

**Site Security and  
Health and Safety Plan  
for  
Operable Unit 3  
Remedial Investigation/Feasibility Study**

**Naval Industrial Reserve  
Ordnance Plant  
Fridley, Minnesota**

**Volume IV of IV**



**Southern Division  
Naval Facilities Engineering Command**

**Contract Number N62467-94-D-0888**

**Contract Task Order 0003**

**October 1997**

**SITE SECURITY AND  
HEALTH AND SAFETY PLAN  
FOR  
OPERABLE UNIT 3  
REMEDIAL INVESTIGATION/FEASIBILITY STUDY**

**NAVAL INDUSTRIAL RESERVE ORDNANCE PLANT  
FRIDLEY, MINNESOTA**

**VOLUME IV OF IV**

**REVISION 3  
OCTOBER 1997**

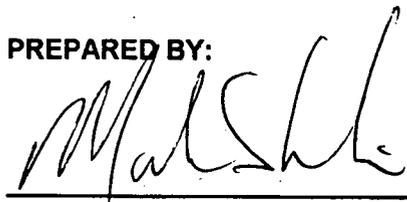
**COMPREHENSIVE LONG-TERM  
ENVIRONMENTAL ACTION-NAVY (CLEAN) CONTRACT**

**Submitted to:  
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**CONTRACT NUMBER N62467-94-D-0888  
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**PREFACE**

This Site Security and Health and Safety Plan (SS and HASP) is Volume IV of the four-volume Work Plan.

## 1.0 INTRODUCTION

This Health and Safety Plan (HASP) has been written to encompass site activities that are to be conducted at the Naval Industrial Reserve Ordnance Plant (NIROP) in Fridley, Minnesota as part of Contract Task Order (CTO) 0003. This CTO directing this Remedial Investigation (RI) is part of an overall effort conducted under Comprehensive Long-Term Environmental Action Navy (CLEAN III) administered through the U.S. Navy Southern Division Naval Facilities Engineering Command (NAVFAC) as defined under Contract Number N62467-94-D-0888. In addition to this HASP, a copy of the Brown & Root Environmental Health and Safety Guidance Manual must be present at the site during the performance of site activities. This guidance manual provides detailed information pertaining to the HASP as well as Brown & Root Environmental (B&R Environmental) standard operating procedures (SOPs). Both documents must be present at the site to comply with the requirements stipulated in the Occupational Safety and Health Administration (OSHA) standard 29 CFR 1910.120.

This HASP has been developed using the latest available information regarding known or suspected chemical contaminants and potential physical hazards associated with the proposed work and site. The HASP will be modified if new information becomes available. All changes to the HASP will be made with the approval of the B&R Environmental Health and Safety Manager (HSM) and the Task Order Manager. The Task Order Manager (TOM) will notify affected personnel of all changes. A Site Safety Follow-up Report will document all changes to the HASP.

The elements of this HASP are in compliance with the requirements established by OSHA 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response" (HAZWOPER), and sections of 29 CFR 1926, "Safety and Health Regulations for Construction." The information contained in this plan, as well as policies on conducting onsite operations, have been obtained from the B&R Environmental Health and Safety Program and NIROP policies and procedures.

### 1.1 KEY PROJECT PERSONNEL AND ORGANIZATION

This section defines responsibility for site health and safety for B&R Environmental and subcontractor employees. Personnel assigned to these positions are responsible for all onsite health and safety. These people are primary points of contact for questions regarding any procedures or control measures.

- The B&R Environmental TOM is responsible for the overall direction and implementation of health and safety for this project.
- The B&R Environmental Field Operations Leader (FOL) is responsible for implementation of this HASP with the assistance the Site Safety Officer (SSO). The FOL manages field activities, executes the work plan, and enforces safety procedures.
- The SSO supports site activities by advising the FOL on all aspects of health and safety on site. These duties may include the following:
  - Coordinates all health and safety activities with the FOL.
  - Selects, inspects, implements, and maintains personal protective equipment.
  - Establishes work zones and control points.
  - Directs and assists in the development of decontamination areas and procedures.
  - Implements air-monitoring program for onsite activities.
  - Verifies training and medical status of onsite personnel status in relation to site activities.
  - Implements hazard communication, respiratory protection, and other health and safety programs.
  - Coordinates emergency services.
  - Provides site-specific training for all onsite personnel.
- In the event of an imminent danger or life-threatening situation, the FOL or SSO have the authority to stop site operations. All personnel must immediately notify them when conditions may warrant termination of operations. Should the FOL and SSO be unavailable, any employee or project-related personnel has the authority to terminate operations for health and safety reasons.
- Compliance with these requirements is monitored by the SSO and coordinated through the CLEAN Health and Safety Manager.

## 1.2 SITE INFORMATION AND PERSONNEL ASSIGNMENTS

Site Name: NIROP Fridley Address: Fridley, Minnesota  
Remedial Project Manager Scott Glass Phone Number: (803) 820-5587  
NAVSEA Site Contact: Kerry Morrow Phone Number: (612) 572-6360  
NAVFAC Site Contact: Patrick Mosites Phone Number: (612) 572-6438

**Purpose of Visit:** This activity will be divided into a multi-task operation performed sequentially through the execution of the elements as defined in the scope of work.

**Proposed Dates of Work:** 20 OCT 97 - 20 FEB 98

### Project Team:

#### **B&R Environmental Personnel:**

Debra M. Wroblewski  
Mark Sladic, P.E.  
Pat Hooper  
Terry Rojahn  
Matthew M. Soltis, CIH, CSP  
Jim Laffey  
Bryn Howze

#### **Discipline/Tasks Assigned:**

Program Manager  
Task Order Manager (TOM)  
Deputy Task Order Manager  
Field Operations Leader (FOL)  
Health and Safety Manager (HSM)  
Site Safety Officer (SSO)  
Geologist

#### **Non-B&R Environmental Personnel**

Kole Hance  
Donald Ramstead

#### **Affiliation/Discipline/Tasks Assigned**

Hance Cable Testing-Cable Locator  
Hance Cable Testing-Cable Locator

#### **Boart Longyear Company Personnel**

Bill Zamow  
Loran Enninga  
Jeff Rustad

#### **Discipline/Tasks Assigned**

Driller/Sampler  
Driller/Sampler  
Driller/Sampler

**Boart Longyear Company Personnel (continued)**

**Discipline/Tasks Assigned**

Steve Wahlstrom

Driller/Sampler

Brad Beck

Driller/Sampler

Greg Kudak

Driller/Sampler

John Einum

Driller/Sampler

Ed Wilber

Driller/Sampler

Dan Tonnancour

Driller/Sampler

Dave Bates

Driller/Sampler

Mark Prueher

Driller/Sampler

Steve Johnson

Driller/Sampler

Roy Buckenberger

Driller/Sampler

Ken Lueck

Driller/Sampler

**Prepared by:** Thomas M. Dickson, ASP

**Modified by:** Jim Laffey

**Reviewed and Approved by:**

Mark Sladic, P.E.  
Task Order Manager

Matthew M. Soltis, CIH, CSP  
Health & Safety Manager

## 2.0 EMERGENCY ACTION PLAN

### 2.1 INTRODUCTION

This section has been developed as part of a planning effort to direct and guide field personnel in the event of an emergency. When onsite emergencies that cannot be handled by onsite personnel occur, site personnel will be evacuated to a safe place of refuge, and the appropriate emergency response agencies will be notified. Because a majority of potential emergency situations will require assistance from outside emergency responders, B&R Environmental and subcontractor personnel will not provide emergency response support for significant emergency events beyond their capabilities. The emergency response agencies listed in this plan are capable of providing effective response and will be designated as the primary responders. These agencies are located within a reasonable distance from the NIROP area of operations and are capable of providing adequate emergency response time. This emergency action plan conforms to the requirements of OSHA Standard 29 CFR 1910.38(a), as allowed in OSHA 29 CFR 1910.120(l)(1)(ii).

B&R Environmental will, through necessary services, include incidental response measures for incidents such as:

- Incipient fire-fighting support and prevention
- Incipient spill control and containment measures and prevention
- Removal of personnel from emergency situations
- Provision of initial medical support for injury/illnesses requiring only first-aid-level support
- Provision of site control and security measures as necessary

### 2.2 PRE-EMERGENCY PLANNING

Through the initial hazard/risk assessment effort, injury or illnesses resulting from exposure to chemical or physical hazards or fire are the most probable emergencies that could be encountered during site activities. To minimize and eliminate these potential emergency situations, pre-emergency planning activities associated with this project include the following. The SSO and/or the FOL are responsible for:

- Coordinating response actions with NIROP Fridley Emergency Services personnel to ensure that B&R Environmental emergency action activities are compatible with existing facility emergency response procedures.
- Establishing and maintaining information at the project staging area (support zone) for easy access in the event of an emergency. This information will include the following:
  - Chemical Inventory (for substances used on site), with Material Safety Data Sheets.
  - Onsite personnel medical records (medical data sheets).
  - A logbook identifying personnel on site each day.
- Identifying a chain of command for emergency action.
- Educating site workers to the hazards and control measures associated with planned activities at the site, and providing early recognition and prevention, where possible.
- Drilling and practicing incidental response measures periodically.

It will be the responsibility of the B&R Environmental FOL to ensure that this information is available and present at the site.

## **2.3 EMERGENCY RECOGNITION AND PREVENTION**

### **2.3.1 Recognition**

Foreseeable emergency situations that may be encountered during site activities will generally be recognizable by visual observation. Visual observation will be the principal method of identifying physical hazards that may be associated with the proposed scope of work. Visual observation will also play a role in detecting some chemical overexposures. A clear knowledge of what signs and symptoms which may be evident in the event of overexposure to contaminants of concern may alert personnel of the potential hazard concerning themselves or in their fellow workers. These potential hazards, the activities with which they have been associated, and the recommended control methods are discussed in detail in Sections 5.0 and 6.0 of this document. Additionally, early recognition will be supported by periodic site surveys to eliminate any situation predisposed to an emergency. The FOL and the SSO will

constitute the site evaluation committee responsible for these periodic surveys. Site surveys will be conducted at least once a week during the initiation of this effort.

The above actions will provide early recognition for potential emergency situations. B&R Environmental will provide incipient stage support. Should an incident take place, B&R Environmental will take defensive and offensive measures to control these situations. However, if the FOL and the SSO determine that an incident has progressed to a serious emergency situation, B&R Environmental will withdraw, and notify the appropriate response agencies.

### **2.3.2      Prevention**

B&R Environmental and subcontractor personnel will minimize the potential for emergencies by ensuring compliance with the HASP, the Health and Safety Guidance Manual, and applicable OSHA regulations.

### **2.4            SAFE DISTANCES AND PLACES OF REFUGE**

In the event that the site must be evacuated, all personnel will immediately stop activities and report to the telephone communications point at the support zone area. Telephone communication points and safe places of refuge will be determined prior to the commencement of site activities and will be conveyed to personnel as part of the daily safety meeting conducted each morning. Upon reporting to the refuge location, personnel will remain there until directed otherwise by the B&R Environmental FOL. The FOL or the SSO will take a head count at this location to confirm the location of all site personnel. The site logbook will be used to take the head count.

### **2.5            EVACUATION ROUTES AND PROCEDURES**

Once an evacuation is initiated, personnel will proceed immediately to the designated place of refuge in the support zone, unless doing so would further jeopardize the welfare of workers. In such an event, personnel will proceed to a designated alternate location (to be identified) and remain there until further notification from the FOL. The use of these locations as assembly points provides communication and a direction point for emergency services, should they be needed.

Evacuation procedures will be discussed prior to the initiation of any work at the site. This shall include identifying primary and secondary evacuation routes and assembly points. Evacuation routes from the

site are dependent upon the location at which work is being performed and the circumstances under which an evacuation is required. Additionally, site location and meteorological conditions (i.e., wind speed and direction) will influence the designation of evacuation routes. As a result, assembly points at NIROP Fridley were selected, and in the event of an emergency, field personnel will proceed to these points by the most direct route possible without further endangering themselves.

## **2.6 DECONTAMINATION PROCEDURES/EMERGENCY MEDICAL TREATMENT**

During a site evacuation, decontamination procedures will be performed only if doing so does not further jeopardize the welfare of site workers. Decontamination will not be performed if the action that initiates an evacuation would further endanger the lives of workers. However, it is unlikely that an evacuation would occur at this site which would require workers to evacuate the site without first performing decontamination procedures.

## **2.7 EMERGENCY ALERTING AND ACTION/RESPONSE PROCEDURES**

Since B&R Environmental personnel will not always be working in proximity to each other, hand signals, voice commands, air horns, and two-way radios will comprise the mechanisms to alert site personnel of an emergency.

If an accident occurs, site personnel will initiate the following procedures:

- Initiate incident alerting procedures (if needed) verbally, by air horn, or using two-way radios.
- Describe to the FOL (who will serve as the Incident Coordinator) what has occurred and as many details as possible. Once all personnel are evacuated, incipient response procedures will be enacted to control the situation.

In the event that site personnel cannot control the incident through offensive and/or defensive measures, the FOL and SSO will enact the emergency notification procedure to secure additional outside assistance in the following manner:

- Call 2222 and report the emergency.
- Give the emergency operator the location of the emergency and a brief description of what has occurred.
- Stay on the phone follow the instructions given by the operator.
- The appropriate agency will be notified and dispatched.

If an accident occurs at NIROP outside of our designated operating areas impacting field personnel, the following procedures are to be initiated:

- Initiate an evacuation (if needed) by voice commands, hand signals, air horns, or two-way radio.
- Proceed to the assembly points as directed by NIROP.

#### 2.7.1 NIROP FRIDLEY EMERGENCY ALARMS

The following emergency procedures are in-place at NIROP Fridley.

**TAKE COVER IMMEDIATELY**  
in designated area if possible

**Alarm ••••**  
A high pitched beep

**EVACUATE THE PLANT IMMEDIATELY**  
and go to designated meeting location if possible

**Alarm ] ] ] ] A whoop**  
that starts low and ends high

## **2.8 PERSONAL PROTECTIVE EQUIPMENT (PPE) AND EMERGENCY EQUIPMENT**

A first-aid kit and fire extinguisher are maintained in the trailer. Throughout the plant there are first aid stations which are immediately available for use in the event of an incident. The personal protective equipment (PPE) used in support of everyday activities will serve as the first line of defense in an emergency. This PPE will be required in all areas of the site and will be accessible to authorized personnel. Emergency response units will provide any emergency-related PPE required, should a situation become unmanageable.

## **2.9 EMERGENCY CONTACTS**

Prior to performing work at the site, all personnel will be thoroughly briefed on the emergency procedures to be followed in the event of an accident. A mobile phone shall also be available on site. Table 2-1 provides a list of emergency contacts and their corresponding telephone numbers. This table must be posted on site where it is readily available to all site personnel.

## **2.10 EMERGENCY ROUTE TO HOSPITAL**

The following hospital is approximately 3 miles from the front gate and has the facilities to accept chemically contaminated patients.

