

**REMEDIAL INVESTIGATION AND FEASIBILITY STUDY
FINAL WORK PLAN
EXTERIOR INDUSTRIAL WASTE DITCH
NAVAL REACTORS FACILITY
IDAHO FALLS, IDAHO**

APPENDIX C

IWD SITE SPECIFIC HEALTH AND SAFETY PLAN

September 1992

Prepared for the
U.S. Department of Energy
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1.0 INTRODUCTION

This section of the Industrial Waste Ditch (IWD) Site Specific Health and Safety Plan (HASP) document defines applicability and responsibilities with respect to compliance with Health and Safety programs.

1.1 Scope and Applicability of the Site Health and Safety Plan

The purpose of this IWD Site Specific HASP is to define the requirements and designate protocols to be followed during the Remedial Investigation/Feasibility study (RI/FS) activities at the IWD located at the Naval Reactors Facility (NRF). Applicability extends to all NRF employees, Department of Energy-Idaho Branch Office personnel, contractors, subcontractors, and visitors.

All personnel on site, contractors and subcontractors included, shall be informed of the site emergency response procedures and any potential fire, explosion, health, or safety hazards of the operation. This site specific HASP summarizes those hazards and defines protective measures planned for the IWD site.

This plan must be reviewed and an agreement to comply with the requirements must be made by all personnel prior to entering the exclusion zone or contamination reduction zone. In addition, NRF and each subcontractor will provide protective equipment to their respective personnel.

During development of this plan, consideration was given to current safety standards as defined by: 1) EPA/OSHA/NIOSH, 2) health effects and standards for known contaminants, and 3) procedures designed to account for the potential of exposure to unknown substances. Specifically, the following reference sources have been consulted:

- DOE Order 5480.4
- OSHA 29 CFR 1910.120 and EPA 40 CFR 311
- U.S. EPA, OERR ERT Standard Operating Safety Guides (1988)
- OSHA/NIOSH/EPA/USCG Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (1985)
- NIOSH Pocket Guide to Chemical Hazards (1990)
- 1990-1991 Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, 1990
ACGIH
Cincinnati, OH
- DOE Drilling Safety Manual, Prepared by EG&G Idaho Inc., (1983)

1.2 Visitors

All visitors entering the contamination reduction zone and exclusion zone at the site will be required to read and verify compliance with the provisions of this site specific HASP. In addition, visitors will be expected to comply with relevant OSHA requirements such as medical monitoring (Sec. 6.0), training (Sec. 4.0), and respiratory protection (Sec. 5.0).

In the event that a visitor does not adhere to the provisions of this site specific HASP, he/she will be required to leave the work area. All nonconformance events will be recorded in the site log.

2.0 KEY PERSONNEL/IDENTIFICATION OF HEALTH AND SAFETY PERSONNEL

In order to properly administer the HASP's requirements, the identification and assignment of responsibilities to key individuals is essential for the development, coordination and implementation of the plan. The organizational structure should identify these individuals and establish the chain of command to effectively implement the plan through an integrated effort.

2.1 Key Personnel

The personnel and organizations that are critical to the planned activities at the site are detailed in the Work Plan for the IWD. The Work Plan also discusses the specific duties associated with the positions comprising the organizational structure. The subcontractor personnel will be identified when the contract has been awarded. The organizational structure presented in the Work Plan will be reviewed and updated as necessary.

2.2 Site Specific Health and Safety Personnel

Health and Safety Officer (HSO) - The HSO has the responsibility for ensuring the adequacy and proper implementation of the HASP on all field work activities being conducted. Therefore, the HSO must be completely familiar with the provisions of the site specific HASP. The HSO also has the responsibility to advise the Project Engineer (PE) on health and safety aspects concerning site operations. The HSO shall also conduct periodic site inspections to evaluate the effectiveness of the HASP. The HSO shall review and modify the HASP when unforeseen hazardous conditions are encountered that are not adequately addressed in the HASP. The HSO holds periodic site safety meetings to address any safety related concerns at the site. The HSO will also confirm that onsite personnel have the proper medical surveillance program and appropriate training. Additionally, the HSO shall ensure that the site monitoring equipment is properly maintained and calibrated. The HSO will make sure that the appropriate type of Personal Protection Equipment (PPE) is being utilized and in good condition.

Changing field conditions may require decisions to be made concerning adequate protection programs. Therefore, the personnel assigned as HSO and SSO will be experienced and will meet the additional training requirements specified by OSHA in 29 CFR 1910.120 (see Section 4.0 of this HASP).

The subcontractor will designate the site HSO for the planned IWD work effort who will work together with the following NRF site representatives.

Site Safety Officer (SSO) - The SSO will be the on-site daily representative of the HSO. The SSO has the responsibility for ensuring the daily implementation of the SITE SPECIFIC HEALTH AND SAFETY PLAN (HASP), and any other site specific health and safety plans developed by the HSO, on all field work activities being conducted. The SSO will maintain close liaison with the HSO, and will provide weekly written status reports. Any unusual circumstances shall be brought to the immediate attention of the HSO.

NRF Representatives

S. D. Lee
NRF/Environmental Remediation
3-5275

K. D. Willie
NRF/Environmental Remediation
3-5513

A. Sierra
NRF/Environmental Remediation
3-5024

In addition, an Industrial Hygienist (certified by the American Board of Industrial Hygiene in Comprehensive Practice) and NRF Safety personnel will serve in a consulting capacity for the planned site activities.

2.3 Organizational Responsibility

NRF:

In general, the NRF site representative is responsible for overall project administration and contractor oversight. As a part of that oversight function, NRF will ensure that project plans, at a minimum, meet DOE requirements and that the health and safety of all site personnel is a primary concern. The organizational structure for NRF is included in the IWD Work Plan.

Field Investigation Team (FIT):

The FIT organization is responsible for data collection activities in response to RI/FS activities for the IWD under NRF oversight. The FIT will consist primarily of subcontractor personnel. The FIT organizational structure for the site subcontractor will include the position of HSO.

3.0 SITE OPERATION SAFETY AND HEALTH RISK ANALYSIS

3.1 Historical Overview of Site

This site specific HASP defines the hazards and methods to protect personnel from those hazards as identified in previous site work or background information. For a thorough overview of historical information concerning the IWD refer to the following documents:

Scope of Work for the IWD
Environmental Remediation

RI/FS Work Plan for the IWD
Environmental Remediation

3.2 General Site Description

The IWD is an industrial wastewater channel that accommodates the disposal of liquid discharges from prototype plant and support operations at NRF. The area of the IWD where all site work activities will take place is located outside the NRF perimeter fence. Specifically, this area of the IWD is an open channel that is located in the northwest corner of the facility and extends out in a northeasterly direction for 3.2 miles.

This channel typically has water flowing from the outfall to approximately 1.2 to 1.6 miles with various types of vegetation growing along this portion of the IWD. Beyond this point, the channel is dry with little vegetation on the channel bed. The channel is part of an old stream bed that is now isolated by roads and canals. There is a dirt road that runs along the length of the channel. Since around 1954, the IWD has been used for liquid waste disposal and has evolved into a significant ecological feature.

3.3 Task by Task Risk Analysis

The evaluation of hazards is based upon the knowledge of site background presented in Section 3.1, and anticipated risks posed by the specific operation.

The following subsections describe each task/operation in terms of the specific hazards associated with it. In addition, the protective measures to be implemented during completion of those operations are also identified.

The various activities that will take place on and around the IWD include:

- Geophysical site surveying
- Surface water sampling
- Sediment sampling and
- Borehole drilling activities

The data obtained from these activities will be used to support the objectives detailed in the RI/FS for the IWD. Details of these activities will be included in the Work Plan document. The planned activities will commence in the spring of 1992 and will terminate around the fall of 1992.

Table 3.1 provides a summary of the contaminant exposure hazards for each task at the Site. From previous site investigations and analysis of the data, the contaminants seem to be concentrated in the IWD channel sediments (in the interval from 0 to 15 inches deep). There is also a decrease in contaminant concentration with increasing depth. Levels above background of select heavy metals (chromium, lead, mercury and silver) have been detected in the soils below the sediments. Evaluation of the data for organic contaminants indicate that these contaminants are bound up in the upper six inches of the IWD channel sediments. Based on the above evaluation, no exposure to any contaminant of concern is expected for the geophysical site survey. Only a slight potential exists for contaminant exposure during surface water sampling; however, precautions will be taken (refer to the list of PPE recommended for this task under section 5.2). No exposure to the contaminants of concern is expected for the soil boring task outside the IWD channel provided the work area is away from the dredge piles. The potential of exposure to the contaminants of concern may exist should drilling be done in the IWD channel and if the process generates dust that may contain contaminants. In addition, the potential of low exposure to the contaminants of concern exists during sediment sampling since the contaminants were detected in this media during previous sampling activities.

