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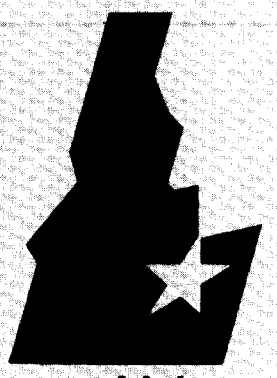

Idaho
National
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of Energy

INFORMAL REPORT

HEALTH AND SAFETY PLAN FOR OPERATIONS PERFORMED FOR THE BURIED WASTE PROGRAM, ENVIRONMENTAL RESTORATION PROGRAM

TASK: VAPOR VACUUM EXTRACTION DEMONSTRATION

N. W. Spang

EG&G Idaho

Work performed under
DOE Contract
No. DE-AC07-76ID01570

Note: This Health and Safety Plan incorporates the "Health and Safety Plan for Operations Performed for the Buried Waste Program, Environmental Restoration Program" (EGG-WM-8504) with Appendix A completed for the Vapor Vacuum Extraction Demonstration.

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EG&G Idaho, Inc.

Idaho National Engineering Laboratory
Idaho Falls, Idaho 83415

Prepared for the
U.S. Department of Energy
Idaho Operations Office
Under DOE Contract No. DE-AC07-76ID01570

HEALTH AND SAFETY PLAN
FOR
OPERATIONS PERFORMED FOR THE
BURIED WASTE PROGRAM,
ENVIRONMENTAL RESTORATION PROGRAM

Approved by:

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Date

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R. G. Thompson, per telecon — 3/29/89
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FIGURES

TABLES

ACRONYMS

ACGIH	American Conference of Governmental Industrial Hygienists
ARDC	Administrative Record and Document Control
BWP	Buried Waste Program
CAM	Continuous Air Monitor
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CGI	Combustible Gas Indicator
COCA	Consent Order and Compliance Agreement
CPR	Cardiopulmonary Resuscitation
DCQAP	Data Collection Quality Assurance Plan
DEIS	Draft Environmental Impact Statement
DOE	Department of Energy
DOP	Detailed Operating Procedure
DOT	Department of Transportation
DRR	Document Revision Request
EPA	Environmental Protection Agency
HEPA	High-efficiency Particulate Air
HP	Health Physics Technician
HSO	Health and Safety Officer
HSP	Health and Safety Plan
HW	Hazardous Waste
IH	Industrial Hygienist
INEL	Idaho National Engineering Laboratory
LEL	Lower Explosive Limit
LLW	Low Level Waste
MFP	Mixed Fission Product
MSDS	Material Safety Data Sheets
NIOSH	National Institute for Occupational Safety and Health
OMP	Occupational Medical Program
OSHA	Occupational Safety and Health Administration
PM	Project Manager
PPE	Personnel Protective Equipment
QAPP	Quality Assurance Project Plan
RCRA	Resource Conservation Recovery Act
RE	Radiological Engineer
RMF	Respirator Maintenance Facility
RWMC	Radioactive Waste Management Complex
SCBA	Self-contained Breathing Apparatus
SDA	Subsurface Disposal Area
SOP	Standard Operating Procedure
SSWP	Special Safe Work Permit
SWEPP	Stored Waste Examination Pilot Plant
SWP	Safe Work Permit

ACRONYMS (Continued)

TIPS	Timely Incident Posting System
TLD	Thermoluminescent Dosimeter
TLV	Threshold Limit Values
TPM	Task Project Manager
TRU	Transuranic
USCG	United States Coast Guard
WBGT	Wet Bulb Globe Temperature

Definition:

Task Site: Immediate area where BWP task operations are being performed.

1. INTRODUCTION

The Buried Waste Program (BWP) Health and Safety Plan (HSP) establishes the procedures and provides general guidelines for worker and public safety to be used by EG&G Idaho, Inc. during the Resource Conservation Recovery Act (RCRA)/Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) investigations being performed at the Radioactive Waste Management Complex (RWMC), Idaho National Engineering Laboratory. The purpose of the BWP investigations is to select, demonstrate, and implement remedial actions that will permanently protect people and the environment from mixed (hazardous and radioactive) waste buried in the Subsurface Disposal Area (SDA) of the RWMC.

The Plan applies to EG&G, subcontractors to EG&G, and employees of other firms and DOE Labs working under the technical direction of EG&G at the SDA investigation site. It has been prepared in recognition of and is consistent with the NIOSH/OSHA/USCG/EPA Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, October 1985; the EG&G Safety Manual; the EG&G Radiological Controls Manual; and EPA Standard Operating Safety Guides, November 1984.

It is recognized that this Health and Safety Plan must be dynamic to fit the many diverse conditions encountered for each task included in this investigation. For this reason, each BWP task that requires a HSP must include a task addendum to be incorporated as Appendix A to this Plan. The task addendum should include any additions, omissions, or modifications to the main body of the HSP that would individualize this plan into a task specific plan. If a document meets the intent of Appendix A [e.g., Detailed Operating Procedure (DOP)], it may be attached as Appendix C to this HSP, for approval, and Appendix A may then be ignored. The task specific HSP will be considered complete when the HSP task addendum is signed and approved. If the Task Project Manager (TPM),

Industrial Hygienist (IH), Health Physics (HP) Technician, Radiological Engineer (RE), Safety Engineer (SE), RWMC Operations Shift Manager, Job Supervisor, Project Manager (PM), and Health and Safety Officer (HSO) concur, modifications to the approved task specific plan may be implemented through a Document Revision Request (DRR). The DRR will then be signed and approved by the BWP Manager and all changes must be recorded in the TPM's Daily Activity Log, along with rationale for the change. If the change was made in a DOP for RWMC field activities, the RWMC/SWEPP program manager will approve this change.

1.1 Policy Statement

It is the policy of EG&G Idaho, Inc. to take every practical precaution to protect the health of its employees, the employees of its subcontractors, the surrounding community, and visitors from any adverse effect that might result from activities at a hazardous waste site. The safety and health precautions in this plan should allow the BWP investigative activities at the RWMC to be accomplished safely without placing an excessive burden of equipment and procedures on the personnel performing the work, thus allowing all projects to be performed efficiently and expeditiously.

Activities conducted in accordance with this policy will be in compliance with OSHA Interim Final Standard 29 CFR 1910.120 governing hazardous waste operations. All EG&G employees who conduct, supervise, and/or manage hazardous waste operations are responsible for carrying out activities in compliance with the provisions of this policy.

1.2 Site Description

The SDA is an 88 acre tract of land inside the fenced area that comprises the western part of the RWMC. Included in the SDA are pits,

trenches, soil vault rows, and Pad A (Figure 1-1). Previously, both intermediate-level and low-level, solid and liquid, transuranic (TRU) and mixed fission product (MFP), and nonradioactive wastes were disposed of in the burial ground.

The pits are excavations with a variety of dimensions. They generally have surface areas of several acres and range in depth from 5 to 15 ft. In general, the pits were excavated to bedrock, which was then usually covered with 2 ft of dirt, although some waste is believed to lay directly on basalt. After the waste was emplaced, the pits were backfilled with at least 3 ft of soil. During operations, soil cover was applied over the waste during weekly or daily operations, depending on the procedures for that particular year. In general, closure of a filled pit included applying final soil cover a few feet deep and planting stabilizing vegetation on the final cover.

Trenches at the SDA range in length from 100 to over 1000 ft. Trenches were excavated approximately 5 ft wide and an average of 12 ft deep on 16 ft centers. The waste was emplaced and usually (but not always) covered with at least 3 ft of dirt. Centerlines of the trenches were usually marked at both ends by a concrete monument. A brass plate on each monument identifies the trench number, opening and closing dates, and its direction by means of an arrow pointing down the trench. Early pits and trenches have been resurveyed and monuments placed at approximate corners or centerlines.

Soil vaults at the SDA are cylindrical holes drilled into the ground for disposal of special waste with radiation levels in excess of 500 mR/h at 3 ft from the container surface. Rows of vaults were drilled along predetermined centerlines. Soil vault diameters vary from 1.3 to 6.5 ft, with an average depth of 12 ft. If the drilling penetrated to basalt,

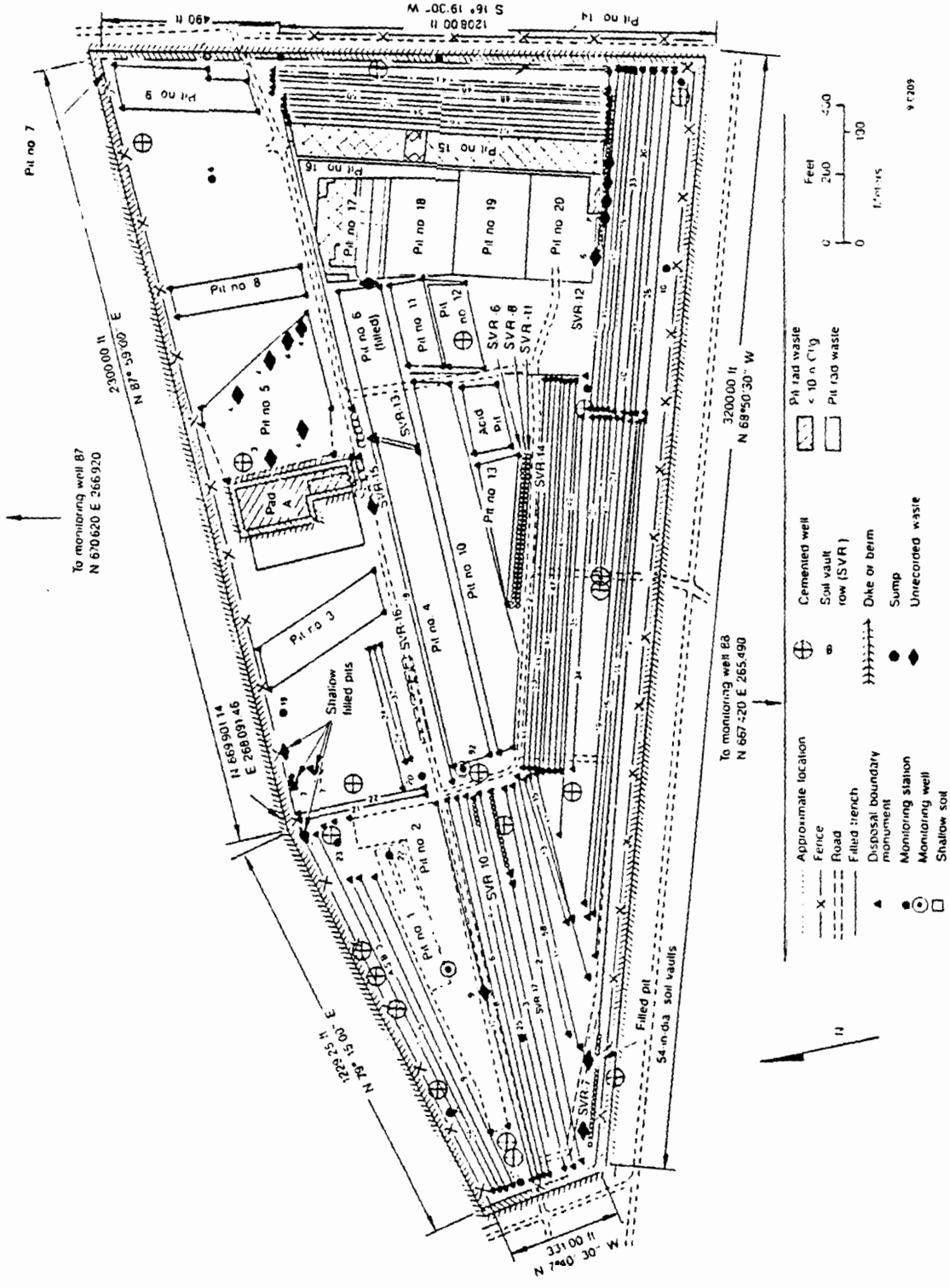

Figure 1-1. Layout of the SDA.

2 ft of soil was placed on the vault floor. Each vault was separated from previously buried waste by approximately 2 ft. After the containers of waste were emplaced in a vault, at least 3 ft of dirt cover was placed on top of the vault.

Pad A is an asphalt pad on which containers of waste were stacked and covered with soil. Pad A is located in the north central part of the SDA. The original pad measured 120 x 170 ft. A southern extension, built in 1973, measures 120 x 165 ft. A second addition, 120 x 335 ft, was constructed in 1976 to the west. The entire pad now has overall dimensions of 240 x 335 ft.

At Pad A, waste (in containers) was stacked in layers and approximately half of the containers were covered with plywood and polyethylene prior to final coverage with soil. Sufficient earth was placed around the pad to provide a 3 ft cover and a 3:1 maximum final slope. The cover included seeding with stabilizing vegetation. The ground below the pad is basalt.

1.3 Work Description

The objective of the BWP investigations at the SDA, located at the RWMC, is to evaluate the nature and extent of the mixed (hazardous and radioactive) waste releases; evaluate the site characteristics; and select, demonstrate, and implement appropriate remedial actions that will protect both people and the environment from this waste. The following components are part of this program:

- Characterizing the source(s) of the release(s) of contaminants (radiological and volatile organic)

- Characterizing the nature and extent of contamination within the SDA boundaries and migration from the area. This includes defining the waste sources, pathways, and methods of migration; including the transport media, extent, direction, speed, complicating factors influencing movement, concentration profiles, etc.

- Identifying areas and populations that may be exposed to releases from the facility

- Determining short- and long-term, present and potential risks to human health and the environment from releases from the facility

- Identifying and implementing interim measures to abate further spread of contaminants

- Identifying, developing, and implementing corrective measures to prevent and remediate releases of volatile organics and radiological components from the SDA

- Designing a program to monitor the implementation, maintenance, and performance of any interim or final corrective measures to ensure that risks to human health and the environment are minimized.

The above stated objectives are being performed in support of the Draft Environmental Impact Statement (DEIS) and associated RCRA/CERCLA documentation. This document will constitute the official recommendation of the BWP for a permanent solution for management of the buried mixed waste at the RWMC.

The work scope for each individual task included in the BWP investigations must be included in the task specific addendum located in Appendix A.

The field activities that will be conducted to complete this investigation may involve exposure to hazardous and/or radioactive materials or wastes resulting from direct contact with contaminated soil, rock, and groundwater; and from vapors emanating from open boreholes and wells at the SDA. Protecting on-site personnel from occupational health and safety hazards will be of major concern during the field activities at the investigation site. To this end, EG&G has identified a number of subjects to be addressed that will provide protection to personnel and the environment. Ten major areas to be addressed are as follows:

- Health and safety responsibilities
- Personnel training
- Medical surveillance program
- Hazard evaluation
- Levels of protection and use of personal protective equipment
- Safe work practices
- Establishment of work zones, site entry, and security procedures
- Personnel and environmental monitoring and record keeping requirements
- Decontamination procedures
- Emergency procedures, equipment, and information.

Each of these areas is detailed with respect to the proposed RWMC activities in the following sections.

2. HEALTH AND SAFETY RESPONSIBILITIES

The direct implementation of the BWP Health and Safety Plan (HSP) will be the responsibility of the TPM, IH, HP, HSO, SE, and all operations personnel. It is imperative that open communications and responsiveness exist among all team members to ensure the safe completion of each of the tasks. If the TPM is unable to be at the RWMC, he may appoint a qualified alternate to act in his place. This change must be approved by the RWMC Operations Shift Manager and recorded in the daily activity log. The TPM should develop and record the task organizational structure and identify key personnel staff in the task specific addendum in Appendix A. If a person is qualified, he may act in dual positions for a task (e.g., IH and HSO).

2.1 Task Project Manager (TPM)

The TPM has the ultimate responsibility for the safe and successful completion of task activities and for all phases of safety at the task site. There is one TPM for each task performed under the BWP. If operations have been halted due to a potentially hazardous health and safety issue, the TPM will confer with the IH, HSO, RE, HP, PM, and RWMC Operations Shift Manager and agree upon a safe solution to the problem. In addition, he must remain responsive to any health and safety issues raised by operations personnel.

The TPM will conduct an orientation meeting prior to the start of a task to review and discuss operating procedures and the HSP (including any attachments) with all operations personnel (he may assign the HSO to perform this duty). If new team members arrive at the site, this orientation shall be repeated for them. At the beginning of each work day, the TPM will meet with operations personnel to discuss the days activities and address any health and safety issues that may have arisen or potentially could arise that day.

The TPM will maintain a file for each employee working on the task site. This file will include a signed Health and Safety Certification Form (Appendix B), whole body counts, bioassays, all personal and air monitoring data results, any accident or illness report forms, and records of training. Duplicate copies of these files will be sent to the BWP Administrative Records and Document Control (ARDC) Office and updated accordingly.

The TPM will also interface with the analytical lab(s) concerning analyses of the filter samples and will make provisions with the lab for a 24-48 hour turnaround for analysis in the event of an exposure above an action limit.

Additional Responsibilities of the TPM include:

- Halting or modifying any work condition or moving personnel from the task site if the TPM considers conditions to be unsafe. This decision will be made by considering recommendations from the HSO, IH, SE, and HP

- Notifying the RWMC Operations Shift Manager of any modifications or a suspension of work conditions

- Ensure that all task site personnel understand and comply with all safety requirements

- Initiate corrective action for observed safety violations

- Implement the safety training as described in this plan (Section 3).

2.2 Health and Safety Officer (HSO)

The HSO is responsible for ensuring compliance with and the execution of the health and safety procedures as described in this plan. He will be at the task site whenever operations personnel are present. The HSO will be supported by the SE, IH, HP, RE, and RWMC Operations Shift Manager.

Responsibilities of the HSO include:

- Ensuring that all necessary safety equipment is located on the site and properly maintained and calibrated; e.g., monitoring equipment is checked for proper operation, batteries are fully charged, and unused respirators with specified cartridges are supplied. Each team member should know the location of this equipment

- Observe site activities to ensure the proper uses of personal protective equipment (Section 6.)