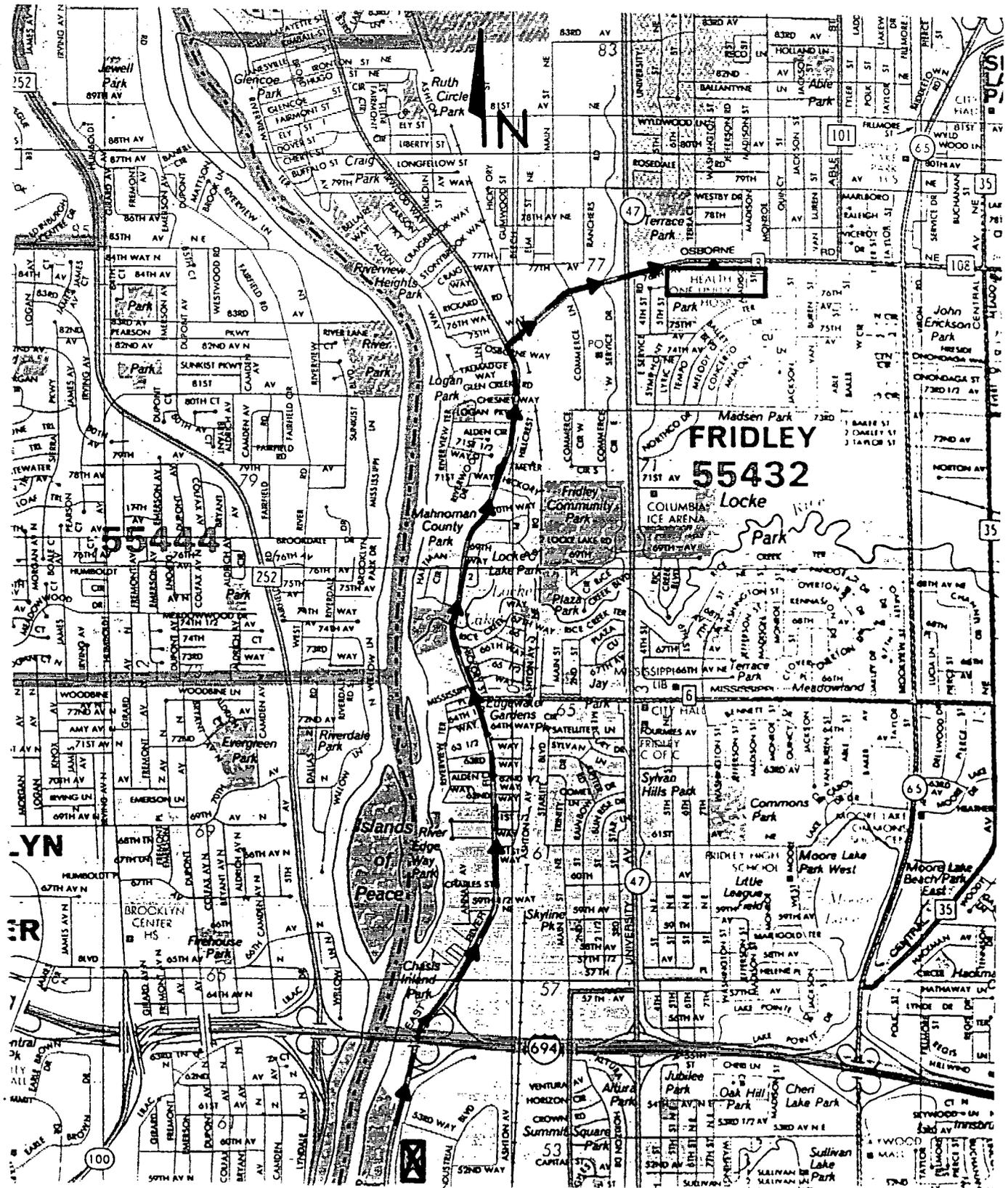
Unity Medical Center  
550 Osborne Road  
Fridley, Minnesota  
(612) 780-6845



Prior to the initiation of site mobilization of field activities, a legible map indicating the travel route from the site to Unity Medical Center will be obtained and inserted as Figure 2-1 of this HASP. Directions to the medical center are as follows:

- Exit main entrance (Gate 7) of NIROP Fridley and turn north (right) on East River Road.
- Proceed approximately 2 miles north to Osborne Road and turn right (east) at Super America Gas Station / A&W Root Beer Stand onto Osborne Rd.
- Proceed approximately one-half mile east to the hospital.
- Follow signs to entrance of Unity Medical Center.

FIGURE 2-1



### 3.0 SITE BACKGROUND

The NIROP Fridley is located in the City of Fridley, on the southernmost tip of Anoka County, Minnesota. The plant is situated approximately one-quarter mile east of the Mississippi River and 1 mile south of Interstate 694 on East River Road NIROP. Fridley was placed on the United States Environmental Protection Agency's (EPA's) Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) National Priorities List (NPL) as a result of the release of trichloroethene (TCE) from past operations at the plant. NIROP Fridley was constructed in the early 1940s for heavy manufacturing operations. The United States Department of the Navy has entered into a Federal Facilities Agreement (FFA) with EPA and the Minnesota Pollution Control Agency to define the overall extent of contamination. Additional information concerning the historical background, current site conditions, and the release of TCE may be found in the accompanying project plan.

#### 3.1 CURRENT STATUS

The NIROP is a government-owned and contractor-operated (GOCO) facility. The contracted operator is currently United Defense, LP. Plant operations consist of processing, assembly, and manufacturing operations associated with the production of advanced weapons systems. The Northern Pump Company and FMC Corporation were previous operators. The government-owned and contractor-operated portion of the plant is 82.61 acres in size and is currently active.

## 4.0 SCOPE OF WORK

The following is a list of activities that are proposed for Phase II of the CTO 0003 investigation:

- Monitoring well installation (drilling)
- Multimedia sampling, including groundwater, soils, and investigative-derived waste (IDW)

The above listing represents a summarization of the tasks as they apply to the scope and application of this HASP. For a more detailed description of the associated tasks, refer to the Field Sampling Plan (FSP) and/or the Work Plan (WP).

## 5.0 TASKS/HAZARDS/ASSOCIATED CONTROL MEASURES SUMMARIZATION

Table 5-1 of this section serves as the primary portion of the site-specific HASP, which identifies the tasks that are to be performed under this HASP. The anticipated hazards, recommended control measures, air-monitoring recommendations, required PPE, and decontamination measures for each site task are discussed in detail. This table and the associated control measures shall be changed if the scope of work, contaminants of concern, or other conditions change. Through using the table, the FOL and field personnel can determine which hazards are associated with each task, what hazards are present at each site, and what associated control measures are necessary to minimize exposure to injuries related to those hazards. The table also assists the FOL in determining which PPE and decontamination procedures to use based on proper air-monitoring techniques and site-specific conditions.

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**TABLE 5-1  
 TASKS/HAZARDS/CONTROL MEASURES COMPENDIUM  
 NIROP FRIDLEY REMEDIAL INVESTIGATION**

Tasks/Operation/ Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring	Personal Protective Equipment*	Decontamination Procedures
Soil boring/monitoring well installation	<p><i>Chemical Hazards</i></p> <p>1) Air/particulate/water borne contaminant - Chlorinated hydrocarbons: trichloroethylene, trichloroethane, tetrachloroethene, 1,1-dichloroethane, 1,2-dichloroethylene, methyl chloroform, and PCBs. In addition, various metal compounds were detected. Carbon monoxide has been added to the chemicals of concern because much of this operation will be performed inside a building using internal combustion engines as power sources. See Table 6-1 for more information on the chemicals of concern.</p> <p>2) Transfer of contamination into clean areas and onto other personnel</p> <p><i>Physical hazards</i></p> <p>3) Rotating machinery</p> <p>4) Noise</p> <p>5) Energized systems</p>	<p>1) Use real-time monitoring instrumentation, observe specified action levels, and use identified PPE to control exposures to potentially contaminated medias (e.g. air, water, soils, etc.).</p> <ul style="list-style-type: none"> <li>- Air movers and elephant trucks (w/squirrel cages) will be used in an effort to reduce or evacuate carbon monoxide exhaust emissions.</li> </ul> <p>2) Decontaminate all equipment and supplies between drilling events and prior to leaving the site.</p> <p>3) All equipment to be used will be</p> <ul style="list-style-type: none"> <li>- Inspected in accordance with Federal safety and transportation guidelines, OSHA (1926.600,.601,.602), and manufacturer's design.</li> <li>- Operated by certified operators, and knowledgeable ground crew.</li> <li>- Used within establish safe zones and with clearly demarated routes of approach</li> </ul> <p>In addition to equipment considerations, the following safe operating procedures will be incorporated:</p> <ul style="list-style-type: none"> <li>- All personnel not directly supporting the drilling operation will remain at least 33 feet from the point of operation.</li> <li>- Drilling, drill masts, or other projecting devices shall be at least 20 feet from overhead power sources and a minimum of 3 feet from underground utilities.</li> <li>- Hand signals will be established prior to the commencement of drilling.</li> <li>- The driller and helper can simultaneously handle moving augers or flights only when there is a standby person to activate the emergency stop device.</li> <li>- The driller must never leave the controls while tools are rotating unless all personnel are clear of the rotating equipment.</li> <li>- A long handled shovel or equivalent shall be used to clear away drill cuttings from the hole and rotating equipment. Hands or feet shall not be used for this purpose.</li> <li>- A remote sampling device must be used to sample drill cuttings near rotating tools. The driller shall shutdown operations if the sampler is near the tools.</li> <li>- Only manufacturer-approved equipment may be used in conjunction with equipment repair procedures (i.e. pins for auger flights etc.).</li> <li>- Never climb a drill mast while equipment is rotating.</li> <li>- Use ANSI-approved fall protection (i.e., belts, lanyards) or portable ladders which meet OSHA's requirements when climbing drill masts.</li> <li>- Work areas will be kept clear of clutter.</li> <li>- Secure all loose articles to avoid possible entanglement.</li> <li>- All equipment shall be equipped with movement warning systems.</li> <li>- All personnel working in high equipment traffic areas are required to wear reflective vests for high visibility.</li> <li>- All personnel will be instructed in the location and operations of the emergency shut-off device(s). This device will be tested initially (and then periodically) to ensure its operational status.</li> <li>- Areas will be inspected prior to the movement of drill rigs and support vehicles to eliminate any physical hazards. This will be the responsibility of the FOL and/or SSO.</li> <li>- Drill rigs and support vehicles will be moved no closer than 3 feet to floor openings, pits, etc.</li> </ul> <p>4) Hearing protection will be used during all drilling activities until the SSO can quantify associated noise levels.</p> <p>5) All utility clearances shall be obtained prior to drilling. Prior to any subsurface investigations, the locations of all underground utilities will be identified and marked. Obtain written permit clearance prior to all subsurface investigations.</p>	<p>Photoionization Detector w/ 10.2 eV UV lamp source, or a Flameionization Detector, will be used as follows:</p> <p>1) Source (borehole and split spoon) monitoring will be conducted at regular intervals determined by the SSO. Positive sustained (above background) results which may affect operations crew will require the following actions.</p> <ul style="list-style-type: none"> <li>- Monitor the breathing zone of high-risk employees. Any sustained reading above background in the breathing zone requires evacuation to a safe area until the following measurements can be taken to determine the presence/concentration of trichloroethylene.</li> </ul> <ul style="list-style-type: none"> <li>- Sample-Colorimetric detector tube, Trichloroethylene 2/a.</li> </ul> <p>Trichloroethylene 2/a requires 3-5 strokes or pumps of the bellows witha pproximately 2 minutes reured for the timeof measurement. Reaction (Rxn): pale gray to orange discoloration.</p> <p>Positive I.D. of trichloroethylene above 35 ppm Level C protection is required (Not to exceed 100 ppm)</p> <p>&gt;10 ppm - Level B protection</p> <ul style="list-style-type: none"> <li>- Ultra PhD 4 gas meter utilizing LEL, O2, and CO sensors. During operation activities as a general area measuring device:        O2 - &lt;19.5%: O2-deficient Level B protection;        &gt;23.5% O2-enriched: Cease operations, evacuate and ventilate.        CO - 0-15 ppm: Continue to work, continue to monitor; 15-25 ppm: Level C protection, Super size CO canister with window-cator not to exceed 1,500 ppm.</li> </ul> <p>4) The SSO will perform sound-level measurements to determine noise levels during Geoprobe operations. Additionally, noise dosimetry may be performed to quantify worst-case scenarios.</p> <p>5) Where the utility clearance cannot be obtained in a reasonable period, or not located, drilling shall proceed with extreme caution using a magnetometer for periodic downhole surveys every 2 feet to a depth of at least 6 feet.</p>	<p>All drilling operations are to be initiated in level D protection.</p> <p>Level D protection constitutes the following minimum protection</p> <ul style="list-style-type: none"> <li>- Standard field dress (Long pants, long-sleeve shirts</li> <li>- Steel-toe/shank safety shoes</li> </ul> <p>These following items will be incorporated during drilling operations:</p> <ul style="list-style-type: none"> <li>- Nitrile gloves with a cotton liner.</li> <li>- Hardhat, safety glasses, impermeable boot covers, and earplugs or muffs.</li> <li>- <i>Tyvek coveralls will be worn if there is a possibility of soiling work attire.</i></li> <li>- <i>PVC or PE coated Tyvek will be incorporated if there is a potential for saturation of work attire.</i></li> </ul> <p>Level C protection upgrade will be done based on monitoring instrument results to the following:</p> <ul style="list-style-type: none"> <li>- Air-Purifying Respirator (APR) with organic vapor/HEPA cartridges for</li> <li>- positive trichloroethylene confirmation greater than 35 ppm (not to exceed 100 ppm).</li> <li>- carbon monoxide concentrations &gt; 15 ppm (Not to exceed 1,500 ppm).</li> </ul> <p>Chemical protective clothing, if required, will consist of impermeable boot covers, nitrile gloves with a cotton liner, Tyvek coveralls (unless free-phase product is encountered). Free-phase product or splash potential requires the use of polyvinyl chloride (PVC) or polyethylene (PE) splash suit.</p> <p>Level B protection        Self-Contained Breathing Apparatus (SCBA), or airline respiratory protection will be used</p> <ul style="list-style-type: none"> <li>- For positive confirmation of trichloroethylene detection in excess of 100 ppm.</li> <li>- IDLH (Immediately Dangerous to Life and Health) concentrations are exceeded for any compound listed in Table 6-1.</li> </ul> <p>Chemical-protective clothing will consist of impermeable boot covers, nitrile gloves with a cotton liner, Tyvek coveralls (unless free-phase product is encountered). Free-phase product or splash potential requires the use of PVC or PE splash suit.</p> <p>Ascension to Level B protection requires immediate notification of the TOM and Health and Safety Manager (Pittsburgh Office)</p> <p>Because contaminant concentrations and conditions may change radically, the following equipment will be maintained during all onsite activities:</p> <ul style="list-style-type: none"> <li>• Fire extinguishers (strategically placed)</li> <li>• Stretcher, blankets, and first-aid kit</li> </ul>	<p><b>Personnel Decontamination</b> - Will consist of a soap/water wash and rinse for outer protective equipment (e.g., boots, gloves, PVC splash suits, etc.). This function will take place at an area adjacent to the drilling operations bordering the support zone.</p> <p>This decontamination procedure for <b>Level D</b> protection will consist of</p> <ul style="list-style-type: none"> <li>- Equipment drop</li> <li>- Soap/water wash and rinse of outer boots and outer gloves</li> <li>- Soap/water wash and rinse of the outer splash suit, as applicable</li> <li>- Wash hands and face; leave contamination reduction zone</li> </ul> <p>For <b>Levels C &amp; B</b> in addition to that described above:</p> <p><b>Note:</b> SCBA air tank or APR cartridge change-out would take place at this point.</p> <ul style="list-style-type: none"> <li>- Outer suit, boot covers, outer glove removal</li> <li>- Respiratory (face mask) protection removal</li> <li>- Wash hands and face; leave contamination reduction zone</li> </ul> <p><b>Equipment Decontamination</b> - All heavy equipment decontamination will take place at a centralized decontamination pad utilizing steam or pressure washers. Heavy equipment, such as drill rigs, will have the wheels and tires cleaned along with any loose debris removed, prior to transporting to the central decontamination area. All site vehicles will be restricted access to exclusion zones, or also will have their wheels/tires sprayed off so as not to track mud onto the roadways servicing this installation. Roadways shall be cleared of any debris resulting from the onsite activity.</p> <p>All equipment used in the exclusion zone will require a complete decontamination between locations and prior to removal from the site. The FOL or the SSO will be responsible for evaluating equipment arriving onsite and that which is to leave the site. No equipment will be authorized access or exit without this authorization.</p> <p>Evaluation will consist of</p> <ul style="list-style-type: none"> <li>- Visual inspection</li> <li>- Scanning equipment with monitoring instruments</li> </ul>

\*Items in italics are optional, as conditions dictate or as directed by the FOL or SSO.

