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**RCRA Facility Assessment  
Health and Safety Plan**  
for  
**Naval Weapons Industrial  
Reserve Plant**  
Calverton, New York



**Northern Division  
Naval Facilities Engineering Command**  
Contract Number N62472-90-D-1298  
Contract Task Order 0270

February 1997

**C F BRAUN ENGINEERING CORPORATION**

**RCRA FACILITY ASSESSMENT  
HEALTH AND SAFETY PLAN**

**FOR**

**NAVAL WEAPONS INDUSTRIAL RESERVE PLANT  
CALVERTON, NEW YORK**

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

**Submitted to:**

**Northern Division  
Environmental Branch Code 18  
Naval Facilities Engineering Command  
10 Industrial Highway, Mail Stop #82  
Lester, Pennsylvania 19113-2090**

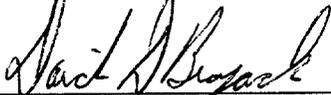
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CONTRACT TASK ORDER 0270**

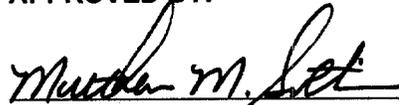
**FEBRUARY 1997**

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1.0 SITE INFORMATION AND PERSONNEL ASSIGNMENTS

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Address: Suffolk County, New York

Client Contact: Jim Colter  
Phone Number: (610) 595-0567

Other Contacts: Al Taormina  
Phone Number: (516) 346-0344

Effective Date: February 1997  
Purpose of Site Visit: Remedial Investigation  
Proposed Dates of Work: Spring - Summer 1997

Project Team:

CF Braun Engineering Corporation Personnel:

Discipline/Tasks Assigned:

David Brayack, P.E.  
TBD  
TBD  
TBD

Project Manager (PM)  
Field Operations Leader (FOL)  
Site Safety Officer (SSO)  
Field Geologist / Sampler

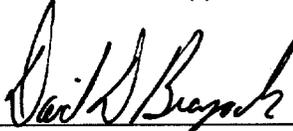
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CLEAN Health and Safety Manager

## **1.1 INTRODUCTION**

This Health and Safety Plan (HASP) has been prepared for site activities that are to be conducted as part of Remedial Investigation activities at the NWIRP Calverton facility. This HASP must be used in conjunction with the Brown & Root Environmental (B&R Environmental) Health and Safety Guidance Manual. Both of these documents must be present at the site during the performance of all site activities. The Guidance Manual provides detailed information pertaining to the HASP as well as applicable Brown & Root Environmental Standard Operating Procedures (SOPs). This HASP and the contents of the Guidance Manual were developed to comply with the requirements stipulated in 29 CFR 1910.120 (OSHA's Hazardous Waste Operations and Emergency Response Standard).

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 at the site. The HASP will be modified if new information becomes available. All changes to the HASP will be made with the approval of the CF Braun Engineering Corporation Site Safety Officer (SSO) and the CF Braun Engineering Corporation CLEAN Health and Safety Manager (HSM). Requests for modifications to the HASP will be directed to the SSO who will determine whether to make the changes. The SSO will notify the Project Manager (PM), who will notify all affected personnel of changes.

The elements of this HASP are in compliance with the requirements established by 29 CFR 1910.120 and sections of 29 CFR 1926 (Safety and Health Regulations For Construction). The information contained in this plan and policies on conducting onsite operations have been obtained from the Brown & Root Environmental Health and Safety Program and NWIRP Calverton policies and procedures.

## 2.0 BACKGROUND

### 2.1 ACTIVITY LOCATION

Naval Weapons Industrial Reserve Plant (NWIRP) Calverton is located at the eastern end of Long Island, in Suffolk County, New York. It covers almost 6,000 acres, a portion in the town of Riverhead and the remaining part is in Brookhaven.

### 2.2 ACTIVITY MISSION AND HISTORY

The mission of NWIRP Calverton was to assemble, develop, and flight-test aircraft for the U.S. military. (NWIRP Bethpage manufactures many of the components assembled and tested at NWIRP Calverton.)

NWIRP Calverton was built during the Korean War. Construction was completed in 1954. Its mission continues to be the assembly, testing, refitting, and retrofitting of Naval aircraft. The Department of Navy personnel oversee the work done by civilian experts and technicians employed by Grumman Aerospace Corporation (Grumman).

NWIRP Calverton was formerly a Government Owned Contractor Operated (GOCO) activity operated by the Grumman Aerospace Corporation. The facility covers 11 square miles, most of which is owned by the Navy. Plant 08 (an avionics test building) and its guard booth are the only structures situated on land owned by Grumman (General Plan, March 1985). Grumman completed operations at the facility in February 1996.

### 2.3 BACKGROUND OF SPECIFIC SITES TO BE INVESTIGATED

#### 2.3.1 Site 1: Northeast Pond Disposal Area

The NWIRP Calverton Northeast Pond Disposal Area is located in the northeastern portion of the activity. The area of contamination is located south of Middle County Road (Route 25) and 5,000 feet east of the north gate of the activity.

Aerial photographs taken between 1947 and 1984 indicate that the area was active more or less continuously from 1947 through about 1984. The Preliminary Assessment estimated that the thickness of the disposed material is approximately 20 feet and the estimated volume of the site is 7,500 cubic yards of debris and cover material.

The following types of disposed material at the site have been documented in the Preliminary Assessment: a cockpit portion of an aircraft fuselage fabricated primarily of aluminum and metal components; a large number of concrete columns; piles of asphalt macadam, plywood, and framing lumber; scraps of rusting metal parts; hulks of several 5-gallon pails and numerous 1-gallon paint pails containing small amounts of paint residues.

Previous testing at the site found the fill materials to be contaminated with several metals including lead and chromium. Leachate testing of the fill material indicated that some of the fill may be classifiable as a RCRA characteristic hazardous waste for chromium. PCBs were detected at a maximum concentration of 8.4 mg/kg. Previous test pit activities found one buried drum at the site. The drum contents were determined to contain solvents. This drum was removed under a separate action. Other than the drum area, solvents were detected only sporadically at this site. In addition, trace concentrations of other chemicals including pesticides, PCBs, lead, chromium were found in the site groundwater, sediments, and/or surface water. As a result, personnel exposures to these substances are not anticipated to represent a significant occupational threat.

### **2.3.2 Site 2: Fire Training Area**

The Fire Training Area has been used exclusively by the Grumman Crash Crew and other fire fighting personnel at NWIRP Calverton since 1952. Fire Training Area appears to be a bermed ring created from site soils. This early gaining ring was unlined. For training exercises, this ring was partially filled with water and a layer of fuel was floated on top of the water. This fuel layer was ignited to provide fire fighting practice. An estimated 450 gallons per year of solvent [including toluene, methylethyl ketone (MEK), and lacquer thinner] were disposed of in this manner from 1953 to 1975. An estimated 1,500 to 2,000 gallons per year of waste fuel oils were mixed with the disposed solvents and burned at the site. This practice was stopped in 1975. Reportedly, since 1975 personnel have burned only clean (unmixed) fuel.

Two spills of fuel oil occurred in 1982 and 1983. One spill originated from a 6,000-gallon underground oil supply tank used for the exercises; and the other spill (1983) involved 300 gallons from another storage tank in this area.

The entire Fire Training Area has been upgraded with concrete berms installed to contain the oil and water used in the training exercises. The piping was modified to prevent spills and a direct line was installed between the storage tank and the training area. The underground 6,000-gallon tank was removed and replaced by an aboveground 1,000-gallon tank.

Hazardous wastes potentially present at the site include petroleum oil lubricants (POLs), toluene, and methylethyl ketone and soluble leads from gasoline burned during the exercises.-

Previous testing at the site identified fuels and solvents in the subsurface soils and groundwater. A pilot air sparging/soil vapor extraction study conducted in 1995 and 1996 addressed the majority of this contamination at and near the fire training ring. In addition to fuels and solvents, PCBs and moderate concentrations of metals and semi-volatile organics were detected in the site soils.

### **2.3.3 Site 6A: Fuel Calibration Area**

This area is where newly assembled aircraft receive preflight testing (refer to Figure 2-5). This testing includes the fuel delivery system and the engine. The engine is operated at high speeds for periods long enough to ensure that these systems are fuel-tight and are ready for continuous service. Fuel leakage usually occurs when the systems are first pressurized.

There have been three recorded spills at these sites in the years between 1982-1984. In 1982, about 200 gallons of JP-5 (Jet Fuel) spilled at the Engine Test House. In 1983, 30 gallons of JP-5 was spilled on the ground at the Engine Run-Up Area. In 1984, an unknown amount of oil and water in a mixture spilled at the Fuel Calibration Area. Previous testing at the site identified fuels and solvents in the subsurface soils and groundwater.

### **2.3.4 Site 7: Fuel Depot**

This site has experienced numerous spills during fueling/refueling operations at Calverton (refer to Figure 2-6). A total of 30 wells have been installed which monitor the contamination. In addition, a recovery well system is being designed to recover the product which is expected to be a light non-aqueous product (mostly diesel and gasoline).

Previous testing at the site identified fuels in the subsurface soils and groundwater. Freon was also detected in the groundwater south of the Fuel Depot.

### **2.3.5 Site 9: Electronic Counter Measures (ECM) Area**

The ECM is located in the northeast corner of the NWIRP Calverton. This area was constructed in the early 1970s and was recently used for testing and evaluating various electronic counter measures equipment. No manufacturing occurred at this site. However, 1,1,1-trichloroethane (TCA) was used as a cleaning agent at

this site. It had been reported that approximately 10 gallons per year of TCA was used in the cleaning of miscellaneous parts.