Table 3.1 Parameters for Contaminants of Concern								
Contaminant	TLV-TWA mg/m ³	TLV- STEL mg/m ³	PEL- TWA mg/m ³	PEL- CEILING mg/m ³	IDLH mg/m ³	Contaminant Media	Routes of Exposure	Symptoms of Acute Exposure
Arsenic	0.2	NE	0.01	NE	100	Sediment Soil Surf. H ₂ O Expected Level: trace	Inhalation Ingestion Contact	Dermatitis, respiratory, irritation gastrointestinal disturbance, hyper- pigmentation of skin Ca-Group 1 IARC
Barium, soluble compounds as Ba	0.5	NE	0.5	NE	1100	Sediment Expected Level: Sl. above bkgnd	Inhalation Ingestion Contact	Upper respiratory irritation, muscle spasms, slow pulse, skin & eye irritation, skin burns gastroenteritis
Chromium, II,III compounds as Cr	0.5	NE	0.5	NE	NE	Sediment Soil Expected Level: 30- 1200 ppm (sediment) 30-130 ppm (soil)	Inhalation Contact Ingestion	Sensitization dermatitis
Chromium, VI compounds as Cr	0.05	NE	NE	0.1	30	Sediment Soil Expected Level: 1-20 ppm (sediment)	Contact Inhalation Ingestion	Sensitization dermatitis, skin ulcer, nasal septum perforation, liver kidney damage Ca-Group 1 IARC

Table 3.1 Parameters for Contaminants of Concern								
Contaminant	TLV-TWA mg/m ³	TLV- STEL mg/m ³	PEL- TWA mg/m ³	PEL- CEILING mg/m ³	IDLH mg/m ³	Contaminant Media	Routes of Exposure	Symptoms of Acute Exposure
Chromium, metal	0.5	NE	1.0	NE	NE	Soil Expected Level: 30-100 ppm (soil)	Inhalation Ingestion	Histologic fibrosis of the lungs
Lead	0.15	NE	0.05	NE	700	Sediment Soil Expected Level: 15-90 ppm (sediment) 15-50 ppm (soil)	Inhalation Ingestion Contact	Insomnia, weakness, facial pallor, anorexia, lead gum line, low weight, malnutrition, constipation, abdominal pain, hypertension Ca-Group 2B IARC
Mercury (vapor) as Hg, skin	0.05	NE	0.05	NE	28	Sediment Soil Expected Level: 1-10 ppm (sediment) 0.1-0.4 ppm (soil)	Inhalation Skin Absorption Contact	Cough, chest pain, tremor, insomnia, irritability, indecision, headache, fatigue, weakness, gastrointestinal disturbance, irritation of eyes, skin

Table 3.1 Parameters for Contaminants of Concern								
Contaminant	TLV-TWA mg/m ³	TLV- STEL mg/m ³	PEL- TWA mg/m ³	PEL- CEILING mg/m ³	IDLH mg/m ³	Contaminant Media	Routes of Exposure	Symptoms of Acute Exposure
Mercury (aryl & inorganic comp.) as Hg, skin	0.1	NE	NE	0.1	NE	Sediment Soil Expected Level: 1-10 ppm (sediment) 0.1-0.4 ppm (soil)	Inhalation Ingestion Skin Absorption Contact	Tremor, stomach complaints
Silver, soluble compounds, as Ag	0.01	NE	0.01	NE	NE	Sediment Soil Expected Level: 1-10 ppm (sediment) 0.5-1.0 ppm (soil)	Inhalation Ingestion Contact	Blue-gray eyes, nasal septum, throat, skin irritation, skin ulceration, gastrointestinal disturb.
1,1,2,2 Tetrachloroethane skin	1 ppm	NE	1 ppm	NE	150 ppm	Sediment Expected Level: Trace	Inhalation Ingestion Absorption Contact	Nausea, vomiting, abdominal pain, jaundice, enlarged tender liver, tremor fingers, kidney damage, dermatitis Ca-Group 3 IARC

Table 3.1 Parameters for Contaminants of Concern								
Contaminant	TLV-TWA mg/m ³	TLV- STEL mg/m ³	PEL- TWA mg/m ³	PEL- CEILING mg/m ³	IDLH mg/m ³	Contaminant Media	Routes of Exposure	Symptoms of Acute Exposure
Gamma- Butyrolactone (Dihydro-2(3H)- furanone)	NE	NE	NE	NE	NE	Sediment Expected Level: Trace	Inhalation Ingestion Eye Contact	Drowsiness, dizziness; stinging, tearing, redness, swelling and eye damage

Notes: Ca - Carcinogen,
 Group 1 International Agency for Research on Cancer (IARC) - Sufficient evidence for carcinogenicity in humans,
 Group 2B IARC - Possible human carcinogen,
 Group 3 IARC - Inadequate evidence for carcinogenicity in humans, limited evidence for carcinogenicity in animals,
 IDLH - Immediately Dangerous to Life and Health
 NE- Not Established

3.4 Task Hazard Descriptions

Geophysical Site Surveying Hazards:

- Slipping, tripping and falling on uneven terrain around the investigation area
- Injuries, ailments, and illnesses from irritant vegetation (i.e., plants with thorns, etc.) and native wildlife (i.e., insect bites, animal bites etc.)
- Surveying equipment hazards (i.e., back strain due to carrying instruments) and injuries associated with motor vehicle accidents from driving vehicle in an unsafe manner or on uneven terrain
- Injuries and disabling conditions that may lead to death (i.e., heat/cold stress) as a result of severe weather exposure (i.e., lightning storms, high winds, extreme heat/cold, etc)

Hazard Control Measures:

- Slip, trip and fall hazards on uneven terrain can be prevented by being alert and cautious while walking in such terrain. Another control measure would be the use of footwear that provide adequate traction and minimize ankle injuries.
- In order to minimize vegetation and wildlife hazards, the immediate area should be patrolled to pin-point these hazards. Then a suitable area should be picked away from these hazards if possible. Use appropriate Personal Protective Equipment (PPE) to minimize contact with such hazards
- Utilize proper lifting techniques, good driving habits and survey the site in order to choose a clear driving path
- Exposure to severe weather can be controlled by the cessation of work activities and seeking adequate shelter during lightning and high wind storms. In addition, heat and cold stress management techniques should be implemented when such conditions warrant (see Attachment 1 on heat and cold stress)

Soil boring hazards:

- Various equipment hazards (i.e., noise and fume pollution from equipment engines, moving parts on equipment that can catch clothing or body appendages, raising and lowering of a derrick or boom near overhead utility wires, worn hydraulic lines and frayed cables)
- High work hazards (i.e., work being done on the derrick of a drilling rig or objects falling from elevated areas)
- Moving mobile drilling equipment over uneven terrain may cause vehicle to turn over.