- Initiate contact with the INEL emergency response agencies (security, fire, medical), ensure personnel and environmental monitoring requirements are established using recommendations made by the IH and RE (Section 9.), and test the emergency phone numbers to ensure their accuracy

- Ensure that personnel observe the work zones and decontamination procedures as described in this plan (Sections 8. and 10.)

- Maintain an up-to-date Material Safety Data Sheets (MSDS) file and assure that all hazardous materials are properly labeled at the task site

- Conduct the orientation meeting prior to beginning the task if requested by the TPM.

2.3 Industrial Hygienist (IH)

The IH (one who is educated in Industrial Hygiene) will be the primary source of information regarding health and safety issues at the site. He is responsible for operating, daily cleaning, and calibrating all monitoring equipment (except for radiological equipment), as well as maintaining a daily logbook of monitoring activities. The IH will be at the work site during all operations (or as specified in the Appendix A task specific addendum). The IH will advise the TPM on any monitoring or personal protective equipment changes and on task site evacuation and re-entry. He will also report equipment problems to the TPM.

The IH is responsible for designing a practical monitoring program capable of measuring detectable levels of hazardous materials in the work environment. He will also take the field samples and log results and observations. (It should be noted that there is a large amount of uncertainty as to the chemical hazards that may be encountered. Not everything can be monitored and common sense must be exercised at all times.)

Following a worker hazardous material exposure incident (as defined by the IH), it is the responsibility of the IH to identify such workers to the Occupational Medical Program (OMP) and provide the following information at the time of the medical examination:

- Time of first exposure
- Monitoring data including locations and dates
- Personal protective equipment requirements and use
- Number of days personal protective equipment will be used

- How long the work will continue
- Training the employee has received, including respirator training
- Respirator cartridge type that was used.

2.4 Health Physics (HP) Technician

The HP will be the primary source of information and guidance for monitoring radiological hazards. He will be present at the work site before operations begin and at any point during task operations when a radiological hazard to operations personnel may exist or surface. His responsibilities include:

- Ensuring radiological equipment is calibrated and functioning properly
- Radiological surveying of any site, equipment (before and after decontamination), and samples
- Collecting and analyzing smears as directed by the RE
- Supervise decontamination of equipment (radiological contaminants)
- Providing OMP with radiological information in the event of a worker exposure incident
- Immediately notifying appropriate emergency personnel in the event of a radioactive release, fire, explosion, etc. as specified in the RWMC Emergency Action Plan.

- Accompanying radiation incident victim to CFA Medical Facility for evaluation.

2.5 Radiological Engineer (RE)

The RE will be the primary source of information and guidance for radiological controls that may be imposed on a BWP task. The RE will be available to ensure the safety of operations personnel if a radiological hazard exists or surfaces at a work site. Responsibilities include:

- Performing radiation exposure estimates using information provided by cognizant engineers, area HPs, history of past work evaluations, bioassays, TPMs, etc.

- Identifying the type(s) of radiological monitoring equipment necessary to maintain a safe work site for operations personnel

- Attending pre-job briefings if required by TPM

- Advising the TPM on any monitoring or personal protective equipment changes and on task site evacuation and re-entry

- Maintaining contact with the area HP to suggest HSP modifications if radiological changes occur at the work site.

2.6 Administrative Record and Document Control (ARDC) Officer

The ARDC Officer is responsible for the organization and maintenance of all data and reports (safety, sampling, and operations) generated by the BWP task. This manager will also maintain a supply of all controlled documents and provide a documented checkout system for the control and release of all controlled documents, reports, and records. A copy of the

HSP personnel files (Health and Safety Certification Form, whole body counts, bioassays, personal and air monitoring data results, accident or illness report forms, records of training, etc.) will be sent to the BWP ARDC Officer by the TPM and maintained for 30 years after the individual leaves employment (29 CFR Part 1910.20).

2.7 Occupational Medical Program (OMP)

The OMP is authorized by DOE 5480.8 and uses the sciences related to preventative medicine and environmental health to determine the effects of environmental stress on humans in health or disease. The OMP has responsibilities in the following areas:

- Approve site emergency plans and operations
- Treat illnesses or injuries in or arising out of the course of work
- Assist in the documentation and investigation of work related illness or injury
- Provide medical opinion regarding the ability of employees to perform assigned work
- Advise regarding medical treatment and appropriate transportation of injured personnel
- Maintain and operate a radiation and chemical decontamination facility at CFA

- Provide medical surveillance of workers who are identified by an IH as exposed, or most likely to be exposed, to specific toxic substances.

2.8 RWMC Operations Shift Manager

The RWMC Operations Shift Manager has responsibility for the safety of personnel and the safe completion of all project activities conducted at the RWMC. Therefore, he will be kept informed of all site activities. The TPM is required to report progress and work plans to the RWMC Operations Shift Manager: at the beginning of each work day, at the end of each work day, and when any unusual circumstances occur during the work day. The Shift Manager will also serve as advisor to operations personnel with regard to RWMC operations. In case of emergency, the Shift Manager will contact the RWMC Emergency Action Director who will act as coordinator of the situation regarding the RWMC facility and personnel.

2.9 BWP Manager

The BWP Manager is responsible for the entire BWP investigation and remediation for the environmental concerns at the RWMC. He provides technical coordination and interfaces with the DOE-ID Waste Management Branch Chief. He ensures that all activities are conducted in accordance with the DOE requirements and the INEL Consent Order and Compliance Agreement (COCA). He monitors the program budgets and schedules, and he ensures the availability of necessary personnel, equipment, subcontractors, and services. He participates in the development of the BWP tasks, including initial work plans, for the SDA. He also participates in the evaluation of findings, development of conclusions and recommendations, and production of reports. He has primary responsibility for the technical quality of all projects.

2.10 Project Manager (PM)

The Project Managers have the ultimate responsibility for ensuring that all tasks concerned with their portion of the SDA investigation are conducted in accordance with the Program Management Plan and all applicable Occupational Safety and Health Administration (OSHA), EPA, DOE, DOT and State of Idaho requirements as well as the Data Collection Quality Assurance Plan (DCQAP) or Quality Assurance Project Plan (QAPP), the BWP Health and Safety Plan, and sampling and analysis plans. The PM is typically the cost account manager assigning the task. These positions report directly to the BWP Manager and collectively have the responsibility for the coordination of all field, laboratory, and modeling activities.

2.11 RWMC/SWEPP Programs Manager

The RWMC/SWEPP Programs Manager is responsible for management of the RWMC/SWEPP, which include radioactive waste storage/disposal operations; SWEPP operations; technical and administrative support of low level waste (LLW) and transuranic (TRU) waste programs facilities; and various special projects.

2.12 Job Supervisor

The Job Supervisor for BWP/RWMC Operations has the primary responsibility for assuring that field tasks performed at the RWMC are satisfactorily completed within the limitations set by the BWP work package requirements. He is the primary contact with the BWP PM and will provide the BWP with RWMC field task progress. He reports to the RWMC Operations Shift Manager.

2.13 Environmental Hazardous Waste (HW) Engineer

The Environmental Hazardous Waste (HW) Engineer has the responsibility for overseeing and monitoring all field activities at the RWMC to insure compliance with DOE Orders, EPA regulations, and any other laws or regulations concerning the effects of RWMC activities on the environment. Additional responsibilities of the Environmental HW Engineer include:

- Acting as advisor for environmental concerns associated with BWP task activities
- Maintaining a current library of applicable environmental information
- Disseminating applicable environmental information where it is needed.

2.14 Safety Engineer

The Safety Engineer (SE) will offer guidance on all safety issues arising at the BWP task site. He will observe task activities and advise the TPM on any required safety equipment necessary to promote a safer work environment. He will advise the TPM and HSO on any safety problems that he observes during task operations. He will also recommend solutions to any discovered safety problems.

2.15 BWP Operations Personnel

All operations personnel, including EG&G and subcontractor personnel, are responsible for understanding and complying with all requirements of the BWP task specific Health and Safety Plan. Operations personnel will

be briefed prior to the start of each day's activities. They should bring all perceived or potential unsafe site conditions to the attention of the TPM at this meeting.

2.16 Visitors

To minimize risks that may result from site activities, all visitors will be required to follow the rules as set forth in this plan:

- Only visitors who have official business at the task site and who have notified the TPM in advance will be allowed in the proximity of the task site.

- No visitors will be allowed inside the task site unless they have received a minimum of 24 hours of hazardous material worker training; including radiation worker or nonradiation worker training and respirator training/fit testing, as required. (Exceptions to this requirement must be recorded in the task specific addendum located in Appendix A of this HSP.) These visitors are to be oriented (by the HSO) concerning work operations and safety precautions in effect.

- The HSO will provide the visitors with the required protective equipment and ensure the use of this equipment.

- Upon their arrival, the HSO will instruct untrained visitors concerning the task site zones and safety precautions in effect.

3. PERSONNEL TRAINING

Each TPM will ensure that all operations personnel have received 40 hours of training in accordance with the OSHA Interim Final Standard 29 CFR Part 1910.120, Docket # S-760, May 27, 1987 prior to commencing work on the task site. This training should include 32 hours of hazardous material training, 4 hours of respirator training and fit testing, and 12 hours of radiation worker training. All managers (TPM, PM, etc.) who will be at the task site require an additional eight hours of training in the management of hazardous waste sites. At least one worker at the task site will have current first aid and CPR certification. In addition, the TPM will ensure that all personnel understand the specific site hazards associated with each task at the daily shift meetings. Each TPM will also design and implement a task specific training program to instruct operations personnel of the unique hazards or procedures, task specific HSP, DOPs, etc. associated with the task at hand. He may assign this orientation to the HSO. Training records will be kept in the personnel file maintained by the TPM. Copies of these training records will be submitted to the ARDC Office and the files will be updated as changes occur. Table 3-1 summarizes the above mentioned training requirements and recommendations.

The following outline is to be used by the TPM for the training and orientation prior to the start of the task. Personnel who will be working on the task site will be informed of:

WORK PLAN

GENERAL FIELD SAFETY TECHNIQUES

- Personnel responsibilities
- Medical program

TABLE 3-1. BWP Training Requirements and Recommendations[a]

Training Topic	Emphasis of Training	Operations Personnel	Management and Health and Safety
OSHA 29 CFR 1910.120	Chemical and physical properties; chemical reactions; chemical compatibilities	R	R
Respirator Training	Respirator fit; SCBA use	R	R
Radiation Worker Training	Detection instrumentation; personal protection	R	R
Medical Program	First Aid; CPR	O*	O*
Personal Protective Clothing and Equipment	Chemical and Radiological	R	R
Industrial Hygiene	Monitoring; dose levels	O	O
Site Specific Hazard Training	To be developed and presented for each outlined BWP task	R	R
Decontamination	Chemical and Radiological	R	R
Legal and Regulatory Aspects	Applicable health and safety regulations	O	O
Emergency Training	RWMC Drills, Rescue, Response, Information	R	R

R: Required
O: Optional but recommended
*: Two workers on the task site required to be First Aid and CPR trained.

[a] Additional training may be required as needed for each individual task and should be listed in the task specific addendum located in Appendix A.

GENERAL FIELD SAFETY TECHNIQUES (cont'd)

- Site work zones
- Vehicle operation and parking
- Site air and radiological monitoring
  - Monitoring equipment (site and personal)
  - Calibration
  - Cleaning procedures
- Personal monitoring equipment
- Potential hazardous contaminants present at the project site and chemical hazards at specific sites (toxicity and symptoms)
- Potential radiological contaminants
- Contingency plans and responses
- Use of field equipment and supplies
  - Drilling equipment
  - Work tools
  - Sampling equipment
- Site control and security
- Buddy system and hand signals

- Work limitations

  - Weather
  - Fatigue
  - Heat stress
  - Cold stress
  - Hours of work
  - Illumination
  - Lightning

PERSONNEL PROTECTIVE EQUIPMENT AND CLOTHING

- General

- Availability

- Level D personnel protective equipment and clothing, as defined by OSHA, including limitations of protection

  - Work clothing
  - Eye protection
  - Foot protection
  - Head protection
  - Hearing protection

- Level C personnel protective equipment and clothing, as defined by OSHA, including limitations of protection

  - Respiratory protection
  - Work clothing
  - Eye protection

- Foot protection
- Head protection
- Hearing protection
- Skin/hand protection

- Level B personnel protective equipment and clothing, as defined by OSHA, including limitations of protection

  - Air supplied hood or SCBA
  - Disposable chemical-resistant coveralls
  - Anti-C clothing as recommended by the RE if radiological hazards exist
  - Chemical resistant safety shoes with steel toe
  - Chemical resistant shoe covers
  - Hard hat
  - Inner and outer chemically resistant gloves
  - Hearing protection (as required by IH).

- Level A personnel protective equipment and clothing, as defined by OSHA, including limitations of protection

  - SCBA
  - Fully-encapsulating, chemical resistant suit
  - Additional Anti-C clothing as recommended by the RE if radiological hazards exist
  - Chemical resistant safety shoes with steel toe
  - Chemical resistant shoe covers
  - Hard Hat
  - Inner chemically resistant gloves
  - Hearing protection (as required by IH).

EMERGENCY ASSISTANCE

- Availability of emergency services and location of telephone and telephone numbers, MSDSs, etc.
- Transportation of emergency cases and accompanying medical monitoring procedures
- On-site emergency assistance and review of hand and audible signals

SPECIAL PRECAUTIONS DURING TASK SPECIFIC OPERATIONS

- Most dangerous times
- Most dangerous conditions
- Specific task checklist

The TPM will maintain a file of completed Health and Safety Certification Forms, Appendix B, (with copies filed with the ARDC) from each worker indicating that he has read and understood this Health and Safety Plan and has attended the training sessions described above. In addition, the TPM will conduct safety briefings at the beginning of each shift, whenever new personnel arrive at the site, and as significant changes to site or work conditions occur.

4. MEDICAL SURVEILLANCE PROGRAM

The INEL Occupational Medical Program (INEL OMP) medical director has specified, per ANSI Standard 288.2-1980 and OSHA 1910.120, that all hazardous material and hazardous waste handlers will be medically qualified by an annual medical record review, interview, a respiratory questionnaire and such tests and examinations as are required to advise that each worker is (a) able to use respirators safely, (b) can work in a heat stress environment, and (c) has normal organs of detoxification in the event of a brief low-level accident exposure (As described in the American Conference of Governmental Industrial Hygienists, Threshold Limit Values and Biological Exposure Indices for 1988-1989). In addition, the OMP examining physician may form an opinion as to the relationship of current and future disease to on the job conditions if the "job related" information is provided for the hazardous material workers.

The OMP is responsible for worker evaluation and medical assessment and shall provide medical clearance for work with or without restrictions. Background information for each BWP potential hazardous waste worker must be supplied by the PM (or the IH or TPM with the PM's approval) before work has begun and annually in the month before his birth month. Information required to qualify or restrict an employee as a hazardous waste worker and to receive respirator training includes the following:

- Medical history

  - Pre-employment medical examination for full-time employees
  - Current comprehensive medical examinations in an established site medical facility
  - Records and reports from employees' private physicians as required by the Site Occupational Medical Director

- Seen by the INEL OMP on return to work following an illness absence in excess of a full work week of 40 hours (as stated by EG&G Idaho Benefits)
- Immediate examination in the event a supervisor doubts the ability of an employee to perform an assigned task
- Examination in the event the employee doubts his ability to perform an assigned task

- Job related information

  - What type of job does the individual perform?
  - When was the individual first exposed or working in an environment with potential hazardous exposure?
  - Provide all relevant environmental monitoring (IH & HP) data including sample dates and places (If the employee has been exposed to contamination above an action level.)
  - How and when was/will the employee trained in personal protective equipment including respirators?
  - What type of respiratory device is to be used?
  - How many days a month is it to be used?
  - How long is this work to continue?

If the above information and examinations determine an employee to be cleared medically for "Respiratory use only, no prolonged use" he/she:

- Is not qualified for prolonged respirator use

- Is not qualified for work in a heat stress environment

- Has insufficient organ functions to withstand a breach in personal protection

as per the INEL OMP through DOE-ID 5480.8.

If sufficient information is not available at the time of clearance for respirator training, the OMP will require the individual to undergo such additional tests and measures as necessary to make this determination.

- Additional exams that are required but not the responsibility of the OMP (as stated in the EG&G Radiological Controls Manual and under the guidelines of RWMC/SWEPP PD-RS-6.1)

  - Whole body count (baseline, at yearly intervals, and if a radiological contamination incident occurs or is suspected)
  - Bioassay (baseline, as required to assess internal radiation dose and if a radiological contamination incident occurs or is suspected).

Other OSHA-mandated medical surveillance initiatives exist and must be complied with (see 29 CFR 1910.120). These include an emphasis on monitoring symptoms related to the handling of hazardous substances in the work environment. For example, workers who are identified by the IH as being exposed over action levels to specific chemicals such as beryllium will be enrolled in a separate medical surveillance program whose examination content and frequency will be determined by the INEL OMP Medical Director based on medical judgment and/or regulatory requirements.

Subcontractors are required and responsible for being in compliance with government health and safety requirements. All medical examination data collected pursuant to subcontractor worker qualifications shall be

made available to the INEL OMP to assist in the determination of ability to work should doubt arise as to the medical ability of an employee. This medical information is also required from the subcontractor in order for the INEL OMP to confirm subcontractor employee's identification as Hazardous Material Workers.

It is the policy of the INEL OMP that medical examinations for subcontractors be performed by OMP staff in the event of a documented exposure and on recommendation of the IH and/or RE.

Prior to the initiation of any task where a chemical/radiological hazard exists, EG&G medical staff at the CFA Medical Facility, Chemical Processing Plant, and Willow Creek Building Medical Facility will be notified of the start of the task, anticipated schedules, and work site locations by the HSO. In addition, they will be supplied with an inventory of the known hazardous constituents buried at the SDA.

If an exposure occurs above an action limit, or if personnel exhibit symptoms of chemical exposure, the worker(s) will be transported to the nearest medical facility for treatment. Additional medical testing will be performed after the analytical results of the monitoring filters have been received by medical personnel if an indication of exposure above the 1988-89 Threshold Limit Values (TLV) exists. Analysis of the filters and testing of the exposed worker(s) should occur no later than 24 to 48 hours after the exposure incident.