**TABLE 5-1  
TASKS/HAZARDS/CONTROL MEASURES COMPENDIUM  
NIROP FRIDLEY REMEDIAL INVESTIGATION**

Tasks/Operation/ Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring	Personal Protective Equipment*	Decontamination Procedures
<p>Geoprobe - Direct push/hammer soil boring and temporary monitoring well installation to the vadose zone.</p>	<p><i>Chemical Hazards</i></p> <p>1) Air/particulate/waterborne contaminant - Chlorinated hydrocarbons: trichloroethylene, trichloroethane, tetrachloroethene, 1,1-dichloroethane, 1,2-dichloroethylene, methyl chloroform, and PCBs. In addition, various metal compounds were detected. Carbon monoxide has been added to the chemicals of concern because much of this operation will be performed inside a building using internal combustion engines as power sources. See Table 6-1 for the chemicals of concern.</p> <p>2) Transfer of contamination into clean areas or onto clean persons.</p> <p><i>Physical hazards</i></p> <p>3) Pinch/compression and traffic-related hazards</p> <p>4) Noise</p> <p>5) Energized systems</p>	<p>1) Use real-time monitoring instrumentation, action levels, and identified PPE to control exposures to potentially contaminated medias (e.g. air, water, soils, etc.).</p> <p>2) Decontaminate all equipment and supplies between borings, temporary well installation points, and prior to leaving the site.</p> <p>3) All equipment to be used will be</p> <ul style="list-style-type: none"> <li>- Inspected in accordance with Federal safety and transportation guidelines, OSHA (1926.600, .601, .602), and manufacturer's design.</li> <li>- Operated and supported by knowledgeable operators, and ground crew.</li> <li>- Used within establish safe work zones, with routes of approach clearly demarcated.</li> </ul> <p>In addition to equipment considerations, the following safe operating procedures will be incorporated:</p> <ul style="list-style-type: none"> <li>- All personnel not directly supporting this operation will remain at least 25 feet from the point of operation.</li> <li>- Hydraulic masts or other projecting devices shall be at least 20 feet from overhead power sources and a minimum of 3 feet from underground utilities.</li> <li>- Hand signals will be established prior to the commencement of the operation.</li> <li>- Only manufacturer-approved equipment may be used in conjunction with equipment repair procedures (i.e., flight connectors etc.).</li> <li>- Work areas will be kept clear of clutter.</li> <li>- Secure all loose articles to avoid possible entanglement.</li> <li>- All equipment shall be equipped with movement warning systems.</li> <li>- All personnel working in high equipment traffic areas are required to wear reflective vests for high visibility, and to establish unimpeded work areas around the operation. This activity may require areas of the building to be coordinated off during this operation.</li> <li>- All personnel will be instructed in the location and operations of the emergency shut-off device(s). This device will be tested initially (and then periodically) to ensure its operational status.</li> <li>- Areas will be inspected prior to the movement of Geoprobe and support vehicles to eliminate any physical hazards. This will be the responsibility of the FOL and/or SSO.</li> <li>- The Geoprobe and support vehicles will be moved no closer than 3 feet to floor openings, sidewalls, and excavations.</li> </ul> <p>4) Hearing protection will be used during all Geoprobe intrusive activities.</p> <p>5) All utility clearances shall be obtained prior to any subsurface investigation. Prior to any subsurface investigations, the locations of all underground utilities will be identified and marked. The FOL will obtain written permit clearance prior to all subsurface investigations.</p>	<p>Photoionization Detector w/ 10.2 eV UV lamp source, or a Flameionization Detector, will be used as follows:</p> <p>1) Source (borehole; macrocore sampler) monitoring will be conducted at regular intervals determined by the SSO. Positive sustained (see action levels) results which may affect operations crew will require the following actions.</p> <ul style="list-style-type: none"> <li>- Monitor the breathing zone of high risk employees. Any sustained reading above background in the breathing zone requires evacuation to a safe area until the following measurements can be taken to determine the presence/concentration of trichloroethylene.</li> </ul> <ul style="list-style-type: none"> <li>- Sample-Colorimetric detector tube, Trichloroethylene 2/a.</li> </ul> <p>Trichloroethylene 2/a requires 3-5 strokes or pumps of the bellows with approximately 2 minutes required for the time of measurement. Fxn: pale gray to orange discoloration.</p> <p>Positive I.D. of trichloroethylene above 35 ppm - Level C Protection is required (Not to exceed 100 ppm)</p> <p>&gt;100 ppm - Level B protection</p> <ul style="list-style-type: none"> <li>- Ultra PhD 4 gas meter utilizing LEL, O2, and CO sensors. During operation activities as a general area measuring device: O2 - &lt;19.5%: O2-deficient Level B protection; &gt;23.5% O2-enriched: Cease operations, evacuate and ventilate. CO - 0-15 ppm: Continue to work, continue to monitor; 15-25 ppm: Level C protection, Super size CO canister with window-cator not to exceed 1,500 ppm.</li> </ul> <p>4) The SSO will perform sound-level measurements to determine noise levels during Geoprobe operations. Additionally, noise dosimetry may be performed to quantify worst-case scenarios.</p> <p>5) Where the utility clearance cannot be determined, subsurface activities shall proceed with extreme caution using a magnetometer for periodic downhole surveys every 2 feet to a depth of at least 6 feet.</p>	<p>All subsurface Geoprobe operations are to be initiated in level D protection. Level D protection constitutes the following minimum protection</p> <ul style="list-style-type: none"> <li>- Standard field dress (Long pants, long-sleeve shirts</li> <li>- Steel-toe/shank safety shoes</li> </ul> <p>These following items will be incorporated during Geoprobe operations:</p> <ul style="list-style-type: none"> <li>- Nitrile gloves with a cotton liner.</li> <li>- Hardhat, safety glasses, and earplugs or muffs.</li> <li>- Tyvek coveralls will be worn if there is a possibility of soiling work attire.</li> <li>- PVC or PE coated Tyvek will be incorporated if there is a potential for saturation of work attire.</li> </ul> <p>Level C protection upgrade will be done based on monitoring instrument results to the following:</p> <ul style="list-style-type: none"> <li>- Air-Purifying Respirator (APR) with organic vapor/HEPA cartridges for</li> <li>- Positive trichloroethylene confirmation greater than 35 ppm (Not to exceed 100 ppm).</li> <li>- Carbon monoxide sampling data indicates concentrations &gt; 15 ppm.</li> </ul> <p>Chemical-protective clothing will consist of nitrile gloves with a cotton liner. Tyvek coveralls (unless free-phase product is encountered); Free-phase product or splash potential PVC or PE splash suit will be utilized as conditions dictate or at the direction of the FOL or SSO.</p> <p>Level B protection Self-Contained Breathing Apparatus (SCBA), or airline respiratory protection will be used</p> <ul style="list-style-type: none"> <li>- For positive confirmation of trichloroethylene detectopm on excess of 100 ppm.</li> <li>- If IDLH concentrations are exceeded for any contaminants of concern.</li> </ul> <p>Chemical-protective clothing will consist of impermeable boot covers, nitrile gloves with a cotton liner, Tyvek coveralls (unless free-phase product is encountered). Free-phase product or splash potential requires the use of PVC or PE splash suit.</p> <p>Ascention to Level B protection requires immediate notification of the TOM, and Health and Safety Manager (Pittsburgh Office)</p> <p>As contaminant concentrations and conditions may change radically the following equipment will be maintained during all onsite activities</p> <ul style="list-style-type: none"> <li>• Fire Extinguishers (strategically placed)</li> <li>• Stretcher, blankets, and first-aid kit</li> </ul>	<p><b>Personnel Decontamination</b> - Will consist of a soap/water wash and rinse for outer protective equipment (e.g. boots, gloves, PVC splash suits, etc.). This function will take place at an area adjacent to the drilling operations bordering the support zone.</p> <p>This decontamination procedure for <b>Level D</b> protection will consist of</p> <ul style="list-style-type: none"> <li>- Equipment drop</li> <li>- Soap/water wash and rinse of outer gloves</li> <li>- Soap/water wash and rinse of the outer splash suit, and boots as applicable</li> <li>- Wash hands and face; leave contamination reduction zone</li> </ul> <p>For <b>Levels C &amp; B</b> in addition to that described above:</p> <p><b>Note:</b> SCBA air tank or APR cartridge change-out would take place at this point.</p> <ul style="list-style-type: none"> <li>- Outer suit, boot covers, outer glove removal</li> <li>- Respiratory (face mask) protection removal</li> <li>- Wash hands and face; leave contamination reduction zone</li> </ul> <p><b>Equipment Decontamination</b> - All heavy equipment decontamination will take place at a centralized decontamination pad utilizing steam or pressure washers. Heavy equipment, such as drill rigs, will have the wheels and tires cleaned along with any loose debris removed, prior to transporting to the central decontamination area. All site vehicles will be restricted access to exclusion zones, or also have their wheels/tires sprayed off so as not to track mud onto the roadways servicing this installation. Roadways shall be cleared of any debris resulting from the onsite activity.</p> <p>All equipment used in the exclusion zone will require a complete decontamination between locations and prior to removal from the site. The FOL or the SSO will be responsible for evaluating equipment arriving on site and that which is to leave the site. No equipment will be authorized access or exit without this authorization.</p>

\*Items in italics are optional, as conditions dictate or as directed by the FOL or SSO.

**TABLE 5-1  
TASKS/HAZARDS/CONTROL MEASURES COMPENDIUM  
NIROP FRIDLEY REMEDIAL INVESTIGATION**

Tasks/Operation/ Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring	Personal Protective Equipment*	Decontamination Procedures
<p>Multi-media sampling including soils (subsurface); water (groundwater)</p> <p>This activity will be conducted concurrently with soil boring and well installation activities, and will also include IDW sampling activities.</p>	<p><i>Chemical Hazards</i></p> <p>1) Air/particulate/waterborne contaminant - chlorinated hydrocarbons: trichloroethylene, trichloroethane, tetrachloroethene, 1,1-dichloroethane, 1,2-dichloroethylene, methyl chloroform, and PCBs. In addition, various metal compounds were detected. Carbon monoxide has been added to the chemicals of concern because much of this operation will be performed inside a building using internal combustion engines as power sources. See Table 6-1 for the chemicals of concern.</p> <p>2) Transfer of contamination into clean areas</p> <p><i>Physical hazards</i></p> <p>3) Noise</p> <p>4) Lifting (muscle strains and pulls)</p> <p>5) Pinches and compressions</p> <p>6) Slip, trips, and falls</p>	<p>1) Employ real-time monitoring instrumentation, action levels, and identified PPE to control exposures to potentially contaminated medias (e.g. air, water, soils).</p> <p>2) Decontaminate all equipment and supplies between sampling locations and prior to leaving the site.</p> <p>3) When sampling at the drill rig, employ hearing protection as indicated for that task. The use of hearing protection to protect against excessive noise outside of 25 feet of drilling operations should be incorporated under the following condition:</p> <p>Hearing protection during sample acquisition will be determined on a case-by-case scenario. As a general rule of thumb, if you have to raise your voice to talk to someone who is within 2 feet of your location, noise levels may be excessive.</p> <p>4) Use machinery or multiple personnel for heavy lifts. Use proper lifting techniques.</p> <p>5) Use pinch bars or other equipment to remove hands from the point of operation.</p> <p>6) Preview work locations for unstable/uneven terrain. Barricade all excavations and other associated drop-off points at least 3 feet from the edge.</p>	<p>Monitoring instrumentation will be employed as specified in the Sampling and Analyses Plan to bias samples.</p> <p>Surface soils, groundwaters will not require monitoring as part of sample acquisition.</p> <p>Open all wells prior to sampling to allow venting.</p> <p>Subsurface soils monitoring direction and action levels will proceed in the following manner.</p> <p>Photoionization Detector w/ 10.2 eV UV lamp source or flameionization detector (FID)</p> <p>- Source monitoring will be conducted at regular intervals to be determined by the SSO. Positive sustained results at a source location (boreholes, well heads, split spoons, macro core samplers) which may affect operations crew will require the following actions:</p> <p><b>Excessive chemical contaminant concentrations affecting field crews during this task is not anticipated. The following information is based on a contingency action only.</b></p> <p>1) Monitor the breathing zone of high-risk employees. Any sustained reading above identified action levels within the breathing zone of the at risk employees requires the person (SSO/sampler, etc.) monitoring to determine the presence/concentration of trichloroethylene</p> <p>- Sample-Colorimetric detector tube, Trichloroethylene 2/a.</p> <p>Trichloroethylene 2/a requires 3-5 strokes or pumps of the bellows with approximately 2 minutes required for the time of measurement. Rxn: pale gray to orange discoloration.</p> <p>Positive I.D. of Trichloroethylene above 35 ppm - Level C Protection is required (Not to exceed 100 ppm)</p> <p>- Ultra PhD 4 gas meter utilizing LEL, O2, and CO sensors. During operation activities as a general area measuring device: O2 - &lt;19.5%: O2-deficient Level B protection; &gt;23.5% O2-enriched: Cease operations, evacuate and ventilate. CO - 0-15 ppm: Continue to work, continue to monitor; 15-25 ppm: Level C protection, Super size CO canister with window-cator not to exceed 1,500 ppm.</p> <p>Based on environmental sampling, contaminant concentrations are not anticipated to reach the quantity to require Level B protection.</p>	<p>Level D protection will be utilized for the initiation of all sampling activities.</p> <p>Level D protection constitutes the following minimum protection</p> <ul style="list-style-type: none"> <li>- Standard field dress (long pants, long-sleeve shirts)</li> <li>- Steel toe/shank safety shoes</li> </ul> <p>These following items will be incorporated during sampling operations:</p> <ul style="list-style-type: none"> <li>- Inner nitrile surgeons gloves, layered if necessary.</li> <li>- <i>Hardhat, safety glasses, impermeable boot covers, and earplugs or muffs.</i></li> <li>- <i>Tyvek coveralls will be worn if there is a possibility of soiling work attire.</i></li> <li>- <i>PVC or PE coated Tyvek will be incorporated if there is a potential for saturation of work attire.</i></li> </ul> <p><b>Excessive chemical contaminant concentrations impacting field crews during this task is not anticipated. The following information is based on a contingency action only.</b></p> <p>Level C protection upgrade will be done based on monitoring instrument results to the following:</p> <ul style="list-style-type: none"> <li>- Air-Purifying Respirator (APR) with organic vapor/HEPA cartridges for</li> <li>- positive trichloroethylene confirmation above 35 ppm, (Not to exceed 100 ppm).</li> <li>- carbon monoxide concentrations &gt; 15 ppm.</li> </ul> <p>Chemical-protective clothing will consist of impermeable boot covers, nitrile gloves with a cotton liner, Tyvek coveralls (unless free-phase product is encountered). Free-phase product or splash potential requires the use of PVC or PE splash suit.</p>	<p><b>Personnel Decontamination</b> will consist of a soap/water wash and rinse for outer protective equipment (e.g. boots, gloves, PVC splash suits, etc.).</p> <p>This function will take place at a satellite location. Disposable PPE will be bagged between sampling events. This procedure will consist of</p> <ul style="list-style-type: none"> <li>- Sample acquisition</li> <li>- Clean (Deionized water spray) the outside of the sample containers/label/bag; ice samples</li> </ul> <p>This decontamination procedure for <b>Level D</b> protection will consist of</p> <ul style="list-style-type: none"> <li>- Equipment drop</li> <li>- Soap/water wash and rinse of outer boots and outer gloves</li> <li>- Soap/water wash and rinse of the outer splash suit, as applicable</li> <li>- Wash hands and face, leave contamination reduction zone</li> </ul> <p>For <b>Levels C</b> in addition to that described above:</p> <p><b>Note:</b> APR cartridge change-out would take place at this point.</p> <ul style="list-style-type: none"> <li>- Outer suit, boot covers, outer glove removal</li> <li>- Respiratory (face mask) protection removal</li> <li>- Wash hands and face, leave contamination reduction zone</li> </ul> <p>- Pack and ice sample transport container</p>

\*Items in italics are optional, as conditions dictate or as directed by the FOL or SSO.

