section will be completed by the Project Manager, based on knowledge, site history, and site operations, any and all potential hazards that might impact a worker's health and safety, and will describe the tasks to be performed and the associated level of personal protective equipment (PPE) required for those tasks. Specific control measures for the hazards indicated in this section are identified in Sect. 5.2, as are procedures and procedure numbers that will be used in the completion of this task.

5.1.1 Task Description(s)

5.1.1.n *[insert appropriate section number and title for each task]*

Intrusive _____ Nonintrusive _____

Description: _____

Checklist Summary of Site-Specific Hazards

For the specific hazards listed in this section, a check mark (✓) indicates hazards that are intrinsic to the site locale itself. An "X" indicates hazards associated with task performance and/or the equipment and materials that may be used to accomplish the task.

Physical Hazards/Agents

() Heat Stress	() Cold Stress	() Noise
() Confined Space	() Enclosed Space	() Heavy Lifting
() Tripping/Falling	() Electrical	() High Pressure Water
() Oxygen Deficient	() Explosive/Flammable	() Vibration
() Asbestos	() Underground	() Overhead
() Water	() Other: _____	() Other: _____

Construction Hazards

☐ Trenching	☐ Excavating	☐ Heavy Equipment
☐ Demolition	☐ High Work	☐ Welding/Cutting
☐ Ladders	☐ Drilling	☐ Overhead
☐ Overhead	☐ Other: _____	☐ Other: _____

Chemical Hazards

☐ Organic Chemical	☐ Inorganic Chemical	☐ Carcinogen
☐ Corrosive	☐ Reactive	☐ OSHA-Specific Substances
☐ Mutagen	☐ Teratogen	☐ Other: _____

Ionizing Radiation Hazards

☐ Internal Exposure	☐ External Exposure

Nonionizing Radiation Hazards

☐ UV	☐ Radio Frequency	☐ Microwave
☐ Laser		

Biological/Vector Hazards

☐ Wildlife	☐ Plants	☐ Medical Waste
☐ Bacterial	☐ Parasites	☐ Other: _____

Initial Level of Personal Protective Equipment

Level of Protection:	☐ A	☐ C	☐ Modified (+)
	☐ B	☐ D	

Respirator:	☐ SCBA	☐ Full Face	☐ ½-Face Resp.
Cartridge:	_____		

Protective Clothing:	☐ Encapsulating Suit	☐ Tyvek
	☐ Saranex	☐ Splash Suit
	☐ C-zone	☐ Company Clothing (khakis)
	☐ Other: _____	

Head/eye/ear:	☐ Hard Hat	☐ Safety Glasses	☐ Goggles
	☐ Splash Shield	☐ Ear Plugs	☐ Other: _____

Gloves: () Nitrile () Neoprene () PVC
 () Latex () Vinyl () Leather
 () Other: _____

Footwear: () Steel-Toed Leather () Chemical Over-Boots
 () Steel-Toed Rubber () Other: _____

Additional Comments:

Modifications Allowed:

5.1.1.n *[insert appropriate section number and title for each task]*

Intrusive _____ Nonintrusive _____

Description: _____

Checklist Summary of Site-Specific Hazards:

For the specific hazards listed in this section, a check mark (✓) indicates hazards that are intrinsic to the site locale itself. An "X" indicates hazards associated with task performance and/or the equipment and materials that may be used to accomplish the task.

Physical Hazards/Agents

☐ Heat Stress	☐ Cold Stress	☐ Noise
☐ Confined Space	☐ Enclosed Space	☐ Heavy Lifting
☐ Tripping/Falling	☐ Electrical	☐ High Pressure Water
☐ Oxygen Deficient	☐ Explosive/Flammable	☐ Vibration
☐ Asbestos	☐ Underground	☐ Overhead
☐ Water	☐ Other: _____	☐ Other: _____

Construction Hazards

☐ Trenching	☐ Excavating	☐ Heavy Equipment
☐ Demolition	☐ High Work	☐ Welding/Cutting
☐ Ladders	☐ Drilling	☐ Overhead
☐ Overhead	☐ Other: _____	☐ Other: _____