- Chemical inhalation exposures from dust generation during drilling operations
- Severe weather exposure hazards

Hazard Control Measures:

- Use hearing protection when noise levels exceed 85 dBA. Stay away from equipment exhaust areas
- Use appropriate PPE (i.e., hardhats, steel toed safety boots, respiratory equipment during periods of dust generation)
- Proper equipment maintenance (i.e., inspection of equipment daily, etc) and applying proper equipment handling procedures
- Caution must be exercised when raising and lowering crane boom or drilling rig derrick (making sure overhead objects are cleared with adequate distance). Special precautions are required to clear overhead powerlines as described in the DOE Drilling Safety Manual (a distance of about 10 feet is typically required between powerlines and the derrick or boom)
- Follow hazard control measures and safety procedures discussed in the DOE Drilling Safety Manual under sections 4.1, 4.9, 4.13, 4.15, 4.16, 4.17 and other applicable sections. Adhere to the applicable mandatory drilling safety procedures referenced in DOE order 5480.4 attachment 2

Surface Water Sampling Hazards:

- Slipping, tripping, and falling while taking water samples
- Vegetation and wildlife hazards
- Severe weather exposure hazards

Hazard Control Measures:

- Sampling should be done from the bank exercising caution and being alert.
- Follow the control measures as detailed under the geophysical site surveying section for severe weather exposure, vegetation and wildlife hazards

Sediment Sampling Hazards:

- Slipping, tripping and falling on wet/muddy surfaces and on uneven terrain
- Splashing of potentially contaminated water into the eyes or exposed skin
- Direct skin contact with contaminants in the sediments

- Sampling equipment hazards that may result in personal injury due to improper use, malfunctioning or other causes
- Vegetation and wildlife hazards
- Severe weather exposure hazards

Hazard Control Measures:

- Slip, trip, and fall hazards on wet/muddy surfaces or uneven terrain can be prevented by the use of footwear that are waterproof, provide adequate traction and minimize ankle injuries. Chest waders will be worn in those areas of the IWD where the water is more than a few inches deep. Personnel should walk cautiously in the wet areas and on uneven terrain
- The splashing of contaminated water to the eyes and exposed skin can be prevented by the use of a face shield (with glasses), water resistant coveralls and chest waders, chemical resistant gloves and other appropriate PPE. Exposure to the contaminants in the sediments can be prevented by using chemical resistant protective clothing.
- Sampling equipment hazards can be controlled by being adequately trained on the use of such equipment, equipment maintenance/inspections, use of appropriate PPE and adherence to detailed sampling procedures.
- Follow the hazard control measures as detailed under the geophysical site surveying section for severe weather exposure, vegetation and wildlife hazard

3.5 General Hazard Control Measures

1. Thorough application of all Work Document and HASP procedures (No deviations).
2. No initial work activity will commence without reviewing the Work Document or the HASP, or when any questions arise regarding the HASP requirements.
3. Onsite safety meetings will be held periodically and when new personnel arrive that are unfamiliar with the Work Document, the HASP, or when any hazardous situation arises not adequately addressed by the HASP.
4. All site work activities shall be done by employing the buddy system (two persons working together). For any site work activity, the work party should consist of at least two persons.
5. Common sense practices in hazard avoidance. (i.e., avoid walking needlessly through puddles, leaning on or sitting on equipment, etc.).

6. Be alert for and heed all information and warning signs at all times.
7. Practice proper hygiene habits (i.e., cleaning up prior to eating and after working at the site using an appropriate cleaning solution).
8. Be alert to potentially hazardous situations that may arise (i.e., strong irritating odors, visible vapor clouds, note any unusual conditions and suspicious substances - stability of stacked items, condition of site structures and equipment being used, etc.).
9. Practice good housekeeping habits (i.e., keep traffic and work areas free from debris or obstacles, dispose of all trash properly, keep hand tools properly stored when not in use, keep supplies (such as pipe) properly stacked and/or stored, patrol the area prior to the end of the work day and attend to areas that may have been overlooked to assure a clear and proper work area for the next workday).
10. Misuse of tools and equipment or circumventing safety devices can result in injury to yourself and/or others. Do not use make-shift tools or equipment to perform your job. Keep all machinery guards, guardrails and other protective devices in place and in good operating order. Use only properly functioning tools and equipment.
11. Promptly report all occupational injuries/illnesses, unsafe and unhealthy practices and conditions to the immediate supervisor.
12. Follow 29 CFR 1910.1200 labeling requirements to reduce potential for chemical exposures to chemicals used onsite as cleaning agents or other purposes.
13. Follow appropriate fire protection requirements and fire prevention practices such as:
 - Fire extinguishers must be visible and readily accessible. Debris or any other material must not be on or in front of extinguisher
 - Ensure fire extinguishers are being inspected monthly and documented on inspection tag
 - Smoking is strictly prohibited on site except in those areas designated by the HSO
 - Uses of flammable and combustible liquids must be strictly controlled per NFPA and OSHA requirements.
 - Combustible and flammable material must be minimized
 - Combustible or flammable materials must not be placed next to permanent structures
 - Labels that identify the container contents are required on all containers. The labels should also provide information such as flammable, combustible, toxic, etc.

- Trash containers with solvent soiled rags will be emptied daily

3.6 Offsite Hazard Analysis

NRF is aware that the generation of dust may result while drilling in the IWD channel. None of the field activities are expected to concentrate the contaminants by any process or technique. Measures to minimize dust emissions during the drilling process will be implemented. Due to the remoteness of NRF and the locations where the site investigative activities will take place, no offsite hazards are projected even during those site activities that may generate dust. Thus, no fence line air monitoring will be required during those site activities that may generate dust.

4.0 PERSONNEL TRAINING REQUIREMENTS

Consistent with OSHA's 29 CFR 1910.120 regulation covering Hazardous Waste Operations and Emergency Response, all site personnel are required to be trained in accordance with the standard. At a minimum, all personnel are required to be trained to recognize the hazards onsite, become familiar with the provisions of this site specific HASP, and recognize the personnel responsible for site safety and health.

4.1 Preassignment Site Worker Training and Emergency Response Training

Prior to arrival on-site, each employer will be responsible for certifying that his/her employees meet the requirements of preassignment training. Consistent with OSHA 29 CFR 1910.120 paragraph (e)(3), each employee should be able to provide a document certifying dates of 24 hours of training for workers occasionally on-site for a specific task, or 40 hours of training for general site workers. An employer may also grandfather experienced personnel. Personnel must receive 8 hours of annual refresher training.

The INEL HAZMAT Team will be available to respond to site emergencies that involve such incidents as hazardous material spills. This Emergency Response Team has been trained in accordance with requirements of 29 CFR 1910.120 for emergency response.

Other applicable training on NRF safety and emergency response procedures will be covered in the preentry meeting.

4.2 Site Supervisors Training

Consistent with OSHA 29 CFR 1910.120 paragraph (e)(8), individuals designated as site supervisors require an additional 8 hours of training.

The following individuals are identified as site supervisors:

<u>Name</u>	<u>Title/Responsibility</u>
S. D. Lee	NRF representative for surface water and sediment sampling activities
K. D. Willie	NRF representative for geophysical site surveying and borehole drilling activities

4.3 Hazard Communication Training

Additional training for site personnel will include hazard communication training requirements in accordance with 29 CFR 1910.1200. The labeling requirements and other forms of warning detailed in this regulation will be met. In accordance with this regulation, Material Safety Data Sheets (MSDSs) for all hazardous chemicals used during the IWD site work activities will be readily accessible.

4.4 Training and Briefing Topics

The following items will be discussed by a qualified individual at the site pre-entry briefing(s), as well as at daily or periodic site briefings (i.e., prior to the commencement of or change in a site task).

<u>Training</u>	<u>Frequency</u>
Task physical hazards	Periodically
Chemical hazards, Table 3.1.	Periodically

5.0 PERSONAL PROTECTIVE EQUIPMENT TO BE USED

This section describes the general requirements of the EPA designated Levels of Protection (A-D) and the specific levels of protection required for each task at the Site.

5.1 Levels of Protection

Personnel wear protective equipment when site activities involve known or suspected atmospheric contamination, when vapors, gases, or particulates may be generated by site activities, or when direct contact with skin-affecting substances may occur. Full facepiece respirators protect lungs, gastrointestinal tract, and eyes against airborne toxicants. Chemical-resistant clothing protects the skin from contact with skin-destructive and absorbable chemicals.

The specific levels of protection and necessary components for each have been divided into four categories according to the degrees of protection afforded:

- Level A: Should be worn when the highest level of respiratory, skin, and eye protection is needed.
- Level B: Should be worn when the highest level of respiratory protection is needed, but a lesser level of skin protection is required.
- Level C: Should be worn when the criteria for using air-purifying respirators are met, and a lesser level of skin protection is needed.
- Level D: Should be worn only as a work uniform and not in any area with respiratory or skin hazards. It provides minimal protection against chemical hazards.

Modifications of these levels are permitted, and routinely employed during site work activities to maximize efficiency. For example, Level C respiratory protection and Level D skin protection may be required for a given task. Likewise the type of chemical protective ensemble (i.e., material, format) will depend upon contaminants and degrees of contact.

The Level of Protection selected is based upon the following:

- Type and measured concentration of the chemical substance in the ambient atmosphere and its toxicity.
- Potential for exposure to substances in air, splashes of liquids, or other direct contact with material due to work being done.

- Knowledge of chemicals on-site along with properties such as toxicity, route of exposure, and contaminant matrix.