**TABLE 5-1  
TASKS/HAZARDS/CONTROL MEASURES COMPENDIUM  
NIROP FRIDLEY REMEDIAL INVESTIGATION**

Tasks/Operation/ Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring	Personal Protective Equipment*	Decontamination Procedures
Mobilization/ demobilization	<i>Physical Hazards</i>  1) Lifting (muscle strains and pulls) 2) Pinches and compressions 3) Slip, trips, and falls 4) Moving machinery 5) Vehicular and foot traffic	1) Use machinery or multiple personnel for heavy lifts. Use proper lifting techniques. 2) Use pinch bars or other equipment to remove hands from point of operation or other associated pinch points. 3) Preview work locations for unstable/uneven terrain. Barricade all floor openings from access closer than 2 feet from the edge. 4) All equipment will be - Inspected in accordance with OSHA, and manufacturer's design. - Operated by certified operators, and knowledgeable ground crew. 5) Establish safe zones of approach (Boom + 3 feet).	Not required	Level D - (Minimum Requirements) - Standard field attire (long-sleeve shirt; long pants) - Safety shoes (Steel toe/shank) - <i>Safety glasses</i> - <i>Hardhat (when overhead hazards exists, or identified as a operation requirement)</i> - <i>Reflective vest for high traffic areas</i> - <i>Hearing protection for high noise areas, or as directed on an operation by operation scenario.</i>	Not required
Site surveying	<i>Physical Hazards</i>  1) Lifting (muscle strains and pulls) 2) Slip, trips, and falls 3) Vehicular traffic	1) Use machinery or multiple personnel for heavy lifts. Use proper lifting techniques. 2) Preview work locations for unstable/uneven terrain. Maintain a minimum of 2 feet from floor openings. 3) Surveying activities conducted in high-traffic areas will require the use of reflective vests and warning signs to inform motorists of the work activity to proceed with caution.	Not required	Level D - (Minimum Requirements) - Standard field attire (Long sleeve shirt; long pants) - <i>Reflective vest for high traffic areas</i> - <i>Hearing protection for high noise areas, or as directed on an operation by operation scenario.</i>	Not required
Decontamination of sampling and heavy equipment	<i>Chemical Hazards</i>  1) Air/particulate/waterborne contaminant - chlorinated hydrocarbons: trichloroethylene, trichloroethane, tetrachloroethene, 1,1-dichloroethane, 1,2-dichloroethylene, methyl chloroform, and PCBs. In addition, various metal compounds were detected. Carbon monoxide has been added to the chemicals of concern because much of this operation will be performed inside a building using internal combustion engines as power sources. See Table 6-1 for the chemicals of concern.  1) Decontamination fluids - Liquinox (detergent), acetone or methanol, and hexane  <i>Physical Hazards</i>  2) Lifting (muscle strains and pulls) 3) Pinches and compressions	1) Employ protective equipment to minimize contact with site contaminants and hazardous decontamination fluids. 2) Use multiple persons where necessary for lifting and handling heavier pieces of equipment for decontamination purposes. 3) Provide stacking racks for air drying of decontaminated equipment to prevent unstable drying stacks of equipment from collapsing.	1) Use visual observation, and real-time monitoring instrumentation specified for the activity that the equipment was used for, to ensure that all equipment has been appropriately cleaned of potentially contaminated medias (e.g. water, soils).	<i>For Heavy Equipment (i.e., auger flights, etc.):</i> This applies to high-pressure soap/water, steam-cleaning, wash and rinse procedures.  Level D minimum requirements - - Standard-field attire (Long-sleeve shirt; long pants) - Safety shoes (Steel toe/shank) - Chemical-resistant boot covers - Nitrile outer gloves, cotton liners - PVC Rainsuits or PE or PVC coated Tyvek - Safety glasses underneath a splash shield  Respiratory protection is not anticipated for this activity.  <i>For sampling equipment including trowels, split spoons, bailers, etc., the following PPE is required:</i>  Level D Minimum requirements - - Standard field attire (Long-sleeve shirt; long pants) - Safety shoes (Steel toe/shank) - Nitrile outer gloves, cotton liners - Safety glasses underneath a splash shield  In the event of overspray of chemical decontamination fluids, employ PVC rainsuits or PE or PVC coated Tyvek as necessary.	This decontamination procedure for <b>Level D</b> protection will consist of  - Soap/water wash and rinse of outer gloves - Soap/water wash and rinse of the outer splash suit, as applicable - Wash hands and face; leave contamination reduction zone

\*Items in italics are optional, as conditions dictate or as directed by the FOL or SSO.

**TABLE 5-1  
TASKS/HAZARDS/CONTROL MEASURES COMPENDIUM  
NIROP FRIDLEY REMEDIAL INVESTIGATION**

Tasks/Operation/ Locations	Anticipated Hazards	Recommended Control Measures	Air Monitoring	Personal Protective Equipment	Decontamination Procedures
Maintenance of site equipment	<p><i>Chemical Hazards</i></p> <p>1) Air/particulate/waterborne contaminant - chlorinated hydrocarbons: trichloroethylene, trichloroethane, tetrachloroethene, 1,1-dichloroethane, 1,2-dichloroethylene, methyl chloroform, and PCBs. In addition, various metal compounds were detected. Carbon monoxide has been added to the chemicals of concern because much of this operation will be performed inside a building using internal combustion engines as power sources. See Table 6-1 for the chemicals of concern.</p> <p><i>Physical Hazards</i></p> <p>2) Energized systems including pneumatic, electrical, hydraulic, kinetic, and compressed gas.</p>	<p>1) Use visual observation, real-time monitoring instrumentation, and proper decontamination procedures to ensure all equipment slated for maintenance is properly cleaned of potentially contaminated medias (e.g., air, water, soils).</p> <p>2) Utilize accepted energy control methods, as defined in 29 CFR 1910.147, to control potential energy sources during maintenance operations. Contact Health Sciences Department for guidance.</p>	<p>Photoionization Detector w/ 10.2 eV UV lamp source or flameionization detector (FID)</p> <p>1) Source monitoring will be conducted for evaluation of equipment slated for maintenance by the SSO. Positive sustained results at a source location will require the equipment to be redecontaminated until acceptable levels (no positive indications above background) are obtained.</p>	<p>Selections for PPE should be made in accordance with job task.</p> <p>At a minimum, the Level D protection, as defined in the mobilization/demobilization section, will be observed.</p>	<p>Anytime personnel may encounter potential contaminants, PPE and decontamination procedures such as those described in the drilling task will be utilized.</p>

\*Items in italics are optional, as conditions dictate or as directed by the FOL or SSO.

## 6.0 HAZARD ASSESSMENT

The following section provides information regarding the chemical hazards associated with the NIROP site and the activities that are to be conducted as part of the scope of work. Table 6-1, which is included as part of the site-specific HASP, provides various information related to the chemical hazards that may be present at the site. Specifically, toxicological information, exposure limits, symptoms of exposure, physical properties, and air monitoring and sampling data are discussed in the table. Section 6.1 provides general information regarding all contaminants that may be present at the NIROP site.

### 6.1 CHEMICAL HAZARDS

Previous investigations conducted at the NIROP site have indicated the presence of various volatile organic compounds. Of particular concern, based on greater concentrations observed during previous investigations, are trichloroethene, 1,1-dichloroethane, and tetrachloroethene. Information on the toxicological, chemical, and physical properties of these substances, as well as for additional organic compounds that are anticipated to be at lower concentrations are all addressed in Table 6-1 of this HASP. In addition to volatile organic compounds, various metals that are also addressed in Table 6-1 were indicated to be present at the site. Additionally, polychlorinated biphenyls (PCBs) were detected at low concentrations (near the detection limits of the laboratory analytical method). It is anticipated that the greatest potential for exposure to site contaminants is during intrusive activities (drilling, sampling, etc.). Metals and PCBs are anticipated to be bound to particulates. Exposure to these compounds is most likely to occur through inhalation of airborne particulates or through ingestion of contaminated soil or water through hand-to-mouth contact during soil disturbance activities.

Additionally, since some of the work activities will involve the use of diesel/gasoline-powered equipment (geoprobe, drill rigs) within a building, the potential exists for workers to be exposed to constituents of exhaust gases such as carbon monoxide and nitrogen oxides. Based on this observation, carbon monoxide has been selected as an indicator gas. Continuous air monitoring will be performed during vehicle and equipment operations conducted within the building to determine exposure potentials to carbon monoxide.

Carbon monoxide is a lethal, colorless and odorless gas that can temporarily impair a worker's coordination and thinking because of a decrease in the amount of oxygen being carried to the body tissues (including the brain). The extent of this impairment is highly dependent upon the worker's health,

the workload, and the amount of carbon monoxide intake from nonoccupational sources, such as cigarette smoking. If the impairment is significant, a worker performing potentially dangerous operations, such as drilling or excavating, could become fatally injured as a result of the worker's inability to avoid the work-related hazards. Additional information on the effects of carbon monoxide exposure is provided in Table 6-1 of this HASP. To control this hazard, workers will carefully monitor the level of carbon monoxide in the work area to maintain exposures below 15 ppm. In addition, external venting of exhaust gases from the drill rig or other equipment via flexible tubing to roof vents or windows will be used (if feasible) during all subsurface activities.

## 6.2 PHYSICAL HAZARDS

In addition to the chemical hazards discussed above, the following physical hazards may be present during the performance of site activities.

- Contact / entanglement with rotating equipment or machinery.
- Slips, trips, and falls.
- Contact with underground or overhead utilities (electric lines, gas lines, water lines, etc.).
- Strain from heavy lifting.
- Pinch / compression points.
- Noise in excess of 85 decibels (dBA).
- Temperature extremes.
- Other physical hazards associated with ongoing plant operations (proximity to heavy equipment and machinery, vehicular traffic, etc.).

These physical hazards are discussed in detail in Table 5-1 as applicable to each site task.

**TABLE 6-1  
CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA  
NIROP FRIDLEY, MINNESOTA**

Hazardous Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
1,2-Dichloroethylene	540-59-0	I.P. 9.65 eV, High response with PID and 10.2 eV lamp 50% response with FID	Air sample using charcoal tube and carbon disulfide, OSHA 07; NIOSH Method 1003	OSHA PEL; NIOSH, REL; ACGIH TLV 200 ppm TWA 1000 ppm IDLH	Adequate- Odor threshold 0.085-17 ppm. Use organic vapor/acid gas cartridges for exceedances above the TWA up to 1,000 ppm. >1,000 ppm should use pressure-demand, supplied-air respirator above exposure limits.  Recommended glove: Nitrile - 0.12 hrs Viton - 0.95 hrs	Boiling Pt: 117°F; 47°C Melting Pt: 7°F; -13.8°C Solubility: 0.4% Flash Pt: 36°F; 2.2°C LEL/LFL: 5.6% UEL/UFL: 12.8% Vapor Density: 2.0 Vapor Pressure: 180-260 mmHg Specific Gravity: 1.27 @ 90°F; 32°C Incompatibilities: Strong oxidizers, alkalis, potassium hydroxide, and copper. When heated to decomposition temperatures, will emit toxic fumes of phosgene. Appearance and Odor: Colorless liquid with an acrid odor.	Overexposure may result in CNS depression with potential to cause sleepiness, hallucinations, distorted perceptions, and stupor (narcosis). Systemically, symptoms may result in nausea, vomiting, weakness, tremors, and cramps. May also irritate the eyes, skin, and mucous membranes. Chronic exposures may result in dermatitis, liver, kidney, and lung damage.
1,2-Dichloroethane see also Ethylene dichloride	107-06-2	I.P. 11.05 eV 80% response with FID	Air sample using charcoal sorbent tube and carbon disulfide desorption with gas chromatography-flame ionization detector; NIOSH 1003	OSHA 50 ppm PEL; Ceiling 100 ppm, ACGIH 10 ppm TLV-TWA; NIOSH 1 ppm REL  IDLH 50 ppm	Inadequate - This compound has poor warning properties (odor threshold 26 ppm). OSHA allows the use of organic vapor cartridges in certain circumstances.  Recommended glove: Polyvinyl Alcohol >8.00 hrs; Viton 6.90 hrs; Teflon >24.00 hrs; Silver Shield >6.00 hrs	Boiling Pt: 182°F; 83°C Melting Pt: -31°F; -35°C Solubility: 0.9% Flash Pt: 56°F; 13°C LEL/LFL: 6.2% UEL/UFL: 16% Vapor Density: Not available Vapor Pressure: 64 mmHg @ 68°F; 20°C Specific Gravity: 1.24 Incompatibilities: Strong oxidizers and caustics, chemically active metals such as aluminum or magnesium powder, sodium, and potassium. Appearance and Odor: Colorless liquid with a pleasant, chloroform-like odor.	Exposure to this substance may cause CNS depression, nausea, vomiting, dermatitis, and irritation of the eyes. Chronic overexposure may result in damage to the kidneys, liver, eyes (cornea opacity), skin, and CNS.
1,1-Dichloroethane	75-34-3	I.P. 11.06 eV  80% Relative response with FID	Air sample using charcoal tube and carbon disulfide desorption, OSHA 07-B / NIOSH 1003	OSHA, NIOSH and ACGIH have established a TWA of 100 ppm  IDLH 4000 ppm	Questionable warning properties - Odor threshold 49 - 1359 ppm.  Recommended APR Cartridge: APRs may be employed for escape only. Exceedances over the exposure limits are recommended to use airline or airline/APR-combination-type respirator.  Recommended glove: Butyl; Polyvinyl alcohol; Viton	Boiling Pt: 135°F; 57°C Melting Pt: -143°F; -97°C Solubility: 0.6% Flash Pt: 2°F; -17°C LEL/LFL: 5.6% UEL/UFL: 11.4% Vapor Density: NA Vapor Pressure: 182 mmHg Specific Gravity: 1.18 Incompatibilities: Strong oxidizers, strong caustics Appearance and odor: Colorless, oily liquid with a chloroform-like odor.	Overexposure may result in CNS depression, skin and eye irritation, and damage to the liver, kidneys, and lungs.

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**TABLE 6-1  
CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA  
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Hazardous Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Aroclor-1260 (Polychlorinated biphenyl, PCB) It should be noted that this substance is representative of the more common isomers Aroclor - 1242, 1254, which may be encountered.	11096-82-5 53469-21-9 (42%)  11097-69-1 (54%)	Substance is not volatile (VP=0.00006 mmHg), no I.P. exists; therefore PID will not detect substance. Substance is non-combustible and as a result will not be detected by FID	Air sample using a particulate filter, Florisil sorbent tube with glass fiber filter. Hexane desorption and gas chromatography-electron capture detector, NIOSH 5503 (PCBs)	OSHA PEL & ACGIH TLV-TWA 0.5 mg/m <sup>3</sup> (skin)  NIOSH REL 0.001 mg/m <sup>3</sup>  IDLH 5 mg/m <sup>3</sup>	Inadequate - However because of the low volatility, it is assumed, unless agitated, this substance does not present a volatile vapor or gas respiratory threat.  <b>Recommended APR Cartridges:</b> For dusty conditions where this material may cling to particulates, use a HEPA filter.  APRs are approved for escape only when concentrations exceed the exposure limits. Concentrations greater than the exposure limits require Powered Air-Purifying Respirator (PAPR) or supplied-air respirators.  <b>Recommended glove:</b> Butyl rubber >24 hrs; Neoprene rubber >24.00 hrs; Silver shield or Viton (for pure product).	<b>Boiling Pt:</b> distillation range 689- 734°F; 365-390°C <b>Melting Pt:</b> -2 to 50°F; -19 to 10°C <b>Solubility:</b> Insoluble <b>Flash Pt:</b> Not applicable <b>LEL/LFL:</b> Not applicable <b>UEL/UFL:</b> Not applicable Nonflammable liquid; however, exposure to fire results in black soot containing PCBs, dibenzofurans, and chlorinated dibenzo-p-dioxins <b>Vapor Density:</b> N.A. <b>Vapor Pressure:</b> 0.00006 - 0.001 mmHg <b>Specific Gravity:</b> 1.566 @ 60°F; 15.5°C <b>Incompatibilities:</b> Strong oxidizers <b>Appearance and Odor:</b> Colorless to pale yellow, viscous liquid or solid (Aroclor 54 below 50°F) with a mild, hydrocarbon odor	This substance is irritating to the eyes and skin. Chronic effects of overexposure may include potential to cause liver damage, chloracne, and reproductive effects. Recognized as possessing carcinogenic properties by NIOSH, and NTP.
Arsenic	7440-38-2	Particulate form - This substance is unable to be detected by PID/FID	Sample with Mixed Cellulose Ester (MCE) filter; analyze using inductively coupled atomic emission spectroscopy in accordance with NIOSH Method #7900 or Method #7300	OSHA Organic compounds 0.5 mg/m <sup>3</sup> PEL  Inorganic compounds 0.01 mg/m <sup>3</sup> PEL  NIOSH ceiling 0.002 mg/m <sup>3</sup>  ACGIH 0.2 mg/m <sup>3</sup> TLV-TWA	No identifiable warning properties to indicate presence and thereby detection  <b>Recommended APR Cartridge:</b> Suitable for dust and fume. Organic vapor acid gases with HEPA filter. This substance may be presented as a pesticide; therefore a cartridge suitable for pesticides (MSA-GMP)  <b>Recommended Gloves:</b> This is in the particulate form. Therefore, any glove suitable to prevent skin contact (Nitrile has been the one most widely used for the other substances).	<b>Boiling Pt:</b> sublimation @ 1132°F; 612°C <b>Melting Pt:</b> 1135°F; 613°C; 1497°F; 814°C @ 36 atm <b>Solubility:</b> Insoluble in water; soluble in nitric acid <b>Flash Pt:</b> Nonflammable; however, airborne in the form of a dust this substance will support combustion <b>LEL/LFL:</b> Nonflammable <b>UEL/UFL:</b> Nonflammable <b>Vapor Density:</b> N.A. <b>Vapor Pressure:</b> 1 mm @ 702°F; 372°C <b>Specific Gravity:</b> 5.73 <b>Incompatibilities:</b> Oxidizers, halogens, zinc, lithium, azides, and acetylides <b>Appearance and odor:</b> Gray to black, brittle, crystalline, amorphous, odorless.	Overexposure to this substance through inhalation or ingestion may result in ulceration of the nasal septum. GI disturbances resulting in violent purging and vomiting hoarse voice, sore throat, excessive salivation, peripheral neuropathy (numbness and burning sensations beginning at the extremities followed by motor weakness), respiratory irritation leading to possible pulmonary edema. Skin or eye contact may result in irritation, dermatitis, and hyperpigmentation (darkening of the areas exposed) of the skin. This substance has been judged to be a human carcinogen by NTP, and IARC.