General site features include an old disposal area located approximately 600 feet south and two depressions located within a swale located to the southeast. It is likely that these depressions used to consist of a natural drainage swale leading to the south. Construction debris and miscellaneous equipment are visible in and around the disposal area and throughout the southeast depression. The former ECM Building (Building 07-39) has been demolished since the initial RFA sampling occurred.

Located to the east of the ECM Area is the property fence line. Beyond this line is a sod farm. A portion of the sod farm (nearest the ECM Area) was selected as an experimental program for growing sod using municipal solid waste compost to amend the natural soils and provide nutrients. As part of the experimental program, a series of monitoring wells were installed and are being monitored by the Suffolk County Department of Health. TCA at a concentration of 190 ug/l was detected in the well furthest from the ECM Area. Monitoring wells closer to the site exhibited lower concentrations of chemicals. Also noted during site visits conducted in the 1993 and 1994 was the presence of several drums located just northeast of the ECM Area, on the sod farm, and near the fence.

### **2.3.6            Site 10A: Jet Fuel Systems Lab**

The Jet Fuel System Lab is situated east of the three production wells for the facility and across the street and just south of the Fuel Depot. The site was investigated during the initial RFA as part of a cesspool/leachfield investigation to determine the presence of potential industrial wastewater overflow releases into the cesspool/leachfields. The area of investigation is centered around the location of four cesspools located in front of the jet fuel system lab. Groundwater from production wells located adjacent to the jet fuel system lab contain concentrations of VOCs (including freon) at concentrations greater than drinking water standards. The RFA investigation did not find VOC contamination in the soils at this area. However, the detection limits reported for VOCs were approximately 700 times higher than typical detection limits because of test interferences. Based on field observations and tentatively identified compounds (TICs) results, petroleum contamination may be present at the site.

The Jet Fuel Systems Lab was used for the testing of fuels and fuel systems. Additional site features include an area behind the northwestern corner of the Jet Fuel System Lab, where several underground storage tanks were recently removed.

Previous testing at the site indicates that the subsurface soils and groundwater may be contaminated with freon and fuels.

**2.3.7            Site 10B: Engine Test House**

The Engine Test House is located in the south-central portion of the facility. This area was initially evaluated as part of the cesspool/leachfield investigation. However, this investigation was not conclusive as to the presence or absence of contamination.

In addition, an underground storage tank was present at this site. The tank and surrounding soils have been removed. However, subsequent testing indicated that groundwater may have been impacted from these fuels.

### **3.0 SCOPE OF WORK**

Remedial investigations associated with this CTO include soil boring activities, monitoring well installations, multi-media sampling (groundwater, subsurface soils, sediments, etc.), test pit excavations, and general surveying activities. These tasks and other site activities including mobilization/demobilization and decontamination procedures are discussed in Table 3-1 of this HASP.

#### **3.1 TASKS / HAZARDS / ASSOCIATED CONTROL MEASURES SUMMARIZATION**

Table 3-1 of this section serves as the primary portion of the site-specific HASP, identifying the tasks that are to be performed. 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 or injuries related to those hazards.

*In further support of the elements of this HASP, Safe Work Permits will be issued for each operation, in an effort to incorporate site specific conditions associated with this operation and to ensure elements identified within this plan are indeed incorporated into the daily activities.*

**TABLE 3-1  
TASKS/HAZARDS/CONTROL MEASURES COMPENDIUM  
NWIRP, CALVERTON, NEW YORK**

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 contaminants including - Jet Fuels (JP-5), TPH constituents, organic solvents (1,1,1-trichloroethane, naphthalene, methylene chloride), BTEX compounds (primarily ethyl benzene and xylenes), and various metals. Semivolatile organic compounds (SVOCs), PCBs and pesticides have also been detected at various sites but at low (ppb) concentrations. See Table 6-1 for more information on the chemicals of concern. Additionally, Section 2.0 discusses the primary contaminants associated with each site.</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>6) Biological hazards (particularly ticks)</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> <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 demarcated 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 unless the SSO quantifies 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>6) Avoid potential nesting areas of biting/stinging insects and animals. Use commercially available insect repellents and snake bite kits. Avoid contact with poisonous vegetation. Wear appropriate clothing. Tape ankle and wrists areas to prevent ticks, chiggers, etc. from attaching themselves to you skin. Wear light colored clothing so that ticks and other biting insects can be easily visible.</p>	<p><b>Based on previous analytical data from the site, and the dispersion of potential vapors by natural wind currents and dilution, airborne concentrations are not anticipated to be present in worker breathing zones. However, the following information is provided as a contingency.</b></p> <p>Photoionization Detector w/ 10.2 eV UV lamp source, or a Flame Ionization 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> <p>A) Monitor the breathing zone of high-risk employees. Any sustained readings (&gt; 1 minute in duration) above background levels but below 10 ppm in the worker breathing zone requires site activities to be temporarily suspended while additional air monitoring is performed. Any sustained breathing zone readings &gt;10 ppm above background levels will require the HSM to be contacted and site activities to be suspended until readings return to background levels.</p> <p>Additional air monitoring activities are discussed in Section 5.5 of the HASP.</p> <p>B) If airborne dusts are generated as a result of site activities, field crews will employ area wetting methods to minimize dust generation. If area wetting methods are inadequate, the level of protection will be upgraded to Level C.</p> <p>4) Hearing protection will be required whenever excessive noise levels are experienced. Noise levels will be considered excessive if workers must raise their voice in order to communicate when standing within 2 feet of each other.</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 10 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 (leather work gloves with surgical style inner gloves may be substituted for Nitrile gloves).</li> <li>- Hardhat, safety glasses, impermeable boot covers, and earplugs or muffs.</li> <li>- Tyvek coveralls</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>The need for upgraded levels of protection will be based on air monitoring activities with the PID/FID and colorimetric tubes.</p> <p>Level C protection (full-face air-purifying respirator with combination GMC-H filter cartridges) will be required in the following circumstances:</p> <ul style="list-style-type: none"> <li>- Initial colorimetric tube sampling for vinyl chloride</li> <li>- Continued colorimetric tube sampling when positive indications of the presence of vinyl chloride (&lt;10 ppm) are present.</li> <li>- Whenever colorimetric tube sampling indicates the presence of vinyl chloride at concentrations &lt;10 ppm.</li> <li>- Whenever airborne dusts are observed an they cannot be controlled with area wetting methods.</li> </ul> <p>Any FID/PID readings greater than 10 ppm in worker breathing zones or vinyl chloride concentrations greater than 10 ppm will require site activities to be suspended and the HSM to be contacted.</p> <p>Chemical protective clothing for Level C protection will consist of impermeable boot covers, nitrile gloves with surgical style inner gloves, and Tyvek coveralls (unless free-phase product is encountered). If free-phase product or a splash potential exists, polyvinyl chloride (PVC) or polyethylene (PE) splash suits will be used in place of Tyvek coveralls.</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> </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>

\*PPE items noted in italics are optional, based on site condition and observations, at the discretion of the SSO.

**TABLE 3-1  
TASKS/HAZARDS/CONTROL MEASURES COMPENDIUM  
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Tasks/Operation/ Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring	Personal Protective Equipment*	Decontamination Procedures
<p>Multi-media sampling including soils (subsurface); water (groundwater). Surface water and sediment samples may also be collected during this task.</p> <p>This activity will be conducted concurrently with soil boring and well installation activities.</p>	<p><i>Chemical Hazards</i></p> <p>1) Air/particulate/water borne contaminants including - Jet Fuels (JP-5), TPH constituents, organic solvents (1,1,1-trichloroethane, naphthalene, methylene chloride), BTEX compounds (primarily ethyl benzene and xylenes), and various metals. Semivolatile organic compounds (SVOCs), PCBs and pesticides have also been detected at various sites but at low (ppb) concentrations. See Table 6-1 for more information on the chemicals of concern. Additionally, Section 2.0 discusses the primary site contaminants associated with each site.</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>7) Water hazards (for surface water collection activities conducted on bodies of water such as ponds, lagoon, etc.</p> <p>8) Biological hazards (particularly ticks)</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 keep 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>7) Utilize United States Coast Guard approved personal floatation devices (safety vests) when collecting samples on or near bodies of water.</p> <p>8) Avoid potential nesting areas of biting/stinging insects and animals. Use commercially available insect repellents and snake bite kits. Avoid contact with poisonous vegetation. Wear appropriate clothing. Tape ankle and wrists areas to prevent ticks, chiggers, etc. from attaching themselves to you skin. Wear light colored clothing so that ticks and other biting insects can be easily visible.</p>	<p><b>Based on previous analytical data from the site, and the dispersion of potential vapors by natural wind currents and dilution, airborne concentrations are not anticipated to be present in worker breathing zones. However, the following information is provided as a contingency.</b></p> <p>Photoionization Detector w/ 10.2 eV UV lamp source, or a Flame Ionization Detector, will be used as follows:</p> <p>1) Source monitoring will be conducted at regular intervals determined by the SSO. Positive sustained results (above background levels) at a source location (boreholes, well heads, split spoons, macro core samplers) which may affect operations crew will require the following actions:</p> <p>A) Monitor the breathing zone of high-risk employees. Any sustained readings (&gt; 1 minute in duration) above background levels but below 10 ppm in the worker breathing zone requires site activities to be temporarily suspended while additional air monitoring is performed. Any sustained breathing zone readings &gt;10 ppm above background levels will require the HSM to be contacted and site activities to be suspended until readings return to background levels.</p> <p>Additional air monitoring activities are discussed in Section 5.5 of the HASP.</p> <p>B) If airborne dusts are generated as a result of site activities, field crews will employ area wetting methods to minimize dust generation. If area wetting methods are inadequate, the level of protection will be upgraded to Level C.</p> <p>4) Hearing protection will be required whenever excessive noise levels are experienced. Noise levels will be considered excessive if workers must raise their voice in order to communicate when standing within 2 feet of each other.</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 10 feet.</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>- Tyvek coveralls</li> <li>- Steel toe/shank safety shoes</li> <li>- Inner nitrile surgeons gloves, layered if necessary.</li> <li>- <i>Hardhat and safety glasses if sampling activities are conducted in the presence of drilling operations or other overhead/flying projectile hazards.</i></li> </ul> <p><b>Excessive chemical contaminant concentrations that would impact field personnel are not anticipated to be present during this task. The following information is based on a contingency action only.</b></p> <p>The need for upgraded levels of protection will be based on air monitoring activities with the PID/FID and colorimetric tubes.</p> <p>Level C protection (full-face air-purifying respirator with combination GMC-H filter cartridges) will be required in the following circumstances:</p> <ul style="list-style-type: none"> <li>- Initial colorimetric tube sampling for vinyl chloride</li> <li>- Continued colorimetric tube sampling when positive indications of the presence of vinyl chloride (&lt;10 ppm) are present.</li> <li>- Whenever colorimetric tube sampling indicates the presence of vinyl chloride at concentrations &lt;10 ppm.</li> <li>- Whenever airborne dusts are observed and they cannot be controlled with area wetting methods.</li> </ul> <p>Any FID/PID readings greater than 10 ppm in worker breathing zones or vinyl chloride concentrations greater than 10 ppm will require site activities to be suspended and the HSM to be contacted.</p> <p>Chemical protective clothing for Level C protection will consist of impermeable boot covers, nitrile gloves with surgical style inner gloves, and Tyvek coveralls (unless free-phase product is encountered). If free-phase product or a splash potential exists, polyvinyl chloride (PVC) or polyethylene (PE) splash suits will be used in place of Tyvek coveralls.</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.). 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> </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 samples, transport</p>