5. HAZARD EVALUATION

Review of documents and records (as listed in References) indicate that the materials listed in Table 5-1 may have been disposed at the RWMC SDA - most are hazardous. The list is not all inclusive and omissions are possible due to the lack of or inaccuracy of records from INEL waste generators and off-site generators. Air, water, and soil analyses conducted in recent years have supplemented and added to the existing information and those contaminants are included in the list in Table 5-1. Other radioactive contaminants are also present at the SDA. However, due to the uncertainty of the contaminants truly present on the SDA, they are not listed in this HSP; but they can be found in the latest revisions of Engineering Design Files BWP-ISV-001, BWP-ISV-002, BWP-ISV-003, and BWP-ISV-004. The TPM should circle all suspected hazards on this same list, reproduced in Appendix A, pertinent to the individual project. Note that many of the hazardous materials listed may also be contaminated with fission products, activation products, and transuranics. Additional hazards should be listed in the task specific addendum in Appendix A.

The following sections provide general information on the types of hazards anticipated while working at the SDA.

5.1 Chemical Hazards

Chemical hazards to operations personnel may exist when gaseous, liquid, or solid materials from the investigation sites contact human tissue. Every effort will be made to avoid direct contact with the subsurface materials at the SDA site.

Routes of Exposure: Operations personnel may be exposed to contamination through inhalation, ingestion, and/or skin and eye contact.

TABLE 5-1. LIST OF MATERIALS THAT MAY BE BURIED AT THE SDA

1,1,1-Trichloroethane
1,1,2,2-Tetrachloroethane
1,1-Dichloroethane
1,1-Dichloroethylene
1,2-Dichlorobenzene
1,2-Dichloropropane
1,2-Trans-Dichloroethylene
Acetone
Acids (HF, HCl, etc.)
Aluminum
Americium - 241
Ammonia
Animal carcasses and feces
Arsenic
Asbestos
Barium
Batteries
Benzene
Beryllium
Butane (probably in compressed gas cylinders)
Cadmium
Calcium
Calcium silicate
Carbon tetrachloride
Caustic compounds (NaOH, etc.)
Chloroform
Chromium
Cobalt
Copper
Cyanide
Dichlorodifluoroethane
Dichlorodifluoromethane
Ethylene glycol
Gasoline
Herbicides
Lead
Magnesium
Meat with botulinus
Mercury
Mixed activation products
Mixed fusion products
Nickel
Nitrate
Oil
Plutonium - 238, 239, 240, 241, 242
Potassium
Regal Oil
Roaster oxide
Santo Wax
Sodium
Tantalum
Tetrachloroethene
Tetrachloroethylene (Perchloroethylene)
Thallium oxide
Toluene
Trichloroethylene (Trichloroethene)
Tritium
U^{233}, U^{235}, U^{238}
UO_2 powder
Vanadium
Vehicles
Zinc
Zirconium

- Respiratory system contact with contaminated materials can occur due to lack of or improper use of respiratory equipment, malfunctioning monitoring equipment, presence of undetected chemicals, or chemicals in quantities greater than respiratory equipment protection limits.

- Gastro-intestinal system contact with samples can occur when workers do not pay attention to good personal hygiene habits; e.g., washing hands thoroughly before smoking, eating, or drinking after leaving the work site.

- Skin contact with solid, liquid, or gaseous contaminants can occur by injection through cuts or abrasions and absorption. These paths of contamination can exist when a worker does not wear proper protective clothing during project activities, when sample preparation and packing is carelessly done, or when a breach of protective clothing has occurred.

- Eye contact with solid or liquid contaminated samples can occur when a worker does not wear safety glasses during project activities or when dirty hands are used to rub an eye.

Indicators of Chemical Exposure

- Observable by others

    - changes in complexion, skin discoloration
    - lack of coordination
    - changes in demeanor
    - excessive salivation, papillary response
    - changes in speech pattern

- Nonobservable

  - headaches
  - dizziness
  - blurred vision
  - cramps
  - irritation of eyes, skin or respiratory tract

5.2 Other Hazards

The field team can be exposed to a number of other hazards while working at the SDA. Hazards that may be encountered are:

- Fire and explosion
- Oxygen deficiency
- Radiological Hazards
- Biological hazards
- Industrial safety hazards
- Electrical hazards
- Heat stress
- Cold exposure
- Noise
- Decontamination activities
- Work stress
- Lightning.

General considerations are discussed below.

5.2.1 Fire and Explosion

There are many potential causes of explosions and fires at hazardous waste sites. Explosions and fires may arise spontaneously. However, they more commonly result from site activities such as moving drums,

accidentally mixing incompatible chemicals, introducing an ignition source into an explosive or flammable environment, or refueling equipment. Intense heat, open flame, smoke inhalation, flying objects, and the release of toxic chemicals into the environment can result.

In order to protect against this hazard, the SE will determine what monitoring equipment is necessary to guard against explosive atmospheres and flammable vapors. Other preventative measures include: keeping all potential ignition sources at least 50 feet away from an explosive or flammable environment; use non-sparking, explosion-proof equipment; and follow safe practices when performing any task that might result in agitation or release of flammable vapors or gases. Equipment refueling shall be performed in accordance with RWMC/SWEPP PD-RS-6.2, paragraph 3.3.14.

5.2.2 Oxygen Deficiency

Oxygen deficiency can result from the displacement of oxygen by another gas or the consumption of oxygen by a chemical reaction. Confined spaces or low-lying areas such as pits or trenches are particularly vulnerable to oxygen deficiency and should always be monitored by the IH prior to entry. The EG&G Safety Manual (Chapter 20.0, Appendix A) should also be reviewed when working in a confined space.

5.2.3 Radiological Hazards

The potential exists for personnel exposure to radiologically-contaminated materials and radiation fields while working at the SDA. The HP on duty at the task site will be radiologically monitoring the work area, material, and equipment during each task. The RE should list all known radiological hazards for each project in the task specific addendum in Appendix A.

The RE will determine the monitoring equipment necessary to alert operations personnel to airborne radioactivity and other sources. Confined spaces (i.e., containment buildings, pits, and trenches) may be especially hazardous and should be monitored by a HP before entry. High-efficiency particulate air (HEPA) filters may also be advised by the RE to ventilate work zones where particulate airborne activity may exist.

5.2.4 Biological Hazards

Waste from hospitals and research facilities, garbage, animal carcasses, and animal feces may contain disease-causing organisms. These agents could infect site personnel and can be dispersed in the environment by water and wind.

Normal tetanus bacteria live in soil. It is recommended (not required) that operations personnel have updated tetanus immunizations to minimize this hazard.

The TPM (or the HSO if designated by the TPM will inform operations personnel that local wildlife encounters may be possible. Snakes, insects, and other animals can and will bite if disturbed and avoidance is the best solution. Prompt first aid measures will be performed if this type of injury occurs.

5.2.5 Industrial Safety Hazards

Numerous safety hazards may be encountered such as:

- Hazardous objects and terrain
- Elevated work areas

- Lifting heavy objects
- Moving equipment and falling objects
- Personal protective equipment
- Project related equipment.

Operations personnel should constantly look for potential safety hazards and should immediately inform the TPM of any new hazards so that action can be taken and the hazard be incorporated in a Safe Work Permit (SWP).

Existing Objects or Terrain: Existing objects and terrain can present safety hazards in the form of:

- Holes and ditches
- Precariously positioned objects such as drums or boards that may fall
- Sharp objects such as nails, metal shards, and broken glass
- Slippery surfaces
- Steep grades
- Uneven terrain and
- Unstable surfaces such as walls that may collapse or flooring that may give way.

Safety hazards that are a result of performing each individual task should be listed in the Appendix A task specific addendum and presented to all operations personnel by the TPM.

Elevated Work Areas: During the course of the site activities, personnel may be required to work on elevated equipment. When such work must be performed, the individual will be required to wear a safety harness and the work will be overseen by the HSO.

Lifting Heavy Objects: Operations personnel may risk injury by lifting heavy objects at the task site. All operations personnel should be trained in the proper method of lifting heavy equipment and cautioned against lifting objects that are too heavy for one person. Mechanical and hydraulic assists will be utilized whenever possible to minimize lifting dangers.

Moving Machinery and Falling Objects: Operations personnel may be subject to lacerations and contusions (cuts and bruises) when activity involves contact with moving machinery and possible falling objects. This will be minimized by wearing protective clothing, hard hats, steel-toed boots, and using mechanical assists whenever possible. Loose clothing or neck chains for security badges should not be worn around rotating drilling equipment or any other potentially hazardous piece of equipment.

Personal Protective Equipment: Wearing of personal protective equipment reduces worker's abilities to move freely, see clearly, and hear directions and noise that might indicate a hazard. Personal protective equipment can also increase the risk of heat stress. Personnel must adjust their habits to accommodate for these limitations.

Task Related Equipment: The TPM should list all hazardous equipment not mentioned above in the Appendix A task specific addendum and make all task personnel aware of these dangers.

5.2.6 Electrical Hazards

Overhead power lines, downed electrical wires, and buried cables all pose a danger of shock or electrocution if workers contact or sever them during site operations. Electrical equipment used on site may also pose a hazard to workers. Careful observation for overhead electrical hazards will be performed by operating personnel prior to raising masts on drill

rigs or using cranes. The appropriate INEL operating group (526-2512/ 526-1591) will be contacted for underground utility clearances prior to drilling or excavating operations. EG&G requirements stated in the EG&G Safety Manual for work permits and clearances for operations near power lines shall be followed.

5.2.7 Heat Stress

During the task, workers may be required to wear protective clothing that could prevent the body from cooling naturally thus causing a rise in body temperature. High ambient temperatures can result in various symptoms including heat fatigue and physical discomfort, stemming from the increase of body temperature. The HSO and IH must be alert for the signs and symptoms of heat stress and inform the TPM to preserve the safe work practices necessary for each operation. Work scheduled for the summer months is subject to the higher ambient temperatures than in winter. Radiant heat will also be sufficiently high to create a hazard in the summer. The IH will monitor the ambient air temperature and suggest adjustments of the work/rest cycles to the TPM according to the response of the workers. Guidelines for the schedule have been established by the American Conference of Governmental Industrial Hygienists (ACGIH) and are intended for the initial establishment of the schedule. The IH will evaluate the task site condition and suggest an initial work/rest schedule to the TPM. The IH may adjust this schedule as atmospheric conditions change.

- Operations Personnel will be observed for the following signs and symptoms of heat stress:

  - dizziness
  - profuse sweating
  - skin color change

- vision problems
- confusion
- nausea
- slurred speech
- fatigue
- fainting
- clammy skin.

Operations Personnel who exhibit any of these symptoms will be removed immediately from the task site and allowed to rest. Using the best judgment of the IH, they will be taken directly to the medical dispensary to be examined. As per the OMP Director, the following guidelines are provided regarding heat stress. Minor symptoms of heat stress include muscle cramping, temperature changes, skin color changes and the like. Mental confusion, and decreased apparent consciousness must always be considered an emergency requiring medical evaluation and treatment at the nearest OMP medical facility. The use of an ambulance for this situation should be considered normal procedure.

Many other methods are available to minimize the effects of heat stress besides personnel monitoring and the establishment of a work/rest regimen. The work can be scheduled to begin early in the day or later at night to minimize the effect of radiant heat generally encountered in the afternoon. During break, each worker will be at rest and able to drink cool liquids such as water or commercial drink mixes such as Gatorade or Quik Kick. Protective clothing shall be removed and personnel will be decontaminated and surveyed prior to leaving the SDA for a break.

5.2.8 Cold Exposure

Cold exposure may be a factor if work is done in the evening hours, if winds are high, if unpredictable weather moves in, and in the winter months (e.g., at 50°F, with a 25 mph wind, the equivalent chill

temperature is 32°F). Adequate protective clothing to ensure warmth will be necessary but extra care must be taken while working in this environment. Observation is required of co-workers' facial extremities (ears and nose) for signs of frostbite (whitening of the skin surface), and of workers mental coherence and body movements to avoid hypothermia.

5.2.9 Noise

Operations personnel may be exposed to excessive noise levels from heavy equipment and other sources during each task. All personnel in the proximity of excessive noise will wear hearing protection. Any employee whose work exposes him/her to more than 85 dBA, 8 hr time weighted average or otherwise exceeds the noise exposure criteria shall be identified to the OMP for medical surveillance. The IH will survey the task site, designate, and post areas where hearing protection is required.

5.2.10 Decontamination

The hazardous and radiological decontamination processes for tools, equipment, and personnel to remove contaminant generated by the activities identified in this document has the potential for spreading contamination and increasing the exposure to personnel if care is not exercised when decontamination activities are taking place. High pressure hot water and steam used in the process can also present a hazard if blasts of either rebound into the face or on the body of the decontamination technician or nearby workers. Good housekeeping measures will be followed, so that decontamination liquids do not present a hazard.

5.2.11 Work Stress

Hazardous activities that rely on a high degree of personal alertness shall be performed under controlled conditions of job performance as outlined in Section 20, Part 2.2, and Appendix C of the EG&G Safety Manual. The TPM assumes the responsibility to use good judgment in the assignment of personnel fatigued by excessive hours of work in psychologically and possibly physiologically stressful environments. A work week in excess of 48 hours requires approval of the BWP manager, or the RWMC/SWEPP Programs Manager for RWMC field activities, or the Waste Management department manager.

6. LEVELS OF PROTECTION AND PERSONAL PROTECTIVE EQUIPMENT

Personal protective equipment selection is based on the recommendations contained in the Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (NIOSH, 10/85). Prior to entry, each work location will be monitored for potentially hazardous contaminants using an organic vapor detector, a combustible gas indicator, and radiological detection equipment. Due to the types of known contaminants, and the likelihood of unknown contaminants being present, several recommended levels of Personal Protective Equipment (PPE) are described in this section. These levels are Level A, Level B, Level C, and Level D. The required level for PPE will depend on the task site hazard assessment (both radiological and hazardous), physical conditions, and monitoring data. The PPE level used at the task site shall be specified by the TPM with concurrence from the HP, IH, and HSO. The specific PPE Level for each day shall be documented by the TPM in the Daily Activity Log. Prior to performing work at the task site in Level B PPE (Level A in extreme cases), concurrence must be obtained from the RWMC/SWEPP Programs Manager.

Wearing some PPEs may increase the effects of work and heat stress on personnel, especially when ambient temperatures rise above 65°F. Without compromising the protection from chemical and radiological exposure, and considering the comfort of the workers, Level B and Level C clothing may be slightly modified as stated in the referenced Occupational Safety and Health Guidance Manual, Chapter 8. This decision will be made by the IH, HP, and HSO and documented by the TPM in the Appendix A task specific addendum.

When the IH is interpreting the organic vapor detector readings to determine the PPE levels, he should be aware that these readings can be

affected by engine exhaust, dust particles, wind, moisture, radiation, and the response of the chemicals measured. He should use common sense when interpreting the HNus.

6.1 Provisions for Site Evacuation

If at any time the Combustible Gas Indicator (CGI) readings at designated areas exceed 10% of the lower explosive limit (LEL) for a duration of time indicated by the SE, the task site will be evacuated. Before resuming task work, the TPM in conjunction with the IH and the HSO will develop safe procedures for continuing operations.

If the organic vapor detector readings are in excess of 5 ppm above background levels for more than 5 continuous minutes, then an air sample will be taken at the task site to determine the constituents present and the IH will continue to monitor the fluctuation of vapor levels with the CGI and organic vapor detector. If organic vapor detector concentrations exceed 100 ppm (or another level designated by the IH in Appendix A), task operations will be discontinued and the task site evacuated. If the elevated vapor levels do not subside, the PM in conjunction with the IH, HP, TPM, and HSO will determine a course of action that will allow safe operations.

6.2 Level D Personnel Protective Equipment

Personnel working inside the task site with designated Level D PPEs shall wear as a minimum:

- Safety glasses
- Safety shoes with steel toe
- Hard hat
- Hearing protection (as required by the IH).

6.3 Level C Personnel Protective Equipment

Personnel working inside the task site with designated Level C PPEs shall wear as a minimum:

- Full-face or half-face air-purifying respirator (with appropriate filters and eye protection) as required by INEL Health Physics and the IH. (Note: The use of half-face respirators is not permitted in a radiological environment without RWMC manager's approval.)
- Disposable chemical-resistant coveralls
- Anti-C clothing as recommended by the RE if radiological hazards exist
- Chemical resistant safety shoes with steel toe
- Chemical resistant shoe covers
- Hard hat
- Inner and outer chemically resistant gloves
- Hearing protection (as required by IH)
- Eye protection (as required by SE).

6.3.1 Respirators

All personnel shall wear only those protective respirators for which they have been trained and acceptably fit-tested.

Respirators shall be used under the recommendation of the IH and HP. Also, the guidelines for respirator use, storage, cleaning, and maintenance, as stated in the EG&G Safety Manual, Section 16, Supplement 16.1, shall be followed.

The lifetime of charcoal filters is short, consequently, all used respirators should be cleaned and filters should be replaced daily. When in a radiological environment, respirators are not reused. New filters will be supplied by the Respirator Maintenance Facility (RMF) and should not be attached to the respirator until it is used.

Inspection procedure to be performed before respirators are used:

- Check and make sure respirator is clean.
- Look for breaks or tears in the headband material. Stretch the bands to ensure sufficient elasticity.
- Ensure that all headbands, fasteners, and adjusters are in place and not bent.
- Check the facepiece for dirt, cracks, tears, or holes. Ensure that the rubber is flexible, not stiff.
- Check the shape of the facepiece for possible distortion that may occur if the respirator is not properly stored.
- Check the exhalation valve located near the chin between the cartridge holders by:

  - unsnapping the cover,
  - lifting the flexible rubber valve and the valve seat to check for cracks, tears, dirt, and distortion, and,
  - After replacing the cover, ensuring that it spins freely.