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TABLE 6  
 CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA  
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Hazardous Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Barium	7440-39-3 as Ba  10022-31-8 as Ba (NO <sub>3</sub> ) <sub>2</sub>  10361-37-2 as Ba Cl <sub>2</sub>	Particulate form - This substance is unable to be detected by PID/FID	Air sample using particulate filter; water desorption; atomic absorption spectrometry in accordance with NIOSH Method # 7056	OSHA PEL; NIOSH REL; ACGIH TLV- TWA; 0.5 mg/m <sup>3</sup>	No identifiable warning properties to indicate presence and thereby detection  <b>Recommended APR Cartridge:</b> Suitable for dust and fume. Organic vapor acid gases with HEPA filter.  <b>Recommended gloves:</b> This is in the particulate form. Therefore, any glove suitable to prevent skin contact (Nitrile has been the one most widely used for the other substances).	<b>Boiling Pt:</b> 2984°F; 1640°C (decomposes) <b>Melting Pt:</b> 1337°F; 725°C <b>Solubility:</b> Varies between compounds 9/38% <b>Flash Pt:</b> N.A. (Airborne dust may burn or explode when exposed to heat, flame, or incompatible chemicals) <b>LEL/LFL:</b> N.A. <b>UEL/UFL:</b> N.A. <b>Vapor Density:</b> N.A. <b>Vapor Pressure:</b> 10 mm @ 1920°F; 1049°C <b>Specific Gravity:</b> 3.5 <b>Incompatibilities:</b> Acids, oxidizers <b>Appearance and odor:</b> Silver to white, odorless	Overexposure to this substance results in the solubilization in the water or stomach acids. Symptoms include vomiting, colic, diarrhea (watery, sometimes bloody), slow to irregular pulse, transient hypertension, convulsive tremors, and muscular paralysis resulting in stiffness immobility, leg cramps, twitching, and impairment of speech and swallowing. Overexposure to some compounds via inhalation may result in respiratory distress, dyspnea, and baritosis (a benign pneumoconiosis). Direct contact with the skin or eyes may result in irritation.
Benzene	71-43-2	I.P 9.24 eV, 100% response with PID and 10.2 eV lamp; 150% response with FID	Air sample using charcoal tube and carbon disulfide desorption, OSHA 07 or NIOSH Method #1500	1 ppm OSHA 10 ppm ACGIH 0.1 ppm NIOSH 500 ppm IDLH	Inadequate - Odor threshold 34-199 ppm. OSHA accepts the use of air-purifying respirators with organic vapor cartridge up to 10 ppm despite the inadequate warning properties, providing cartridges are changed at the beginning of each shift.  <b>Recommended gloves:</b> Butyl/neoprene blend - >8.00 hrs; Silver shield as a liner - >8.00 hrs; Viton - >8.00 hrs	<b>Boiling Pt:</b> 176°F; 80°C <b>Melting Pt:</b> 42°F; 5.5°C <b>Solubility:</b> 0.07% <b>Flash Pt:</b> 12°F; -11°C <b>LEL/LFL:</b> 1.3% <b>UEL/UFL:</b> 7.9% <b>Vapor Density:</b> 2.77 <b>Vapor Pressure:</b> 75 mmHg <b>Specific Gravity:</b> 0.88 <b>Incompatibilities:</b> Strong oxidizers, fluorides, perchlorates, and acids <b>Appearance and Odor:</b> Colorless to a light yellow liquid with an aromatic odor	Overexposure may result in irritation to the eyes, nose, throat, and respiratory system. Central Nervous System (CNS) effects include giddiness, lightheadedness, headaches, staggered gait, fatigue, and lassitude and depression. Additional effects may include nausea. Long-duration exposures may result in respiratory collapse. Regulated as an OSHA carcinogen. May cause damage to the blood- forming organs and may cause a form of cancer called leukemia.

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TABLE 6-1  
 CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA  
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Hazardous Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Cadmium	7440-43-9	Particulate form. This substance is unable to be detected by PID/FID.	Air sample using a mixed cellulose-ester filter/acid desorption and analysis by atomic absorption-flame; NIOSH 7300 or 7048.	OSHA 2 $\mu\text{g}/\text{m}^3$ (0.002 $\text{mg}/\text{m}^3$ ) PEL  ACGIH 0.01 $\text{mg}/\text{m}^3$ TLV-TWA (total particulate) 0.002 $\text{mg}/\text{m}^3$ (respirable particulate)	No identifiable warning properties to indicate presence and thereby detection.  <b>Recommended APR Cartridge:</b> The use of an air purifying, full face-piece respirator with a high-efficiency particulate air filter for concentrations up to 0.25 $\text{mg}/\text{m}^3$ .	<b>Boiling Pt:</b> 1412°F; 767°C <b>Melting Pt:</b> 610°F; 321°C <b>Solubility:</b> Insoluble <b>Flash Pt:</b> Not applicable (Airborne dust may burn or explode when exposed to heat, flame, or incompatible chemicals) <b>LEL/LFL:</b> Not applicable <b>UEL/UFL:</b> Not applicable <b>Vapor Density:</b> N.A. <b>Vapor Pressure:</b> 1 mm @ 741°F; 394°C <b>Specific Gravity:</b> 8.65 @ 90°F; 32°C <b>Incompatibilities:</b> Strong oxidizers, elemental sulfur, selenium, tellurium, zinc, nitric acid, and hydrazoic acid <b>Appearance and Odor:</b> Metal: Silver-white, blue-tinged lustrous, odorless solid. Fume: yellow-brown, finely divided particulate dispersed in air.	Overexposure to this substance may result in irritation to the respiratory tract, dyspnea, tightness in the chest, coughing, possibly pulmonary edema. Overexposure to fumes causes symptoms characteristic of the flu (headaches, chills, muscle aches, nausea, vomiting, diarrhea). Chronic exposure may result in damage to the lungs, kidneys, and liver. This substance has been identified as a confirmed animal; potential human carcinogen by IARC and NTP.
Carbon monoxide	630-08-0	Ionization potential 14.01 eV  FID relative response ratio is unknown; however, is considered detectable.  For this operation an Ultra PhD 4 gas meter will be used to identify and quantify levels of carbon monoxide generated within the area of operation.	Bag collection; Electrochemical analysis  NIOSH Method # S340	NIOSH/OSHA 35 ppm; 200 ppm ceiling  ACGIH TWA 25 ppm	This material is a colorless, odorless gas - Warning properties are considered poor (Odor threshold: 100,000 ppm).  Carbon monoxide canister with a window-cator can be used for concentrations not to exceed 1,500 ppm.  This material exhibits no associated skin hazard unless in its cryogenic form, which is not the case. Therefore, any gloves suitable for the operations identified.	<b>Boiling Pt:</b> -313°F; -192°C <b>Melting Pt:</b> <-337°F; <-205°C <b>Solubility:</b> 2% <b>Flash Pt:</b> Not applicable (Gas) <b>LEL/LFL:</b> 12.5% <b>UEL/UFL:</b> 74% <b>Vapor Density:</b> RGasD 0.97 <b>Vapor Pressure:</b> >35 atm <b>Specific Gravity:</b> 0.97 <b>Incompatibilities:</b> Strong oxidizers, bromine trifluoride, chlorine trifluoride, lithium <b>Appearance and Odor:</b> Colorless, odorless gas.	Signs and symptoms associated with overexposure to carbon monoxide are typically associated with its oxygen depriving capabilities to the cells of the body. As with other chemical asphxiants, most signs and symptoms are associated with the brain and heart which are most sensitive to the effects brought on by deprivation of oxygen. Some signs and symptoms may include cherry red color of the skin or possible pallor and cyanosis, mild headache with increasing severity as carboxyhemoglobin concentrations build, irritability, impaired judgment, rapid fatigue, dizziness, confusion, severe ataxia, possible coma, and respiratory failure and death.

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 CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA  
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Hazardous Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Chloroform	67-66-3	I.P. 11.42 eV - 100% response with FID	Air sample using charcoal sorbent tube and carbon disulfide desorption with gas chromatography- flame ionization detector; NIOSH 1003	OSHA 50 ppm (ceiling); NIOSH STEL 2 ppm; ACGIH 10 ppm TLV-TWA IDLH 500 ppm	Inadequate - Odor threshold 133 - 276. Chloroform has poor warning properties but will adhere to organic vapor cartridges. Supplied-air respirators are recommended.  <b>Recommended glove:</b> Polyvinyl Alcohol >8.00 hrs; Viton 9.50 hrs; Teflon >3.60 hrs	<b>Boiling Pt:</b> 143°F; 62°C <b>Melting Pt:</b> -81°F; -62°C <b>Solubility:</b> 0.5% <b>Flash Pt:</b> N/A <b>LEL/LFL:</b> Not available <b>UEL/UFL:</b> Not available <b>Vapor Density:</b> Not available <b>Vapor Pressure:</b> 160 mmHg @ 68°F; 20°C <b>Specific Gravity:</b> 1.48 <b>Incompatibilities:</b> Strong caustics, chemically active metals such as aluminum or magnesium powder, sodium and potassium, strong oxidizers: <b>Appearance and Odor:</b> Colorless liquid with a sweet, pleasant odor.	Overexposure to this substance may cause dizziness, mental dullness, nausea, headache, fatigue, anaesthesia, and irritation of the skin and eyes. Chronic overexposure may result in damage to the liver, kidneys, heart, eyes, and skin.
Chromium compounds	7440-47-3 (Element)	Particulate form: Not detectable by PID or FID.	Air sample using mixed cellulose -ester filter/acid desorption and analysis by atomic absorption; in accordance with NIOSH 7024.	OSHA PEL & NIOSH REL (Chromium II, III) 0.5 mg/m <sup>3</sup> TWA (Chromium VI) 0.1 mg/m <sup>3</sup> ceiling  ACGIH 0.5 mg/m <sup>3</sup> TLV- TWA (Chromium II, III compounds) 0.05 mg/m <sup>3</sup> (Chromium VI compounds)  IDLH 30 mg/m <sup>3</sup> (Chromium VI compounds)	No identifiable warning properties to indicate presence and thereby detection.  <b>Recommended APR Cartridge</b> The use of an air-purifying, full face-piece respirator with a high-efficiency particulate filter for concentrations up to 0.1 mg/m <sup>3</sup> .  <b>Recommended Gloves:</b> This substance is in a particulate form. Therefore, any glove suitable to prevent skin contact.	<b>Boiling Pt:</b> 4788°F; 2642°C <b>Melting Pt:</b> 3452°F; 1900°C <b>Solubility:</b> Insoluble <b>Flash Pt:</b> Not applicable (Airborne dust may burn or explode when exposed to heat, flame, or incompatible chemicals) <b>LEL/LFL:</b> Not applicable <b>UEL/UFL:</b> Not applicable <b>Vapor Density:</b> N.A. <b>Vapor Pressure:</b> 0 mmHg <b>Specific Gravity:</b> 7.14 <b>Incompatibilities:</b> Strong oxidizers, peroxides, and alkalis <b>Appearance and Odor:</b> Appearance and odor vary depending upon the specific compound.	Health hazards are characterized normally through chronic exposure manifesting as histologic fibrosis of the lungs and ulceration of the nasal septum and skin. IARC, NTP, and ACGIH list various chromium compounds as possessing carcinogenic properties.

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**TABLE 6-1  
CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA  
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Hazardous Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Copper	7440-50-8 (Cu) 1317-38-0 (CuO)	Substance is not volatile. Unable to be detected by PID or FID.	Air sample using a mixed cellulose ester filter/inductively coupled plasma/atomic emission spectroscopy; NIOSH 7300.	ACGIH TLV-TWA 0.10 mg/m <sup>3</sup> ; OSHA PEL, and NIOSH REL. 0.2 mg/m <sup>3</sup>	No identifiable warning properties to indicate presence and thereby detection.  <b>Recommended APR Cartridge:</b> The use of an air-purifying, full-face respirator with a high efficiency particulate air filter.  <b>Recommended gloves:</b> This is in the particulate form. Therefore any glove suitable to prevent skin contact (Nitrile has been the one most widely used for the other substances).	<b>Boiling Pt:</b> 4215°F; 2324°C <b>Melting Pt:</b> 1981°F; 1083°C <b>Solubility:</b> Insoluble <b>Flash Pt:</b> Not applicable (Airborne dust may burn or explode when exposed to heat, flame, or incompatible chemicals) <b>LEL/LFL:</b> Not applicable <b>UEL/UFL:</b> Not applicable <b>Vapor Density:</b> N.A. <b>Vapor Pressure:</b> 1 mm @ 2962°F/1628°C <b>Specific Gravity:</b> 8.94 <b>Incompatibilities:</b> Oxidizers, alkalis, sodium azide, acetylene, bromates, chlorates, iodates, and acids. <b>Appearance and Odor:</b> Metal: Reddish, lustrous malleable, odorless solid. Fume: Finely divided black particulate dispersed in air.	Irritation to the nose, throat, and respiratory tract. Metallic taste. Discoloration of skin (potential dermatitis) and hair. Chronic exposure may result in dermatitis and damage to the liver and kidneys. Overexposure to fumes causes symptoms characteristic of the flu (headaches, chills, muscle aches, nausea, vomiting, diarrhea). Ingestion may cause burning in the mouth, throat, and stomach. Metallic taste with colicky abdominal pain. Individuals with Wilson's disease are at greater risk of chronic exposure as a result of the body's tendency to absorb and retain copper.
Diesel fuel No. 2-D	Mixture	Components of this substance will be detected readily by the PID and FID; however, no documentation exists as to the relative response	Air sample using charcoal tube; carbon disulfide desorptions; GC/FID detection. Follow OSHA 07 or NIOSH Method 1500	OSHA PEL NIOSH REL ACGIH TLV-TWA 5 mg/m <sup>3</sup> as mineral oil mist. In addition, NIOSH and ACGIH establish 10 mg/m <sup>3</sup> as a STEL.	Kerosene odor  <b>Recommended air purifying cartridges:</b> Organic vapor  <b>Recommended gloves:</b> Nitrile	<b>Boiling Pt:</b> <170-400°F; 77-204°C. <b>Melting Pt:</b> N.A. <b>Solubility:</b> Negligible <b>Flash Pt:</b> 125°F; 52°C <b>LEL/LFL:</b> 0.6% <b>UEL/UFL:</b> 7.5% <b>Vapor Density:</b> >5 <b>Vapor Pressure:</b> <1 mmHg @ 70°F; 21°C <b>Specific Gravity:</b> 0.86 <b>Incompatibilities:</b> strong oxidizers, halogens, and hypochlorites <b>Appearance and odor:</b> Colorless to amber with a kerosene odor	Prolonged or repeated exposures to this product may cause skin and eye irritation. Because of the defatting capabilities this exposure may lead to a dermatitis condition. High vapor concentrations are irritating to the eyes and respiratory tract. Exposure to high airborne concentrations may result in narcotic effects, including dizziness, headaches, and unconsciousness. High concentrations in a confined space may adequately displace oxygen and thereby result in suffocation.
Ethylbenzene	100-41-4	I.P. 8.76, High response with PID and 10.2 eV lamp 100% response with FID	Air sample using charcoal tube and carbon disulfide desorption, OSHA 07. NIOSH Method #1501 Aromatic Hydrocarbon	ACGIH & NIOSH 100 ppm TLV-TWA; REL 125 ppm STEL OSHA 00 ppm	Adequate - Can use air-purifying respirator with organic vapor cartridge up to 1,000 ppm  <b>Recommended gloves:</b> Neoprene or nitrile w/ silver shield when potential for saturation; Teflon >3.00 hrs	<b>Boiling Pt:</b> 277°F; 136°C <b>Melting Pt:</b> -139°F; -95°C <b>Solubility:</b> 0.01% <b>Flash Pt:</b> 55°F; 13°C <b>LEL/LFL:</b> 1.0% <b>UEL/UFL:</b> 6.7% <b>Vapor Density:</b> 3.66 <b>Vapor Pressure:</b> 10 mmHg @ 79°F; 26°C <b>Specific Gravity:</b> 0.87 <b>Incompatibilities:</b> Strong oxidizers <b>Appearance and odor:</b> Colorless liquid with an aromatic odor. Odor Threshold of 0.092-0.60.	Regulated primarily because of its potential to irritate the eyes and respiratory system. In addition, effects of overexposure may include headaches, narcotic effects, CNS changes (i.e., coordination impairment, impaired reflexes, tremoring), difficulty in breathing, possible chemical pneumonia, and potentially respiratory failure or coma.