Chemical Hazards

☐ Organic Chemical	☐ Inorganic Chemical	☐ Carcinogen
☐ Corrosive	☐ Reactive	☐ OSHA-Specific Substances
☐ Mutagen	☐ Teratogen	☐ Other: _____

Ionizing Radiation Hazards

☐ Internal Exposure	☐ External Exposure

Nonionizing Radiation Hazards

- ☐ UV ☐ Radio Frequency ☐ Microwave
☐ Laser

Biological/Vector Hazards

- ☐ Wildlife ☐ Plants ☐ Medical Waste
☐ Bacterial ☐ Parasites ☐ Other: _____

Initial Level of Personal Protective Equipment

- Level of Protection: ☐ A ☐ C ☐ Modified (+)
 ☐ B ☐ D

- Respirator: ☐ SCBA ☐ Full Face ☐ ½-Face Resp.
 Cartridge: _____

- Protective Clothing: ☐ Encapsulating Suit ☐ Tyvek
 ☐ Saranex ☐ Splash Suit
 ☐ C-zone ☐ Company Clothing (khakis)
 ☐ Other: _____

- Head/eye/ear: ☐ Hard Hat ☐ Safety Glasses ☐ Goggles
 ☐ Splash Shield ☐ Ear Plugs ☐ Other: _____

- Gloves: ☐ Nitrile ☐ Neoprene ☐ PVC
 ☐ Latex ☐ Vinyl ☐ Leather
 ☐ Other: _____

- Footwear: ☐ Steel-Toed Leather ☐ Chemical Over-Boots
 ☐ Steel-Toed Rubber ☐ Other: _____

Additional Comments:

Modifications Allowed:

5.1.2 Site Control

Site work zones are required in order to reduce the accidental spread of hazardous substances from contaminated areas to clean areas. Identification of work zones will provide control of operations and flow of personnel. The Hazardous Waste Operations and Emergency Response (HAZWOPER) Program Coordinator (HPC) will provide signs for posting HAZWOPER requirements at the site. The HP technician will determine radiological postings. Should additional barriers (rope, tape) or signs be required, HP, IH, and Industrial Safety will be consulted. Personnel accessing the zones must meet access requirements as stated in this plan and posted at the entrance of the zones. The Site Safety and Health Officer (SSHO) is responsible for ensuring all workers and visitors meet site access requirements. Site access requirements are identified in Sect. 8 of the WAG 2 RI&SI HASP. Task-specific training requirements are identified under "Administrative Controls" in Sect. 5.1.1 of this site-specific Work Plan/Health and Safety Checklist (WP/HSC). Section 10 of this site-specific WP/HSC is a record of the qualifications of personnel involved in this specific task.

Use of the "buddy system" is required for this project. All workers will have a partner to work with. To ensure worker safety, personnel will (1) maintain internal communication, (2) remain within a line of sight with other workers, and (3) conduct work-party monitoring. The buddy system will be implemented at the points controlling access to the radiological zones. A two-way radio will be maintained in the support zone to ensure communication with the Laboratory Shift Superintendent and emergency, safety, and health support personnel.

The items below must be completed to ensure that required site controls are identified.

Site posted information/notification required? Yes ____ No ____ NA ____

Site guard required? Yes ____ No ____ NA ____

Access control required? Yes ____ No ____

Entry/exit logs required? Yes ____ No ____

Escape routing/posting required? Yes ____ No ____ If so, include site map.

5.1.3 Administrative Controls (Required Permits, Training, etc.)

5.1.4 Sanitation

Task(s): _____

Potable water required? Yes ____ No ____

Nonpotable water used? Yes ____ No ____

Eating, drinking, and use of tobacco products permitted? Yes ____ No ____

Location: _____

Toilet facilities required? Yes ____ No ____

Location and number: _____

Washing facilities required? Yes ____ No ____

Location: _____

Change rooms required? Yes ____ No ____

Specify: _____

5.1.5 Safety Equipment

5.2 SITE-SPECIFIC HAZARDS AND CONTROLS

This section provides specific details and control measures for each general hazard identified in Sect. 5.1.