\*PPE items noted in italics are optional, based on site condition and observations, at the discretion of the SSO.

**TABLE 3-1  
TASKS/HAZARDS/CONTROL MEASURES COMPENDIUM  
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Tasks/Operation/ Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring	Personal Protective Equipment*	Decontamination Procedures
Mobilization/ demobilization	<p><i>Physical Hazards</i></p> <ol style="list-style-type: none"> <li>1) Lifting (muscle strains and pulls)</li> <li>2) Pinches and compressions</li> <li>3) Slip, trips, and falls</li> <li>4) Moving machinery</li> <li>5) Vehicular and foot traffic</li> </ol>	<ol style="list-style-type: none"> <li>1) Use machinery or multiple personnel for heavy lifts. Use proper lifting techniques.</li> <li>2) Use pinch bars or other equipment to keep hands from point of operation or other associated pinch points.</li> <li>3) Preview work locations for unstable/uneven terrain. Barricade all floor openings from access closer than 3 feet from the edge.</li> <li>4) All equipment will be <ul style="list-style-type: none"> <li>- Inspected in accordance with OSHA, and manufacturer's design.</li> <li>- Operated by certified operators, and knowledgeable ground crew.</li> </ul> </li> <li>5) Establish safe zones of approach (Boom + 3 feet).</li> </ol>	Not required	<p>Level D - (Minimum Requirements)</p> <ul style="list-style-type: none"> <li>- Standard field attire (long-sleeve shirt; long pants)</li> <li>- Safety shoes (Steel toe/shank)</li> <li>- Safety glasses</li> <li>- Hardhat (when overhead hazards exists, or identified as a operation requirement)</li> <li>- Reflective vest for high traffic areas</li> <li>- Hearing protection for high noise areas, or as directed on an operation by operation scenario.</li> </ul>	Not required
Decontamination of sampling and heavy equipment	<p><i>Chemical Hazards</i></p> <ol style="list-style-type: none"> <li>1) Air/particulate/water borne contaminants including - Jet Fuels (JP-5), TPH constituents, organic solvents (1,1,1-trichloroethane, naphthalene, methylene chloride), BTEX compounds (primarily ethyl benzene and xylenes), and various metals. Semivolatile organic compounds (SVOCs), PCBs and pesticides have also been detected at various sites but at low (ppb) concentrations. See Table 6-1 for more information on the chemicals of concern.</li> </ol> <p>If decontamination activities require the use of solvents, MSDS must be obtained and reviewed to determine any additional PPE and/or control measures.</p> <ol style="list-style-type: none"> <li>1) Decontamination fluids - Liquinox (detergent), acetone or methanol, and hexane</li> </ol> <p><i>Physical Hazards</i></p> <ol style="list-style-type: none"> <li>2) Lifting (muscle strains and pulls)</li> <li>3) Pinches and compressions</li> <li>4) Noise and eye/face hazards</li> </ol>	<ol style="list-style-type: none"> <li>1) Employ protective equipment to minimize contact with site contaminants and hazardous decontamination fluids.</li> <li>2) Use multiple persons where necessary for lifting and handling heavier pieces of equipment for decontamination purposes.</li> <li>3) Maintain equipment guards in place. Secure loose clothing. No jewelry. Keep hands out f machine operating points.</li> <li>4) Hearing protection will be required during equipment decontamination efforts if excessive noise levels are present.</li> <li>5) Eye and face (face shields) will be required if equipment decontamination requires the use of steam or high pressure washers.</li> </ol>	<ol style="list-style-type: none"> <li>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).</li> </ol>	<p><i>For Heavy Equipment (i.e., auger flights, etc.):</i> This applies to high-pressure soap/water, steam-cleaning, wash and rinse procedures.</p> <p>Level D minimum requirements -</p> <ul style="list-style-type: none"> <li>- Standard-field attire (Long-sleeve shirt; long pants)</li> <li>- Safety shoes (Steel toe/shank)</li> <li>- Chemical-resistant boot covers</li> <li>- Nitrile outer gloves, cotton liners</li> <li>- Safety glasses underneath a splash shield</li> <li>- PVC Rainsuits or PE or PVC coated Tyvek if the potential for saturation of work clothes exists.</li> <li>- Hearing protection</li> </ul> <p>Respiratory protection is not anticipated for this activity.</p> <p><i>For sampling equipment including trowels, split spoons, bailers, etc., the following PPE is required:</i></p> <p>Level D Minimum requirements -</p> <ul style="list-style-type: none"> <li>- Standard field attire (Long-sleeve shirt; long pants)</li> <li>- Safety shoes (Steel toe/shank)</li> <li>- Nitrile outer gloves, cotton liners</li> <li>- Safety glasses underneath a splash shield</li> </ul> <p>In the event of overspray of chemical decontamination fluids, employ PVC rainsuits or PE or PVC coated Tyvek as necessary.</p>	<p>This decontamination procedure for <b>Level D</b> protection will consist of</p> <ul style="list-style-type: none"> <li>- Soap/water wash and rinse of 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>

\*PPE items noted in italics are optional, based on site condition and observations, at the discretion of the SSO.