- Check both inhalation valves, located under the respirator cartridges for the same items listed above.
- Check the cartridge holders to ensure that they are clean, necessary gaskets are in place, threads are not worn, and there are no cracks or other visible signs of damage and ensure that they are the correct type of filter required for the job.
- Check cartridges, and especially the threaded portions, for dents or other damage.

6.3.2 Respirator Repair and Replacement

Respirators should not be repaired by unqualified personnel. Damaged respirators should be sent to RMF, CF 617, for maintenance (phone 6-6380).

6.4 Level B Personnel Protective Equipment

Level B PPEs must be worn, as a minimum, by all personnel within the Exclusion Zone, as required. Level B is the same as Level C except the respiratory protection is upgraded to air supplied hood or self-contained breathing apparatus (SCBA). As a minimum, Level B PPEs should include:

- Air supplied hood or SCBA
- Disposable chemical-resistant coveralls
- Anti-C clothing as recommended by the RE if radiological hazards exist
- Chemical resistant safety shoes with steel toe
- Chemical resistant shoe covers
- Hard hat
- Inner and outer chemically resistant gloves
- Hearing protection (as required by IH).

6.5 Level A Personnel Protective Equipment

In rare circumstances, it may be necessary for operating personnel to wear Level A PPE. Level A has the same maximum respiratory protection as Level B, however, the highest available skin and eye protection are required for Level A. As a minimum, all personnel required to wear Level A PPE should include:

- SCBA
- Fully-encapsulating, chemical resistant suit

- Additional Anti-C clothing as recommended by the RE if radiological hazards exist
- Chemical resistant safety shoes with steel toe
- Chemical resistant shoe covers
- Hard Hat
- Inner chemically resistant gloves
- Hearing protection (as required by IH).

7. SAFE WORK PRACTICES

An EG&G SWP or Special Safe Work Permit (SSWP) will be required for EG&G employees who perform any kind of work at the RWMC. The EG&G SWP or SSWP should be completed in accordance with the EG&G Safety Manual. The SWPs for BWP specific tasks will be signed by the TPM, HP, and RWMC Operations Shift Manager. If a SSWP is required, it must be signed by the BWP Manager or the RWMC/SWEPP Operations Program Manager for RWMC field activities.

Several factors may affect the safe working environment in the field; e.g., inclement weather, extended working schedules, work in heavy personal protective equipment, temperature, and work done under artificial illumination. These factors can compromise the work performance of operations personnel. The TPM is responsible for effective communication with operations personnel to ensure safe and efficient work conditions.

If it is anticipated that work schedules will be extended to expedite the project, Section 20 in the EG&G Safety Manual offers the guidelines and managerial approval needed for personnel working more than a 48-hour week. The TPM is always responsible for the safety of operations personnel, however, when work weeks are in excess of 48 hours, he must realize that physiological and psychological stresses reduce the safety and efficiency of the field operations and that the ultimate responsibility rests on his judgment.

Work performed in heavy personal protective equipment creates additional stresses which severely limit the ability of operations personnel to work long shifts. The TPM should be aware of such limitations and adjust schedules accordingly. The HSO, IH, and HP will advise the TPM on this issue.

If hot and/or windy conditions exist during the regular work shift, schedules may need to be changed to perform operations at night. The use of artificial illumination, although a necessity, can create an environment of reduced visibility for the workers. Operations personnel in this environment will need to be especially alert and cautious as they maneuver around in the work areas.

The buddy system is an effective way of making sure each worker is monitored as to his mental and physical well being during the course of a work day and makes it impossible for someone to become ill or injured and not be noticed. This is particularly crucial for workers in the Exclusion Zone. The TPM will pair up workers to regularly check on one another during the day's activities. Each pair will observe their partner's alertness, motor functions, and coherence.

The following are general safe work practices that will be adhered to on each task (if work practices vary from those described below, the TPM must record changes in the Appendix A task specific addendum):

- Contact lenses should not be worn in eye-hazard areas unless they are essential to correct a vision defect not correctable by prescription safety glasses. Additional restrictions apply as per the EG&G Safety Manual (Section 16, paragraph 3.7).

- Eating, drinking, chewing gum or tobacco, smoking, or any other practice that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited within the RWMC operational areas, except in approved eating areas.

- Avoid contact with potentially contaminated substances. Do not walk through puddles, pools, mud, etc. Avoid kneeling, leaning, or sitting on equipment or the ground.

- All operations personnel should be alert to potentially dangerous situations (the presence of strong, irritating, and/or nauseating odors, high concentration dust accumulation, breached drums, etc.). Personnel should report all potentially dangerous situations to the TPM.

- Prevent hazardous material spills to the extent possible. If spillage occurs, contain it, report it to the RWMC Operations Shift Manager, and immediately clean it up in accordance with the EG&G Emergency Action Plan for the RWMC, Appendix I.

- Prevent splashing of contaminated materials during decontamination.

- Operations personnel will familiarize themselves with the physical characteristics of the sites of investigation including, but not limited to:

  - wind direction
  - accessibility to fellow workers, equipment, and vehicles
  - communications at and near the site
  - exclusion zones (areas of known or suspected contamination)
  - site access
  - nearest water sources
  - nearest emergency assistance.

- No less than two workers should be in an Exclusion Zone when there is a potential for airborne contamination.

- Keep an eye on your co-worker. Look for signs of exhaustion, heat or cold stress, or exposure to harmful vapors. Ask regularly if they are okay. Talk to them.

- All wastes generated during the site investigation will be managed in accordance to the EG&G Safety Manual, Section 15.

- Adhere to strict personal hygiene practices such as washing face, neck, and hands prior to eating, drinking, smoking, or using the restroom. Keep hands away from mouth and eyes when working in an Exclusion Zone or after handling samples or sample containers. A complete shower may be required at the end of a work shift (IH discretion).

8. WORK ZONES, SITE ENTRY, AND SECURITY

Based on the expected levels of contamination and work activity anticipated by each task, several work zones may have to be established for each task site. If it is determined that specific zones must be established for a particular task, then task site entry will be strictly controlled. Unnecessary personnel will be excluded and visitors will be required to have clearance from the TPM prior to being allowed access to the investigation sites.

Figure 8-1 provides an example of an approved work site and its established work zones as recommended by NIOSH 10/85. If work zones are deemed necessary by the TPM, each project's established work zones should be documented in the Appendix A task specific addendum. Several work zones required for Levels A, B, C, and D work activities are:

- Exclusion Zone
- Contamination Area
- Contamination Reduction Corridor
- Contamination Reduction Zone
- Support Area.

Radiological control zones will also be incorporated into the work zones as stated in Section 8.6.

8.1 Exclusion Zone

The Exclusion Zone includes the immediate work area around the Contamination Area. The minimum number of personnel required to safely perform the required operations will be allowed into the Exclusion Zone. The cordon around the Exclusion Zone is called the "Hot Line."

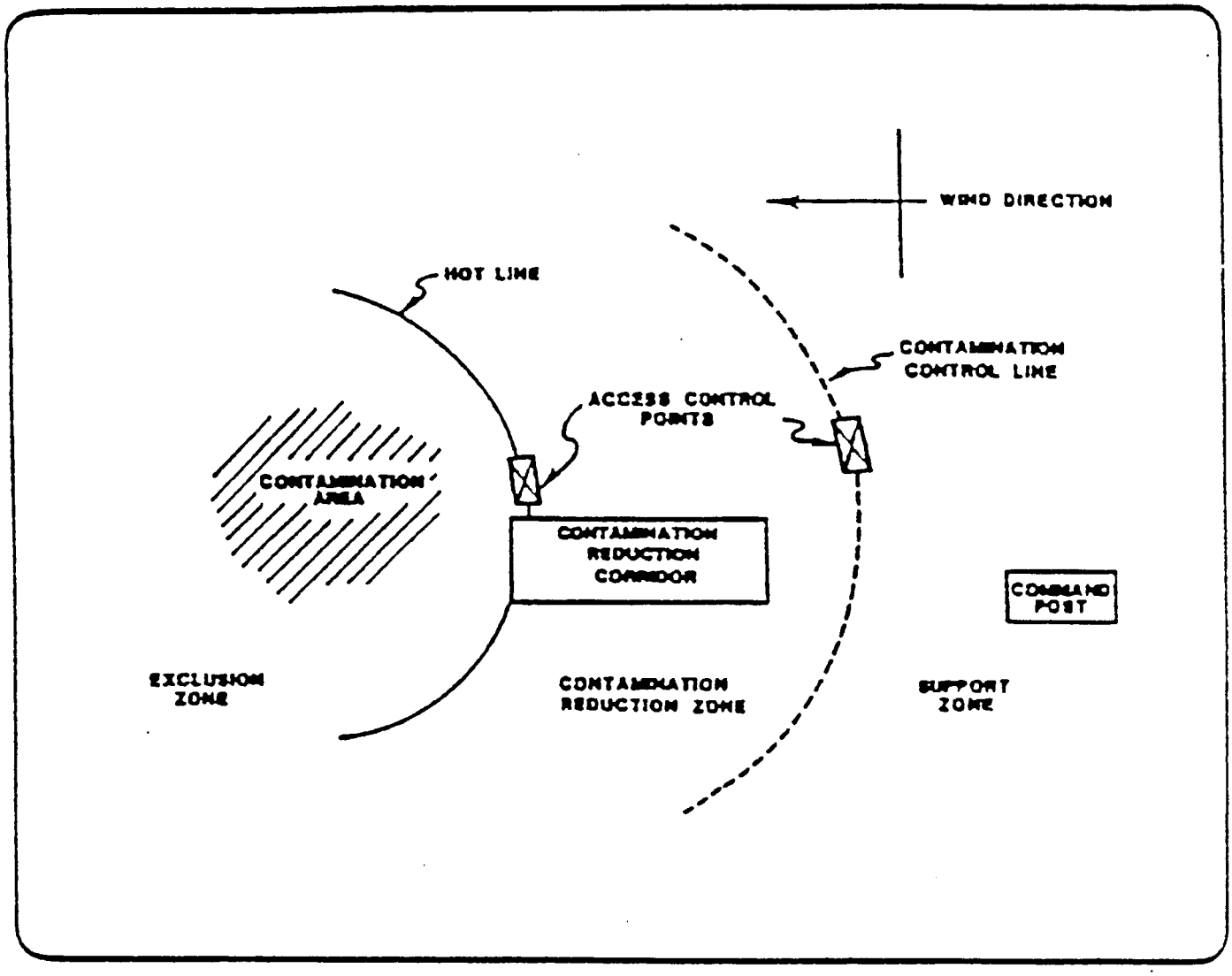

Figure 8-1. Diagram of typical task work site as recommended by. NIOSH, 10/85.

8.2 Contamination Area

The Contamination Area is the immediate area in the Exclusion Zone where investigation activities are taking place. In this area, operations personnel may be subject to the hazards listed in Section 5.

8.3 Contamination Reduction Corridor

The Contamination Reduction Corridor is a transition area between the Exclusion Zone and the Support Zone. This area will serve as a decontamination area for equipment and a PPE removal area for operations personnel. In addition, this area may contain emergency response equipment, equipment resupply, and a worker temporary rest area. Due to its sensitive nature, sample packaging and preparation equipment should not be stored here, but rather, in a contamination free area.

8.4 Contamination Reduction Zone

This is an area that surrounds the Exclusion Zone and Contamination Reduction Corridor. This area may consist of several work stations (i.e., sampling, handling, and record keeping) as well as staging areas for equipment. The cordon around the Contamination Reduction Zone is called the "Contamination Control Line."

8.5 Support Area

The Support Area is the area outside of the Contamination Reduction Zone. It may contain the equipment trailer, command post, vehicle parking, equipment staging or any support activity related to the task at hand. All personnel not trained in hazardous material work and visitors are restricted to this area.

8.6 Radiological Control Zones

If a work site is deemed to be radiologically hazardous as stated in the EG&G Radiological Controls Manual, Chapter 4.0, paragraph 3.1, Contamination Control Zones and/or Radiation Areas must be established at the task site.

Contamination is classified as Zone I, II, III, based on contamination levels, as follows:

	Contamination Levels (dpm/100 cm^2)	
Zone Classification	Beta and Gamma	Alpha
I	200 to 5000	20 to 50
II	>5000 to 20,000	>50 to 250
III	>20,000	>250

The RE will determine the radiological zoning requirements and how these Zones will be incorporated at the task site. All operations, barriers, and postings will be in accordance with the Chapter 4.0 requirements. These zones will be documented in the Appendix A task-specific addendum.

Radiation Areas are classified as:

a. Radiation Area - Any area, accessible to personnel, in which radiation exists at such levels that a major portion of the body could receive in any one hour a dose in excess of 5 mrem.

b. High Radiation Area - Any area, accessible to personnel, in which radiation exists at such levels that a major portion of the body could receive in one hour a dose of 100 mrem or greater.

c. Very High Radiation Area - Any area, accessible to personnel, in which radiation exists at such levels that a major portion of the body could receive in one hour a dose of 5000 mrem or greater.

9. ENVIRONMENTAL MONITORING

Employee exposure to site contaminants and physical hazards will be monitored during all task site activities using a combination of techniques. The TPM in conjunction with the IH, HSO, RE, and HP for each task should list the equipment monitoring requirements for specific potential hazards in the Appendix A task specific addendum. An example of items that may be required is:

1. Organic vapor measurements using an organic vapor monitor

2. Combustible gas measurements using a combustible gas indicator

3. Heat or cold stress using field measurements and observations and, if necessary, body temperature measurements

4. Radiation surveys using radiological monitoring equipment that is operated by a HP technician

5. Personal exposure to organic vapors, particulate contamination (heavy metals) using personal monitoring pumps and appropriate filter collection media (active sampling)

6. Personal exposure to radiation using TLDs and direct reading dosimeters

7. Mercury vapors using a mercury vapor detector

8. Noise levels using a sound level meter

(Note: This list is not all inclusive)

9.1 Chemical Exposure Monitoring

All personnel working in an Exclusion Zone will be continuously monitored for organic vapors in the breathing zone (chest or face level). Negative readings on the organic vapor detector should never be interpreted as a complete absence of airborne toxic substances. If the readings on the organic vapor detector rise to 100 ppm above background (or any other limit and time-frame specified by the IH in the Appendix A task specific addendum), work at the task site must be halted and personnel evacuated upwind from the area. At this point, an evacuated canister sample should be taken to determine the constituents present in the air. From the analysis results, the IH will advise on an appropriate plan of action. Operations personnel will not re-enter the site until the TPM has been assured of its safety.

9.2 Combustible Gas Monitoring

If deemed necessary by the IH, each task site will be monitored for combustible gases every 15-30 minutes (or at the recommendation of the IH). Elevated readings on the organic vapor detector might be an indicator of the presence of combustible gases. If at any time the LEL is greater than 10%, work at the task site will stop and operations personnel will be evacuated until the IH assures the TPM that the work site is safe.

9.3 Radiological Monitoring

The RE and HP will be responsible for radiological monitoring and determination of appropriate personnel protective equipment in accordance with the EG&G Radiological Controls Manual. It is the responsibility of the HP to assure the presence of the appropriate radiological instruments at each of the task sites. This information should be recorded in the Appendix A task specific addendum by the TPM.

The HP on the task site will initiate steps to confine/minimize any radiological hazards that arise in accordance with the provisions of the Emergency Action Manual and/or RWMC/SWEPP PD-RS-6.1.

RWMC policy requires personnel entering the SDA to wear a thermoluminescent dosimeter (TLD) and a direct reading dosimeter to monitor individual dosages. In addition, bioassays are required as specified in Section 4.

9.4 Heat and Cold Stress Control and Monitoring

The TPM will set work and break schedules depending upon the ambient weather conditions or work conditions in coordination with the HSO and IH. The HSO and IH will monitor operations personnel to ensure that they adhere to the established work and break schedules, adequately replace body fluids, and keep body temperatures in a normal range.

The IH monitoring program will involve the measurement of the Wet Bulb Globe Temperature (WBGT). The results of the monitoring will be used to establish the initial work/rest regime.

The recommended work schedule for the first day, assuming a moderate work load, should be established as follows:

Work/Rest Regime	WBGT °F	WBGT °C
Continuous Work	80	26
75% work, 25% rest, each hour	82	28
50% work, 50% rest, each hour	85	29
25% work, 75% rest, each hour	88	31

However, the guidelines established by the ACGIH cannot account for the acclimatization of the workers and are conservative as a result. This work/rest regime is also based on a 5-day/8-hour schedule and must be adjusted by the IH to accommodate the 4-day/10-hour schedule.

The TPM in coordination with the HSO and IH, will adjust the schedule after it is determined that the rest breaks are effective and the workers are adequately acclimatized. Workers will be interviewed by the IH periodically to ensure that the controls are effective and excessive heat exposure is not occurring. Workers will be encouraged to monitor their own body symptoms and to take a break before a negative effect is observed.

Rest breaks shall include the following preventive measures:

- Adequate liquids
- Cool, shaded rest area
- Protective clothing removed to allow evaporative cooling
- No other work assignments during the break.

If personnel are wearing semipermeable or impermeable PPEs, determination of the work/rest schedule, as described above, cannot be used and individual personnel temperatures must be monitored when ambient temperatures reach 75°F. If ambient temperatures exceed 80°F, and/or the symptoms outlined in Section 5.2.7 are exhibited, workers must be monitored by the IH for heat stress recovery which includes measuring personnel's heart rates and temperatures. Temperatures can be obtained using disposable thermometers. The IH will see that plenty of liquids (electrolyte replacement fluids such as Gatorade) are provided which must only be consumed in an approved RWMC eating/drinking area.

Finally, the TPM, IH, or HSO will refer a worker to the OMP (6-2356) for medical evaluation whenever he doubts the ability of an employee to do an assigned task.

9.5 Mercury Vapor Monitoring

Task locations may present a need to monitor for mercury vapors as required by the IH. If any vapors are detected above background, work will halt until the IH has assessed the situation and declared it safe. This requirement must be specified in the Appendix A task specific addendum (if the IH deems it necessary).