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TABLE 6  
 CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA  
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Hazardous Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Lead	7439-92-1	Particulate form - This substance is unable to be detected by either PID or FID.	Air sample using a mixed cellulose ester filter / HNO <sub>3</sub> or H <sub>2</sub> O <sub>2</sub> desorption / Atomic absorption; NIOSH 7082 or 7300.	OSHA 0.05mg/m <sup>3</sup> PEL  ACGIH 0.15mg/m <sup>3</sup> TLV-TWA  NIOSH 0.10mg/m <sup>3</sup> REL  IDLH 100 mg/m <sup>3</sup> as lead	The use of an air-purifying, full-face respirator with high efficiency particulate air filter for up to 2.5 mg/m <sup>3</sup> .  <b>Recommended gloves:</b> This is in the particulate form. Therefore, any glove suitable to prevent skin contact (Nitrile has been the one most widely used for the other substances).	<b>Boiling Pt:</b> 3164°F; 1740°C <b>Melting Pt:</b> 621°F; 327°C <b>Solubility:</b> Insoluble <b>Flash Pt:</b> Not applicable (Airborne dust may burn or explode when exposed to heat, flame, or incompatible chemicals) <b>LEL/LFL:</b> Not applicable <b>UEL/UFL:</b> Not applicable <b>Vapor Density:</b> Not available <b>Vapor Pressure:</b> 0 mmHg <b>Specific Gravity:</b> 11.34 <b>Incompatibilities:</b> Strong oxidizers, peroxides, sodium acetylide, zirconium, and acids <b>Appearance and Odor:</b> Metal: A heavy ductile, soft gray solid.	Overexposure to this substance via ingestion or inhalation may result in metallic taste in the mouth, dry throat, thirst, Gastrointestinal disorders (burning stomach pain, nausea, vomiting, possible diarrhea sometimes bloody or black, accompanied by severe bouts of colic), CNS effects (muscular weakness, pain, cramps, headaches, insomnia, depression, partial paralysis, possibly coma and death. Extended exposure may result in damage to the kidneys, gingival lead line, brain, and anemia.
Mercury	7439-97-6	Jerome Mercury Vapor Analyzer for mercury fume or vapor  Particulate form - This substance is unable to be detected by PID/FID	Air sample using Hydrar tube; acid desorption; analyze using atomic absorption/acid in accordance with NIOSH Method # 6009	OSHA PEL; NIOSH REL; ACGIH TLV-TWA as alkyl compounds 0.01 mg/m <sup>3</sup> ; STEL 0.03 mg/m <sup>3</sup>	No identifiable warning properties to indicate presence and thereby detection  <b>Recommended APR Cartridge:</b> Suitable for metallic mercury with HEPA filter. Preferably, with an end-of-service life indicator.  <b>Recommended gloves:</b> This is in the liquid form. Therefore, any glove suitable to prevent skin contact (Nitrile has been the one most widely used for the other substances).	<b>Boiling Pt:</b> 674°F; 356.9°C <b>Melting Pt:</b> -38°F; -38.89°C <b>Solubility:</b> Insoluble <b>Flash Pt:</b> N.A. <b>LEL/LFL:</b> N.A. <b>UEL/UFL:</b> N.A. <b>Vapor Density:</b> N.A. <b>Vapor Pressure:</b> 0.0012 mm @ 77°F; 25°C <b>Specific Gravity:</b> 13.6 <b>Incompatibilities:</b> Acetylene, ammonia, chlorine dioxide, azides, calcium, sodium carbide, lithium, rubidium, and copper <b>Appearance and odor:</b> Silvery-white, heavy, mobile liquid, odorless	This substance is corrosive to all points of contact. Systemic symptoms include irritability, wakefulness, muscle weakness and tremors, increased reflexes, gingivitis, anorexia, headache, tinnitus, hypermotility, GI disturbances (nausea, vomiting), diarrhea (sometimes bloody), liver changes, dermatitis, and fever. Symptoms experienced via inhalation include to those above, coughing, chest pain, dyspnea, bronchial pneumonitis, and excessive salivation.
Methylene chloride	75-09-2	I.P. 11.32 eV, High response with PID and 11.7 eV lamp 100% response with FID	Air sample using charcoal or Anasorb CMS sorbent tube and carbon disulfide desorption with gas chromatography-flame ionization detector; OSHA 59 or 80, NIOSH 1005	OSHA 50 ppm PEL, 100 ppm ceiling, ACGIH 50 ppm TLV-TWA, NIOSH Lowest feasible concentration, IDLH 2300 ppm	Inadequate - Odor threshold 160 ppm. In excess of 25 ppm, use a supplied-air respirator (airline respirator with emergency escape cylinder or a Self-Contained Breathing Apparatus - SCBA)  <b>Recommended gloves:</b> Nitrile rubber latex glove 3.00 hrs (vendor specific); supported Polyvinyl alcohol glove, unsupported 1-8 hrs; Silver Shield 1.90 hrs	<b>Boiling Pt:</b> 104°F; 39.8°C <b>Melting Pt:</b> -141°F; -96°C <b>Solubility:</b> 2% <b>Flash Pt:</b> Not available <b>LEL/LFL:</b> 13% <b>UEL/UFL:</b> 12% <b>Vapor Density:</b> 2.93 <b>Vapor Pressure:</b> 380 mmHg @ 72°F; 22°C <b>Specific Gravity:</b> 1.33 <b>Incompatibilities:</b> Strong oxidizers, caustics, metals (i.e., aluminum, magnesium, potassium, sodium, lithium), and concentrated acids <b>Appearance and Odor:</b> Colorless liquid with a chloroform-like odor. (Note: A gas above 104°F.)	Effects of overexposure may include CNS effects - cause sleepiness, fatigue, weakness, lightheadedness, numbness of the limbs, altered cardiac rate, and incoordination. These signs and symptoms may be accompanied by nausea, gastric and pulmonary irritation leading possibly to pulmonary edema. In addition to the narcosis, long-term effects may include liver injury. Listed as possessing carcinogenic properties by NTP, IARC, and ACGIH.

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TABLE 6-1  
 CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA  
 NIROP FRIDLEY, MINNESOTA  
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Hazardous Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Nickel	7440-02-0	Particulate form - This substance is unable to be detected by PID/FID	Air sample using a 0.8 m mixed cellulose ester filter, acid desorption; analyze by inductively coupled plasma in accordance with NIOSH Method # 173 and Method # 7300	OSHA as Ni metal and insoluble compounds 1 mg/m <sup>3</sup> NIOSH 0.015 mg/m <sup>3</sup> ACGIH 0.05 mg/m <sup>3</sup>	No identifiable warning properties to indicate presence and thereby detection  <b>Recommended APR Cartridge:</b> Suitable for dust and fume. Organic vapor acid gases with HEPA filter.  <b>Recommended gloves:</b> This is in the particulate form. Therefore, any glove suitable to prevent skin contact (Nitrile has been the one most widely used for the other substances).	<b>Boiling Pt:</b> 4946°F; 2730°C <b>Melting Pt:</b> 2651°F; 1455°C <b>Solubility:</b> Insoluble acid <b>Flash Pt:</b> N.A. (Airborne dust may burn or explode when exposed to heat, flame, or incompatible chemicals) <b>LEL/LFL:</b> N.A. <b>UEL/UFL:</b> N.A. <b>Vapor Density:</b> N.A. <b>Vapor Pressure:</b> 1 mm @ 3290°F; 1810°C <b>Specific Gravity:</b> 8.90 <b>Incompatibilities:</b> Strong acids, halogens, sulfur, wood and other combustibles, nickel nitrate, and oxidizers <b>Appearance and odor:</b> Silvery white, hard, malleable ductile metal, odorless	Symptoms of overexposure to this product may include headaches, vertigo, delerium, extreme weakness, GI disturbance, and pain including nausea vomiting and diarrhea, coughing, hyperpnea, cyanosis, weakness, allergic dermatitis, nickel itch, pulmonary asthma, chest pains/ tightness, dyspnea, dry cough, and conjunctivitis. This substances has been identified as a human carcinogen by NTP and IARC.
Silver	7440-22-4	Particulate form unable to be detected by PID or FID.	Air sample using a mixed cellulose ester filter / atomic absorption or plasma emission spectroscopy; NIOSH 5(s182), OSHA ID121.	0.01mg/m <sup>3</sup> TWA; OSHA, ACGIH and NIOSH	No identifiable warning properties to indicate presence and thereby detection.  <b>Recommended APR Cartridge:</b> The use of an air-purifying, full-face respirator with a high-efficiency particulate air filter.  <b>Recommended gloves:</b> This is in the particulate form. Therefore, any glove suitable to prevent skin contact (Nitrile has been the one most widely used for the other substances).	<b>Boiling Pt:</b> 4013°F; 2212°C <b>Melting Pt:</b> 1764°F; 962°C <b>Solubility:</b> Insoluble <b>Flash Pt:</b> Not applicable (Airborne dust may burn or explode when exposed to heat, flame, or incompatible chemicals) <b>LEL/LFL:</b> Not applicable <b>UEL/UFL:</b> Not applicable <b>Vapor Density:</b> N.A. <b>Vapor Pressure:</b> 0 mm <b>Specific Gravity:</b> 10.49 <b>Incompatibilities:</b> Acetylene, acetylene compounds, ammonia, peroxides, bromoazide, chlorine, trifluoride, ethylene imine, oxalic acid, nitric acid, and tartaric acid <b>Appearance and Odor:</b> Metal: white lustrous solid.	Overexposure to this substance may result in gastrointestinal, upper respiratory, and skin, irritation. Discoloration of the eyes, skin, and hair.

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TABLE 6  
 CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA  
 NIROP FRIDLEY, MINNESOTA  
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Hazardous Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Tetrachloroethylene See also Perchloroethylene PERK PCE	127-18-4	I.P. 9.32 eV High response with 10.2 eV Lamp; 70% relative response ratio with a FID	Air sample using charcoal tube and carbon disulfide desorption, OSHA 07, or NIOSH method 1003	ACGIH TLV-TWA 25 ppm 100 ppm STEL  OSHA 100 ppm PEL; 200 ppm Ceiling; 300 ppm 5-minute max peak in any 3-hr period.  IDLH - 150 ppm (NIOSH)	Odor threshold for this substance has been determined to be at airborne concentrations of approximately 47 ppm, which is considered adequate.  <b>Recommended APR Cartridges:</b> APR with organic vapor/acid gas cartridges should be used for escape purposes only. Exceedances over the recommended exposure limits require the use of airline or airline/APR-combination units.  <b>Recommended glove:</b> Viton, PV alcohol 5-16 hrs; Silver shield >6.00 hrs; Teflon 10-24 hrs; and Nitrile in that order. The breakthrough time for the nitrile glove ranges between 1.5 - 5.5 hrs. during complete immersion.	<b>Boiling Pt:</b> 250°F; 121°C <b>Melting Pt:</b> -2°F; 19°C <b>Solubility:</b> 0.02% <b>Flash Pt:</b> Not available <b>LEL/LFL:</b> Not available <b>UEL/UFL:</b> Not available <b>Vapor Density:</b> Not available <b>Vapor Pressure:</b> 14 mmHg @ 77°F; 25°C <b>Specific Gravity:</b> 1.62 @ 77°F; 25°C <b>Incompatibilities:</b> Strong oxidizers, alkalis, fuming sulfuric acid, and chemically active metals. When heated to decomposition, temperatures will emit toxic fumes of chlorine. <b>Appearance and Odor:</b> Colorless liquid with a mild, chloroform-like odor.	Overexposure may result in irritation to eyes, nose, throat, and skin. Potential CNS effects including sleepiness, incoordination, headaches, hallucinations, distorted perceptions, and stupor (narcosis). Systemically, symptoms may result in nausea, vomiting, weakness, tremors, and cramps. Chronic exposures may result in dermatitis, enlarged tender liver, kidney, and lung damage. This material is considered an animal carcinogen (liver tumors), however, inadequate evidence exists concerning carcinogenic potential in humans.
Toluene	108-88-3	I.P. 8.82 eV, High response with PID and 10.2 eV lamp 110% response with FID	Air sample using charcoal tube and carbon disulfide desorption, OSHA 07, or NIOSH Method 1500	OSHA 200 ppm PEL 300 ppm Ceiling ACGIH TLV-TWA 50 ppm (skin)  NIOSH 100 ppm REL 150 ppm STEL  IDLH 500	Adequate - Odor threshold 1.6 ppm is considered good. Can use air-purifying respirator with organic vapor cartridge up to 1,000 ppm  <b>Recommended gloves:</b> Teflon >15.00 hrs; Viton >16.00 hrs; Silver Shield >6.00 hrs; Supported nitrile (Useable time limit 0.5 hr, complete submersion for the nitrile selection); PV Alcohol >25.00 hrs	<b>Boiling Pt:</b> 232°F; 111°C <b>Melting Pt:</b> -139°F; -95°C <b>Solubility:</b> 0.05% (61°F;16°C) <b>Flash Pt:</b> 40°F; 4°C <b>LEL/LFL:</b> 1.2% <b>UEL/UFL:</b> 7.1% <b>Vapor Density:</b> 3.14 <b>Vapor Pressure:</b> 20 mmHg @ 65°F; 18°C <b>Specific Gravity:</b> 0.87 <b>Incompatibilities:</b> Strong oxidizers <b>Appearance and odor:</b> Colorless liquid with a sweet pungent aromatic odor.	Overexposure to this substance may result in mild to moderate irritation at all points of contact, and CNS changes including euphoria, confusion, nervousness, and possibly paresthesia characterized by an abnormal burning sensation, pricking, or numbness. At 200-500 ppm exposure has resulted in headaches, nausea, eye irritation, loss of appetite, bad taste, impair coordination, fatigue, and weariness. Chronically, toluene overexposure may result in dermatitis, liver, and kidney damage.

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TABLE 6-1  
 CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA  
 NIROP FRIDLEY, MINNESOTA  
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Hazardous Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Trichloroethylene	79-01-6	I.P. 9.45 eV, High response with PID and 10.2 eV lamp 70% Response with FID	Air sample using charcoal tube and carbon disulfide desorption, OSHA 07, or NIOSH Method 1022 or 1003	OSHA 50 ppm PEL 200 ppm ceiling  ACGIH 50 ppm TLV-TWA 100 ppm STEL  NIOSH 25 ppm REL  IDLH 1000 ppm	Inadequate - Odor threshold 82 ppm. APRs with organic vapor/acid gas cartridges may be used for escape purposes. Exceedances over the exposure limits require the use of positive pressure-demand, supplied-air respirator.  <b>Recommended gloves:</b> PV Alcohol unsupported >16.00 hrs; Silver Shield >6.00 hrs; Teflon >24.00 hrs; or Viton >24.00 hrs; Nitrile (Useable time limit 0.5 hr, complete submersion for the nitrile selection)	<b>Boiling Pt:</b> 188°F; 86.7°C <b>Melting Pt:</b> -99°F; -73°C <b>Solubility:</b> 0.1% @ 77°F; 25°C <b>Flash Pt:</b> 90°F; 32°C <b>LEL/LFL:</b> 8% @ 77°F; 25°C <b>UEL/UFL:</b> 10.5 @ 77°F; 25°C <b>Vapor Density:</b> 4.53 <b>Vapor Pressure:</b> 100 mm @ 32°C <b>Specific Gravity:</b> 1.46 <b>Incompatibilities:</b> Strong caustics and alkalis, chemically active metals (barium, lithium, sodium, magnesium, titanium, and beryllium) <b>Appearance and Odor:</b> Colorless liquid with a chloroform-type odor. Combustible liquid; however, burns with difficulty.	Central nervous system effects including euphoria, analgesia, anesthesia, paresthesia, headaches, tremors, vertigo, and somnolence. Damage to the liver, kidneys, heart, lungs, and skin have also been reported. Contact may result in irritation to the eyes, skin, and mucous membranes. Ingestion may result in Gastrointestinal (GI) disturbances, including nausea and vomiting. NIOSH lists this substance a potential human carcinogen.
Zinc	7440-66-6	Nondetectable (particulate)	Air sample using 0.8µ mixed cellulose ester filters; analyze by inductively coupled plasma or x-ray diffraction in accordance with NIOSH method 7300 or 7502	OSHA PEL 10 mg/m <sup>3</sup>  Total dust 5 mg/m <sup>3</sup>  Respirable fraction NIOSH PEL 5 mg/m <sup>3</sup> 15 mg/m <sup>3</sup> TWA (ceiling) ACGIH 10 mg/m <sup>3</sup> TLV-TWA  These limits are based on zinc oxide dust.	No identifiable warning properties to indicate presence and thereby detection  <b>Recommended APR Cartridge:</b> Suitable for dust and fume. Organic vapor acid gases with HEPA filter.  <b>Recommended gloves:</b> This is in the particulate form. Therefore any glove suitable to prevent skin contact (Nitrile has been the one most widely used for the other substances).	<b>Boiling Pt:</b> 1666°F; 908°C <b>Melting Pt:</b> 788°F; 419.8°C <b>Solubility:</b> Insoluble <b>Flash Pt:</b> N.A. (Airborne dust may burn or explode when exposed to heat, flame, or incompatible chemicals) <b>LEL/LFL:</b> N.A. <b>UEL/UFL:</b> N.A. <b>Vapor Density:</b> N.A. <b>Vapor Pressure:</b> 0 mm <b>Specific Gravity:</b> 7.14 <b>Incompatibilities:</b> Strong acids, halogens, catalytic metals, combustibles, oxidizers, nitryl fluoride <b>Appearance and odor:</b> Bluish-white, lusterous metal, odorless	Inhalation of fumes may result in metal fume fever. This condition is characterized by metallic taste, dryness of the throat, coughing with generalized aching and flu-like symptoms. Effects through ingestion may include coughing, difficulty in breathing, and sweating. A human skin irritant. Irritation to the eyes may result from mechanical action.