In situations where the type of chemical, concentration, and possibilities of contact are not known, the appropriate Level of Protection must be selected based on professional experience and judgment until the hazards can be better identified.

5.2 Specific Levels of Protection Planned for the Site

The following levels of protection will be utilized during activities at the site:

- Level C & D

Level D protection for surface water sampling and sediment sampling activities will be modified to include some chemical resistant protective equipment (e.g. chemical resistant gloves and boots/boot covers). Table 5.1 presents the level of protection planned for the completion of individual task assignments and the specific components of each protective ensemble. Refer to table 7.2 for additional requirements.

TABLE 5.1
SPECIFIC LEVELS OF PROTECTION PLANNED FOR THE
TASK ASSIGNMENTS AT THE SITE

<u>TASK</u>	<u>PPE LEVEL</u>	<u>REQUIREMENTS</u>
Soil Boring & Sediment Sampling	C C	Only in the IWD Channel & during visible dust generation
Geophysical surveying	D	
Surface water sampling	D modified	Some Chemical Resist. PPE
Soil boring	D	Outside the IWD Channel, no visible dust generation & no potential for mercury absorption through the skin
Sediment sampling	D modified	Some Chemical Resist. PPE Outside the IWD Channel & no visible dust generation

Level C

Personnel Protective Equipment for Soil Boring and Sediment Sampling Activities with generation of visible dust or where the potential for skin absorption of mercury exists:

- Air purifying canister-equipped respirator (a NIOSH approved negative pressure or powered air purifying respirator with appropriate cartridges and filters that provide protection against the contaminants listed in table 3.1)
- Chemical-resistant (>8 hour breakthrough requirement) clothing (one or two-piece chemical-splash suit; disposable chemical-resistant one-piece suits)
- Coveralls
- Gloves (outer), chemical-resistant (>8 hour breakthrough requirement)
- Gloves (inner), chemical-resistant (>8 hour breakthrough requirement)
- Boots, chemical-resistant, (>8 hour breakthrough requirement) steel toe and shank
- Boot covers, chemical-resistant (>8 hour breakthrough requirement)
- Hard hat
- 2-way radio communications (intrinsically safe)

Level D

Personal Protective Equipment for Surface Water Sampling, Geophysical Site Surveying Activities plus Soil Boring and Sediment Sampling with no generation of visible dust and where potential for mercury absorption through the skin does not exist:

- Outer garments/Coveralls, [chemical resistant (>8 hour breakthrough requirement) for sediment sampling and when soil boring activities take place on the IWD channel]
- Inner gloves (optional)
- Outer gloves
- Boots, steel toe and shank
- Boot covers, chemical resistant (optional)
- Hard hat (optional for surface water sampling, site surveying and sediment sampling)
- Face shield & glasses (for sediment sampling in wet areas of the IWD channel)

5.3 Chemical Resistant Protective Material

The greater than eight hour breakthrough requirement for all chemical resistant clothing specified will be met. The following specific clothing materials will be used for the site:

Sediment sampling - (Level D modified & Level C)

- Inner Gloves - Cotton/surgical
- Boot/Boot Covers - chemical resistant
- Outer Gloves - chemical resistant
- Outer Garment/Coveralls - chemical resistant chest waders

Soil Borings - (Level D & Level C)

- Inner Gloves - Cotton/surgical
- Boots/Boot Covers - Steel toe and chemical resistant for level C work
- Outer Gloves - Work gloves: for work done outside the IWD channel, Chemical resistant: for work done on the IWD channel
- Outer Garment/Coveralls - Cotton: for work done outside the IWD channel, Chemical resistant: for work done on the IWD channel

Surface water sampling - (Level D modified)

- Inner Gloves - Cotton
- Boots/Boot Covers - chemical resistant
- Outer Gloves - chemical resistant
- Outer Garments/Coveralls - Cotton or Tyvek

Geophysical Site Surveying - (Level D)

- Boots/Boot Covers - Steel-toed
- Outer Gloves - Work gloves
- Outer Garments/Coveralls - Cotton

5.4 Reassessment of Protection Program

The Level of Protection provided by PPE selection shall be upgraded or downgraded based upon a change in site conditions or the findings of investigations. An anticipated potential change in site conditions for the tasks at the IWD is the generation of visible dust which will result in an upgrade of the PPE to a level C. Should other significant changes occur, the hazards will be reassessed.

5.5 Work Mission Duration

Before the workers actually begin work in their PPE ensembles, the anticipated duration of the work mission should be established. Several factors limit mission length, including:

- Suit/Ensemble permeation and penetration rates for chemicals.
- Ambient temperature and weather conditions (heat stress, cold stress refer to Attachment 1 for monitoring details).
- Capacity of personnel to work in PPE.

6.0 MEDICAL SURVEILLANCE REQUIREMENTS

Medical monitoring programs are designed to track the physical condition of employees on a regular basis as well as survey preemployment or baseline conditions prior to potential exposures. The medical surveillance program is a part of each employer's Health and Safety program. This program shall be designed and implemented in accordance with 29 CFR 1910.120 and 1910.134.

6.1 Baseline or Preassignment Monitoring

Prior to being assigned to a hazardous or a potentially hazardous activity involving exposure to toxic materials, each employee must receive a preassignment or baseline physical. The contents of the physical are to be determined by the employer's medical consultant. The minimum medical monitoring requirements recommended by the NIOSH/OSHA/USCG/EPA's Occupational Safety & Health Guidance Manual for Hazardous Waste Site Activities, for work to be performed at the IWD site, are applicable.

The preassignment physical should categorize employees as fit-for-duty and able to wear respiratory protection.

6.2 Periodic Monitoring

In addition to a baseline physical, all employees require a periodic physical within the last 12 months unless the advising physician believes a shorter interval is appropriate.

All personnel that will be working in potentially contaminated areas at the IWD site will require a periodic physical in accordance with OSHA medical monitoring requirements. This will be verified by checking NRF medical records for NRF personnel and by the subcontractor providing the date of last physical for each employee.

6.3 Site Specific Medical Monitoring

For activities at the site, no site specific tests will be required prior to individuals entering the Exclusion Zone or Contamination Reduction Zone.

6.4 Exposure/Injury/Medical Support

As a follow-up to an injury or possible exposure above established exposure limits, all employees are entitled to and encouraged to seek medical attention and physical testing. Depending upon the type of exposure, it is critical to perform follow-up testing within 24-48 hours. It will be up to the employer's medical consultant to advise the type of test required to accurately monitor for exposure effects.

6.5 Exit Physical

At termination of employment or reassignment to a work area which does not represent a risk of exposure to the hazardous materials related to the original assignment, an employee shall be required to have an exit physical. If his/her last physical was within the last 6 months, the advising medical consultant has the right to determine adequacy and necessity of exit exam.

7.0 FREQUENCY AND TYPES OF AIR MONITORING/SAMPLING

This section explains the general concepts of an air monitoring program and specifies the surveillance activities that will take place during project completion at the site.

The purpose of air monitoring is to identify and quantify airborne contaminants in order to verify and determine the level of worker protection needed.

7.1 Air Monitoring/Sampling Instrumentation

The OSHA/NIOSH/EPA/USCG Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities provides an overview of available monitoring/sampling instrumentation for onsite use and their specific application. For the specific instrument to be used, calibration of the instrument is to be performed in accordance with the instrument's calibration procedures.

Air monitoring/sampling will not be required at the IWD site unless the site activities generate visible dust that may contain airborne contaminants. To minimize the generation of dust, the ground should be wetted down whenever possible. If dust generation cannot be avoided during activities around the IWD channel, then air sampling must be done to verify whether a hazard exists. The specific equipment for air monitoring/sampling, if required, will include calibrated air sampling pumps, passive organic vapor monitors, mercury vapor meter and passive mercury vapor monitors.

After site activities have commenced and if air monitoring/sampling is required, the selective monitoring of high-risk workers (i.e., those who are closest to the source of contaminant generation) is essential. Personal monitoring samples should be collected in the breathing zone and, if workers are wearing respiratory protective equipment, outside the facepiece.

Those employees working closest to the source have the highest likelihood of being exposed to concentrations which exceed established exposure limits. Representative sampling approaches emphasizing worst case conditions (i.e., those employees with the greatest risk of exposure) are acceptable. However, the sampling strategy may change if the operation or tasks change onsite or if exposures potentially increase.