**TABLE 3-1  
TASKS/HAZARDS/CONTROL MEASURES COMPENDIUM  
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Tasks/Operation/ Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring	Personal Protective Equipment*	Decontamination Procedures
<p>Test pit excavations (10 - 12 feet deep).</p>	<p><b>Chemical hazards</b> 1) Air/particulate/water borne contaminants including - Jet Fuels (JP-5), TPH constituents, organic solvents (1,1,1-trichloroethane, naphthalene, methylene chloride), BTEX compounds (primarily ethyl benzene and xylenes), and various metals. Semivolatile organic compounds (SVOCs), PCBs and pesticides have also been detected at various sites but at low (ppb) concentrations. See Table 6-1 for more information on the chemicals of concern.</p> <p><b>Physical hazards</b> 2) Moving machinery 3) Collapse of the excavation 4) Energized systems 5) Noise 6) Biological hazards (particularly ticks)</p> <p>NOTE: Buried drums are not anticipated to be present in areas of proposed test pit excavations. Any drums or unidentified containers that are encountered during site activities are to be left undisturbed. Drum sampling or handling activities will require revisions to this HASP.</p>	<p>1) Employ real-time monitoring instrumentation, action levels, and identified PPE to detect and identify exposures to potentially contaminated medias (e.g. air, water, soils).</p> <p>2) All equipment to be employed 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, as applicable.</li> <li>- Establish safe zones of approach (i.e. Boom + 3 feet).</li> <li>- All equipment shall be equipped with movement warning systems.</li> <li>- All personnel working in amongst equipment traffic are required to wear reflective vests for high visibility</li> </ul> <p>3) All excavations shall be in conformance with requirements established under 29 CFR 1926.650 - .652 concerning sloping, shoring, storage, and movement on and over trenches and excavations.</p> <p>-- No personnel associated with this field effort will enter excavations</p> <p>All supplies, clean fill, vehicular traffic will be maintained at a distance of 3 feet from the excavation, or 2 feet if a restraining device is employed.</p> <p>4) All utility clearances shall be obtained prior to any excavation.</p> <p>5) Excessive noise levels will be mitigated through the use of hearing protection. Anticipated excessive noise level operations include the following:</p> <ul style="list-style-type: none"> <li>• Heavy equipment operation including backhoes, excavators, front end loaders, concrete saws, and drill rigs.</li> <li>• Portable hand tools (circular saws), pneumatic hammers, generators, etc.</li> </ul> <p>Any piece of equipment or operation that has the potential to generate excessive noise levels (You must raise your voice to speak to someone within two feet of where you are standing) will require hearing protection until monitoring may be conducted to quantify the associated noise levels.</p> <p>6) Avoid potential nesting areas of biting/stinging insects and animals. Use commercially available insect repellents and snake bite kits. Avoid contact with poisonous vegetation. Wear appropriate clothing. Tape ankle and wrists areas to prevent ticks, chiggers, etc. from attaching themselves to you skin. Wear light colored clothing so that ticks and other biting insects can be easily visible.</p>	<p><b>Based on previous analytical data from the site, and the dispersion of potential vapors by natural wind currents and dilution, airborne concentrations are not anticipated to be present in worker breathing zones. However, the following information is provided as a contingency.</b></p> <p>Photoionization Detector w/ 10.2 eV UV lamp source, or a Flame Ionization 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> <p>A) Monitor the breathing zone of high-risk employees. Any sustained readings (&gt; 1 minute in duration) above background levels but below 10 ppm in the worker breathing zone requires site activities to be temporarily suspended while additional air monitoring is performed. Any sustained breathing zone readings &gt;10 ppm above background levels will require the HSM to be contacted and site activities to be suspended until readings return to background levels.</p> <p>Additional air monitoring activities are discussed in Section 5.5 of the HASP.</p> <p>B) If airborne dusts are generated as a result of site activities, field crews will employ area wetting methods to minimize dust generation. If area wetting methods are inadequate, the level of protection will be upgraded to Level C.</p> <p>4) Hearing protection will be required whenever excessive noise levels are experienced.</p> <p>5) Where the utility clearance cannot be obtained in a reasonable period, or not located, excavation activities shall proceed with extreme caution using a magnetometer for periodic downhole surveys every 2 feet to a depth of at least 10 feet.</p>	<p>All test pit excavations 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> <li>- Hardhat and safety glasses</li> </ul> <p>These following items will be incorporated during excavating operations:</p> <ul style="list-style-type: none"> <li>- Nitrile gloves (for sampling activities or if the potential for contact with potentially contaminated soils exists).</li> <li>- Earplugs or muffs.</li> <li>- Tyvek coveralls</li> <li>- PVC or PE coated Tyvek will be incorporated if there is a potential for saturation of work attire.</li> </ul> <p>Operations are not anticipated to surpass Level D protection. The following information is provided as a contingency.</p> <p>The need for upgraded levels of protection will be based on air monitoring activities with the PID/FID and colorimetric tubes.</p> <p>Level C protection (full-face air-purifying respirator with combination GMC-H filter cartridges) will be required in the following circumstances:</p> <ul style="list-style-type: none"> <li>- Initial colorimetric tube sampling for vinyl chloride</li> <li>- Continued colorimetric tube sampling when positive indications of the presence of vinyl chloride (&lt;10 ppm) are present.</li> <li>- Whenever colorimetric tube sampling indicates the presence of vinyl chloride at concentrations &lt;10 ppm.</li> <li>- Whenever airborne dusts are observed an they cannot be controlled with area wetting methods.</li> </ul> <p>Any FID/PID readings greater than 10 ppm in worker breathing zones or vinyl chloride concentrations greater than 10 ppm will require site activities to be suspended and the HSM to be contacted.</p> <p>Chemical protective clothing for Level C protection will consist of impermeable boot covers, nitrile gloves with surgical style inner gloves, and Tyvek coveralls (unless free-phase product is encountered). If free-phase product or a splash potential exists, polyvinyl chloride (PVC) or polyethylene (PE) splash suits will be used in place of Tyvek coveralls.</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 in a control location. This procedure will consist of</p> <ul style="list-style-type: none"> <li>- Equipment drop</li> <li>- Soap/water wash and rinse of outer boots and gloves</li> </ul> <p><b>Note:</b> For PPE Levels B or C tank or cartridge change out would take place at this point, if necessary.</p> <ul style="list-style-type: none"> <li>- Soap/water wash and rinse of the outer splash suit, as applicable</li> <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 equipment decontamination will take place at a centralized decontamination pad utilizing steam or pressure washers.</p> <p>All site vehicles and equipment decontamination will entail the following:</p> <ul style="list-style-type: none"> <li>• High pressure hot water/detergent solution, followed by a rinse spray.</li> </ul> <p>The SSO will be responsible for evaluating equipment arriving and exiting the site. No equipment will be authorized access or exit without this authorization.</p>

\*PPE items noted in italics are optional, based on site condition and observations, at the discretion of the SSO.

TABLE 3-1  
 TASKS/HAZARDS/CONTROL MEASURES COMPENDIUM  
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Tasks/Operation/ Locations	Anticipated Hazards	Recommended Control Measures	Hazard Monitoring	Personal Protective Equipment*	Decontamination Procedures
General surveying activities	<p><i>Chemical Hazards</i></p> <p>1) The degree of potential exposure to chemical contaminants is dependent upon when the surveying is performed. Many surveying activities are performed either before or after all intrusive activities have been completed. As a result, exposure to site contaminants is unlikely. However, exposure concerns may exist during surveying activities conducted at spill sites or in areas where surface contamination is known to exist. It is anticipated that surveying activities at NWIRP Calverton will be performed after all intrusive tasks are completed.</p> <p>Exposure to site contaminants (TPH, fuels, solvents, PCBs and pesticides) is anticipated to be unlikely.</p> <p><i>Physical hazards</i></p> <p>2) Slip, trips, and falls            3) Biological hazards (Insect/animal bites and stings, poisonous plants)</p>	<p>1) Monitoring instrumentation may be used for surveying activities conducted in areas where contamination is anticipated to exist. Generally, monitoring instrumentation is not needed during surveying activities due to the fact that contact with potentially contaminated media is limited. The need for monitoring instrumentation will be made on a case by case basis.</p> <p>2) Minimize contact with potentially contaminated soils, water, debris, etc.</p> <p>3) Avoid potential nesting areas of biting/stinging insects and animals. Use commercially available insect repellents and snake bite kits. Avoid contact with poisonous vegetation. Wear appropriate clothing. Tap ankle and wrists areas to prevent ticks, chiggers, etc. from attaching themselves to you skin. Wear light colored clothing so that ticks and other biting insects can be easily visible.</p> <p>4) Obtain help when handling heavy or cumbersome loads. Avoid areas of rocky or uneven terrain. Use appropriate equipment (rope ladders, harnesses, ladders, etc.) when needed.</p>	<p>No air monitoring is needed given the unlikelyhood that volatile contaminants are present. The potential for exposure to site contaminants during this activity is considered minimal.</p> <p>Minimize the generation of airborne dusts since many site contaminants are in the form of a particulate or may be bound to particulates.</p>	<p>Surveying activities shall be performed in Level D protection</p> <p><b>Level D Protection</b> consists of the following:            Steel-toe / shank boots, safety glasses, hard hats (if working near machinery), and standard field dress including long sleeved, long pants.</p> <p>Tyvek coveralls may be worn to provide additional protection against poisonous plants and insects, particularly ticks. Disposable boot covers are required in any areas identified as having containing surface contamination. Work gloves may be worn if desired. Surgical style nitrile gloves must be worn if the potential for contact with contaminated media exists.</p>	<p><b>Personnel Decontamination</b> - Will consist of the removal and disposal of outer protective clothing (disposable boots covers, gloves, etc.), if worn. This function will take place at an area adjacent to the surveying operations. The decontamination procedure will consist of:</p> <ul style="list-style-type: none"> <li>- An equipment drop</li> <li>- Removal and disposal of disposable PPE</li> <li>- Wash hands and face, leave contamination reduction zone</li> </ul>

\*PPE items noted in italics are optional, based on site condition and observations, at the discretion of the SSO.

## 4.0 HAZARD ASSESSMENT

### 4.1 CHEMICAL HAZARDS

The primary hazards associated with this investigation include potential exposure to Total Petroleum Hydrocarbons (TPH), jet fuels (JP-5) and associated BTEX compounds, chlorinated hydrocarbons typically associated with solvents and paints (1,1,1-trichloroethane, methylene chloride, methyl ethyl ketone), and various metals including lead. Semivolatile Organic Compounds (SVOC), polychlorinated byphenyls (PCBs), and pesticides have been detected at low concentrations and are not anticipated to represent a significant occupational exposure concern provided appropriate PPE and site control measures are instituted. Potential routes of exposure to site contaminants include inhalation, direct contact with skin, and to a lesser extent ingestion. Section 2.0 identifies each of the sites and the associated contaminants that are anticipated to be present at each site. Additionally, Table 4-1 provides additional information regarding specific site contaminants.

#### 4.1.1 Total Petroleum Hydrocarbons

In addition to the site contaminants listed in Table 4-1, workers have the potential to be exposed to petroleum based hydrocarbon constituents of tar. When high concentrations of petroleum vapors are inhaled, symptoms of intoxication may result. These symptoms, ranging from dizziness to excitement or unconsciousness, are similar to those produced by alcohol. If such effects occur, the victim should be removed to an area with fresh air which should result in complete recovery. Prolonged or repeated exposure to some petroleum products, especially those containing benzene soluble polycyclic aromatic hydrocarbons, may cause cancer. However, exposures of this magnitude and duration are not anticipated in the performance of the planned site activities at this site. As a precautionary measure, continuous air monitoring methods will be employed to assess potential exposures to airborne vapors. Repeated or prolonged skin contact with petroleum products may cause skin irritation and rashes. Some constituents of petroleum products may be absorbed through the skin.

#### 4.1.2 Chlorinated Hydrocarbons

Various chlorinated hydrocarbons have been widely used as chemical intermediates and solvents. The predominant physiological response to exposure to many chlorinated hydrocarbons results in central nervous system (CNS) depression. General symptoms of exposure include dizziness, visual disturbances, mental confusion, fatigue, nausea, vomiting, and headache. Studies have shown repeated or prolonged exposure to chlorinated hydrocarbons may result in damage to the liver and kidneys. Some chlorinated hydrocarbons

have been identified as having carcinogenic properties. However, carcinogenicity is dependent upon the specific chlorinated hydrocarbon of concern. Additional information for specific chlorinated hydrocarbons is provided in Table 4-1 of this HASP.