5.2.1 Physical Hazards/Agents**Fire/Explosion:**

Task(s): _____

Are flammable liquids present? Yes ____ No ____

Description: _____

Location: _____

Quantity: _____

Containment/storage method: _____

Compressed gas cylinders? Yes ____ No ____

Location: _____

Storage: _____

Additional comments and controls: _____

_____**Confined Space Entry:**

Task(s): _____

Confined space entry required? Yes ____ No ____

If yes, has Industrial Hygiene been contacted? Yes ____ No ____

Confined space entry permit obtained? Yes ____ No ____

Training requirements met? Yes ____ No ____

Oxygen-deficient environment? Yes ____ No ____

Explosive/toxic atmosphere? Yes ____ No ____

Additional comments and controls: _____

Asbestos:

Task(s): _____

Known asbestos present? Yes ____ No ____

Insulation/fiber filling? Yes ____ No ____

Any fibrous material? Yes ____ No ____

Industrial Hygiene contacted? Yes ____ No ____

Electrical Hazards:

Task(s): _____

Electrical shock hazard? Yes ____ No ____

Voltage: _____ Current: _____

Location of hazard: _____

Temperature:

Task(s): _____

Temperature extremes (hot/cold)? Yes ____ No ____

Average daily high temperature (during work shift) (°F/°C) ____

Average daily low temperature (during work shift) (°F/°C) ____

Wet-bulb globe temperature (WBGT) will be obtained prior to daily activities as necessary.
When WBGT is >80° F (26.7° C), ACGIH work-rest regimen guidelines should be followed.

Work load:

Light _____

Moderate _____

Heavy _____

Controls: _____

Cooling/heating equipment needed: _____

Noise Hazards:

Task(s): _____

Potential/known noise source? Yes ____ No ____

Industrial Hygiene notified? Yes ____ No ____

If yes, have engineering controls been established? Yes ____ No ____

If yes, is hearing protection being worn? Yes ____ No ____

Additional comments and controls: _____

Underground Hazards:

Task(s): _____

Are underground hazards present? Yes ____ No ____

Additional comments and controls: _____

Overhead Hazards:

Task(s): _____

Are overhead hazards present? Yes ____ No ____

Additional comments and controls: _____

Machinery Hazards:

Task(s): _____

Is hazardous machinery present or involved in site tasks? Yes ____ No ____

Additional comments and controls: _____

Water Hazards:

Task(s): _____

Are water hazards present or involved in site tasks? Yes ____ No ____

Additional comments and controls: _____

Other Physical Hazards:

Task(s): _____

Hazard: _____

Additional comments and controls: _____

5.2.2 Construction Hazards

Cutting or Welding Hazards:

Task(s): _____

Cutting or welding on site? Yes ____ No ____

If so, explain: _____

Hot-work permit required? Yes ____ No ____

Other Construction Hazards:

Task(s): _____

Hazard: _____

Additional comments and controls: _____

5.2.3 Chemical Hazards**Chemicals to be brought on site:**

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Are MSDSs assembled for chemicals to be brought on site? Yes ___ No ___ NA ___

Other chemical hazards known or suspected to exist on site:

The information indicated below must be provided for each chemical hazard known or suspected to exist on site. The contaminants should be identified by the Project Manager, and the associated information required for each contaminant should be provided by the SSHO.