7.1.1 Instrument Calibration

All instruments that will be used for air monitoring and sampling will be calibrated each day prior to use. The manufacturer's manual for the specific instrument used shall be consulted for correct use and calibration. The air sampling pump will be calibrated using a primary gas flow bubble calibrator.

7.2 Site Air Monitoring/Sampling

The air monitoring/sampling, if required, will be done with the instruments listed in table 7.1. Table 7.1 and 7.2 provide the guidelines for air monitoring/sampling during the IWD site work activities. Background levels shall be measured and recorded

before any field activities begin if air monitoring/sampling is required. To obtain accurate background levels, background readings will take place away from areas of potential contamination. Air monitoring/sampling values will be recorded on forms B-1, B-2 and B-3 (see Attachment 2).

The criteria for requiring air monitoring/sampling is when site activity increases airborne contaminant possibilities (i.e., dust generation).

Table 7.1 Air Monitoring/Sampling During Dust Generation						
Equipment	Monitoring Frequency		8 Hour Sample		Chemicals Monitored	Location
	Continuous	Background Once Daily	Once Weekly	Daily		
Mercury Vapor Meter	yes	yes			Mercury	IWD Channel
Passive Organic Vapor Monitor			yes ^A		Organic vapors	IWD Channel
Personal Air Sampling Pump			yes ^A		Butyrolactone	IWD Channel
Personal Air Sampling Pump			yes ^A		Arsenic, Chromium Lead Mercury Silver	IWD Channel
Personal Passive Mercury Monitor				yes	Mercury	IWD Channel

Notes: A - Per NIOSH sampling and analytical methods with appropriate collection media

Table 7.2 Hazard Monitoring Methods and Protective Measures				
Hazard	Monitoring Method	Observation/Action Level	Protective Measures	Monitoring Schedule
Toxic Dusts ^A	Visual	No dust observed	Level D PPE	None
Toxic Dusts ^A	Visual	Significant dust observed	Implement dust suppression, don level C PPE	Conduct monitoring per Table 7.1
Mercury	Mercury Vapor Meter	Background to 0.02 mg/m ³ Hg ^B	Level D PPE	Conduct monitoring per Table 7.1
Mercury	Mercury Vapor Meter	>0.02 mg/m ³ Hg to <0.05 mg/m ³ Hg ^B	Level C PPE	Continue work with continuous monitoring
Mercury	Mercury Vapor Meter	≥0.05 mg/m ³ Hg ^B	Evacuate area notify project manager	

Notes: A - Dusts containing heavy metals (see table 7.1)

B - Continuous reading for greater than 30 seconds, in appropriate site worker's breathing zones

8.0 SITE CONTROL MEASURES

The following section defines measures and procedures for maintaining site control. Site control is an essential component in the implementation of the site health and safety program.

8.1 Buddy System

During all activities that present a risk to personnel, the implementation of a buddy system is mandatory. A buddy system requires at least two people to work as a team; each looking out for the other. All tasks that are planned for the IWD will require a buddy system and any additional site control requirements.

8.2 Site Communications Plan

Successful communications between field teams and contact with personnel in the support zone is essential. The following communications systems will be available during activities at the Site.

- Two way radio
- Whistle
- Hand Signals

<u>Signal</u>	<u>Definition</u>
Hands on top of head	Need assistance
Thumbs up	OK/I am alright/I understand
Thumbs down	No/negative
Arms waving upright	Send backup support
Grip partners wrist	Exit area immediately

8.3 Work Zone Definition

The three general work zones that are typically established at the site are the Exclusion Zone, Contamination Reduction Zone, and Support Zone. Due to the low levels of contamination and other hazards anticipated at the IWD site, the work zones will be kept at a minimum and controlled accordingly. The work zones will be established by the NRF site representative and the subcontractor HSO prior to the commencement of site activities. Figure 8.1 provides a schematic representation of the typical general work zones.

The Exclusion Zone is defined as the area where contamination is either known or likely to be present, or because of activity, will provide a potential to cause harm to personnel. Entry into the Exclusion Zone requires the use of personnel protective equipment.

The Contamination Reduction Zone is the area where personnel conduct personal and equipment decontamination. It is essentially a buffer zone between contaminated areas and clean areas. Activities to be conducted in this zone will require personal

protection as defined in the decontamination plan. This work zone may be excluded for level D work activities.

The Support Zone is situated in clean areas where the chance to encounter hazardous materials or conditions is minimal. Personal protective equipment is therefore not required.

8.4 Safe Work Practices

Standing orders for the Exclusion Zone and the Contamination Reduction Zone are detailed below.

The Exclusion Zone Hotline will be posted with these words "Exclusion Zone" and a list of PPE required for entry. Standing orders for the Exclusion Zone are outlined below:

1. No smoking, eating, or drinking in this zone.
2. No horse play.
3. No matches or lighters in this zone.
4. Check-in on entrance to this zone.
5. Check-out on exit from this zone.
6. Implement the communications system.
7. Line of sight must be in position.
8. Wear the appropriate level of protection as defined in the HASP.

Standing orders for the Contamination Reduction Zone are outlined below:

1. No smoking, eating, or drinking in this zone.
2. No horse play.
3. No matches or lighters in this zone.
4. Wear the appropriate level of protection as defined in the HASP.

8.5 Emergency Alarm Procedures

The warning signals discussed in section 10.4 "Evacuation Routes and Procedures," will be deployed in the event of an emergency. The details will be covered in the preentry meeting. Communication signals will also be used according to section 8.2.

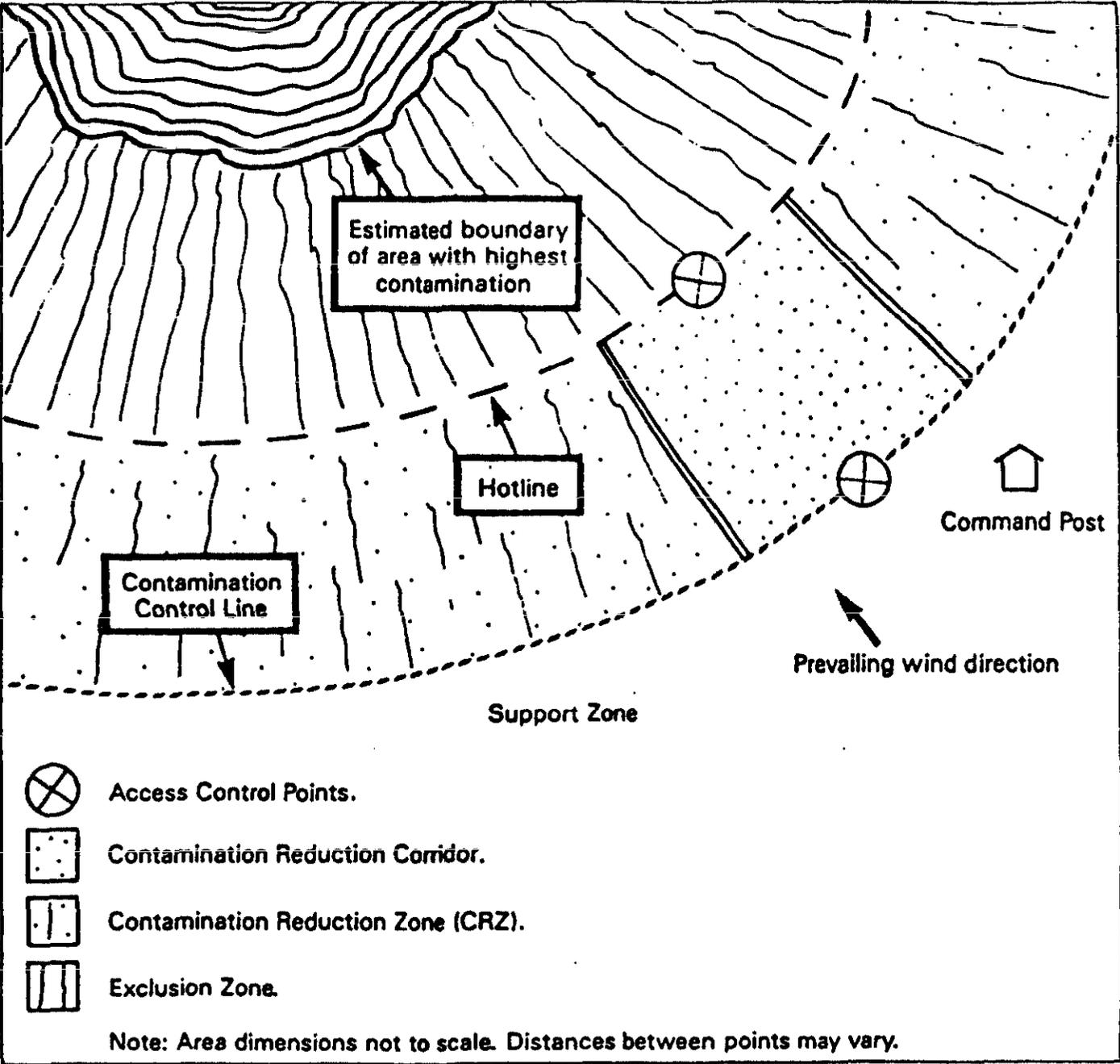


Figure 8.1 Site Work Zones

9.0 DECONTAMINATION PLAN

Table 5.1 lists the tasks and specific levels of protection required for each task. Consistent with the levels of protection required, Figure 9.1 provides a step by step representation of the personnel decontamination process for Level C. These procedures should be modified to suit site conditions and protective ensembles in use.