## **4.2 PHYSICAL HAZARDS**

During the execution of the scope of work (see section 3.0) certain physical hazards may be encountered while engaged in onsite activities. Based on the hazard analyses of each task and operation, it is anticipated that the following physical hazards could be encountered:

- Contact with energized sources
- Exposure to moving machinery, particularly during drilling activities
- Uneven or unstable terrain (slip, trip, and fall hazards)
- Strain, sprains or muscle pulls
- Noise in excess of 85 dBA
- Falls from elevated surfaces
- Heat stress (particularly if chemical protective coveralls are worn in warm/hot weather)
- Cold stress (during site activities conducted in cold weather)
- Working on or near waters edge
- Inclement weather
- Biological hazards including biting or stinging insects and poisonous plants and animals (of particular concern is contact with disease carrying ticks)

Appropriate control measures to mitigate these physical hazards are discussed below and are also discussed in Table 3-1 of this HASP.

### **4.2.1 Contact with Energized Sources**

To avoid hazards of this type, no drilling mast or any other such projecting items shall be permitted within a 20-foot radius of any energized source. Also, any areas targeted for subsurface activities shall first be investigated to determine the presence of underground utilities. Spotters will be used if equipment such as drill rigs are to be moved in or around any overhead utility lines.

**TABLE 4-1  
CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA  
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Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Methylnaphthalene	90-12-0 (1-) 91-57-6 (2-) 1321-94-4	There is no information available regarding this substance. It is assumed that this substance based on its characteristics is detectable using an FID however, relative response ratio was not available.	Air sample using charcoal tube; carbon disulfide desorption; GC/FID detection; Sampling and analytical protocol in accordance with OSHA 07 or NIOSH Method #1501.	None established for this compound. However, it is recommended that 0.2 mg/m <sup>3</sup> for coal tar pitch volatiles be employed where excessive concentrations may exist. This is more relevant for those PAHs considered carcinogenic.	Information regarding this substance was limited. This material is a natural constituent of coal tar.  Adequate - Odor threshold 0.012-0.023 mg/m <sup>3</sup> . The use of air-purifying respirators with organic vapor cartridge/HEPA filter up to 10 ppm is acceptable, providing cartridges are changed at the beginning of each shift.  Recommended gloves: Butyl - >8.00 hrs; are recommended for other coal tar pitch associated substances; Neoprene >4.00 hrs; Nitrile >1.00 hrs	<b>Boiling Pt:</b> 434-507°F; 241-264°C <b>Melting Pt:</b> -8°F(1-),94°F (2-); -22°C (1-), 35°C (2-) <b>Solubility:</b> Insoluble in water <b>Flash Pt:</b> Not available <b>LEL/LFL:</b> Not available <b>UEL/UFL:</b> Not available <b>Density:</b> 1.0058 (Beta isomer); 1.02 (alpha isomer) <b>Vapor Density:</b> 4.91 (1-) <b>Vapor Pressure:</b> 180-260 mmHg <b>Specific Gravity:</b> 0.994 (2-); 1.025(1-) <b>Incompatibilities:</b> Strong oxidizers, alkalis, and acids. <b>Appearance and Odor:</b> Colorless liquid (alpha isomer) with an acrid odor. The Beta isomer is a solid with slight odor.	Overexposure to this substance has shown to be a skin, eye, and mucous membrane irritant. This substance is not considered a photosensitizer. This substance is considered mildly to moderately toxic by ingestion.
Ethylbenzene	100-41-4	PID: I.P 8.76, High response with PID and 10.2 eV lamp.  FID: 100% response with FID.	Air sample using charcoal tube; carbon disulfide desorption; GC/FID detection. Sampling and analytical protocol in accordance with OSHA Method #07 or NIOSH Method #1501 Aromatic Hydrocarbon.	ACGIH; NIOSH: 100 ppm; 125 ppm STEL  OSHA: 100 ppm  IDLH: 800 ppm	Adequate - Can use air-purifying respirator with organic vapor cartridge up to 800 ppm.  Recommended gloves: 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.
Diesel Fuel No.2-D	Mixture	Components of this substance will be detected readily however no documentation exists as to the relative response ratio of either PID or FID.	Air sample using charcoal tube as a collection media; carbon disulfide desorption; GC/FID detection. Sampling and analytical protocol in accordance with NIOSH Method #1550.	OSHA; NIOSH; ACGIH: 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  Recommended Air Purifying cartridges: Organic vapor  Recommended gloves: Nitrile	<b>Boiling Pt:</b> <170-400°F; 77-204°C <b>Melting Pt:</b> Not available <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. Due to 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 anesthetic to unconsciousness. High concentrations in a confined space may adequately displace oxygen thereby resulting in suffocation.

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Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
JP-4	N/A	Components of this substance will be detected readily however no documentation exists as to the relative response ratio of either the PID or FID.	Air sample using charcoal tube and carbon disulfide desorption; Sampling and analytical protocol shall proceed in accordance with NIOSH Method #1501.	USAF 8 hr - 200 ppm	Kerosene odor threshold ~ 800 ppm Rating - Poor to Adequate  <b>Recommended Air Purifying cartridges:</b> Organic vapor  <b>Recommended gloves:</b> Nitrile	<b>Boiling Pt:</b> <290-470°F; 143-243°C <b>Melting Pt:</b> Not available <b>Solubility:</b> Negligible <b>Flash Pt:</b> -10 to -50°F; -23 to -45°C <b>LEL/LFL:</b> <1% <b>UEL/UFL:</b> 8% <b>Vapor Density:</b> >1 <b>Vapor Pressure:</b> 75 mmHg; 70°F; 21°C <b>Specific Gravity:</b> 0.78 <b>Incompatibilities:</b> strong oxidizers <b>Appearance and odor:</b> Colorless to amber with a kerosene odor	Based on the constituents of jet fuels, it can be surmised that JP-4 is irritating to the eyes, skin, and respiratory tract. <b>Direct contact</b> may result in mild irritation with a possible drying and defatting of the skin <b>Ingestion</b> may result in gastrointestinal irritation, nausea, and vomiting and may be harmful or even fatal. <b>Inhalation</b> of vapors or mists of JP-4 may result in headache, nausea, confusion, narcotic effect, and drowsiness. Chronic inhalation of jet fuel vapors may produce symptoms such as fatigue, anxiety, mood changes, liver and kidney damage, and memory difficulties in exposed workers.
Methylene chloride	75-09-2	PID: 1.P. 11.32 eV, High response with PID and 11.7 eV lamp.  FID: 100% response with FID.	Air sample using charcoal or Anasorb CMS sorbent tube; carbon disulfide desorption; gas chromatography-flame ionization detector; Sampling and analytical protocol shall proceed in accordance with OSHA Method #59, 80, or NIOSH Method #1005.	OSHA: 50 ppm, 100 ppm (Ceiling)  ACGIH: 50 ppm  NIOSH: Lowest feasible concentration  IDLH: 2300 ppm	Inadequate - Odor threshold 160 ppm. Use a gas mask with a Type N canister for concentrations up to 25 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; 40°C).	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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Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Toluene	108-88-3	PID: 1.P. 8.82 eV, High response with PID and 10.2 eV lamp.  FID: 110% response with FID.	Air sample using charcoal tube; carbon disulfide desorption. Sampling and analytical protocol shall proceed in accordance with OSHA Method #07, or NIOSH Method #1500.	OSHA: 200 ppm 300 ppm (Ceiling)  ACGIH: 50 ppm (skin)  NIOSH: 100 ppm 150 ppm STEL  IDLH: 500 ppm	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.
Trichloroethylene	79-01-6	PID: 1.P. 9.45 eV, High response with PID and 10.2 eV lamp.  FID: 70% Response with FID.	Air sample using charcoal tube; carbon disulfide desorption; Sampling and analytical protocol shall proceed in accordance with OSHA Method #07, or NIOSH Method #1022 or #1003.	OSHA: 50 ppm; 200 ppm (Ceiling)  ACGIH: 50 ppm; 100 ppm STEL  NIOSH: 25 ppm  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 mmHg @ 90°F; 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 GI disturbances including nausea, and vomiting. NIOSH lists this substance a potential human carcinogen.
Vinyl chloride	75-01-4	PID: 1.P. 9.99 eV, High response with PID and 10.2 eV lamp.  FID: 40% response with FID.	Air sample using charcoal or Anasorb CMS sorbent tube; carbon disulfide desorption; gas chromatography-flame ionization detection; Sampling and analytical protocol shall proceed in accordance with NIOSH Method #1007, or OSHA Method #75.	OSHA: 1.0 ppm; 5.0 ppm (Ceiling)  ACGIH: 5 ppm  NIOSH: Lowest Feasible Concentration	Inadequate - Odor threshold 10-20 ppm. Gas Mask with a vinyl chloride Type N canister may be employed for concentrations up to 25 ppm. Canisters employed must have a minimum service life of 4-hrs. Exceedances over 25 ppm, must use a positive pressure demand, open-circuit, self-contained breathing apparatus, pressure demand type, with full facepiece. Refer to 29 CFR 1910.1017(g) for specific requirements based on atmospheric concentrations of vinyl chloride.  <b>Recommended gloves:</b> Silver shield >6.00 hrs; Nitrile 5.70 hrs; or Viton 4.4 hrs	<b>Boiling Pt:</b> 7°F; -13.9°C <b>Melting Pt:</b> -256°F; -160°C <b>Solubility:</b> 0.1% @ 77°F; 25°C <b>Flash Pt:</b> 18°F; -8°C <b>LEL/LFL:</b> 3.6% <b>UEL/UFL:</b> 33% <b>Vapor Density:</b> 2.21 <b>Vapor Pressure:</b> 3.3 atm <b>Specific Gravity:</b> N.A. <b>Incompatibilities:</b> Oxidizers, copper, aluminum, peroxides, iron, steel, <b>Appearance and Odor:</b> Colorless gas or liquid (below 7°F) with a pleasant odor at high concentrations.	A severe skin, eye, and mucous membrane irritant (Liquid: frostbite). Narcotic effect causing weakness, abdominal pains, GI bleeding, and pallor skin or cyanosis. Chronic exposure has been linked to the formation of malignant tumors originating from blood lymphatic vessels in the liver (associated enlargement of the liver), and kidneys (angiosarcoma and nephroblastoma). Listed as a carcinogen by NTP, IARC and ACGIH.