9.6 Noise-Level Monitoring

Task personnel exposures to noise will be monitored by the IH. Any employee whose work exposes him/her to more than 85 dBA, 8 hr time weighted average or otherwise exceeds the criteria for the OSHA Hearing Protection Program shall be identified to the OMP for medical surveillance. All persons exposed to excessive occupational noise shall be protected in accordance with the EG&G Safety Manual, Section 16, Supplement 16.3.

9.7 Physical Hazard Control and Monitoring

The TPM will have the primary responsibility for ensuring the task work area is maintained in a safe condition by requiring maintenance of barriers and signs, correction of unsafe conditions, and cleaning of the site to keep debris and trash picked up. The HSO will inspect and recommend changes to the TPM.

Individuals working on each task have a specific responsibility to use safe work techniques, report unsafe working conditions, and exercise good housekeeping habits throughout the course of their job.

9.8 Record Keeping Requirements

The BWP is required to maintain the following information for each BWP hazardous waste worker in the ARDC program file for at least the duration of employment plus 30 years:

- Copies of the RWMC Site Characterization Program Plan, BWP task specific Health and Safety Plan, Data Collection Quality Assurance Plan (DCQAP) or Quality Assurance Project Plan (QAPP), and the Sampling and Analysis plan
- Signed copy of the Health and Safety Certification Form for all operations personnel
- Proof of training in health and safety hazard recognition, Radiation worker training, Respirator training, etc.
- Any accident or illness report forms
- Any monitoring results (e.g., bioassay, whole body counts)
- Personal air sampling results and other environmental sampling results.

The IH is required to maintain a logbook of all air monitoring data, personal sampling data, times of sampling intervals, calibration of instruments, and identity of personnel wearing the monitoring equipment. Detection instrumentation ranges and uncertainties should also be recorded

in the IH logbook. The HP is required to keep a logbook of all radiological monitoring, daily operational activities, and instrument calibrations.

All project records and logbooks, except HP logbooks, should be forwarded to BWP ARDC at intervals as determined by the TPM and ARDC.

10. DECONTAMINATION PROCEDURES

Establishment of decontamination procedures for personnel and equipment is necessary to control contamination and to protect operations personnel. If equipment or personnel are radiologically contaminated, decontamination procedures will be specified by the RE using guidelines established in the EG&G Radiological Controls Manual. When chemically hazardous material decontamination is required, the following procedures are suggested. Mixed decontamination procedures are not discussed here and must be developed by the IH and RE. Decontamination procedures must be presented in the task specific addendum. These procedures can be amended upon recommendations by the IH and RE.

10.1 Modified Level A and B Decontamination Procedures

If Level A or B PPE was required, then two decontamination stations will be utilized at the operations site: one at the hotline between the Exclusion Zone and the Contamination Reduction Corridor and one at the Contamination Control Line which is the personnel access point to the Support Zone from the Contamination Reduction Zone. Decontamination Station A supports personnel and equipment exiting the Exclusion Zone. Figure 10-1 lists the recommended decontamination procedures. Steps 1 through 8 are to be completed at Station A. Coveralls are to be removed at Station B.

10.2 Modified Level C Decontamination Procedures

Decontamination Station B should be located at the personnel access to the Contamination Reduction Corridor. It is to be used by personnel working in the Contamination Reduction Corridor. Figure 10-2 lists the modified Level C decontamination procedures. If tyveks are worn (if recommended by the IH on site) they are to be decontaminated and removed at Station A.

1.	Equipment drop	EXCLUSION ZONE
2.	Boot cover and glove wash and rinse	
3.	Tape removal	
4.	Remove hood, boot covers, and outer gloves	
5.	Disconnect air hose and tape end	
		HOT LINE (STATION A)
6.	Suit and boot wash and rinse	
7.	Suit removal	CONTAMINATION REDUCTION CORRIDOR
8.	Inner glove wash, rinse, and removal	
9.	Coverall removal	
		CONTAMINATION CONTROL LINE (STATION B)
10.	Field wash / shower	
11.	Put on personal clothing	SUPPORT ZONE

Figure 10-1. Recommended modified Level A and B PPE decontamination steps.

1.	Equipment drop	CONTAMINATION REDUCTION CORRIDOR
2.	Boot cover and glove wash and rinse (if worn)	
3.	Respirator removal and drop	
4.	Suit wash, rinse, and removal (if worn)	
5.	Inner glove, wash, rinse, and removal	
6.	Coverall removal	
7.	Field wash / shower	CONTAMINATION CONTROL LINE (STATION B)
8.	Put on personal clothing	SUPPORT ZONE

Figure 10-2. Recommended modified Level C PPE decontamination steps.

At the end of the work day, a full-body shower including a complete soap down using a wash cloth may be required by the IH. Pay particular attention to areas of the body that are typically overlooked.

10.3 Equipment Decontamination and Disposal of Contaminated Materials

Specific equipment decontamination procedures should be recorded or referenced in the task specific addendum as recommended by the IH, RE, and HSO for each specific task.

All materials and equipment used for decontamination must be decontaminated or disposed of properly. Disposable clothing, tools, buckets, brushes, and other contaminated equipment will be secured in containers to be provided by EG&G and stored in a suitable location for disposal by EG&G. Unused contaminated equipment that can be utilized later on in the task will be placed in plastic bags and stored at the task site. Waste disposal shall comply with the EG&G Safety Manual, Section 15.0.

10.4 Decontamination During Medical Emergencies

If a person is injured or becomes ill and lifesaving care is required, the situation will be evaluated on a case-by-case basis. Emergency Care will be instituted immediately without considering decontamination. If the injured part can be mobilized, he will be transported to the Contamination Reduction Corridor. At this point, outer garments can be removed if they do not cause delay, interfere with treatment, or aggravate the illness or injury. Respiratory equipment must always be removed. Again, if the injury or illness is not aggravated, chemical-resistant clothing can be cut away. If the outer contaminated garments cannot be removed, the victim should be wrapped in plastic,

rubber, or cloth to help prevent contamination of transporting vehicles or medical personnel. Outer garments can then be removed at the INEL medical facility. In this event the IH and/or HP will accompany the employee to the medical facility.

11. EMERGENCY PROCEDURES, EQUIPMENT, AND INFORMATION

The nature of work at hazardous waste sites makes emergencies a continual possibility, no matter how infrequently they may occur. Emergencies happen quickly and unexpectedly and require immediate response. The following sections describe the procedures to be used during emergency situations, equipment that will be available on-site for emergency situations, and the agencies, facilities, and off-site personnel who will be notified in case of emergency. Locations and telephone numbers of emergency personnel, facilities, and off-site personnel will be posted at places specified in the Appendix A task specific addendum and each emergency facility will be notified by phone at the beginning of the project to inform them that work has begun at the task site. Emergency contacts may be found in the Appendix A task specific addendum.

11.1 Emergency Procedures

The following emergency procedures will be used by on-site personnel:

- The TPM will be notified of any on-site emergencies and will be responsible for ensuring that the appropriate procedures are followed.

- All injuries, regardless of how minor, will be reported and recorded in a field logbook.

- All injuries or illnesses deemed reportable by the SE, vehicle accidents resulting in damage or losses above $500 and property damage occurrences resulting in losses of $1,000 or more will be reported on the Timely Incident Posting System (TIPS) and DOE Form 5484X. The form will be completed and transmitted to EG&G

Environmental Safety and Quality Department on or before the 10th of the month following the date of the accident. The EG&G Safety Manual, Section 3.0, Supplement 3.2 should be reviewed to determine if the accident should be reported as an Unusual Occurrence.

11.1.1 Personnel Injury in the Exclusion Zone

Upon notification of an injury in the Exclusion Zone, a continuous blast on a vehicle horn or self-contained air horn will be sounded. All equipment within the Exclusion Zone if not necessary to respond to the emergency will be shut down, on-site personnel will transport the injured person to the boundary between the Exclusion Zone and the Contamination Reduction Zone. (NOTE: If the First Aid personnel deem it necessary, the injured person should be immobilized before any move takes place), and all other personnel will assemble at an area designated by the TPM. Those personnel trained in first aid, the HSO, and the TPM will evaluate the nature of the injury and the affected person will be decontaminated to the extent possible, in keeping with the instructions in Section 10.4, prior to movement to the Support Zone. Appropriate first aid will be initiated and contact will be made with the RWMC Emergency Action Director if emergency transportation and medical aid are required. No persons will reenter the Exclusion Zone until the cause of the injury or symptoms is determined.

11.1.2 Personnel Injury in the Support Zone

Upon notification of an injury in the Support Zone, the TPM, HSO, and First Aid personnel will assess the nature of the injury. If the TPM determines the cause of the injury or loss of the injured person does not affect the performance of other personnel, operations will continue. Appropriate first aid will be administered and necessary follow-up, as

discussed above. If the injury increases the risk to other task workers, the designated emergency signal will be sounded, nonessential equipment will be shut down, and all task site personnel will move to an area designated by the TPM and await further instructions. Activities on the task site will not start up again until the risk is removed or minimized.

11.1.3 Transportation of and Follow-up of Injury

If an injured worker is transported to the medical facility, he will be accompanied by at least one other task site worker (preferably the IH and/or HP) to inform medical personnel of the level of decontamination performed prior to leaving the site and to provide specific details as to the nature of the injury.

In the event of contaminant exposure, the same above procedures will be followed and the TPM will appoint an individual to immediately transport the affected personnel monitoring devices to the analytical lab for analysis.

11.1.4 Fire/Explosion

Prior to initiating task activities, brush and grass will be cleared from the task site to eliminate the risk of fire.

In the event of a fire or explosion, all personnel will be immediately evacuated from the task site. Fire and explosive experts will be notified by radio. Personnel should be kept at a safe distance from the involved area until the situation is remedied and risks have been eliminated.

11.1.5 Personal Protective Equipment Failure

If any site worker experiences a failure or alteration of personal protective equipment, that person and his/her buddy will immediately leave the Exclusion Zone. The HP will check personnel to ensure no radiological takeup has occurred. Reentry will not be permitted until the equipment has been repaired or replaced.

11.1.6 Other Equipment Failure or Hazardous Material Spill

If task site equipment fails to operate properly, the TPM will be notified and he will determine the effect of this failure on continuing operations on the task site. If the failure affects the safety of personnel or prevents completion of the Sampling and Analysis Plan tasks, operations personnel will leave the task site until the situation is evaluated and appropriate actions are taken.

In the event of a spill of a hazardous or potentially hazardous material over 2.5 gallons, refer to the EG&G Emergency Action Plan for the RWMC, Appendix I, Spill Prevention and Control Countermeasures and report the spill to RWMC personnel. This includes spillage of petroleum products, decontamination solutions, calibration material, equipment fuels, etc.

11.1.7 Hand Signals

Hand signals will be used if an emergency situation should arise and normal communication becomes impossible or unsafe. The following hand signals will be used in an emergency:

- Hand gripping throat - signals that the person is out of air or can't breathe

- Grip partner's wrist or both hands around waist - means leave area immediately

- Hands on top of head - signals that assistance is needed

- Thumbs up - okay, I'm alright, I understand

- Thumbs down - no, negative.

11.1.8 Emergency Escape

In cases of life-threatening emergencies such as fire or explosion, personnel should leave the vicinity using the shortest possible route without regard for decontamination at that time and move upwind of the affected area. When the situation has stabilized, personnel will take necessary steps to decontaminate themselves, equipment, and other affected areas.

11.1.9 Task Operations Shutdown

Task operations may be suspended for several reasons as indicated below. However, the reasons for operations shutdown are directly related to the degree of hazard each task possesses. Specific reasons for suspending task operations should be listed in the Appendix A task specific addendum. Examples include: excessive vapor/gas concentrations, radiological hazards, uncovering waste, inclement weather, etc.

- At any time when an increase of 100 ppm (or another level recommended by IH) above background is measured in a breathing zone, the activities will be halted and further air analyses will be done to determine the origin and composition of the

vapors. High readings may also indicate the presence of a combustible gas. If a combustible gas indication >10% of the LEL occurs, indicating a buildup of explosive vapors, the site will be evacuated. Reevaluation of the situation will be made by the TPM in conjunction with the IH prior to reentering the site.

- When significant radiological hazards are identified by an HP at the sampling site.

- When actual waste material is uncovered or found in soil samples, even when the appearance of such material may not be associated with a rise in detected contamination levels.

- In addition, drilling, sampling, instrumentation, and other weather sensitive activities will stop during consistent high winds (i.e., greater than 25 mph), gusts of blowing dust, electrical storms, or other inclement weather that may affect the work.

11.1.10 Task Site Reentry

In all situations, when a task site emergency results in evacuation of the task site, personnel will not reenter until authorized by the TPM. He will ensure that:

1. The hazards have been reassessed by the HSO, IH, and/or the RE.

2. The conditions resulting in the emergency have been corrected.

3. The task specific Health and Safety Plan, Sampling and Analysis Plan (SAP), Operational Safety Requirements (OSR)/ Safety Assessments (SA), Standard Operating Procedures (SOPs), Detailed Operating Procedures (DOPs), and the RWMC Emergency Action Plan have been reviewed.

4. Site personnel have been briefed on any changes in the BWP task specific Health and Safety Plan.

Reentry into an evacuated zone to monitor or collect air samples requires minimum Level C protective clothing. The IH may upgrade to Level B/or A if deemed necessary.

11.2 Emergency Equipment

The following emergency equipment will be available at the task site during field operations. (A complete equipment list should be provided in the task specific Addendum in Appendix A.)

Fire Extinguishers: Because of the potential threat of fire at hazardous waste sites, at least one 20-pound (minimum) ABC fire extinguisher will be readily available and at hand throughout the task activities. Additional fire extinguishers may be necessary. This should be indicated in the Appendix A task specific addendum.

Scott Air Packs: Two Scott air packs will be available for extreme emergencies such as reentering a contaminated zone to retrieve injured personnel.

First Aid Kits: An industrial first aid kit with sufficient supplies for five people will be kept in the Support Zone. At least one individual on the task will be trained and certified in First Aid and CPR. The OMP will advise on the selection of first aid supplies to be included at each task site. The HSO will be responsible for maintaining the proper level of first aid supplies in the task site first aid kit.

Eye Wash: Two portable eyewash fountains and sufficient potable water for copious flushing will be readily available throughout the investigation. The location of the eyewash will be determined by the IH.

Communications: Emergency telephone numbers are to be included in the Appendix A task specific addendum and will be posted for all operations personnel. Emergency communication will be discussed in the safety training prior to initiation of site investigation activities. A two-way radio or telephone with capability to contact emergency personnel will be on each task site.

Personal Hygiene: A sufficient supply of clean water and hand soap will be provided at the task site.

REFERENCES

American Conference of Governmental Industrial Hygienists, Threshold Limit Values and Biological Exposure Indices for 1988-1989, Second Printing.

EG&G Emergency Action Plan for the Radioactive Waste Management Complex, Revision 1, June 1988.

EG&G, Pad A Initial Penetration Health and Safety Plan, Revision 1, November 18, 1988.

EG&G, Program Management Plan for the INEL Buried Waste Program, DOE/ID-10218, October 1988.

EG&G, RCRA Facility Investigation Work Plan, Revision 1, EGG-WM-8219, December 1, 1988.

EG&G, Radiological Controls Manual, Issue 14, February 10, 1989.

EG&G, RWMC Subsurface Investigations Procedures: Health and Safety Plan, Revision 1, October 5, 1988.

EG&G Safety Manual, Issue 19, February 17, 1989.

National Institute for Occupational Safety and Health, Pocket Guide to Chemical Hazards, September 1985.

NIOSH/OSHA/USCG/EPA, Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, October 1985.

Occupational Safety and Hazards, 29 CFR 1910.120, May 27, 1987.

RWMC/SWEPP Programs Project Directives.

Hazardous Material References:

Radioactive Waste Management Information System content code material listing, 1954 to 1970.

Estimate of Rocky Flats Plant Organic Wastes Shipped to the RWMC, D. E. Kudera, July 24, 1987.

Buried Sludge Waste Characterization, TLC-29-88, T. L. Clements, Jr. ltr to C. J. Bonzon, May 2, 1988.

Engineering Design File BWP-ISV-004, Detailed Estimate of Radioactive Contents for Pit 9, E. C. Garcia and J. L. Knight.

APPENDIX A

HEALTH AND SAFETY PLAN ADDENDUM
FOR
OPERATIONS PERFORMED
FOR THE
BURIED WASTE PROGRAM,
ENVIRONMENTAL RESTORATION PROGRAM

TASK: VAPOR VACUUM EXTRACTION DEMONSTRATION

DATE: JULY 17, 1989

HEALTH AND SAFETY PLAN ADDENDUM
FOR OPERATIONS PERFORMED
FOR THE BURIED WASTE PROGRAM

REVIEWED BY:

N. W. Spang, Task Project Engineer — Date 6-22-89

L. D. Croft, Environmental Restoration Operations Support RWMC — Date 6/16/89

Task Industrial Hygienist — Date 7/5/89

W. D. Schofield, Task Health and Safety Officer — Date 6/16/89

J. M. Davis, RWMC/SWEPP Program — Date 6-16-89

D. E. Minner, Occupational Medical Program — Date 6-20-89

R. G. Thompson, Quality — Date 6-22-89

APPROVED BY:

T. L. Rasmussen, Buried Waste Program — Date

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HEALTH AND SAFETY PLAN ADDENDUM

Project No. 3X2JS0000

Task: Vapor Vacuum Extraction Demonstration DOE Operations Office: Idaho

Project Manager: R. R. Piscitella Phone No.: 526-1843

Other Contacts: R. S. Natividad Phone No.: 526-0248

N. W. Spang Phone No.: 526-1628

J. F. Ginsburg Phone No.: 526-9698

L. D. Croft Phone No.: 526-8667

Date Plan Requested: May 25, 1989

Purpose of Task:

The purpose of the Vapor Vacuum Extraction Demonstration (VVED) is to determine the adequacy of extracting Volatile Organic Compound (VOC) vapors from a bore hole situated in a contaminated area using a low risk technique which does not require extensive disturbance of the subsurface.