9.1 Standard Operating Procedures

Decontamination involves the orderly controlled removal of contaminants. All site personnel should minimize contact with contaminants in order to minimize the need for extensive decontamination. Standard decontamination procedures and measures are discussed below:

9.1.1 General Procedures

- A decontamination area will be established at the Exclusion Zone boundary (Hotline) in the area where personnel exit. When entering the decontamination area from the exclusion zone, personnel will generally doff overboots or chemical resistant boots, coveralls, and outer gloves
- These articles should then be placed in an appropriate receptacle for recycle or disposal
- Personnel should be familiar with proper decontamination techniques (i.e., removing PPE clothing in an inside out manner)
- Before exiting the regulated work area, personnel must have removed all protective clothing and gear, then they must have washed their hands and facial area with soap and water (the practice of proper Hygiene habits)

9.1.2 Level D Decontamination Measures

- | | | | |
|------------|------------------------------|----|---|
| Station 1: | Equipment Drop | 1. | Deposit equipment used onsite in a designated area on plastic drop cloths so that they can be collected and properly recycled |
| Station 2: | Boot Covers/Gloves/Coveralls | 2. | Remove boot covers, gloves and coveralls and place them in their respective used clothing container (plastic lined) |

9.1.3 Level C Decontamination Measures

- | | | | |
|--------------|------------------------------|-------|--|
| Station 1: | Equipment Drop | 1. | Deposit equipment used onsite on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination. During hot weather a cool down station may be set up in this area |
| Station 2: | Decon and Tape Removal | 2. | Decon outer boots, outer gloves and splash suit or waders with detergent water. Rinse off with plain water. Remove tape around boots and gloves and deposit in plastic lined containers |
| Station 3,4: | Outer Boot and Glove Removal | 3, 4. | Remove outer boots/boot covers and outer gloves. Deposit in plastic lined container. |
| Station 5: | Canister or Mask Change | 5. | If worker leaves the exclusion zone to change canister or mask, this is the last step in the decontamination procedure. Worker's canister is exchanged, new outer gloves and boot covers donned, joints taped, and worker returns to duty. |
| Station 6,7: | Boots/Outer Clothing | 6, 7. | Remove boots, chemical-resistant suit, and deposit in separate plastic lined containers. |
| Station 8: | Face Piece Removal | 8. | Facepiece is removed. Avoid touching face with fingers, then facepiece deposited on plastic sheet. |

- | | | | |
|---------------|-----------------------|--------|--|
| Station 9,10: | Inner Gloves/Clothing | 9, 10. | Inner gloves and perspiration soaked clothing are removed and deposited in separate plastic lined containers. |
| Station 11: | Don Coveralls | 11. | Don disposable coveralls and proceed to shower area. |
| Station 12: | Remove Coveralls | 12. | Remove coveralls and place in plastic lined container. |
| Station 13: | Wash and Shower | 13. | Thorough washing of hands and face. Shower as soon as possible if highly toxic, skin corrosive or absorbable materials are known or suspected to be present. Collect and dispose of shower discharge properly. |
| Station 14: | Redress | 14. | Put on clean clothes. |

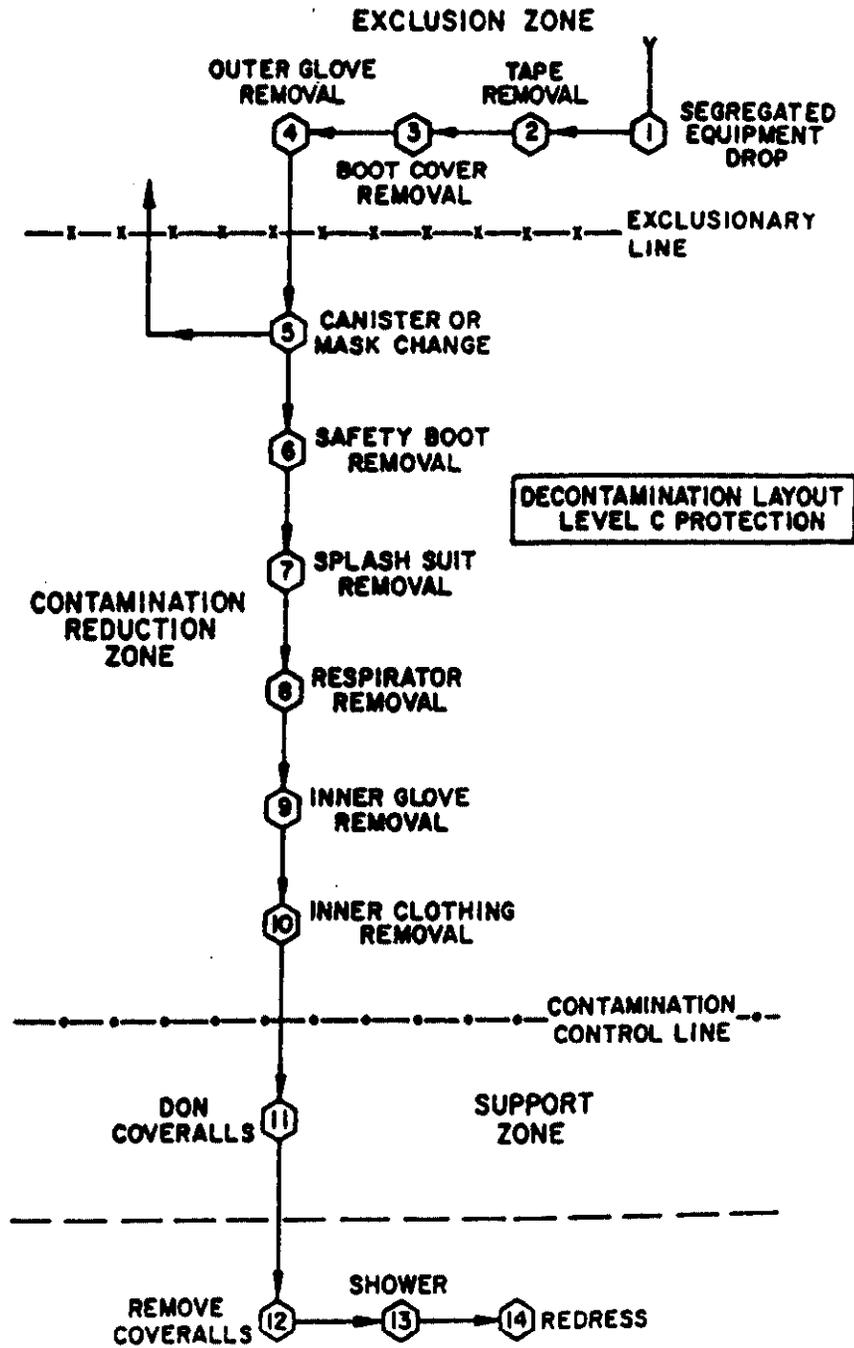


Figure 9.1 Decontamination Layout for Level C Protection

9.2 Levels of Decontamination Protection Required for Personnel

The levels of protection required for personnel assisting with decontamination will be the same as that required in the Exclusion Zone.

Modifications include: Use of chemical resistant suit, boots and gloves

The HSO is responsible for monitoring decontamination procedures and determining their effectiveness.