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Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Xylene All isomers o-,m-, p-	1330-20-7	PID: I.P. 8.56 eV, High response with PID and 10.2 eV lamp.  FID: 110% response with FID.	Air sample using charcoal tube; carbon disulfide desorption; GC/FID detection. Sampling and analytical protocol shall proceed in accordance with OSHA 07, or NIOSH Method 1500.	ACGIH, & NIOSH: 100 ppm, 150 ppm STEL  OSHA: 100 ppm  IDLH: 900 ppm	Adequate - Odor thresholds for the following isomers: 0.6 m-; 5.4 p-; 20 o- ppm. Can use air-purifying respirator with organic vapor cartridge up to 1,000 ppm concentrations.  <b>Recommended gloves:</b> PV Alcohol >12.67 hrs; Viton >8.00 hrs; CPE >1.00 hr; Butyl 0.87 hrs; Nitrile is acceptable for limited operations and contact (>0.20 hrs)	<b>Boiling Pt:</b> 269-281°F; 132-138°C <b>Melting Pt:</b> -13o/-54m/56p°F; -25o/- 48m/13p °C <b>Solubility:</b> 0.02 % <b>Flash Pt:</b> 81-90°F;27-32°C <b>LEL/LFL:</b> 0.9% <b>UEL/UFL:</b> 7.0% <b>Vapor Density:</b> 3.66 <b>Vapor Pressure:</b> 7-9 mmHg @ 70°F; 21° C <b>Specific Gravity:</b> 0.86-0.88 <b>Incompatibilities:</b> Strong oxidizers and strong acids <b>Appearance and odor:</b> Colorless liquid with an aromatic odor.	Effects may of overexposure include irritation at all points of contact, CNS changes (i.e. dizziness, excitement, drowsiness, incoherent, staggering gait), difficulty in breathing, pulmonary edema, and possibly respiratory failure.  Chronic effects may include dermatitis and cornea vacuolization.
Aluminum	7429-90-5	Particulate form - unable to be detected by PID/FID.	Air sample using a cellulose ester membrane filter (particulate filter); atomic absorption (Method #7013) or ICP (Method #7300). Sampling and analytical protocol shall proceed in accordance with NIOSH Methods #7013 and #7300 as applicable.	OSHA: 15 mg/m <sup>3</sup> Total dust, 5 mg/m <sup>3</sup> Respirable fraction  NIOSH: 10 mg/m <sup>3</sup> Total dust, 5 mg/m <sup>3</sup> Respirable fraction  ACGIH: 10 mg/m <sup>3</sup>	Particulate form - No identifiable warning properties to indicate presence and thereby detection.  Employ air purifying respiratory protection 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> 4452°F; 2450°C <b>Melting Pt:</b> 1220°F; 660°C <b>Solubility:</b> Insoluble <b>Flash Pt:</b> Nonflammable <b>LEL/LFL:</b> Nonflammable <b>UEL/UFL:</b> Nonflammable It should be noted that finely divided powders or dust when airborne becomes moderately flammable/explosive when exposed to heat, flame, or powerful oxidizers <b>Vapor Density:</b> Not available <b>Vapor Pressure:</b> 1 mmHg @ 2343°F; 1284°C <b>Specific Gravity:</b> 2.702 @ 77°F; 25°C <b>Incompatibles:</b> Acids, alkalis, oxidizers, halogens and halocarbons, alcohols <b>Appearance and odor:</b> silvery gray ductile, lustrous metal	Inhalation of finely divided powders or dusts may result in difficulty in breathing, coughing, and has been reported to cause pulmonary fibrosis. This malady known as "Shavers disease" is a form of benign pneumoconiosis.
Beryllium	7440-41-7 as Be	Particulate form - This substance is unable to be detected by PID/FID.	Air sample using a particulate filter; acid desorption; AAS/GF detection. Sampling and analytical protocol shall proceed in accordance with NIOSH Method #7102.	OSHA: 0.002 mg/m <sup>3</sup> , (Ceiling) 0.005 mg/m <sup>3</sup>  NIOSH: 0.0005 mg/m <sup>3</sup>  ACGIH: 0.002 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> 5378°F; 2970°C <b>Melting Pt:</b> 2332°F; 1278°C <b>Solubility:</b> Insoluble <b>Flash Pt:</b> Not available (Airborne dust may burn or explode when exposed to heat, flame, or incompatible chemicals) <b>LEL/LFL:</b> Not available <b>UEL/UFL:</b> Not available <b>Vapor Density:</b> Not available <b>Vapor Pressure:</b> 0 mmHg <b>Specific Gravity:</b> 1.85 <b>Incompatibilities:</b> Halocarbons, strong oxidizers, acids and caustics <b>Appearance and odor:</b> gray to white hard light metal, brittle	Overexposure to this substance may result in respiratory symptoms including difficulty in breathing, coughing, rales, chest pain, possibly pulmonary edema, weakness, fatigue, headache, weight loss. Direct contact may result in irritant action on the skin (dermatitis), eyes (conjunctivae), and mucous membranes. This substance has been identified as a potential human carcinogen.

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Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Chromium Compounds	7440-47-3 (Element)	Not detectable by PID. Not detectable by FID.	Air sample using mixed cellulose -ester filter; acid desorption and analysis by atomic absorption. Sampling and analytical protocol shall proceed in accordance with NIOSH Method #7024.	OSHA & NIOSH: (Chromium II, III) 0.5 mg/m <sup>3</sup> (Chromium VI) 0.1 mg/m <sup>3</sup> (Ceiling)  ACGIH: 0.5 mg/m <sup>3</sup> (Chromium II, III compounds), 0.05 mg/m <sup>3</sup> (Chromium VI compounds)  IDLH: 30 mg/m <sup>3</sup> (Chromium VI compounds)	The use of a 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 is in 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> Not available <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.
Lead	7439-92-1	Particulate form - Unable to be detected by either PID or FID.	Air sample using a mixed cellulose ester filter; or HNO <sub>3</sub> or H <sub>2</sub> O <sub>2</sub> desorption; or Atomic absorption detection. Sampling and analytical protocol shall proceed in accordance with NIOSH Method #7082 or #7300.	OSHA: 0.05 mg/m <sup>3</sup>  ACGIH: 0.15 mg/m <sup>3</sup>  NIOSH: 0.10 mg/m <sup>3</sup>  IDLH: 100 mg/m <sup>3</sup> as lead	The use of a 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.
Manganese	7439-96-5 as Mn	Particulate form - This substance is unable to be detected by PID/FID.	Air sample using particulate filter; acid desorption, ICP detection. Sampling and analytical protocol shall proceed in accordance with NIOSH Method #7300.	OSHA: Ceiling 5 mg/m <sup>3</sup> as a fume 1 mg/m <sup>3</sup>  NIOSH: 1 mg/m <sup>3</sup> for dust and fume; 3 mg/m <sup>3</sup> as a STEL  ACGIH: 5 mg/m <sup>3</sup> for dust; 1 mg/m <sup>3</sup> for fume  IDLH: 500 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> 3452°F; 1900°C <b>Melting Pt:</b> 2300°F; 1260°C <b>Solubility:</b> Insoluble <b>Flash Pt:</b> Not available (Airborne dust may burn or explode when exposed to heat, flame, or incompatible chemicals. This substance is considered a combustible solid.) <b>LEL/LFL:</b> Not available <b>UEL/UFL:</b> Not available <b>Vapor Density:</b> Not available <b>Vapor Pressure:</b> 1 mmHg @ 2358°F; 1292°C <b>Specific Gravity:</b> 7.20 <b>Incompatibilities:</b> Strong oxidizers, halogens, and nitrates. Will react with water to produce hydrogen gas. <b>Appearance and odor:</b> Silvery solid or reddish-gray, odorless	Overexposure to this product may result in Central Nervous System and pulmonary effects by inhalation. Symptoms may include disturbances in gait and speech, sleepiness, mental confusion, stolid, masklike face, muscular twitching varying from tremors to coarse rhythmical movements of the extremities accompanied by cramps. Symptoms are described as postencephalitic Parkinsonism. Additionally dry throat, tightness in the chest, dyspnea, rales, flu-like symptoms low back pain, and vomiting.