Contaminant: _____

Physical property: _____

PEL/TLV: _____

IDLH: _____

Route of exposure: _____

Target organ: _____

Symptoms: _____

LEL: _____

UEL: _____

Water solubility: _____

Ionization potential: _____

Monitoring equipment: _____

Additional comments/controls: _____

Contaminant: _____

Physical property: _____

PEL/TLV: _____

IDLH: _____

Route of exposure: _____

Target organ: _____

Symptoms: _____

LEL: _____

UEL: _____

Water solubility: _____

Ionization potential: _____

Monitoring equipment: _____

Additional comments/controls: _____

5.2.4. Ionizing Radiation Hazards

Isotope: _____

Ionizing radiation present: Yes ___ No ___ (alpha/beta/gamma/neutron)

Radiation work permit required: Yes ___ No ___

Health Physics contacted: Yes ___ No ___

Health Physics coverage: Yes ___ No ___

Protective clothing required: Yes ___ No ___

Additional comments and controls: _____

Isotope: _____

Ionizing radiation present: Yes ___ No ___ (alpha/beta/gamma/neutron)

Radiation work permit required: Yes ___ No ___

Health Physics contacted: Yes ___ No ___

Health Physics coverage: Yes ___ No ___

Protective clothing required: Yes ___ No ___

Additional comments and controls: _____

Isotope: _____

Ionizing radiation present: Yes ___ No ___ (alpha/beta/gamma/neutron)

Radiation work permit required: Yes ___ No ___

Health Physics contacted: Yes ___ No ___

Health Physics coverage: Yes ___ No ___

Protective clothing required: Yes ___ No ___

Additional comments and controls: _____

Isotope: _____

Ionizing radiation present: Yes ___ No ___ (alpha/beta/gamma/neutron)

Radiation work permit required: Yes ___ No ___

Health Physics contacted: Yes ___ No ___

Health Physics coverage: Yes ___ No ___

Protective clothing required: Yes ___ No ___

Additional comments and controls: _____

5.2.5 Nonionizing Radiation Hazards

High-voltage (>100 kV) electrical transmission lines nearby? Yes ____ No ____

Location, distance, and voltage: _____

Additional comments and controls: _____

Radio frequency radiation sources (AM and/or FM broadcast towers, radio frequency sealers) nearby? Yes ____ No ____

Location and distance: _____

Additional comments and controls: _____

Microwave sources in use on site? Yes ____ No ____

Location and distance: _____

Additional comments and controls: _____

Lasers in use nearby? Yes ____ No ____

Location and laser class: _____

Additional comments and controls: _____

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

Additional comments and controls: _____

Are ultrasound sources in use on site? Yes ____ No ____

Location: _____

Additional comments and controls: _____

5.2.6 Biological/Vector Hazards

Task(s): _____

Hazard: _____

Comments and controls: _____

Task(s): _____

Hazard: _____

Comments and controls: _____

Task(s): _____

Hazard: _____

Comments and controls: _____

Task(s): _____

Hazard: _____

Comments and controls: _____

6. MONITORING REQUIREMENTS

This section should be completed with consultation from the IH representative or the HPC and the HP representative.

6.1 DIRECT READING INSTRUMENTS

	Task(s)	Monitoring Frequency	Action Level
LEL meter	_____	_____	_____
O ₂ meter	_____	_____	_____
Colorimetric indicator tubes	_____	_____	_____
Photoionization detector (PID)	_____	_____	_____
Flame ionization detector (FID)	_____	_____	_____
Alpha meter	_____	_____	_____
Beta/gamma meter	_____	_____	_____
Area radiation monitors	_____	_____	_____
Noise meter	_____	_____	_____
Other (specify)	_____	_____	_____

6.2 PERSONAL MONITORING

	Task(s)	Monitoring Frequency	Action Level
Whole-body dosimetry	_____	_____	_____
Extremity dosimetry	_____	_____	_____
Whole-body count	_____	_____	_____
Urinalysis/bioassay	_____	_____	_____
Chemical air sampling	_____	_____	_____
Radiation air sampling	_____	_____	_____

Instruments used by the IH representative will be calibrated and maintained in accordance with IH Standard Operating Procedures. Instruments used by the Office of Radiation Protection are calibrated and source-checked in accordance with established HP procedures.