9.3 Equipment Decontamination

Sampling equipment will be decontaminated in accordance with procedures as defined in the work plan. A sequence of decontamination steps required for non-sampling equipment and heavy machinery include the following:

- Pressurized steam cleaning
- Scrubbing and scraping with a brush and scraper
- Triple rinsing

9.4 Disposition of Decontamination Wastes

All disposable protective clothing and plastic sheeting used during site operations shall be containerized, labeled and disposed of per RCRA approved procedures. All equipment decontamination solutions shall be discarded as described in the IWD Work Plan.

10.0 EMERGENCY RESPONSE/CONTINGENCY PLAN

This section describes contingencies and emergency planning procedures to be implemented at the Site. This plan is compatible with local, state and federal disaster and emergency management plans as appropriate.

10.1 Pre-Emergency Planning

During the periodic site briefings, all employees will be trained in and reminded of provisions of the emergency response plan, communication systems, and evacuation routes. The plan will be reviewed and revised if necessary, on a regular basis by the HSO. This will ensure that the plan is adequate and consistent with prevailing site conditions. In addition, the contractor personnel will be briefed on NRF site wide emergency response procedures during a site pre-entry meeting.

10.2 Personnel Roles and Lines of Authority

The Site Supervisor has primary responsibility for responding to and correcting emergency situations. This includes taking appropriate measures to ensure the safety of site personnel and the public. Possible actions may involve evacuation of personnel from the site area, and evacuation of adjacent residents. He/she is additionally responsible for ensuring that corrective measures have been implemented, appropriate authorities notified, and follow-up reports completed. The HSO may be called upon to act on the behalf of the site supervisor, and will direct responses to any medical emergency. The individual contractor organizations are responsible for assisting the site supervisor in his/her mission within the parameters of their scope of work.

10.3 Emergency Recognition/Prevention

Table 3.1 provides a listing of chemical hazards onsite and the task hazard description section details the physical task hazards. Additional hazards as a direct result of site activities are listed in Table 10.1 as are prevention and control techniques/mechanisms. Personnel will be familiar with techniques of hazard recognition from preassignment training and site specific briefings. The HSO is responsible for ensuring that prevention devices or equipment are available to personnel.

10.4 Evacuation Routes/Procedures

In the event of an emergency at the IWD site, communications will be established between the site supervisor or HSO and NRF security via a 2-way radio system that shall be on site at all times. After NRF security has been reached, they will be briefed of the emergency situation. They will then contact the appropriate emergency response party. NRF security will be available to respond to medical emergencies during backshifts, weekends, and holidays. In addition to notifying NRF security on emergency situations, the Department of Energy-Idaho Branch Office (DOE-IBO) will be notified promptly.

For fire, radiation and hazardous material release emergencies, the NRF uses the following alert systems: fire alarm, take cover alert, criticality alert, and site evacuation. The details on each of these and the appropriate actions to be taken will be covered in the site pre-entry meeting.

TABLE 10.1
EMERGENCY RECOGNITION/CONTROL MEASURES

<u>Hazard</u>	<u>Control Response Equipment</u>	<u>Prevention\Control</u>
Fire/Explosion	Fire extinguisher	Alarm System Fire Inspections
Air Release		Water Spray Evacuation Routes

10.5 Emergency Contact/Notification System

The following list provides names and telephone numbers for emergency contact personnel. In the event of a fire, medical or other emergency, personnel will take direction from the HSO and the site supervisor. They will then notify the appropriate emergency organization (this will typically be NRF Security first).

<u>Organization</u>	<u>Contact</u>	<u>Telephone</u>
NRF Security		3-5233, 3-5234
NRF Medical		3-LIFE
Environmental Remediation	R.W. Nieslanik	3-5027
	L.W. Rossiter	3-5237
NRF Safety	W. Hammond	3-5358
	D. Jensen	3-5358
DOE-IBO	R.C. Cullison	3-5243
	R.D.E. Newbry	3-5057

10.6 Nearest Medical Assistance

The nearest medical facility is the NRF dispensary. This facility is available to treat individuals who may experience an injury onsite during regular working hours (0745 - 1610) Monday through Friday. Another available medical facility, within close proximity, is the Central Facilities Area (CFA) dispensary. This facility can provide full medical service during regular working hours (0800 - 1630) Monday through Friday. A registered nurse is available 24 hours a day. Figure 10.1 illustrates the route to this medical facility. CFA ambulance service is also available to transport victims to the medical facilities. These facilities should be familiar to all site personnel. A two way radio will be located at the site at all times to alert NRF Security of medical

emergencies who will in turn contact the appropriate response party.

The following individuals onsite have current certification in CPR and/or first aid:

- S.D. Lee
- A. Sierra
- Certified NRF Security Personnel

10.7 Emergency Medical Treatment Procedures

When any person becomes ill or injured in the exclusion zone, first aid shall be promptly administered. NRF security shall be contacted as soon as possible via 2-way radio communications (an N-NET system radio) and they will contact the appropriate emergency medical response parties (i.e., ambulance service, nearest medical facilities). For serious illnesses or injuries, decontamination will not be necessary due to the low levels of contamination anticipated. All work activities near the victim will immediately cease in order that these activities will not interfere with emergency response actions. All injuries and illnesses must immediately be reported to the site supervisor.

Any person being transported to a clinic or hospital for treatment should take with them information on the chemical(s) they may have been exposed to at the site. This information is included in Table 3.1.

10.8 Fire or Explosion

In the event of a fire or explosion, NRF Security shall be contacted immediately and they will notify the INEL fire department. Upon arrival of the INEL fire department, the site supervisor or designated alternate will advise the fire commander of the location, nature, and identification of the hazardous materials onsite.

If it is safe to do so, site personnel may:

- Use fire fighting equipment available onsite to control or extinguish the fire; and,
- Remove or isolate flammable or other hazardous materials which may contribute to the fire.

10.9 Spill or Leaks

In the event of a spill or a leak, site personnel will:

- Inform their supervisor immediately;
- Locate the source of the spillage and stop the flow if it can be done safely; and,
- Begin containment and recovery of the spilled materials.

10.10 Emergency Equipment

The following emergency equipment will be made available on site:

- First Aid Kit
- Site Two-way Radio
- Eye Wash
- Fire Extinguishers

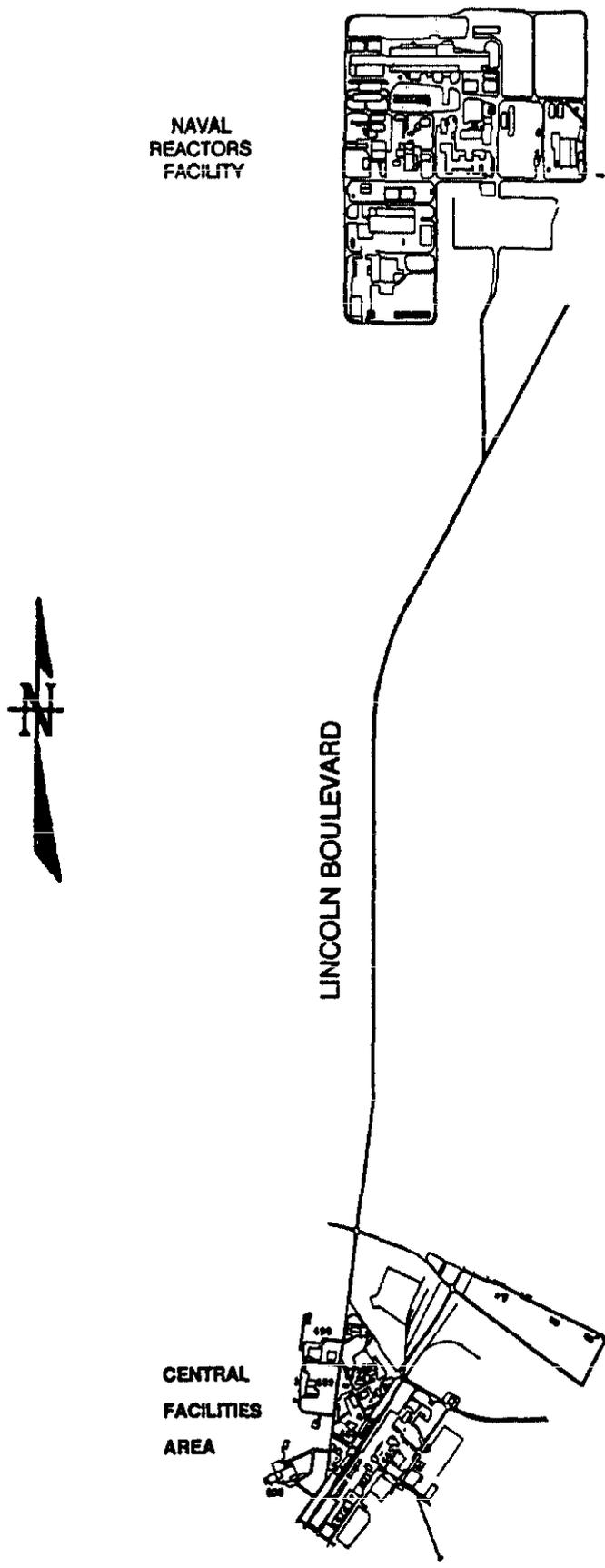


Figure 10.1 Medical Emergency Route

11.0 HEALTH AND SAFETY AUDITS

Compliance with the IWD HASP and adequacy of the health and safety provisions detailed in the HASP will be determined through a Health and Safety Audit Plan. This audit will be conducted bimonthly by the HSO in accordance with the provisions of the EPA's Health and Safety Audit Guideline manual ("Health and Safety Audit Guidelines, SARA Title I Section 126").