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Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
DDT and the major metabolites; DDD and DDE.	50-29-3 72-54-8 72-55-9	Substance is not volatile, I.P. is unknown, detection by PID is unknown. Substance non-combustible, therefore a FID is anticipated to have reduced response to DDT.	Air sample using a binder free, glass fiber filter; isooctane desorption; gas chromatography-electron capture detector. Sampling and analytical protocol will proceed in accordance with NIOSH Method #3(S274).	OSHA; ACGIH: 1 mg/m <sup>3</sup>  NIOSH: 0.5 mg/m <sup>3</sup>	Adequate - Can use air purifying respirator with high efficiency particulate air filter (HEPA).  <b>Recommended glove:</b> Nitrile acceptable for incidental contact.	<b>Boiling Pt:</b> 230°F; 110°C <b>Melting Pt:</b> 226°F; 108°C <b>Solubility:</b> Insoluble <b>Flash Pt:</b> 162-171°F; 72-77°C <b>LEL/LFL:</b> Not available <b>UEL/UFL:</b> Not available <b>Vapor Density:</b> Not available <b>Vapor Pressure:</b> Low <b>Specific Gravity:</b> 0.99 <b>Incompatibilities:</b> Strong oxidizers and alkalis <b>Appearance and Odor:</b> Colorless crystals or off-white powder with a slight aromatic odor	Large doses are followed by vomiting due to gastric irritation, diarrhea may follow. Numbness and paresthesias of the lips tongue and face associated with malaise, headache, sorethroat, fatigue and weakness. Coarse tremors (usually first of the neck, head, and eyelids). This may be accompanied by confusion, apprehension, and depression. Convulsions may result and death may occur from respiratory failure. DDT is absorbed and retained in the fat of humans. Chronic exposure may result in damage to the liver, kidneys and Peripheral Nervous System. DDT is recognized as possessing carcinogenic properties by IARC and NTP.
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), I.P. is unknown however is anticipated to be elevated, therefore, PID is not anticipated to detect this 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; gas chromatography-electron capture detector. Sampling and analytical protocol shall proceed in accordance with NIOSH Method #5503 (PCBs).	OSHA; ACGIH: 0.5 mg/m <sup>3</sup> (skin)  NIOSH: 0.001 mg/m <sup>3</sup>  IDLH: 5 mg/m <sup>3</sup>	Inadequate - However due to the low volatility it is assumed unless agitated this substance does not present a volatile vapor or gas respiratory threat. 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 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, & chlorinated dibenzo-p-dioxins <b>Vapor Density:</b> Not available <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.

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Substance	CAS No.	Air Monitoring/Sampling Information		Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Methyl ethyl ketone (2-Butanone)	78-93-3	PID: I.P. 9.54 eV, high response with PID and 10.2 eV lamp.  FID: 80% relative response ratio with FID.	Air sample using Ambersorb tube; carbon disulfide desorption; GC/FID detection. Sampling and analytical protocol shall proceed in accordance with OSHA Method #16, 84 or NIOSH Method #2500.	OSHA; NIOSH; ACGIH: 200 ppm  NIOSH; ACGIH: have established STEL of 300 ppm  IDLH: 3000 PPM	Adequate - Can use air purifying respirator with organic vapor cartridges up to 2000 ppm.  <b>Recommended glove:</b> Poly vinyl alcohol or natural rubber.	<b>Boiling Pt:</b> 175°F; 79°C <b>Melting Pt:</b> -124°F; -86.4°C <b>Solubility:</b> 28% <b>Flash Pt:</b> 16°F; 9°C <b>LEL/LFL:</b> 1.4% <b>UEL/UFL:</b> 11.4% <b>Vapor Density:</b> 2.41 <b>Vapor Pressure:</b> 71 mmHg <b>Specific Gravity:</b> 0.81 <b>Incompatibilities:</b> Strong oxidizers, amines, ammonia, inorganic acids, caustics, copper, isocyanates, pyridines <b>Appearance and odor:</b> Colorless liquid with a moderately sharp, fragrant mint- or acetone like odor	Exposure may result in irritation to the eyes and nose. Overexposure may cause headache, dizziness, and vomiting. Target organs are the Central Nervous System and lungs.
Naphthalene	91-20-3	PID: I.P. 8.12 eV, relative response ratio unknown.  No information was found as to the relative response for FID, however it is certain it is detectable at a high response.	Air sample using charcoal tube; carbon disulfide desorption; GC/FID detection. Sampling and analytical protocol in accordance with OSHA Method #35 or NIOSH Method #1501.	OSHA; NIOSH; ACGIH: 10 ppm  NIOSH; ACGIH: have established a STEL of 15 ppm.  IDLH: 250 ppm	Odor Threshold 0.038 ppm, Adequate - Use an air purifying respirator with organic vapors and dust/mists cartridges for concentrations up to 250 ppm.  <b>Recommended glove:</b> Nitrile >6.00 hrs; Neoprene >6.00 hrs	<b>Boiling Pt:</b> 424°F; 218°C <b>Melting Pt:</b> 176°F; 80°C <b>Solubility:</b> 0.003% <b>Flash Pt:</b> 174°F; 79°C <b>LEL/LFL:</b> 0.9% <b>UEL/UFL:</b> 5.9% <b>Vapor Density:</b> Not available <b>Vapor Pressure:</b> 1 mmHg <b>Specific Gravity:</b> 1.15 <b>Incompatibilities:</b> Strong oxidizers, chromic anhydride <b>Appearance and odor:</b> Colorless to brown solid with and odor of mothballs	Overexposure to this substance may result in irritation to the eyes, headache, confusion, excitement, nausea, vomiting, abdominal pain, irritation of the bladder, profuse sweating, jaundice, blood in the urine, renal (kidney shutdown), and dermatitis. Prolonged or chronic exposure may further cause optical neuritis, and corneal damage. Target organs are listed as eyes, blood, liver, kidneys, skin, red blood cells, and central nervous system.
1,1,1-Trichloroethane	71-55-6	PID: I.P. 11.00 eV relative response ratio unknown.  FID: 110% relative response ration with a FID.	Air sample using charcoal / coconut sorbent material and carbon disulfide desorption; GC/FOD detectopm/ Sampling and analytical protocol in accordance with NIOSH Method 1003 or OSHA Method 14.	OSHA; NIOSH; ACGIH: 350 ppm  ACGIH STEL: 450 ppm  IDLH: 700 ppm	Odor Threshold 390 ppm, Questionable warning properties - Use an air-purifying respirator with organic vapor cartridges.  <b>Recommended glove:</b> Nitrile >2 hours; Poly vinyl alcohol > 6.00 hours	<b>Boiling Pt:</b> 165°F; 218°C <b>Melting Pt:</b> NA <b>Solubility:</b> 0.4% <b>Flash Pt:</b> Unknown <b>LEL/LFL:</b> 7.5% <b>UEL/UFL:</b> 12.5% <b>Vapor Density:</b> Not available <b>Vapor Pressure:</b> 100 mmHg <b>Specific Gravity:</b> 1.34 <b>Incompatibilities:</b> Strong caustics and oxidizers, chemically active metals such as zinc, aluminum, magnesium, and potassium <b>Appearance and odor:</b> Colorless liquid with a mild chloroform-like odor.	Exposure to this substance may be irritating to the eyes and skin. Inhalation may cause headache, cardiac arrhythmias, CNS effects including dizziness, loss of coordination, loss of equilibrium, and confusion.. Skin contact may cause dermatitis consisting of red, dry, itching skin. Long term, repeated exposure may cause damage to the liver.

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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	PID: I.P. 9.32 eV, relative response ratio 200% with 10.6 eV lamp.  FID: 70% relative response ratio with a FID.	Air sample using charcoal tube; carbon disulfide desorption; GC/FID detection. Sampling and analytical protocol shall proceed in accordance with OSHA Method #07, or NIOSH Method #1003.	ACGIH: 25 ppm 100 ppm STEL  OSHA: 100 ppm 200 ppm Ceiling; 300 ppm 5-minute max peak in any 3-hr period.  IDLH: 150 ppm	Odor threshold for this substance has been determined to be at airborne concentrations of approximately 47 ppm, which is considered adequate. APR with organic vapor/acid gas cartridges should be used for escape purposes only. Exceedances over the recommended exposure limits requires 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> 5.83 <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 a animal carcinogen (liver tumors), however, inadequate evidence exists concerning carcinogenic potential in humans.

#### **4.2.2 Exposure to Moving Machinery**

Personnel shall also be advised of the hazards associated with working in a close proximity to moving machinery (i.e. drill rig). Safety measures employed to overt hazards of this nature will include: using only proper fitting personal protective equipment to avoid possible entanglement in moving parts; employing lockout/tagout procedures prior to performing maintenance functions on equipment; and lastly, all equipment, prior to use, then periodically afterwards will be inspected by the SSO or their onsite representative to ensure all guards, protective cages, and emergency shut-off devices are in place and functioning properly. All equipment (i.e., hand tools, portable power tools), and machinery on site (i.e., drill rigs) will be kept properly maintained, positioned, guarded, and operated. All maintenance performed on equipment shall be done so in accordance with manufacturer's specifications.

#### **4.2.3 Uneven or Unstable Terrain**

During various site activities there is potential for slip, trip, and fall hazards associated with wet, steep or unstable banks and sediment surfaces along creeks, ditches, and the disposal pond and other areas associated with this scope of work. To minimize the hazards of this nature, personnel required to work in and along areas prone to these types of hazards will be required to employ life lines and/or safety harnesses, ring buoys and other means of personnel extraction suitable for the task at hand. All sampling conducted will be performed utilizing the Buddy system with one member of the team in position for extraction. Equipment and personnel must stay away from the edges of open excavations. Any samples from within test pits will be collected directly from the bucket of the backhoe. No personnel will be permitted to enter open excavations with depths greater than 4 feet.

#### **4.2.4 Strain, Sprains and/or Muscle Pulls**

During execution of this scope of work there is potential for strains, sprains and/or muscle pulls due to the physical demands and nature of this site work. To avoid injury, during lifting tasks personnel are to lift with the force of the load carried by their legs and not their backs. When lifting or handling heavy material or equipment, use an appropriate number of personnel. Keep the work area free from ground clutter. Use gravel or sand where necessary and feasible to improve traction. Due to the type of environment/topography (soft muck, swampy type environment in some locations), locomotion and operation will be extremely difficult. These conditions increase hazard potential and make even small jobs more difficult. Therefore extreme caution and best professional judgment should be exercised to mitigate these hazards as they are encountered.