7. DECONTAMINATION

The purpose of decontamination is to prevent contaminants that may be present on protective clothing and equipment from coming into contact with personnel as they unsuit. Also, decontamination protects workers from hazardous substances that may contaminate and eventually permeate the PPE used on site, and it protects personnel by minimizing the transfer of harmful materials into clean areas. Combining decontamination with the correct sequential method of removing PPE will prevent exposure to personnel leaving the work areas as well as preventing off-site migration of contaminants. Generally, decontamination is accomplished by starting with the most heavily contaminated item and progressing to the least contaminated item.

Personnel will remove any disposable PPE, in the order listed in the WAG 2 RI&SI HASP, Sect. 6.2, and dispose of it in provided containers before leaving the radiological area. The Radiation Protection representative will assist the SSHO in establishing stations and sequence for doffing of PPE. Monitoring (frisking) of personnel and equipment prior to exiting contaminated areas will be conducted by the SSHO.

Upon job completion, all equipment will be surveyed by ORNL Radiation Protection and tagged accordingly. If contamination is detected on equipment, the equipment will be cleaned with a paper towel. Equipment that cannot be decontaminated will be bagged and disposed of in accordance with instructions from the Radiation Protection representative.

For a more detailed explanation of decontamination, see Sect. 9 of the WAG 2 RI&SI HASP.

8. PERSONAL PROTECTIVE EQUIPMENT

PPE required for each specific job/activity is addressed in Sect. 5.1.1 of this site-specific WP/HSC. For a more detailed description of the recommended levels of PPE, see Sect. 6 of the WAG 2 RI&SI HASP. The recommended levels of PPE shall be determined by the SSHO and the HP technician on a task-by-task basis and shall incorporate recommendations of the appropriate ORNL health and safety organizations. Downgrades of PPE may be recorded by the SSHO in the project logbook. All upgrades of PPE will require approval from the HPC, IH, HP, and Industrial Safety and revision of this WP/HSC.

9. MEDICAL SURVEILLANCE

9.1 PHYSICAL EXAMINATION

Generally, WAG 2 RI&SI personnel do not meet the criteria to meet the criteria listed in 29 CFR 1910.120 for inclusion in the Hazardous Waste Worker Medical Surveillance Program. If field conditions should change, personnel who meet these criteria will be included in the ORNL Hazardous Waste Worker Medical Surveillance Program.

Has the ORNL HPC been contacted? Yes ____ No ____

9.2 PERSONNEL SAMPLING/BIOLOGICAL MONITORING

This section is to be filled out by the SSHO and the HP or IH technician in the event a worker has the potential of an exposure to a contaminant that could be detrimental to his or her health or safety. Because of their potential to be exposed to radioactive contaminants, WAG 2 RI&SI field personnel are participants in the bioassay program.

Chemical in question: _____

Personnel monitoring device: _____

Biological samples required? Yes ____ No ____

Biological samples taken: _____

Additional comments and controls: _____

Chemical in question: _____

Personnel monitoring device: _____

Biological samples required? Yes ____ No ____

Biological samples taken: _____

Additional comments and controls: _____

Nuclide in question: _____

Personnel monitoring device: _____

Biological samples required? Yes ____ No ____

Biological samples taken: _____

Additional comments and controls: _____

Nuclide in question: _____

Personnel monitoring device: _____

Biological samples required? Yes ____ No ____

Biological samples taken: _____

Additional comments and controls: _____

Nuclide in question: _____

Personnel monitoring device: _____

Biological samples required? Yes ____ No ____

Biological samples taken: _____

Additional comments and controls: _____

10. SITE PERSONNEL AND CERTIFICATION

Site-specific training requirements are listed in Sect 5.1.3 of this WP/HSC.