## 7.0 AIR MONITORING

Monitoring devices, such as Direct Reading Instruments (DRIs), will be used at the site to detect and evaluate the presence of on-site contaminants and other potentially harmful agents, as indicated in Table 5-1. The specific type of monitoring and the associated instruments, frequency of use, and applicable action levels are dependent upon the specific scope of work and the contaminants of concern. As a result, specific air monitoring measures and requirements have been established in Table 5-1 of this site-specific HASP. Additionally, Section 1.0 of the B&R Environmental Health and Safety Guidance Manual contains detailed information regarding direct reading instrumentation and personal and area air sampling procedures, as well as general calibration procedures of various instruments. The instruments used on this site will be as follows:

### Flame Ionization Detectors (FID)

- The Photovac MicroFid handheld flame ionization detector. It measures the concentration of airborne organic, combustible gases and vapors in air at parts-per-million. The reading displayed on the unit represents the total concentration of all ionizable chemicals present in the sample.
- The Sensydine FID is also a hand held unit that performs in a similiar method as the Photovac.

### Multi-Gas Detectors

- Phd Ultra - This unit manufactured by Biosystems Inc. is a personal, portable, microprocessor controlled gas detector that can monitor oxygen, combustible gas and carbon monoxide levels. A loud audible alarm and individual alarm lights for each gas being monitored warns of hazards. This instrument is classified by UL as to Intrinsic Safety for use in Hazardous Locations Class I, Division 1, Groups A,B,C, and D.
- Dräger Pump Model 21/31 - This unit consists of a bellows type hand pump and glass tubes which contain reagent chemicals (colorimetric tubes). The pump sucks in air through the colorimetric tube which measures the gas volume. The tube that will be used at NIROP will detect low levels of trichloroethylene (TCE) (Dräger tube TCE 2/a).

## **8.0 TRAINING/MEDICAL SURVEILLANCE REQUIREMENTS**

### **8.1 INTRODUCTORY/REFRESHER/SUPERVISORY TRAINING**

This section is included to specify health and safety training and medical surveillance requirements for both B&R Environmental and subcontractor personnel participating in site activities.

#### **8.1.1 Requirements for B&R Environmental Personnel**

All B&R Environmental personnel must complete 40 hours of introductory hazardous waste site training prior to performing work at the NIROP Fridley. Additionally, B&R Environmental personnel who have had introductory training more than 12 months prior to site work must have completed 8 hours of refresher training within the past 12 months before being cleared for site work. In addition, 8-hour supervisory training in accordance with 29 CFR 1910.120(e)(4) will be required for site supervisory personnel.

Documentation of B&R Environmental introductory, supervisory, and refresher training as well as site-specific training will be maintained at the project. Copies of certificates or other official documentation will be used to fulfill this requirement.

B&R Environmental will also conduct a brief meeting daily to discuss operations planned for that day. At the end of the workday, a short meeting will be held to discuss the operations completed and any problems encountered. This activity will be supported through the use of a Safe Work Permit System (See Section 9.4).

#### **8.1.2 Requirements for Subcontractors**

All B&R Environmental subcontractor personnel must have completed introductory hazardous waste site training or equivalent work experience as defined in OSHA Standard 29 CFR 1910.120(e) and 8 hours of refresher training meeting the requirements of 29 CFR 1910.120(e)(8) prior to performing field work at the NIROP Fridley. B&R Environmental subcontractors must certify that each employee has had such training by sending B&R Environmental a letter, on company letterhead, containing the information in the example letter provided as in Figure 8-1 and by providing copies of certificates for all subcontractor personnel participating in site activities.

**FIGURE 8-1**  
**TRAINING LETTER**

The following statements must be typed on company letterhead and signed by an officer of the company and accompanied by copies of personnel training certificates:

LOGO  
XYZ CORPORATION  
555 E. 5th Street  
Nowheresville, Kansas 55555

Month, day, year

Mr. Mark Sladic, P.E.  
Task Order Manager  
B&R Environmental  
Foster Plaza 7, 661 Andersen Drive  
Pittsburgh, Pennsylvania 15220

Subject: HAZWOPER Training for NIROP Fridley, Minnesota

Dear Mr. Sladic:

As an officer of XYZ Corporation, I hereby state that I am aware of the potential hazardous nature of the subject project. I also understand that it is our responsibility to comply with all applicable occupational safety and health regulations, including those stipulated in Title 29 of the Code of Federal Regulations (CFR), Parts 1900 through 1910 and Part 126.

I also understand that Title 29 CFR 1910.120, entitled "Hazardous Waste Operations and Emergency Response," requires an appropriate level of training for certain employees engaged in hazardous waste operations. In this regard, I hereby state that the following employees have had 40 hours of introductory hazardous waste site training or equivalent work experience as requested by 29 CFR 1910.120(e) and have had 8 hours of refresher training as applicable and as required by 29 CFR 1910.120(e)(8) and that site supervisory personnel have had training in accordance with 29 CFR 1910.120(e)(4).

LIST FULL NAMES OF EMPLOYEES AND THEIR SOCIAL SECURITY NUMBERS HERE.

Should you have any questions, please contact me at (555) 555-5555.

Sincerely,

(Name and Title of Company Officer)

## 8.2 SITE-SPECIFIC TRAINING

B&R Environmental will provide site-specific training to all B&R Environmental employees and subcontractor personnel who will perform work on this project. Site-specific training will also be provided to all personnel [U.S. Department of Defense (DOD), EPA, etc.] who may enter the site to perform functions that may or may not be directly related to site operations. Site-specific training will include:

- Names of designated personnel and alternates responsible for site safety and health
- Safety, health, and other hazards present on site
- Use of personal protective equipment
- Work practices to minimize risks from hazards
- Safe use of engineering controls and equipment
- Medical surveillance requirements
- Signs and symptoms of overexposure
- Contents of the Health and Safety Plan
- Emergency response procedures (evacuation and assembly points)
- Spill response procedures
- Review of the contents of relevant Material Safety Data Sheets

Site-specific documentation will be established through the use of Figure 8-2. All site personnel and visitors must sign this document upon receiving site-specific training.

## 8.3 MEDICAL SURVEILLANCE

### 8.3.1 Medical Surveillance Requirements for B&R Environmental Personnel

All B&R Environmental personnel participating in project field activities will have had a physical examination meeting the requirements of B&R Environmental's medical surveillance program and will be medically qualified to perform hazardous waste site work using respiratory protection

Documentation for medical clearances will be maintained in the B&R Environmental Pittsburgh office and made available, as necessary.



### **8.3.2 Medical Surveillance Requirements for Subcontractors**

Subcontractors are required to obtain a certificate of their ability to perform hazardous waste site work and to wear respiratory protection. The "Subcontractor Medical Approval Form" provided in Figure 8-3 shall be used to satisfy this requirement, providing it is properly completed and signed by a licensed physician.

Subcontractors who have a company medical surveillance program meeting the requirements of paragraph (f) of OSHA 29 CFR 1910.120 can substitute "Subcontractor Medical Approval Form" with a letter, on company letterhead, containing all of the information in the example letter presented in Figure 8-4 of this HASP.

### **8.3.3 Requirements for All Field Personnel**

Each field team member (including subcontractors) and visitors entering the exclusion zone(s) shall be required to complete and submit a copy of Medical Data Sheet found in the B&R Environmental Health and Safety Guidance Manual. This shall be provided to the SSO, prior to participating in site activities. The purpose of this document is to provide site personnel and emergency responders with additional information that may be necessary in order to administer medical attention.

## **8.4 SUBCONTRACTOR EXCEPTIONS**

Subcontractors who will not enter the exclusion zone during operation, and whose activities involve no potential for exposure to site contaminants, will not be required to meet the requirements for training/medical surveillance other than site-specific training as stipulated in Section 8.2.

**FIGURE 8-3**  
**SUBCONTRACTOR MEDICAL APPROVAL FORM**

For employees of \_\_\_\_\_  
Company Name

Participant Name: \_\_\_\_\_ Date of Exam: \_\_\_\_\_

**Part A**

The above-named individual has:

1. Undergone a physical examination in accordance with OSHA Standard 29 CFR 1910.120, paragraph (f), and was found to be medically -  
 qualified to perform work at the NIROP Fridley work site  
 not qualified to perform work at the NIROP Fridley work site  

and,
2. Undergone a physical examination in accordance with OSHA 29 CFR 1910.134(b)(10) and was found to be medically -  
 qualified to wear respiratory protection  
 not qualified to wear respiratory protection

My evaluation has been based on the following information, as provided to me by the employer.

- A copy of OSHA Standard 29 CFR 1910.120 and appendices.
- A description of the employee's duties as they relate to the employee's exposures.
- A list of known/suspected contaminants and their concentrations (if known).
- A description of any personal protective equipment used or to be used.
- Information from previous medical examinations of the employee that is not readily available to the examining physician.

**Part B**

I, \_\_\_\_\_, have examined \_\_\_\_\_  
Physician's Name (print) Participant's Name (print)

and have determined the following information:

**FIGURE 8-3  
SUBCONTRACTOR MEDICAL APPROVAL FORM  
PAGE TWO**

1. Results of the medical examination and tests (excluding finding or diagnoses unrelated to occupational exposure):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

2. Any detected medical conditions which would place the employee at increased risk of material impairment of the employee's health:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

3. Recommended limitations upon the employee's assigned work:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

I have informed this participant of the results of this medical examination and any medical conditions which require further examination or treatment.

Based on the information provided to me, and in view of the activities and hazard potentials involved at the NIROP Fridley work site, this participant

- may  
 not

perform his/her assigned task.

Physician's Signature \_\_\_\_\_

Address \_\_\_\_\_

Phone Number \_\_\_\_\_

NOTE: Copies of test results are maintained and available at:

\_\_\_\_\_  
Address

**FIGURE 8-4**  
**MEDICAL SURVEILLANCE LETTER**

The following statements must be typed on company letterhead and signed by an officer of the company:

LOGO  
XYZ CORPORATION  
555 E. 5th Street  
Nowheresville, Kansas 55555

Month, day, year

Mr. Mark Sladic, P.E.  
Task Order Manager  
B&R Environmental Corp.  
Foster Plaza 7, 661 Andersen Drive  
Pittsburgh, Pennsylvania 15220

Subject: Medical Surveillance for NIROP Fridley, Minnesota

Dear Mr. Sladic:

As an officer of XYZ Corporation, I hereby state that the persons listed below participate in a medical surveillance program meeting the requirements contained in paragraph (f) of Title 29 of the Code of Federal Regulations (CFR), Part 1910.120, entitled "Hazardous Waste Operations and Emergency Response: Final Rule." I further state that the persons listed below have had physical examinations under this program within the past 12 months and that they have been cleared, by a licensed physician, to perform hazardous waste site work and to wear positive- and negative-pressure respiratory protection. I also state that, to my knowledge, no person listed below has any medical restriction that would preclude him/her from working at the NIROP Fridley, Minnesota, site.

LIST FULL NAMES OF EMPLOYEES AND THEIR SOCIAL SECURITY NUMBERS HERE.

Should you have any questions, please contact me at (555) 555-5555.

Sincerely,

(Name and Title of Company Officer)

## 9.0 SITE CONTROL

This section outlines the means by which B&R Environmental will delineate work zones and use these work zones in conjunction with decontamination procedures to prevent the spread of contaminants into previously unaffected areas of the site. It is anticipated that a three-zone approach will be used during work at this site: exclusion zone, contamination reduction zone, and support zone. It is also anticipated that this control measure will be used to control access to site work areas. Use of such controls will restrict the general public, minimize potentials for the spread of contaminants, and protect individuals who are not cleared to enter the work areas.

### 9.1 EXCLUSION ZONE

The exclusion zone will be considered those areas of the site of known or suspected contamination. It is not anticipated that significant amounts of surface contamination are in the proposed work areas of this site. It is anticipated that this will remain so until/unless contaminants are brought to the surface by intrusive activities such as drilling. Furthermore, once such activities have been completed and surface contamination has been removed, the potential for exposure is again diminished and the area can then be reclassified as part of the contamination reduction zone. Therefore, the exclusion zones for this project will be limited to those areas of the site where active work is being performed plus so many feet surrounding the point of operation (see Table 5-1 for specific operation). The exclusion zone for this activity will be fragmented to represent the areas where the soils are disturbed through drilling and direct push subsurface activities. All exclusion zones will be delineated using barrier tape, cones and/or drive poles, and postings to inform and direct facility personnel.

#### 9.1.1 Exclusion Zone Clearance

A pre-startup site visit will be conducted by members of the identified field team in an effort to identify proposed subsurface investigation locations, obtain utility clearances, and provide upfront notices concerning scheduled activities within various sections within the facility. Access to the different GOCO sections of the NIROP Main Industrial Plant building will be coordinated through the Base Contact Kerry Morrow. Utility clearances will incorporate the combined efforts of One Call Utility Clearance Services, Hance Cable Testing and the NIROP Public Works Engineering section.

In all cases, no subsurface activities will proceed without utility clearance. In the event a utility is struck during a subsurface investigative activity, the emergency numbers provided in Section 2.9, Table 2-1 will be notified.

It is tentatively planned that most work will be conducted during second shift when the fewest amount of NIROP facility personnel will be in the areas near the operations. When NIROP personnel are in the proximity of this investigation, they will be moved or their operation temporarily discontinued to remove them from potential hazards associated with this operation.

### 9.1.2 Site Restoration

To ensure base personnel, contractors, and the general public are not exposed to the contaminants in question, B&R the following mechanisms as control measures:

- The top layers of sod (humus layer) will be removed as intact as possible and placed on plastic to be used as a top cover during site restoration. This humus layer will be placed over clean fill, which will replace the excavated materials, and choked in with topsoil or sand.
- Plastic will be laid down to catch any soil cuttings during the drilling activities, and U.S. Department of Transportation (DOT) approved drums will be used to collect drill cuttings as they are generated. No loose excavated materials, resulting either from the drilling activities or sample acquisition, will be left on the surface.
- All concrete and/or asphalt removed to gain access to subsurface media will be replaced prior to releasing the area back to the Base.
- All surface plots in and around well heads will be restored prior to releasing these areas back to the base.

## 9.2 **CONTAMINATION REDUCTION ZONE**

The contamination reduction zone (CRZ) will be a buffer area between the exclusion zone and any area of the site where contamination is not suspected. The personnel and equipment decontamination will not take place in this area, but will take place at a central location established for this project. This area,

instead, will serve as a focal point in supporting exclusion zone activities. This area will be delineated using barrier tape, cones and/or drive poles, and postings to inform and direct facility personnel.

### **9.3 SUPPORT ZONE**

The support zone for this project will include a staging area where site vehicles will be parked, equipment will be unloaded, and where food and drink containers will be maintained. In all cases, the support zones will be established at areas of the site where exposure to site contaminants would not be expected during normal working conditions or foreseeable emergencies.

### **9.4 SAFE WORK PERMITS**

All exclusion zone work conducted in support of this project will be done using Safe Work Permits to guide and direct field crews on a task by task basis. An example of the Safe Work Permit to be used is illustrated in Figure 9-1. These work permits will be further supported by the daily meetings conducted during their generation. This effort will ensure all site-specific considerations and changing conditions are incorporated into the planning effort. All permits will require the signature of the FOL, and the SSO. All personnel engaged in onsite activities will be aware of the elements indicating levels of protection and precautionary measures to be used.

The use of these permits will establish and provide for reviewing protective measures and hazards associated with each operation. This HASP will be used as the primary reference for selecting levels of protection and control measures. The work permit will take precedence over the HASP when more conservative measures are required based on specific site conditions.