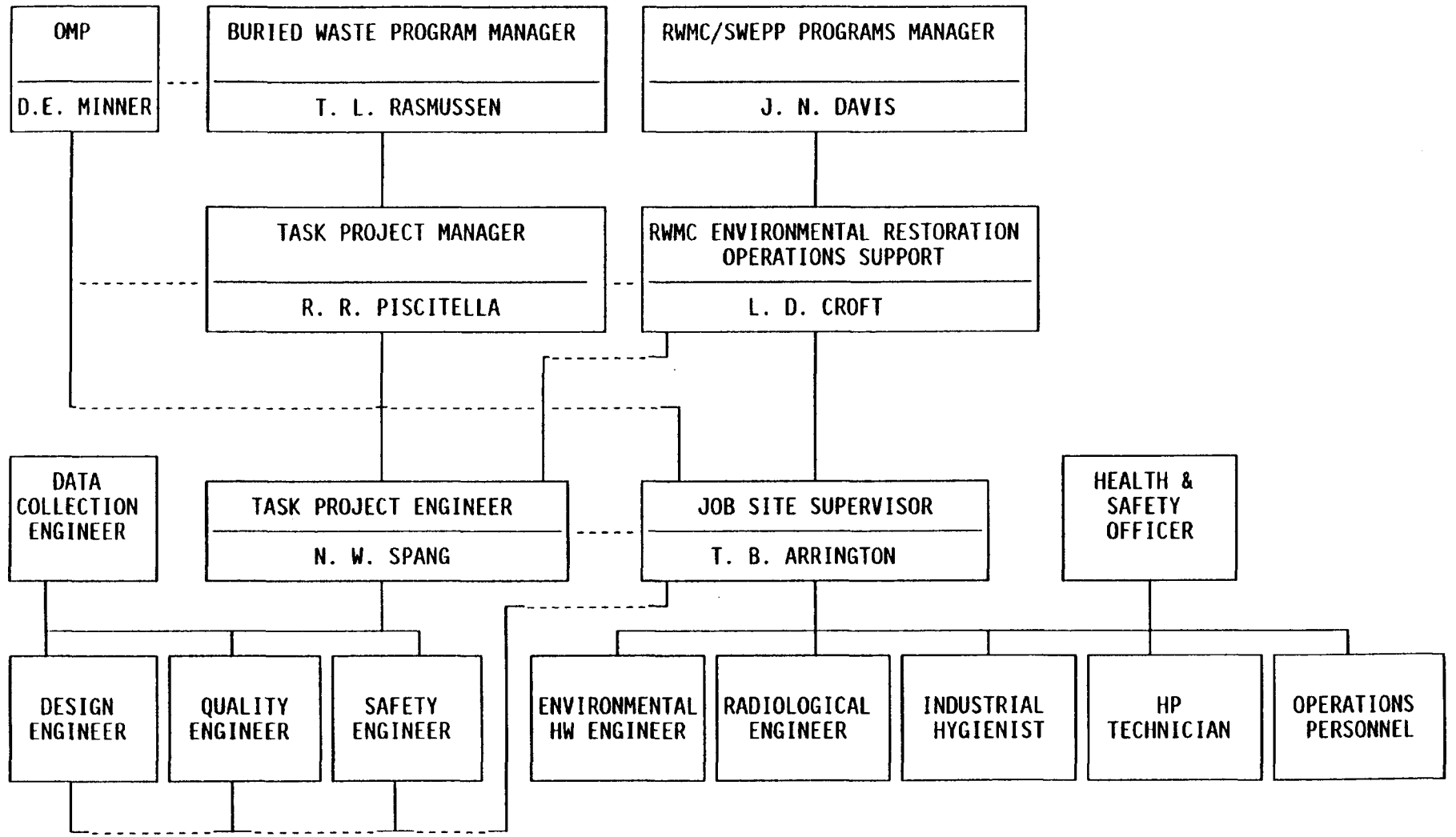
Proposed Dates of Work: July 17, 1989 to December 15, 1989

Proposed Site Investigation Team (2.)(2.3)

Personnel:	Discipline/Tasks Assigned:
	Environmental HW Engineer
	Radiological Engineer
	Safety Engineer
	Industrial Hygienist
	HP Technician
N. W. Spang	Task Project Manager

Plan Preparation
Prepared by: G. E. Matthern (25/05/89)

RWMC FIELD ORGANIZATIONAL CHART (2.)



Task: Vapor Vacuum Extraction Demonstration

——————— Lines of Responsibility
---------- Lines of Communication

SCOPE OF WORK

The purpose of the Vapor Vacuum Extraction Demonstration (VVED) is to determine the adequacy of extracting Volatile Organic Compound (VOC) vapors from a bore hole situated in contaminated area using a low risk technique which does not require extensive disturbance of the subsurface.

This demonstration was developed specifically for the Radioactive Waste Management Complex (RWMC) at the Idaho National Engineering Laboratory (INEL). At the RWMC, leakage from buried waste in subsurface pits and trenches has resulted in significant subsurface VOC contamination. This demonstration is in support of a RCRA Corrective Measures Study (CMS) in progress at the INEL to investigate interim and final corrective actions to mitigate the release of organic compounds from the Subsurface Disposal Area (SDA) of the RWMC. The general approach of the CMS is presented in the RCRA Facility Investigation (RFI) Work Plan, Pre-Investigation Evaluation of Corrective Measure Technologies (EG&G-WM-8219). The objectives for this demonstration are: First, to verify the computer models of VOC migration in the subsurface using the data collected during the VVED; Second, to determine if the vapor vacuum extraction process is a viable remedial method for extracting VOC's for the SDA.

TRAINING CONDUCTED

Attendees	Subject
Operations Personnel	OSHA 1910.120
Management Personnel	Respirator Training
Health and Safety Personnel	Radiation Worker Training
	Personal Protective Clothing and Equipment
	Site Specific Hazard Training
	Decontamination
	Emergency Training
	Medical Program
	First Aid
	CPR
Operations Personnel	Fire Brigade Training

The table on the next page can be used to give the training schedule. The table on page A-28 can be used to indicate the training that each individual has completed.

Training Table

Topic	HRS	DATE	DATE	DATE	DATE	DATE	DATE	DATE	DATE	DATE	DATE
Introduction	AR										
First Aid	8										
CPR	8										
Decontamination	AR										
OVA	AR										
HNu	AR										
SCBA Review	AR										
Sampling	AR										
Task Specific	AR										
OSHA	40										
Respirator	8										
Radiation	12										
Personnel Monitoring Equip.	AR, 1, 2										

Schedule of training that must be conducted
AR = As Required, 1 = vapor patch monitoring,
2 = radiation badge

Certified By: _____
Task Health and Safety Officer

Overall Hazard: High: _____ Moderate: _____

Low: X Unknown: _____

Facility Description:

The Vapor Vacuum Extraction Demonstration (VVED) will operate in the Subsurface Disposal Area (SDA) of the Radioactive Waste Management Complex (RWMC) (see Figure 1, page A-24). Components of VVED will be connected to a bore hole which is drilled to a depth of approximately 260 feet. The bore hole is in a waste free corridor between pit 6 and pit 10; it is 25 meters east of bore hole 8801D (Figures 1 and 2, pages A-24 and A-25).

The components of VVED are shown in Figure 3 (page A-26). The vacuum created by the pump located at the tail end of the process apparatus will pull air through the surrounding vapor dose zone and will cause air laden with VOC to flow from the bore hole and through the extraction apparatus for processing. This design serves a safety function to prevent leaking of VOC vapors from the system.

The stream of VOC first passes through an isolation valve. Then, it is heated by an electric gas immersion heater to prevent condensation of water. Next, the stream passes through a three-stage particulate removal process to remove particulate matter (>0.3 um diameter). The first stage is a cyclone separator, which removes material 15 um or greater in diameter. The second stage is a pre-filter (with an ASHRAE efficiency of 55-60%). The final stage is a High Efficiency Particle Air (HEPA) filter which removes particulates with sizes between 15 um to 0.03 um with a target size of 0.3 um. Next in the flow stream are two carbon adsorbers that operate in parallel. These units will remove volatile organic vapors. Downstream of the carbon adsorbers are filters to remove any charcoal fines that may be present. An on-line instrument (HNU-200) will continually monitor the exhaust from the adsorbers and will automatically shut down the system when organics are detected.(1-3) The effluent from the bed is monitored continuously insuring that the quality of the exiting air stream meets OSHA Workplace Air Contaminant Limits.(4-6) The last major piece of equipment in the flow stream is the vacuum pump which discharges at a rate of 300 cfm up a stack to the atmosphere. All components in the system, except the carbon adsorbers, are located on a 8 foot by 12 foot skid. The carbon adsorbers are stand alone units approximately 7 feet in diameter by 8 feet high.

Reference: See page A-27.

Unusual Features (e.g., containers, buildings, dikes, power lines, terrain):

Figure 1 is a map of the SDA which indicates the location of pits and trenches that are filled with hazardous and radioactive waste.

Status of task site (active, inactive, unknown):

The RWMC is an active site which includes the SDA and the Transuranic Storage Area (TSA). The SDA is a disposal site for low level radioactive waste. The TSA is an interim storage facility for transuranic and mixed transuranic radioactive waste. The VVED equipment is placed between two inactive pits (6 and 10) located in the SDA.

History (worker or nonworker injury, complaints from public, previous agency action):

As early as 1960, concern for movement of contaminants from the SDA to adjacent soil and underlying bedrock and the Snake River Plain Aquifer prompted environmental studies of the disposal facility.[1] Since 1971, at least 75 bore holes and shallow auger holes have been drilled in and adjacent to the RWMC for characterizing the geologic and hydrologic media and to assess the amount of radiologic contamination around and beneath the SDA.

Recent studies indicate that measurable concentrations of volatile organic compounds are present in water wells in and near the SDA[2] and measurable concentrations of VOC vapors occur in surface soil gases at distances from 2000 to 3400 ft from the SDA boundary.[3] Analysis of gases collected at various depths beneath the RWMC indicate maximum gas concentrations at around 100 ft below land surface, and measurable concentrations to 576 ft.[3] Soil gas surveys at the RWMC indicate that organic vapors are being emitted. Soil-gas monitoring has identified the locations of the organic waste producing the vapors. These data suggest that organic liquids have migrated downward through the subsurface and formed a relatively large vapor plume.[3] Analysis of groundwater samples confirm that the organic plume has reached the Snake River Plain Aquifer.[2]

Studies continue today of the subsurface geology and hydrology of the RWMC. Those studies are evaluating the potential for contamination of the Snake River Plain aquifer. The VVED will provide key data to those studies.

References:

1. Hubbell, J.M., L.C. Hull, T.G. Humphrey, B.F. Russell, J.R. Pittman and K.M. Cannon, Annual Progress Report: FY-1985 Subsurface Investigations Program at the Radioactive Waste Management Complex of the Idaho National Engineering Laboratory, DOE/ID 10136, EG&G Idaho, Idaho Falls, ID, 1985.
2. Mann, L.J. and L.L. Knobel, Purgeable Organic Compounds in Ground Water at the Idaho National Engineering Laboratory, Idaho, USGS Open-file Report 87-766, U.S. Geological Survey, Idaho Falls, Idaho, 1988.
3. Laney, P. T., Annual Progress Report: FY-1987, Subsurface Investigations Program at the Radioactive Waste Management Complex of the Idaho National Engineering Laboratory, DOE/ID-10183, EG&G Idaho, Idaho Falls, ID, 1988.

Previous On-Site Monitoring; Previous Sampling Data:

The following reports and articles (in addition to the three listed above) have been published on the conditions of the RWMC site.

1. EGG-WM-8219,RCRA Facility Investigation (RFI) Work Plan, Rev. 1, December 1, 1988.
2. Pre-Investigation Evaluation of Corrective Measure Technologies (EG&G-WM-8219)

POTENTIAL ON-SITE HAZARDS (5.)

Circle those materials that may be present at the task site:

1,1,1-Trichloroethane
1,1,2,2-Tetrachloroethane
1,1-Dichloroethane
1,1-Dichloroethylene
1,2-Dichlorobenzene
1,2-Dichloropropane
1,2-Trans-Dichloroethylene
Acetone
Acids (HF, HCl, etc.)
Aluminum
Americium - 241
Ammonia
Animal carcasses and feces
Arsenic
Asbestos
Barium
Batteries
Benzene
Beryllium
Butane (probably in compressed gas cylinders)
Cadmium
Calcium
Calcium silicate
Carbon tetrachloride
Caustic compounds (NaOH, etc.)
Chloroform
Chromium
Cobalt
Copper
Cyanide
Dichlorodifluoroethane
Dichlorodifluoromethane
Ethylene glycol
Gasoline
Herbicides
Lead
Magnesium
Meat with botulinus
Mercury
Mixed activation products
Mixed fission products
Nickel
Nitrate
Oil
Plutonium - 238, 239, 240, 241, 242
Potassium
Regal Oil
Roaster oxide
Santo Wax
Sodium
Tantalum
Tetrachloroethene
Tetrachloroethylene (Perchloroethylene)
Thallium oxide
Toluene
Trichloroethylene (Trichloroethene)
Tritium
U^{233}, U^{235}, U^{238}
UO_2 powder
Vanadium
Vehicles
Zinc
Zirconium

List potential on-site radiological hazards: (5.2.3)

Radon and its daughter products occur naturally in the soil and they are expected to be present in the gas stream. Most of those nuclides are expected to pass through the filters and to be released to the air. Nuclides which would exist as particulates will be removed from the gas stream by the cyclone separator, pre-filter, and HEPA filter. The collection bin of the cyclone separator, pre-filter, and HEPA filter may contain radionuclides.

Substance	CAS No.	Environmental Concentration (w/units)	In Sample (soil, water, air, waste) (ppm)	Toxicity TLV (ppm)	Toxicity Route of Exposure	Toxicity Comments	Toxicity C
Carbon Tetra-chloride	56-23-5	<25 ppm[a]	207	2	Inhalation	C	
Chloroform	67-66-3	<25 ppm[a]	70	2	Inhalation	C	
Trichloro-ethane	79-00-5	<25 ppm[a]	65	350	Inhalation	NC	
Trichloro-ethylene	79-01-6	<25 ppm[a]	22	50	Inhalation	NC	
Perchloro-ethylene	127-18-4	<25 ppm[a]	9	25	Inhalation	C	
Mercury*	7439-97-6	<0.082 ppm	unknown	0.082	Inhalation	N	

Key: CAS, Chemical Abstract Services; TLV, threshold limit value; C, carcinogenicity; CH, carcinogenicity established for humans; CA, carcinogenicity established for animals; CSH, carcinogenicity suspected for humans; CSA, carcinogenicity suspect for animals; PEL, OSHA Permissible Exposure Level; TWA, Time Weighted Average; a, total organics concentration in gas immediately before the vacuum pump; *, possible but not expected; N, neuropathic effects; NC, narcotic effects.

TASK SITE HAZARDS AND PERSONAL
PROTECTION REQUIREMENTS

Characteristics of Waste:

Corrosive:	___	Flammable:	___	Radioactive:	X		
Toxic:	X	Volatile:	X	Reactive:	___	Inert:	___
Other:	___						

Physical Hazards of Site (5.2.5)

Hazards (taking into account reactivity, stability, flammability, operational concerns, sampling decontamination, etc.):

The VVED is a low hazard activity. Detailed operating and sampling procedures shall be followed carefully when changing or sampling the particulate filter, other filters, the adsorber, or the particulate collection bin of the cyclone separator. A Health Physics Technician should be present whenever components are removed from or placed in the system. Care shall be exercised around the heater and gas exit stack, which could be very hot (>200 F), and these items will be tagged as such to warn personnel of the hazard.

Safe Work Practices (7.)

Record all variations in safe work practices for this task.:

There are no variations from safe work practices in this task.

Personal Protection (6.)

Personal Protection Used on Previous Site Visits (dates and scope of work included):

Levels of Protection B, C, and D were used during the drilling of the bore hole for VVED (Health and Safety Plan for Vapor Vacuum Extraction Bore Hole). Observation visits have required only Level of Protection D or less.

Level of Protection Required for this Task: A____ B____ C____ D__X__

Respiratory and Dermal Requirements - Personal Protection Equipment (PPE):

Leather work gloves. Respirator with HEPA and organics filtration cartridge shall be used when changing or sampling the filters or the particulate collection bin of the cyclone separator or sampling the carbon bed.

Selection Criteria:

The concentrations of the organic vapors in the environment will be below the 8 hour limits established by OSHA for the workplace to insure the health and safety of all those working directly with the equipment as well as the general public.

Modifications for Personal Protection Requirements: (6.)

When the filter or the particulate collector are changed or sampled or the carbon bed is sampled, the personal protection equipment should include a respirator with HEPA and organics filtration cartridge in addition to the Class D Level of Protection equipment.

Action Levels Regarding Limitations in Tasks Assigned, PPE Requirements, and Withdrawal from Site: (11.1.9)

If the HNu organic analyzer measures a total organic concentration of 25 ppm, or greater, for 10 seconds, in the stack, the system will be shutdown automatically. If the level of organic vapors becomes greater than 1 ppm for 5 minutes (as detected by a portable HNu), the system will be manually shutdown and the area will be evacuated until the concentrations of the organics lower to an acceptable level. The system will then be checked to determine the cause of the increase in the level of organic vapors, and corrective action will be taken.

Levels of Protection

Level A protection should be worn when the highest level of respiratory, skin, eye, and mucous membrane protection is needed.

____ Positive-pressure (pressure-demand), self-contained breathing apparatus (MSHA/NIOSH-approved) (REQUIRED).
____ Fully encapsulating, chemical-resistant suit (REQUIRED).
____ Chemical-resistant inner and outer gloves (REQUIRED). Type? ____
____ Chemical-resistant boots with steel toe (depending on suit boot construction, worn over or under suit boot) (REQUIRED).
____ Thermoluminescent Detector (TLD) badge for radiation (REQUIRED).
____ Pencil dosimeter (REQUIRED).
____ Hard hat (under suit).
____ Coveralls (under suits).
____ Two-way radio communication (intrinsically safe) (REQUIRED).