Name: _____ Badge no.: _____

Job performed: _____

Respirator qualified? Yes ____ No ____ Expiration date ____

HAZWOPER (SARA/OSHA) 40-h training? Yes ____ No ____ Expiration date ____

HAZWOPER (SARA/OSHA) 24-h training? Yes ____ No ____ Expiration date ____

HAZWOPER (SARA/OSHA)

8-h annual refresher? Yes ____ No ____ Expiration date ____

HAZWOPER (SARA/OSHA)

8-h annual supervisor training? Yes ____ No ____ Expiration date ____

Confined space entry training? Yes ____ No ____ Expiration date ____

Radiation Worker I? Yes ____ No ____ Expiration date ____

Radiation Worker II? Yes ____ No ____ Expiration date ____

Asbestos worker? Yes ____ No ____ Expiration date ____

Other training: _____

Name: _____ Badge no.: _____

Job performed: _____

Respirator qualified? Yes ____ No ____ Expiration date ____

HAZWOPER (SARA/OSHA) 40-h training? Yes ____ No ____ Expiration date ____

HAZWOPER (SARA/OSHA) 24-h training? Yes ____ No ____ Expiration date ____

HAZWOPER (SARA/OSHA)

8-h annual refresher? Yes ____ No ____ Expiration date ____

HAZWOPER (SARA/OSHA)

8-h annual supervisor training? Yes ____ No ____ Expiration date ____

Confined space entry training? Yes ____ No ____ Expiration date ____

Radiation Worker I? Yes ____ No ____ Expiration date ____

Radiation Worker II? Yes ____ No ____ Expiration date ____

Asbestos worker? Yes ____ No ____ Expiration date ____

Other training: _____

Name: _____ Badge no.: _____

Job performed: _____

Respirator qualified? Yes ____ No ____ Expiration date ____

HAZWOPER (SARA/OSHA) 40-h training? Yes ____ No ____ Expiration date ____

HAZWOPER (SARA/OSHA) 24-h training? Yes ____ No ____ Expiration date ____

HAZWOPER (SARA/OSHA)

8-h annual refresher? Yes ____ No ____ Expiration date ____

HAZWOPER (SARA/OSHA)

8-h annual supervisor training? Yes ____ No ____ Expiration date ____

Confined space entry training? Yes ____ No ____ Expiration date ____

Radiation Worker I? Yes ____ No ____ Expiration date ____

Radiation Worker II? Yes ____ No ____ Expiration date ____

Asbestos worker? Yes ____ No ____ Expiration date ____

Other training: _____

Name: _____ Badge no.: _____

Job performed: _____

Respirator qualified? Yes ____ No ____ Expiration date ____

HAZWOPER (SARA/OSHA) 40-h training? Yes ____ No ____ Expiration date ____

HAZWOPER (SARA/OSHA) 24-h training? Yes ____ No ____ Expiration date ____

HAZWOPER (SARA/OSHA)

8-h annual refresher? Yes ____ No ____ Expiration date ____

HAZWOPER (SARA/OSHA)

8-h annual supervisor training? Yes ____ No ____ Expiration date ____

Confined space entry training? Yes ____ No ____ Expiration date ____

Radiation Worker I? Yes ____ No ____ Expiration date ____

Radiation Worker II? Yes ____ No ____ Expiration date ____

Asbestos worker? Yes ____ No ____ Expiration date ____

Other training: _____

Name: _____ Badge no.: _____

Job performed: _____

Respirator qualified? Yes ____ No ____ Expiration date ____

HAZWOPER (SARA/OSHA) 40-h training? Yes ____ No ____ Expiration date ____

HAZWOPER (SARA/OSHA) 24-h training? Yes ____ No ____ Expiration date ____

HAZWOPER (SARA/OSHA)

8-h annual refresher? Yes ____ No ____ Expiration date ____

HAZWOPER (SARA/OSHA)

8-h annual supervisor training? Yes ____ No ____ Expiration date ____

Confined space entry training? Yes ____ No ____ Expiration date ____

Radiation Worker I? Yes ____ No ____ Expiration date ____

Radiation Worker II? Yes ____ No ____ Expiration date ____

Asbestos worker? Yes ____ No ____ Expiration date ____

Other training: _____

Name: _____ Badge no.: _____

Job performed: _____

Respirator qualified? Yes ____ No ____ Expiration date ____

HAZWOPER (SARA/OSHA) 40-h training? Yes ____ No ____ Expiration date ____

HAZWOPER (SARA/OSHA) 24-h training? Yes ____ No ____ Expiration date ____

HAZWOPER (SARA/OSHA)