### **9.5 SITE MAP**

Once the areas of contamination, access routes, topography, and dispersion routes are determined, a site map will be generated and adjusted as site conditions change. These maps will be posted to illustrate up-to-date collection of contaminants and adjustment of zones and access points.

**BROWN & ROOT ENVIRONMENTAL  
 SAFE WORK PERMIT**

Permit No. \_\_\_\_\_ Date: \_\_\_\_\_ Time: From \_\_\_\_\_ to \_\_\_\_\_

**SECTION I: General Job Scope** (To be filled in by person performing work)

- I. Work limited to the following (description, area, equipment used): \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_
- II. Names: \_\_\_\_\_  
 \_\_\_\_\_
- III. Onsite Inspection conducted  Yes  No Initials of Inspector \_\_\_\_\_

B&RE                      NIROP

**SECTION II: General Safety Requirements** (To be filled in by permit issuer)

- |   |  |   |
|---|--|---|
| IV. Protective equipment required                                 | Respiratory equipment required         |   |
| Level D <input type="checkbox"/> Level B <input type="checkbox"/> | Full face APR <input type="checkbox"/> | Escape Pack <input type="checkbox"/>    |
| Level C <input type="checkbox"/> Level A <input type="checkbox"/> | Half face APR <input type="checkbox"/> | SCBA <input type="checkbox"/>           |
| Detailed on Reverse   | SKA-PAC SAR <input type="checkbox"/>   | Bottle Trailer <input type="checkbox"/> |
|   | Skid Rig <input type="checkbox"/>      | None <input type="checkbox"/>           |

Modifications/Exceptions: \_\_\_\_\_

V. Chemicals of Concern	Action Level(s)	Response Measure
_____	_____	_____
_____	_____	_____

- VI. Additional Safety Equipment/Procedures
- |   |   |
|---|---|
| Chemical goggles..... <input type="checkbox"/> Yes <input type="checkbox"/> No    | Radio..... <input type="checkbox"/> Yes <input type="checkbox"/> No             |
| Hearing Protection..... <input type="checkbox"/> Yes <input type="checkbox"/> No  | Barricades..... <input type="checkbox"/> Yes <input type="checkbox"/> No        |
| Safety belt/harness..... <input type="checkbox"/> Yes <input type="checkbox"/> No | Work/rest regimen..... <input type="checkbox"/> Yes <input type="checkbox"/> No |
- Modifications/Exceptions: \_\_\_\_\_

VII. Procedure review with permit acceptors	Yes	NA	Yes	NA
Safety shower/eyewash (Location & Use).....	<input type="checkbox"/>	<input type="checkbox"/>	Emergency alarms.....	<input type="checkbox"/>
Procedure for safe job completion.....	<input type="checkbox"/>	<input type="checkbox"/>	Evacuation routes.....	<input type="checkbox"/>
Contractor tools/equipment inspected.....	<input type="checkbox"/>	<input type="checkbox"/>	Assembly points.....	<input type="checkbox"/>

VIII. Equipment Preparation	Yes	NA
Equipment drained/depressured.....	<input type="checkbox"/>	<input type="checkbox"/>
Equipment purged/cleaned.....	<input type="checkbox"/>	<input type="checkbox"/>
Isolation checklist completed.....	<input type="checkbox"/>	<input type="checkbox"/>
Electrical lockout required/field switch tested.....	<input type="checkbox"/>	<input type="checkbox"/>
Blinds/misalignments/blocks & bleeds in place.....	<input type="checkbox"/>	<input type="checkbox"/>
Hazardous materials on walls/behind liners considered.....	<input type="checkbox"/>	<input type="checkbox"/>

- IX. Additional permits required (Hot work, enclosed entry, excavation etc.).....  Yes  No  
*If yes, contact Health Sciences Department*

X. Special instructions, precautions: \_\_\_\_\_  
 \_\_\_\_\_

Permit Issued by: \_\_\_\_\_ Permit Accepted by: \_\_\_\_\_  
 Job Completed by: \_\_\_\_\_ Date: \_\_\_\_\_

## **9.6 BUDDY SYSTEM**

Personnel engaged in onsite activities will practice the "buddy system" to ensure the safety of all personnel involved in this operation.

## **9.7 MATERIALS SAFETY DATA SHEET (MSDS) REQUIREMENTS**

B&R Environmental personnel will provide MSDSs for all chemicals brought on site. The contents of these documents will be reviewed by the SSO with the user(s) of the chemical substances prior to any actual use or application of the substances on site. The MSDSs will then be maintained in a central location (i.e., temporary office) and will be available for anyone to review upon request.

## **9.8 COMMUNICATION**

As personnel may not always be working in proximity to one another during field activities, a supported means of communication between field crews will be used as necessary. Two-way radio communication devices will be used while at the facility. In addition the field operations office will be connected to the plant telephone system.

External communication will be accomplished by using the telephones at predetermined and approved locations or through cellular phones. External communication will primarily be used for the purpose of resource and emergency resource communications. Prior to the commencement of activities at the station, the FOL will determine and arrange for telephone communications, if it is determined a cellular means will not be used.

## **9.9 SITE VISITORS**

Site visitors for the purpose of this document are identified representing the following groups of individuals:

- Personnel invited to observe or participate in operations by B&R Environmental.
- Regulatory personnel (i.e., DOD, EPA, OSHA, etc.)
- Southern Division Navy personnel
- Other authorized visitors

All non-DOD personnel working on this project are required to gain initial access to the base by coordinating with our Task Order Manager or designee and following established base access procedures.

Once access to the base is obtained, all personnel who require site (areas of ongoing operations) access will be required to obtain permission from the FOL and the Base Contact. Upon gaining access to the site, all site visitors wishing to observe operations in progress will be required to meet the following minimum requirements:

It is not anticipated that this operation will realize any large numbers of site visitors. However, as some visitors can reasonably be expected, the following requirements will be enforced:

- All site visitors will be routed to the FOL, who will sign them in to the field logbook. Information to be recorded in the logbook will include the individual's name (proper identification required), who they represent, and purpose for the visit.
- All site visitors will be required to produce the necessary information supporting clearance onto the site. This includes information attesting to applicable training (40-hours of HAZWOPER training required for all Southern Division Navy personnel) and to medical surveillance, as stipulated in Section 8.3 of this document. In addition, to enter the site's operational zones during planned activities, all visitors will be required to first go through site-specific training covering the topics stipulated in Section 8.2 of this document.

Following this, the site visitor will be permitted to enter the site and applicable operational areas. All visitors are required to observe the protective equipment and site restrictions in effect at the area of their visit. Any and all visitors not meeting the requirements as stipulated in this plan for site clearance will not be permitted to enter the site operational zones during planned activities. Any incidence of unauthorized site visitation will cause all onsite activities to be terminated until that visitor can be removed. Removal of unauthorized visitors will be accomplished with support from the Base Contact, if necessary. At a minimum, the Base Contact will be notified of any unauthorized visitors.

## 9.10 SITE SECURITY

Site security will be accomplished using field personnel. This is a multiple-person operation, involving multiple operational zones. B&R Environmental personnel will retain complete control over active operational zones.

As this activity will take place at a Navy facility, the first line of security will take place at the Base gate restricting the general public. The second line of security will take place at the work site, where interested parties will be referred to the FOL and Base Contact.

The Base Contact will serve as a focal point for base personnel and for interested parties, and will serve as the final line of security and the primary enforcement contact.

## **10.0 SPILL CONTAINMENT PROGRAM**

### **10.1 SCOPE AND APPLICATION**

It is not anticipated that bulk hazardous materials (over 55-gallons) will be handled at any given time as part of this scope of work. It is also not anticipated that such spillage would constitute a danger to human health or the environment. However, as the job progresses, the potential may exist for accumulating investigative derived wastes (IDW) such as decontamination fluids, soil cuttings, and purge/well development waters, in a central staging area. Once these fluids and other materials are characterized, they can be removed from this area and properly disposed. Because these fluids and soils remained uncharacterized while in the staging area, a spill containment program will be developed and instituted as part of this HASP.

### **10.2 POTENTIAL SPILL AREAS**

Potential spill areas will be periodically monitored in an ongoing attempt to prevent and control further potential contamination of the environment. Currently, limited areas are vulnerable to this hazard including:

- Resource deployment
- Waste transfer
- Central staging

At this junction, it is anticipated all IDW generated, as a result of this scope of work, will be containerized, labeled, and staged to await further analyses. The results of this analysis will determine the method of disposal. See Figure 10-1 for a sample IDW label.

FIGURE 10-1

# INVESTIGATION DERIVED WASTE

GENERATOR INFORMATION:

SITE \_\_\_\_\_ JOB NO. \_\_\_\_\_

LOCATION \_\_\_\_\_

DATE \_\_\_\_\_

DRUM# \_\_\_\_\_

CONTENTS \_\_\_\_\_

VOLUME \_\_\_\_\_

CONTACT \_\_\_\_\_

EMERGENCY PHONE NUMBER \_\_\_\_\_

### **10.3 LEAK AND SPILL DETECTION**

To establish an early detection of potential spills or leaks, a periodic walk-around by the personnel staging or disposing of drums or in the Resource Deployment Area will be conducted during working hours to visually determine that storage vessels are not leaking. If a leak is detected, the contents will be transferred, using a hand pump, into a new vessel. The leak will be collected and contained using absorbents such as Oil-dry, vermiculite, or sand, which are stored at the vulnerable areas in a conspicuously marked drum. This used material, too, will be containerized for disposal pending analysis. All inspections will be documented in the project logbook.

### **10.4 PERSONNEL TRAINING AND SPILL PREVENTION**

All personnel will be instructed in the procedures for spill prevention, containment, and collection of hazardous materials in the site-specific training. The FOL and the SSO will serve as the Spill Response Coordinators for this operation, should the need arise.

### **10.5 SPILL PREVENTION AND CONTAINMENT EQUIPMENT**

The following represents the minimum equipment that will be maintained at the staging area at all times for the purpose of supporting this Spill Prevention/Containment Program.

- Sand, clean fill, vermiculite, or other noncombustible absorbent (Oil-dry);
- Drums (55-gallon U.S. DOT 17-E or 17-H)
- Shovels, rakes, and brooms
- Hand-operated drum pump with hose
- Container labels

### **10.6 SPILL CONTROL PLAN**

This section describes the procedures the B&R Environmental field crew members will employ upon the detection of a spill or leak.

1. Notify the SSO or FOL immediately upon the detection of a leak or spill.

2. Employ the personal protective equipment stored at the staging area. Take immediate actions to stop the leak or spill by plugging or patching the container or raising the leak to the highest point in the vessel. Spread the absorbent material in the area of the spill, covering it completely.
3. Transfer the material to a new vessel; collect and containerize the absorbent material. Label the new container appropriately. Await analyses for treatment or disposal options.
4. Recontainerize spills, including 2-inches of top cover impacted by the spill. Await test results for treatment or disposal options.

It is not anticipated that a spill will occur that the field crews cannot handle. Should this occur, notification of the appropriate Emergency Response agencies will be carried out by the FOL or SSO in accordance with the procedures discussed in Section 2.0 of this HASP.

## 11.0 CONFINED-SPACE ENTRY

Personnel under the guidance of this HASP will not, under any circumstances, enter confined spaces. A confined space is defined as an area that has all of the following characteristics:

- Is large enough and so configured that an employee can bodily enter and perform assigned work.
- Has limited or restricted means for entry or exit (for example, tanks, manholes, sewers, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry).
- Is not designed for continuous employee occupancy.

For further information on confined-space operations, consult the Health and Safety Guidance Manual or call the HSM. Any activity that may be considered a confined space entry shall require modifications of this HASP and shall result in the immediate notification of the Project Health and Safety Officer. This determination shall be made by the FOL and SSO.

## 12.0 MATERIALS AND DOCUMENTATION

The B&R Environmental Field Operations Leader (FOL) shall ensure the following materials/documents are available on the project site and used when required.

- A complete copy of this HASP
- Health and Safety Guidance Manual
- Incident Reports
- Medical Data Sheets
- Material Safety Data Sheets for all chemicals brought on site, including decon solutions, fuels, sample preservatives, calibration gases, etc.
- Follow-up Reports (to be completed by the FOL)
- A full-size OSHA Job Safety and Health Poster (posted in the site trailer)
- Training/Medical Surveillance Documentation Form (Blank)
- First-Aid Supply Usage Form
- Emergency Reference Form (Section 2.0, extra copy for posting)
- Safe Work Permits

### 12.1 MATERIALS TO BE POSTED AT THE SITE

The following documentation is to be posted at the site for quick reference purposes. In situations where posting of these documents is not feasible, (such as no office trailer), these documents should be separated and immediately accessible.

**Chemical Inventory Listing** - This list represents all chemicals brought on site, including decontamination solutions, sample preservatives, fuel, etc.. This list should be posted in a central area.

**Material Safety Data Sheets (MSDSs)** - The MSDSs should also be in a central area accessible to all site personnel. These documents should match all the listings on the chemical inventory list for all substances employed on site. It is acceptable to have these documents within a central folder and the chemical inventory as the table of contents.

**The OSHA Job Safety & Health Protection Poster** - This poster, as directed by 29 CFR 1903.2 (a)(1), should be conspicuously posted in places where notices to employees are normally posted. Each FOL shall ensure that this poster is not defaced, altered, or covered by other material.

**Site Clearance Posting** - This list is found within the training section of the HASP (See Figure 8-1). This list identifies all site personnel, dates of training (including site-specific training), and medical surveillance. This list indicates not only clearance but also status. If personnel do not meet these requirements, they do not enter the site while site personnel are engaged in activities.

**Emergency Phone Numbers and Directions to the Hospital(s)** - This list of numbers and the directions will be maintained at all phone communications points and in each site vehicle.

**Medical Data Sheets/Cards** - Medical Data Sheets will be filled out by all onsite personnel and filed in a central location. The Medical Data Sheet will accompany any injury or illness requiring medical attention to the medical facility. A copy of this sheet or a wallet card will be given to all personnel to be carried on their person.

**Hearing Conservation Standard (29 CFR 1910.95)** - This standard will be posted anytime hearing protection or other noise abatement procedures are required.

**Personnel Monitoring** - All results generated through personnel sampling (levels of airborne toxics, noise levels, etc.) will be posted to inform individuals of the results of that effort.

**Placards and Labels** - Where chemical inventories have been separated because of quantities and incompatibilities, these areas will be conspicuously marked using DOT placards and acceptable [Hazard Communication 29 CFR 1910.1200 (f)] labels.

The purpose, as stated above, is to allow site personnel quick access to this information. Variations concerning location and methods of presentation are acceptable, providing the objective is accomplished.

### 13.0 GLOSSARY

ACGIH	American Conference of Governmental Industrial Hygienists
APR	Air-Purifying Respirator
ASVE	Air Sparging Vapor Extraction
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CLEAN	Comprehensive Long-Term Environmental Action - Navy
CNS	Central Nervous System
CQP	Construction Quality Plan
CTO	Contract Task Order
CZR	Contamination Reduction Zone
DOD	United States Department of Defense
EPA	United States Environmental Protection Agency
eV	electron Volts
FFA	Federal Facilities Agreement
FID	Flame Ionization Detector
FOL	Field Operations Leader
FTL	Field Team Leader
GOCO	government-owned and contractor-operated
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
HEPA	High-Efficiency Particulate Air
HSM	Health and Safety Manager
IDHL	Immediately Dangerous to Life or Health
IDW	Investigative-Derived Wastes
LEL/LFL	lower explosive limit/lower flammable limit
MHSP	Master Health and Safety Plan
MSDS	Material Safety Data Sheet
N/A	Not Available
NIOSH	National Institute for Occupational Safety and Health
NIROP	Naval Industrial Reserve Ordnance Plant
NTP	National Toxicity Program
OSHA	Occupational Safety and Health Administration (U.S. Department of Labor)

PCBs	polychlorinated biphenyls
PEL	Permissible Exposure Limit
PID	Photoionization Detector
PPE	Personal Protective Equipment
PVC	Polyvinyl Chloride
REL	Recommended Exposure Limits (NIOSH)
SAP	Sampling and Analyses Plan
SCBA	Self-Contained Breathing Apparatus
SOPs	standard operating procedures
SSO	Site Safety Officer
STEL	Short-Term Exposure Limit
TBD	To be determined
TCE	Trichloroethene
TLV	Threshold Limit Value (ACGIH)
TOM	Task Order Manager
TWA	Time-Weighted Average
UEL/UFL	Upper explosive limit/upper flammable limit
UV	Ultraviolet
WP	Work Plan