Level B protection should be selected when the highest level of respiratory protection is needed, but a lower level of skin and eye protection is sufficient. Level B protection is the minimum level recommended for initial site entries until hazards have been further identified and defined by monitoring, sampling, and other reliable methods of analysis. Personnel equipment indicated by those findings may then be utilized.

____ Positive-pressure (pressure-demand), self-contained breathing apparatus (MSHA/NIOSH-approved) (REQUIRED).
____ Chemical-resistant clothing (overalls and long-sleeved jacket; coveralls; hooded, two-piece chemical-resistant splash suit; or disposable, chemical-resistant coveralls) (REQUIRED).
____ Coveralls (under splash suit).
____ TLD badge and Pencil dosimeter for radiation (REQUIRED).
____ Chemical-resistant inner and outer gloves (REQUIRED). Type? ____
____ Chemical-resistant boots with steel toe (REQUIRED).
____ Two-way radio communications (intrinsically safe).
____ Hard hat.

Level C protection should be selected when the type of hazardous airborne substance is known, concentration measured, criteria for using air-purifying respirators met, and skin and eye exposure unlikely. Monitoring of the air must be performed to comply with OSHA regulations and to ensure respirator effectiveness.

____ Full-face, air purifying respirator (MSHA/NIOSH-approved) with type ____ cartridge (REQUIRED).
____ Chemical-resistant clothing (one-piece coveralls; hooded, two-piece chemical-resistant splash suit; chemical-resistant hood and apron; disposable, chemical-resistant coveralls) (REQUIRED).
____ TLD badge for radiation (REQUIRED).
____ Pencil dosimeter (REQUIRED).
____ Chemical-resistant inner and outer gloves (REQUIRED). Type? ____
____ Chemical-resistant boots with steel toe (REQUIRED).
____ Two-way radio communications (intrinsically safe).
____ Hard hat.
____ Escape mask (respirator).

Level D protection is primarily a work uniform. It should not be worn on any site when respiratory or skin hazards exist.

_X_ Protective coveralls and protective gloves. Type? cotton & leather
_X_ TLD badge for radiation (REQUIRED).
_X_ Pencil dosimeter (REQUIRED).
_X_ Boots or shoes with steel toe (REQUIRED).
_X_ Hard hat.
_X_ Safety eye wear.

Initial Required Levels of Protection (6.)

Task	Name	PPE Level	Other Modifications
	Task Project Manager	D	
	Task Project Engineer	D	
	Health and Safety Officer	D	
	Data Collection Engineer	D	
	Project Industrial Hygenist	D	
	RWMC Operations Personnel	D	or D and a respirator with HEPA & organics filtration cartridge
	Design Engineer	D	
	Quality Engineer	D	
	Safety Engineer	D	
filter or particulate bin sampling or changing	All personnel involved or monitoring the proceedure	D and a respirator with a HEPA and a organics filtration cartridge	

D - level D protection as identified on page A-14

Operations and Monitoring Equipment Checklist (9.) (9.1) (9.3) (9.5)

Type of Equipment	Number Needed	Calibrated	Field-Ready
Data Acquisition System	1	f, l	yes
HNu photoionization analyzer	1	f, l, s	yes
Temperature sensors	4	f	yes
Differential pressure sensors	5	f	yes
Pressure sensors	3	f	yes
Relative Humidity sensor	1	f	yes
Gas chromatograph	1	f, l, s	yes
Rotameter	1	f	yes
Mass flow meter	1	f	yes
Portable alpha survey	1	f, s	yes
Portable beta-gama survey	1	f, s	yes
Low range direct radiation meter	1	l, s	yes
Combustable gas indicator	1	l, s	yes
Portable HNu photoionization analyzer	1	l,s	yes

f = factory, l = lab, s = demonstration site

Procedures and Methods for Surveillance

Sampling of the breathing zone will be conducted during start-up to document that the gas stream released from the stack presents no hazard to personnel. Comprehensive operating procedures for the VVED process can be found in the Detailed Operating Procedures document DOP-RO-3.3.3 and the Standard Operating Procedures document SOP-3.16. Comprehensive sampling and waste handling procedures can be found in the Sampling and Analysis Plan and the Waste Management Strategy for VVED.

Perimeter Establishment (8.)

Site Secured: _____ Containment Zones Mapped: _____

Perimeter Identified: ___X___ Containment Zones Identified: _____

Perimeter identified with yellow and black tape or rope.

Medical Surveillance Procedures (9.4)

Parameter	Action Level	Biological Medium	Test Method

Not applicable.

Emergency Equipment (11.2)

Equipment will comply with the specifications set forth by the Emergency Action Plan for the RWMC and by the Project Directives for the RWMC.

List emergency equipment below:

Fire Extinguishers - No.: 2
  Locations: One is located at each end of the VVED skid.
Scott Air Packs - No.: Yes
  Locations: RWMC HP Office
First Aid Kits - No.: Yes
  Locations: RWMC HP Office

DECONTAMINATION AND DISPOSAL PROCEDURES (8.0)(10.3)

Map of Facilities

Is there a map enclosed showing restricted access zones, protection levels, decontamination areas, equipment layout, and clean zones?

Yes: ____ No: X

If not, sketch below:

See explanation below.

Explanation:

The access zones and the protection levels for the SDA do not change with the addition of the VVED process. Figures 1 and 2 indicate the location of the bore hole that will be used for the demonstration.

Decontamination Procedures

Contamination from radionuclides is not expected, but precautions for sampling and changing the filters and particulate collection bin are provided in the Waste Management Strategy and the Sampling and Analysis Plan for VVED.

Decontamination of Sampling Bottles and Equipment

Contamination from radionuclides is not expected, but precautions for sampling and changing the filters and particulate collection bin are provided in the Waste Management Strategy and the Sampling and Analysis Plan for VVED.

Decontamination Modification (e.g., personnel, surfaces, materials, instruments, equipment)

Contamination from radionuclides is not expected, but precautions for sampling and changing the filters and particulate collection bin are provided in the Waste Management Strategy and the Sampling and Analysis Plan for VVED.

Disposal Procedures

On-Site:

All samples and filters are considered to be hazardous and radiologically contaminated prior to testing. The details of the waste disposal procedures are contained in the Waste Management Strategy and the Sampling and Analysis Plan for VVED.

Off-Site:

All samples and filters are considered to be hazardous and radiologically contaminated prior to testing. The details of the waste disposal procedures are contained in the Waste Management Strategy and the Sampling and Analysis Plan for VVED.

EMERGENCY REFERENCE

Task: Vapor Vacuum Extraction Demonstration Project No.: 3X2JX000

Emergency Information (Local Resources)

• Warning Communications Center (WCC)	526-1515
• RWMC/SWEPP Emergency Action Director	526-1348
• First Aid - INEL Bldg. CFA 603 (Kansas Avenue)	526-2356
• OMP - INEL Bldg. CFA 603 (Kansas Avenue) D E. Minner, M.D.	526-2356
• Ambulance - INEL Bldg. CFA 666 (Nevada Street)	526-2211
• Fire - INEL Bldg. CFA 666 (Nevada Street)	526-2211
• Security - INEL Bldg. CFA 606 (Memphis Street)	526-2321
• Safety Engineering Support:	
- Industrial Hygiene	
Robert Nash	526-8757
- Explosives Expert	
Richard Green	526-2702
• HP Office at RWMC	526-2710
• RWMC Safety	526-4381
• RWMC Operations Shift Manager	526-2766
• Task Project Engineer	
N. W. Spang	526-1628

EMERGENCY REFERENCE (cont'd)

- Project Manager

  R. R. Piscitella 526-1843

- Design Engineer

  R. S. Natividad 526-0248

- Monitoring Equipment

  J. F. Ginsburg 526-9698

Emergency Routes

INEL Medical Facility: No special facilities in addition to those at the Ocupational Medical Department will be required.

Map attached? Yes, see page A-29 and A-30

Alternate Emergency Facilities To Be Noted: None are required.

Procedures for Inclement Weather:

No special actions are required during inclement weather.

Site Emergency Procedures and Responsibilities

Name	Responsibility	Action
D. L. French	Shift Manager Operations Manager	As required by the Emergency Action Plans and the Project Directives for the RWMC.

Location of Emergency Equipment at RWMC:

Equipment will comply with the specifications set forth by the Emergency Action Plan for the RWMC and by the Project Directives for the RWMC.

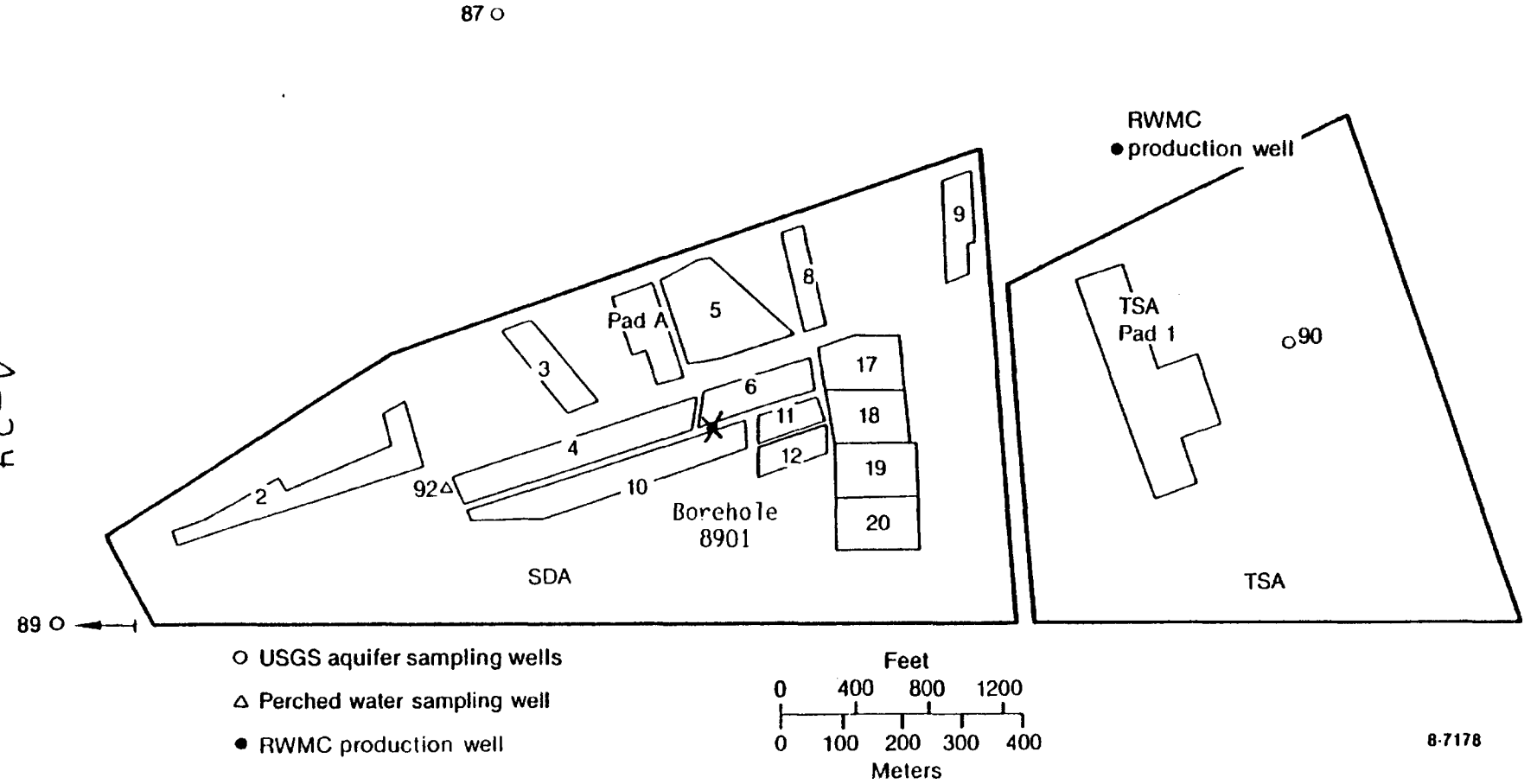
First Aid Supplies (11.2)

Task	Date	Location	Kit No.

Not applicable.

ITEMS:

FIGURE 1: Location of Waste Disposal Pits and Trenches in the Subsurface Disposal Area of the Radioactive Waste Management Complex



o 88

FIGURE 2: Map of the Subsurface Disposal Area Showing the Location of Bore Hole 8910D to be Used for the Vapor Vacuum Extraction Demonstration

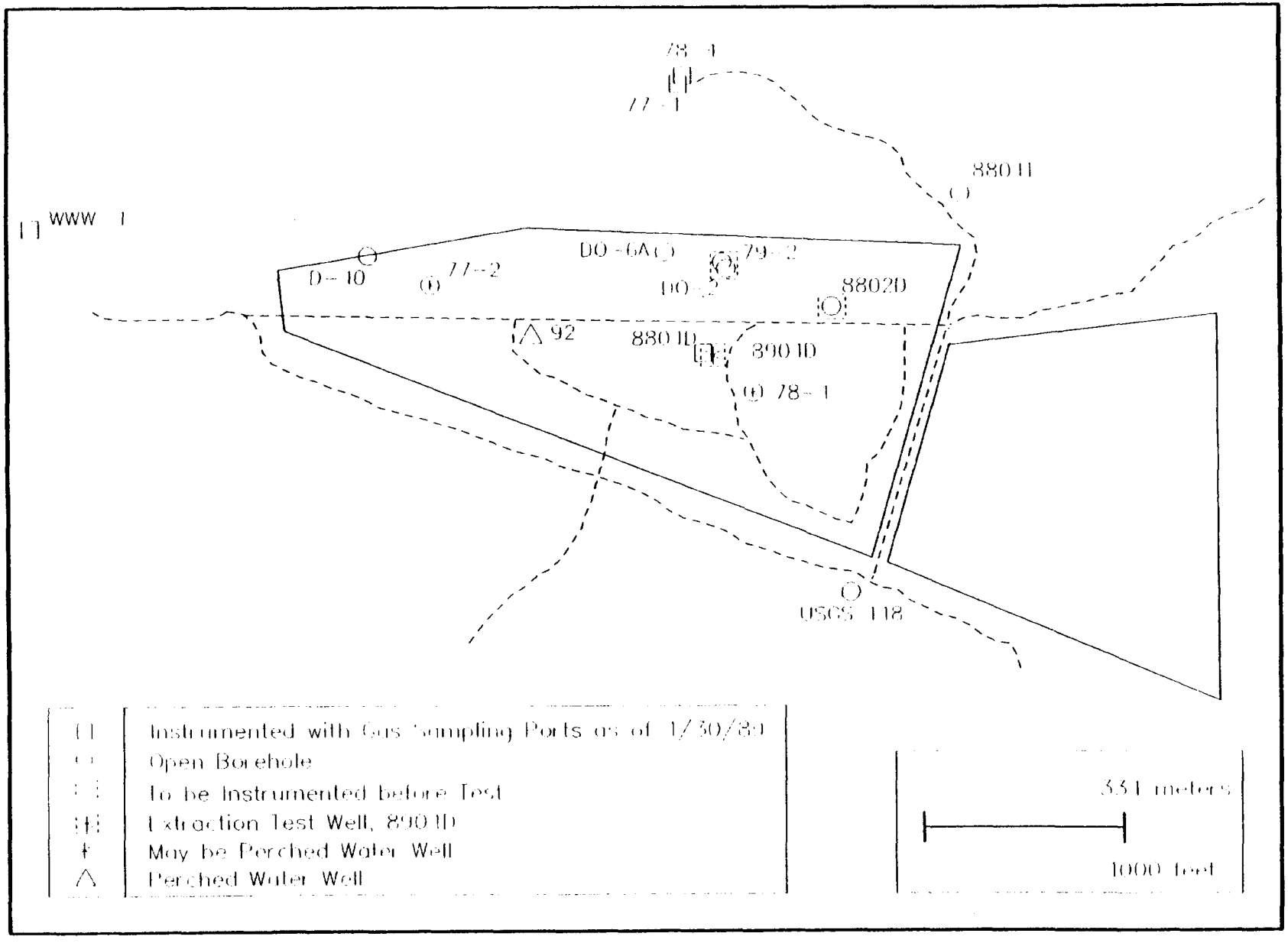
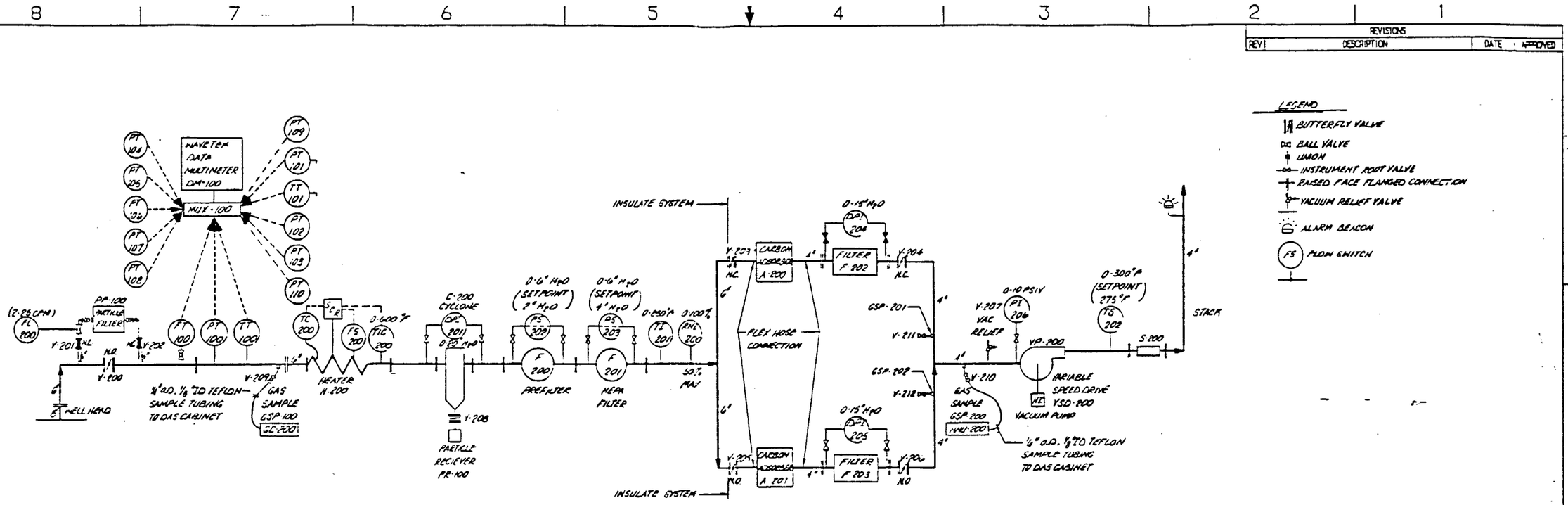