8-h annual refresher? Yes ____ No ____ Expiration date ____

HAZWOPER (SARA/OSHA)

8-h annual supervisor training? Yes ____ No ____ Expiration date ____

Confined space entry training? Yes ____ No ____ Expiration date ____

Radiation Worker I? Yes ____ No ____ Expiration date ____

Radiation Worker II? Yes ____ No ____ Expiration date ____

Asbestos worker? Yes ____ No ____ Expiration date ____

Other training: _____

Name: _____ Badge no.: _____

Job performed: _____

Respirator qualified? Yes ____ No ____ Expiration date ____

HAZWOPER (SARA/OSHA) 40-h training? Yes ____ No ____ Expiration date ____

HAZWOPER (SARA/OSHA) 24-h training? Yes ____ No ____ Expiration date ____

HAZWOPER (SARA/OSHA)

8-h annual refresher? Yes ____ No ____ Expiration date ____

HAZWOPER (SARA/OSHA)

8-h annual supervisor training? Yes ____ No ____ Expiration date ____

Confined space entry training? Yes ____ No ____ Expiration date ____

Radiation Worker I? Yes ____ No ____ Expiration date ____

Radiation Worker II? Yes ____ No ____ Expiration date ____

Asbestos worker? Yes ____ No ____ Expiration date ____

Other training: _____

Name: _____ Badge no.: _____

Job performed: _____

Respirator qualified? Yes ____ No ____ Expiration date ____

HAZWOPER (SARA/OSHA) 40-h training? Yes ____ No ____ Expiration date ____

HAZWOPER (SARA/OSHA) 24-h training? Yes ____ No ____ Expiration date ____

HAZWOPER (SARA/OSHA)

8-h annual refresher? Yes ____ No ____ Expiration date ____

HAZWOPER (SARA/OSHA)

8-h annual supervisor training? Yes ____ No ____ Expiration date ____

Confined space entry training? Yes ____ No ____ Expiration date ____

Radiation Worker I? Yes ____ No ____ Expiration date ____

Radiation Worker II? Yes ____ No ____ Expiration date ____

Asbestos worker? Yes ____ No ____ Expiration date ____

Other training: _____

Appendix B

FIELD CHANGE CONTROL LOG AND FIELD CHANGE ORDER FORMS

ER Field Change Order (FCO)			
FCO NO. _____	MODIFICATION NO. _____	DATE _____	WORK AUTHORIZATION _____
TYPE OF CHANGE _____		PRIORITY ☐ EMERGENCY ☐ URGENT ☐ ROUTINE	
ADS NO. _____	CYWP NO. _____	CWBS NO. _____	☐ MINOR ☐ MAJOR ☐ OTHER
REQUESTER IDENTIFICATION			
NAME _____		ORGANIZATION _____	PHONE _____
TITLE _____		SIGNATURE _____	
BASELINE IDENTIFICATION			
BASELINE(S) AFFECTED ☐ COST ☐ SCOPE ☐ MILESTONES ☐ METHOD OF ACCOMPLISHMENT			
PROGRAM SERVICE ORDER NO. _____		REVISION NO. _____	CAM SIGNATURE _____
DESCRIPTION OF CHANGE _____		PHONE _____	
JUSTIFICATION			
IMPACT OF NOT IMPLEMENTING REQUEST			
PARTICIPANTS AFFECTED BY IMPLEMENTING REQUEST			
COST ESTIMATE (\$) _____		ESTIMATOR SIGNATURE _____	PHONE _____ DATE _____
PREVIOUS FC AFFECTED? ☐ YES ☐ NO			
APPROVAL			
PROJECT MANAGER SIGNATURE _____		DATE _____	
OAS REVIEW _____		DATE _____	
TIME FROM INITIATION TO ACTION _____			

NOTE: CONTINUE ON EXTRA SHEETS, AS NECESSARY

Fig. B.1. Environmental Restoration Field Change Order form.

[illegible]

Fig. B.2. Environmental Restoration Field Change Log.

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