A report of the audits conducted will be made to NRF and subcontractor Project Managers. The subcontractor Project Manager and the HSO will assure that any deficiencies encountered are corrected. NRF personnel will also conduct additional audits during the IWD site work activities which will include a review of the previous Health and Safety Audits.

**ATTACHMENT 1
HEAT AND COLD STRESS**

A.1 Heat Stress

Heat stress is caused by various factors which include environmental conditions, what a person wears (including PPE), workload, and even a person's individual characteristics. Susceptibility to heat stress can vary between individuals depending on factors such as lack of physical fitness, obesity, alcohol and drug use, age, rest and others. Since the occurrence of heat stress depends on these factors, all personnel should be monitored.

A.1.1 Heat Stress Monitoring

For individuals wearing permeable clothing (standard clothes and work clothing) recommendations for monitoring requirements including work/rest schedules are detailed in the American Conference of Governmental Industrial Hygienists (ACGIH) TLV booklet. For semi- or non-permeable encapsulating protective clothing these standards can't be used directly. However, correction factors for this type of protective clothing are listed in the above reference. Under these conditions, the work party members should be monitored when the work area temperature is above 70 degrees Fahrenheit (F).

Monitoring for heat stress should be done by utilizing the buddy system (two work party members monitoring each other for the symptoms of heat stress) and by the HSO or a medical team member during rest periods. During rest periods from site work activities, the heart rate, deep body temperature and, if possible, body waterloss should be monitored when conditions warrant. Additional guidance on this type of monitoring requirements along with recommended work/rest schedules are provided in the Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities. These guidelines are summarized below:

- The heart rate should not exceed 110 beats/minute at the beginning of the rest period. If this rate is exceeded, then the work cycle should be reduced by 1/3.
- The deep body temperature (about one degree F higher than the oral temperature) should not exceed 100.6 degrees F at the end of the work period (an ear temperature probe unit for monitoring deep body temperature can be used for this purpose). If this temperature is exceeded, the work cycle must also be reduced by 1/3. No work party member is allowed to wear semi or impermeable clothing if their deep body temperature exceeds 101.6 degrees F.
- If it is possible to obtain an accurate body weight (within .25 lb) then the weight should be measured at the beginning and the end of each work day (providing the individual is wearing similar clothing). The weight recorded should not exceed 1.5% total body weight loss in a work day.

A.1.2 Heat Stress Prevention

Preventive measures and proper training will help avoid serious heat stress related illnesses. To avoid heat stress the following steps will be taken.

- Adjust work schedules (i.e., modify work/rest schedules in accordance with the above monitoring requirements)
- Provide shelter or shaded areas for the protection of site workers during rest periods
- Maintain worker's body fluids at normal levels. The fluid intake must approximately equal the amount of water and electrolytes lost in sweat. The following steps will be taken to accomplish this.
 - Maintain water temperature at 50 to 60 degrees F
 - Have the workers drink 16 ounces of water or dilute drinks (i.e., electrolyte solutions such as Gatorade) prior to commencing work activities
 - Urge workers to drink eight ounces of plain water or dilute drinks at each rest period
 - Weigh workers before and after work to determine if fluid replacement is adequate
- Encourage workers to maintain an optimal level of physical fitness. Acclimatize workers to site work conditions where indicated

Site personnel should be trained to recognize the signs and symptoms of heat stress and then be able to take appropriate action. Many of these signs and symptoms are covered in the OSHA/NIOSH/EPA/USCG Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities. Some of the signs and symptoms are described below.

A.1.1.1 Heat Exhaustion

Signs and Symptoms:

- Pale, cool, and moist skin
- Heavy sweating
- Light headedness
- Slurred speech
- Weakness (fatigue)
- Confusion
- Fainting
- Nausea

Corrective Action:

- Remove victim to a cool and uncontaminated area
- Remove PPE
- Cool the victim with water and/or fanning
- Give water to drink as soon as reasonably possible
- Allow victim to rest

A.1.1.2 Heat Stroke

Signs and Symptoms:

- Red, hot, usually dry skin
- Lack of or reduced perspiration
- Incoherent, delirious
- Mental confusion and dizziness
- Unconsciousness
- Staggering gait

Corrective action:

- Remove victim to a cool and uncontaminated area
- Remove PPE
- Cool the victim with water and/or fanning
- Give water as soon as reasonably possible
- Transport to medical facility for further treatment since Heat Stroke is a medical emergency.

A.2 Cold Stress

The effects of extreme cold exposure (low temperatures and when the wind chill factor is sufficiently high) are frostbite, hypothermia and impaired work ability when working at a hazardous waste site. Some of the control measures include the use of appropriate clothing, the availability of warm shelter, and the careful scheduling of work/rest periods. These control measures should be taken to help prevent the worker's deep body temperature from falling below 96.8 degrees F.

An early warning to the danger of cold stress is pain in the extremities. During prolonged cold exposure, maximum severe shivering develops when the body temperature has fallen to 95 degrees F. This must be taken as a danger sign and exposure to cold should be immediately terminated. For additional guidelines on evaluation and control of cold stress refer to the ACGIH TLV booklet.

**ATTACHMENT 2
AIR MONITORING/SAMPLING FORMS**

Form B-1

AIR MONITORING RECORD, AIR SAMPLE RECORD FORM

SAMPLING DESCRIPTION

Name _____ Sample Date _____
SS # _____ Badge # _____ Job Title _____
Description of Work _____
Department _____ NIOSH Resp. Apprv. # _____
Sampled by _____ Sample Zone _____
Pump # _____ Calibration Date _____
Flow Rate _____ Calibration Date _____
Collection Device _____ Device # _____
Start Time 1 _____ Stop Time 1 _____ Total Time _____
Start Time 2 _____ Stop Time 2 _____ Volume _____

AIR SAMPLING MONITORING FINAL RESULTS

Chemical	Concentration	Units
----------	---------------	-------

S
A
M
P
L
E

Laboratory Name _____ Laboratory # _____
Analytical Method _____ Remarks _____

Form B-2

DAILY INSTRUMENT CALIBRATION CHECKSHEET

For combustible gas meters, FID, PID instrumentation

Instrument: _____

Serial Number: _____

<u>Date</u>	<u>Pure air (y/n)</u>	<u>Calibration Gas (ppm)</u>	<u>Battery Check</u>	<u>Calibrated by</u>	<u>Remarks</u>
-------------	---------------------------	----------------------------------	--------------------------	--------------------------	----------------

S
A
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Form B-3

AIR MONITORING RECORD, REAL TIME MONITORING

GENERAL INFORMATION

Name _____ Background Level _____

Date _____ Background Level Location _____

Time _____ Sample Probe, Height
from Ground _____

Estimated Wind Direction _____ Wind Speed _____

Weather Conditions _____

EQUIPMENT SETTINGS

PID Serial # _____ CGI, O₂ Serial # _____

Range _____ Alarm Trigger-%LEL _____

Span _____ Alarm Trigger-%O₂ _____

Calibration Gas _____ Calibration Gas _____

MONITORING RESULTS: Indicate height from ground, of sample probe for OVA or HNU readings, under comments.

Location Time Meter type Reading Comment

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