Figure 3: Flow Diagram with the Components of the Vapor Vacuum Extraction Demonstration, to be Used in Removing Organic Materials from the Geo Media Beneath the Subsurface Disposal Area of the Radioactive Waste Management Complex



EQUIPMENT

VVED-C-200-CYCLONE
VVED-PR-100 CYCLONE PARTICLE RECIEVER
VVED-H-200 SYSTEM HEATER
VVED VP-200 VACUUM PUMP
VVED PF-100-PARTICLE SAMPLE FILTER
VVED-F-200-PREFILTER
VVED-F-201-HEPA FILTER
VVED-A-200-CARBON ADSORBER UNIT ONE
VVED-F-202 PUMP PREFILTER UNIT ONE
VVED A-201-CARBON ADSORBER UNIT TWO
VVED F-203 PUMP PREFILTER UNIT TWO
VVED V-200 WELL HEAD SHUT-OFF AND PARTICLE SAMPLER DIVERTER, BUTTERFLY VALVE
VVED-V-201-PARTICLE FILTER ISOLATION BALL VALVE
VVED-V-202-PARTICLE FILTER ISOLATION BALL VALVE
VVED-V-203 CARBON ADSORBER SYSTEM, A-200, ISOLATION GATE VALVE
VVED-V-204 CARBON ADSORBER SYSTEM, A-200, ISOLATION GATE VALVE
VVED-V-205-CARBON ADSORBER SYSTEM, A-201, ISOLATION GATE VALVE
VVED-V-206-CARBON ADSORBER SYSTEM, A-201, ISOLATION GATE VALVE
VVED-V-207-SYSTEM VACUUM RELIEF VALVE (SPRING SET - 6 PSIG)
VVED-V-208-CYCLONE RECEIVER VALVE
VVED-V 209 GC ISOLATION/SHUT OFF VALVE
VVED-V-210 HNU ISOLATION/SHUT OFF VALVE
VVED-GSP-100 SYSTEM FLOW GAS SAMPLE PORT FOR GC
VVED-GSP 200 SYSTEM FLOW GAS SAMPLE PORT FOR VOC BREAKTHRU (HNU)
VVED-S 200 VACUUM PUMP EXHAUST SILENCER
VVED-DM-100 HAVETEK DATA MULTIMETER
VVED-MUX-100 HAVETEK CHANNEL MULTIPLEXER
VVED-GC-200 GAS CHROMATOGRAPH
VVED-HNU-200 GAS BREAKTHROUGH ANALYZER
VVED-V-211-GC GRAB SAMPLE PORT SHUT-OFF VALVE
VVED-V-212-GC GRAB SAMPLE PORT SHUT-OFF VALVE
VVED GSP 201-GRAB SAMPLE PORT
VVED GSP 202-GRAB SAMPLE PORT

DATA TRANSMITTERS

VVED-PT-100 SYSTEM GAGE VACUUM TRANSMITTER TO DAS (-14.7 – 35 PSI)
VVED PT-101 - LOCAL ATMOSPHERE PRESSURE TRANSMITTER TO DAS (0-25 PSIA)
VVED-FT-100 SYSTEM MASS FLOW SENSOR/TRANSMITTER TO DAS (0-500 SCFM)
VVED-TT-100- SYSTEM FLOW TEMPERATURE TRANSMITTER TO DAS (-382 – 752°F)
VVED-TT-101- AMBIENT TEMPERATURE TRANSMITTER TO DAS (-382 – 752°F)
VVED PT 102-110 – SUBSURFACE PRESSURES IN WELL BBOID
NOTE: THE ABOVE VARIABLES CAN BE READ ON THE LCD PANEL ON THE FRONT OF THE HAVETEK DATA MULTIMETER

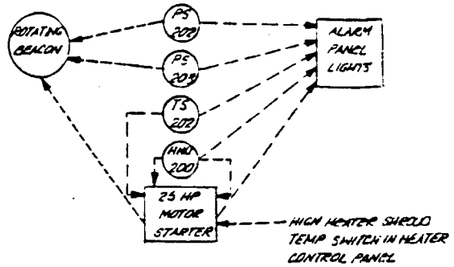
SYSTEM GAGES

VVED-DPI-201- ΔP GAGE ACROSS CYCLONE
VVED-PS-202- ΔP GAGE ACROSS PREFILTER WITH ALARM CONTACTS
VVED-PS-203- ΔP GAGE ACROSS HEPA FILTER, WITH ALARM CONTACTS
VVED DPI-204 ΔP GAGE ACROSS PUMP INLET FILTER, F-202
VVED DPI-205 ΔP GAGE ACROSS PUMP INLET FILTER, F-203
VVED PI-206- VACUUM GAGE FOR VACUUM PUMP
VVED-FI-200- PARTICLE SAMPLER ROTAMETER (FOR F. ON RATE)
VVED-TI-201-CARBON BED INLET TEMPERATURE GAGE
VVED-TS 202-VACUUM PUMP OUTLET TEMPERATURE GAGE WITH ALARM CONTACTS
VVED-RHI-200- DIGITAL RELATIVE HUMIDITY READOUT

NOTE ALL GAGES ARE SYSTEM MOUNTED AND IN VIEW OF OPERATORS.

SYSTEM CONTROLS

VVED TIC-200-HEATER OUTLET TEMPERATURE SENSOR/CONTROLLER-MANUALLY SET TO ACHIEVE 50% RELATIVE HUMIDITY READING FROM RH 200 INITIAL SETPOINT 70°F
VVED-VSD-200-VARIABLE SPEED DRIVE CONTROLLER, MANUALLY SET TO ADJUST SYSTEM FLOW READING FROM FI-100
VVED TS 202- PUMP OUTLET HIGH TEMPERATURE SWITCH AND INDICATOR
VVED-HNU-200 - BREAKTHRU RELAY IS LOCATED IN GAS ANALYZER
VVED-TC-200 - HEATER INTERNAL TC FOR SHROUD HIGH TEMP. CUTOUT SIGNAL (SET @ 350°F)
VVED-PS-200 - FLOW SWITCH TO LOCKOUT HEATER WHEN THERE IS NO SYSTEM FLOW



INSTRUMENTATION ONE LINE DIAGRAM

QUAL LEVEL	PART OR IDENTIFYING NO.	DESCRIPTION/MATERIAL/SPECIFICATION	ITEM/FIND
		PARTS LIST	

NEXT ASSEMBLY DWG 429205 & 429819
UNLESS OTHERWISE SPECIFIED
SURFACE ROUGHNESS
DIMENSIONS AND TOLERANCES ARE IN INCHES
TOLERANCES DECIMALS .X ± .1 .XX ± .03 .XXX ± .010 FRACTIONS ± 1/8 ANGULAR ± 1°
DO NOT SCALE DRAWING

DRAWN U. PROHELIK 2-7-89
CHECKED 3-27-89
DESIGN 3/28/89
APPROVED 3-31-89

EG&G Idaho, Inc.
RWMC-Blank
VAPOR VACUUM EXTRACTION DEMONSTRATION SYSTEM P&ID
SIZE D | KNOX CODE NUMBER | DRAWING NO. 429223 | REV
SCALE NONE | WEIGHT | PROJECT NO.

REFERENCES FOR BACKGROUND DESCRIPTION SECTION PAGE A-6

1. EG&G Idaho, VVED Component Review Package (WTD-29-88)
2. EG&G Idaho, Preliminary Standard Operating Procedures for the Vapor Vacuum Extraction Demonstration System 1.
3. EG&G Idaho, Safety Assessment for Vapor Vacuum Extraction Demonstration.
4. Preamble to OSHA Final Rule Revising Workplace Air Contaminant Limits Chemical Regulation Reporter, vol. 12, The Bureau of National Affairs, Inc., Feb 1989.
5. Threshold Limit Values and Biological Exposure Indices for 1988-1989, American Conference of Governmental Industrial Hygienists (ACGIH), Cincinnati, Ohio.
6. NIOSH Pocket Guide to Chemical Hazards, U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health.

RECORD OF TRAINING COMPLETED BY PERSONNEL

Topic	HRS	NAME							
Introduction	AR	DATE							
First Aid	8								
CPR	8								
Decontamination	AR								
OVA	AR								
HNu	AR								
SCBA Review	AR								
Sampling	AR								
Task Specific	AR								
OSHA	40								
Respirator	8								
Radiation	12								
Personnel Monitoring Equip.	AR, 1, 2								

Schedule of training that must be conducted
AR = As Required, 1 = vapor patch monitoring,
2 = radiation badge

Certified By: _____
Task Health and Safety Officer

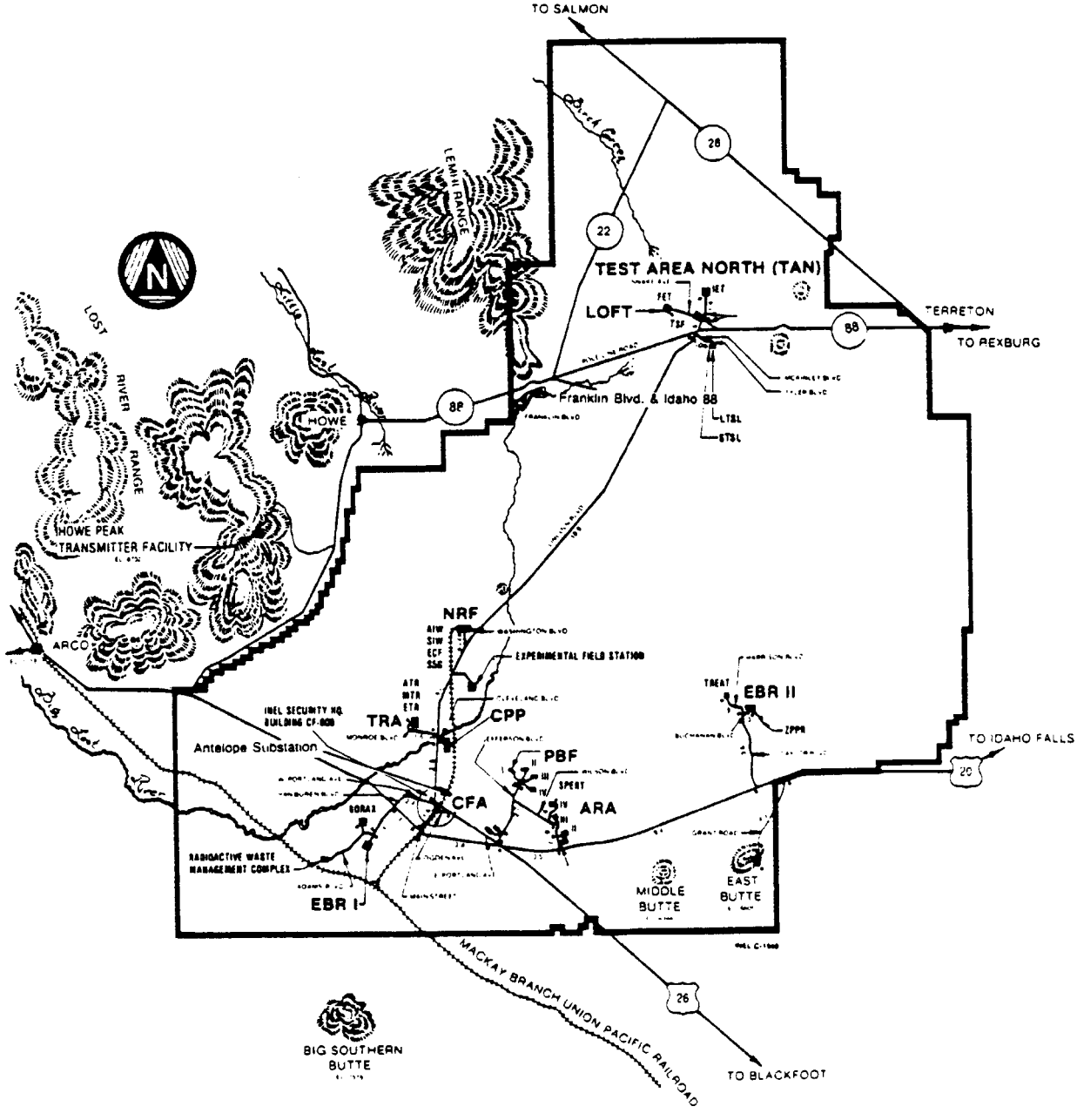


Figure 4. Map Showing Location of the Radioactive Waste Management Complex Relative to the Central Facilities Area

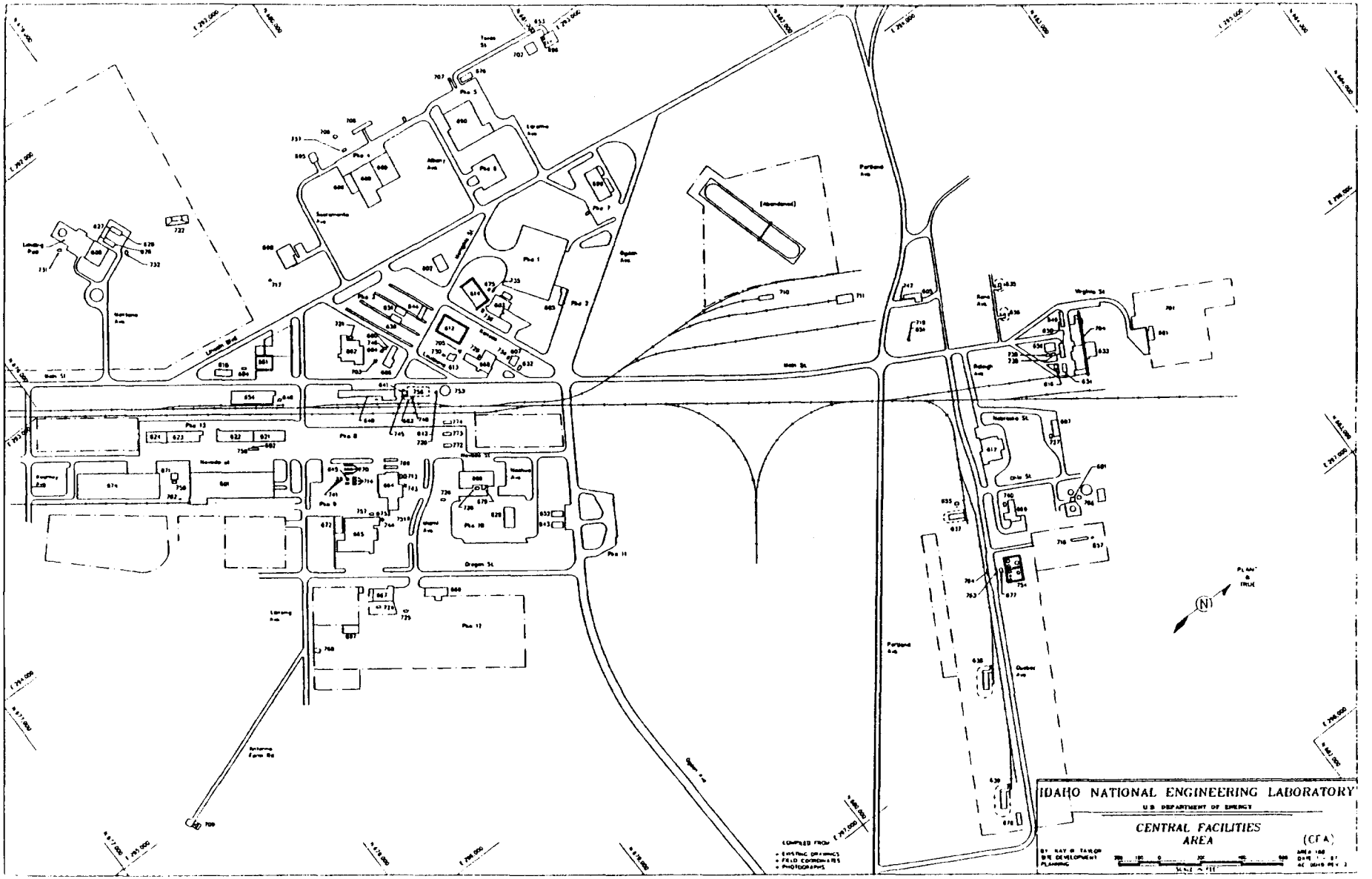


Figure 5. Map Showing the Location of the Occupational Medical Department Facilities (Buildings 612 and 614) Within the Central Facilities Area

APPENDIX B

HEALTH AND SAFETY CERTIFICATION FORM

HEALTH AND SAFETY CERTIFICATION FORM

Task Title:

Project Manager:

Task Project Engineer:

I certify that I have been given a copy of the task specific BWP Health and Safety Plan for the Vapor Vacuum Extraction Demonstration Task, and agree to comply with the procedures described therein. I further certify that I understand the potential health and safety hazards of the program (as outlined in this Health and Safety Plan) and have been trained in the use of the personal protective equipment selected for this task.

Employee: _____
(Print) (Signature) (Date)

Company of Employment: _____

RWMC Shift Manager: _____
(Print) (Signature) (Date)

Health and Safety Officer: _____
(Print) (Signature) (Date)

Note: This certification may become part of the Training and Qualification (T&Q) file for each person who trains and works at the RWMC for this job specific task.