#### **4.2.5 Noise in Excess of 85 dBA**

Various site activities, particularly those utilizing machinery (drill rigs, backhoes, etc.) and tools, have the potential to create noise levels that exceed 85 dBA. As a precautionary measure, hearing protection will be available on site and required for use during heavy equipment operation and during other tasks should it be deemed necessary. The SSO will determine the need to conduct a noise survey of operations.

#### **4.2.6 Falls from Elevated Surfaces**

Although no activities from elevated surfaces are planned, the potential for this hazard may exist in activities such as test pitting activities, or if maintenance needs require someone to work from a ladder to perform repairs on a raised drill rig mast. During test pitting activities, personnel shall maintain a minimum distance of 3 feet from the pit to avoid the potential of falling into the pit in the event of a cave-in. Personnel are not permitted, under any circumstances, to enter the test pit to retrieve a sample or otherwise. Also, during excavation, personnel shall maintain a distance of the full length of the extended boom plus 3 feet. All test pits will be adequately barricaded to prevent access. No test pits will be left unattended. Any activity conducted at a level greater than four (4) feet above the ground surface will require the use of ANSI fall protection, as applicable.

#### **4.2.7 Ambient Temperature Extremes (Heat / Cold Stress)**

As this scope of work will require personnel to employ personal protective equipment (PPE) as a means of protection from both chemical and physical hazards, the potential for heat related disorders during the proposed field dates is present. To combat this problem the FOL and the SSO shall initiate heat stress monitoring, and effect the appropriate control efforts, in accordance with the American Conference of Governmental Industrial Hygienists (ACGIH) recommended control measures

Cold stress controls developed by the ACGIH are intended to protect field personnel from injury as a result of working in cold climates or from immersion in low temperature water. The information is presented in the ACGIH Threshold Limit Value and Biological Exposure Indices discusses definitions, signs and symptoms of overexposure, and evaluation and control for working in cold climates.

#### **4.2.8 Water Hazards**

In the execution of this scope of work, there are planned activities which may be only accessible by boat or along waters edge. To minimize potential drowning hazards associated with working on waters edge or over

water the field team shall employ U.S Coast Guard approved personal flotation devices when working on or within four feet of the water. All activities on water or at waters edge will be terminated should inclement weather conditions arise. This will be at the discretion and direction of the FOL and the on SSO.

#### **4.2.9 Inclement Weather**

As all work will be conducted outdoors, inclement weather may be encountered. As conditions may vary, it will be at the discretion of the FOL and SSO representative on the team to terminate work or continue work if these conditions present themselves. All activities shall be terminated in the event of electrical storms.

Additional control measures for these physical hazards are included in Section 12.0, "Standard Work Practices," of this HASP.

#### **4.2.10 Biological Hazards**

Biological hazards such as stinging or biting insects and poisonous plants and animals have the potential to be present at the site. Potential nesting areas should be avoided to the greatest extent possible. Commercially available insect repellents and snake bite kits are available for use by site personnel. Of particular concern is the potential exposure to disease carrying ticks since they have been identified as a serious problem at the site. Some diseases associated with ticks include Lymes disease, Rocky Mountain Spotted Fever, Ehrlichiosis, Boutonneuse Fever, and Tick Paralysis. Workers performing activities in vegetated areas will utilize PPE and commercially available repellents to minimize contact with ticks. Tyvek coveralls with taped ankle and wrist seams provide additional protection since ticks cannot come into contact with workers skin. Additionally, light colored clothing helps to identify ticks that are adhering to clothes. Additional information regarding tick control and Lymes disease are provided in Section 6.0, Module 4 of the Brown & Root Environmental Health and Safety Guidance Manual.

## **5.0 AIR MONITORING AND ACTION LEVELS**

### **5.1 AIR MONITORING REQUIREMENTS**

This section presents the requirements for the use of real time monitoring instruments during site activities. It establishes the types of instruments to be used, techniques and frequencies for their use, and methods for instrument maintenance, and calibration are described. This section represents the primary mechanisms for the detection of site contaminants will be continuous monitoring with a flame ionization detector and/or photoionization detector (PID) with a 10.6 eV lamp source, the worker's sense of smell, and perception of irritation. Visual observation will aid in evaluating contaminants that are in the form of a suspended particulates or are bound to particulates.

Background readings shall be determined at a location upwind from potential sources of emissions. Sources, such as within the borehole, excavated materials (soils, sediment and water), contaminated materials loading area/operation, and decontamination fluids and sediments shall be monitored continuously for off gas emissions. Worker breathing zones shall be monitored whenever source readings indicate concentrations greater than background levels or anytime potential sources of emissions are identified. Worker breathing zone readings above background levels but less than 10 ppm will require site activities to be temporarily suspended and additional air monitoring using Draeger tubes to be collected. Draeger tubes for vinyl chloride will be used during additional air monitoring efforts to determine appropriate levels of protection. Draeger tube sampling activities are discussed in Section 5.6 of this HASP. Worker breathing zone readings > 10 ppm or vinyl chloride concentrations > 10 ppm require site activities to be suspended. Air monitoring procedures and activities for each task are discussed in greater detail in Table 3-1 of this HASP.

### **5.2 FREQUENCY OF MONITORING**

Monitoring shall be conducted continuously during all intrusive operations such as bore holes, test pits, and sample collection activities. Additionally, monitoring will be initiated at any potential source emissions, then moved to the worker's breathing zone if positive indications are observed at the source.

### **5.3 INSTRUMENT CALIBRATION AND MAINTENANCE**

Air monitoring instruments are pre-field calibrated and maintained at the Brown & Root Environmental equipment warehouse. Field calibrations will be performed prior to each daily use in accordance with the manufacturers recommendations and Brown & Root Environmental Standard Operating Procedures. Field maintenance will consist of daily cleaning of the outer surfaces of the instruments with a damp cloth,

replenishment of hydrogen (FID), cleaning of the lamp with a dry lint-free cloth (PID), and overnight charging of batteries.

All equipment maintenance and calibration efforts onsite shall be conducted by SSO, or his/her designee in accordance with the following Brown & Root Environmental Health and Safety Standard Operating Procedures provided in the Module 1 of the Brown & Root Environmental Health and Safety Guidance Manual.

#### **5.4 VISUAL OBSERVATION**

Based on the hazard assessment, many of the site contaminants (particularly metals and to a lesser extent PCBs and pesticide) are in the form of a particulate or may be bound to particulates. As a result, the potential presence of these contaminants can be determined by visual observations of airborne dusts and particulates. Additionally, exposure to these contaminants can be adequately controlled by preventing or reducing the generation of airborne dusts by employing area wetting methods. Particulate form site contaminants may also be ingested through incidental hand to mouth activities (eating, drinking, smoking or chewing tobacco). To control potential exposure to site contaminants through these activities, following site restrictions, proper decontamination, and personal hygiene measures (washing hands and face prior to performing hand to mouth activities) are essential.

#### **5.5 ADDITIONAL AIR MONITORING ACTIVITIES (COLORIMETRIC TUBE SAMPLING)**

Any sustained readings in worker breathing zones above background level but less than 10 ppm will require site activities to be temporally suspended while additional air monitoring activities are performed to determine appropriate levels of protection. These additional air monitoring activities will be used to determine appropriate levels of protection for continued work. Any worker breathing zone readings greater than 10 ppm will require site activities to be suspended until readings subside. The following procedures will be used to conduct additional air monitoring activities:

1. Review the instructions contained in the Draeger vinyl chloride (1/a) colorimetric tube package. This information will provide the procedure to be used and will include information such as the number of strokes of the hand pump, the intended reaction and color change, the tubes range of detection, and any possible interferences.
2. Worker(s) performing additional sampling will don level C protection (full-face air-purifying respirator with combination GMC-H filter cartridges).

3. Collect the sample from the breathing zone following the procedures listed in the instructions.  
The standard measuring range of the (1/a) tube is either 5-50 ppm or 1-10 ppm depending on the number of strokes of the hand pump. The presence of vinyl chloride causes a yellow-orange color in the tubes indicating layer. Any positive indication of vinyl chloride between 1 and 10 ppm requires site activities to be performed in Level C protection. Vinyl chloride at concentrations greater than 10 ppm will require site activities to be suspended. While readings in worker breathing zones remain above background levels (but below 10 ppm), colorimetric tube analysis will be performed every 15 minutes to continuously evaluate concentrations of vinyl chloride.
  
4. If readings confirm the contaminant of concern is **not** vinyl chloride, work may resume in Level D protection provided breathing zone readings remain below 10 ppm above background levels. If breathing zone readings are greater than 10 ppm above background site activities will be suspended.

## **6.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)**

PPE is necessary to protect personnel from exposure to site contaminants that cannot be controlled through engineering or administrative controls. Additionally, many of the physical hazards related to site activities can be controlled or minimized with the use of PPE. PPE requirements for each tasks associated with of the scope of work is provided in Table 3-1 of this HASP.

### **6.1 PPE REQUIREMENTS (GENERAL)**

All work is anticipated to be performed in a Level D Protection. As a minimum, all personnel must wear standard field dress and steel toe/shank work boots while on site. Hard hats and safety glasses must be worn if personnel are within 20 feet of drilling operations and/or if other conditions arise or exist where head and eye protection may be necessary. Many activities will require the use of chemical resistant coveralls, gloves, and boot covers, as presented in the task breakdown in Table 3-1. In addition, it is possible that work will be upgraded to Level C (air-purifying respirators) or Level B (pressure-demand, supplied-air respirators) protection, depending on the results of air monitoring, site conditions, and task at hand.

## 7.0 SITE CONTROL

This section outlines the means by which CF Braun Engineering Corporation will delineate and use 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 work areas.

### 7.1 EXCLUSION ZONE

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 intrusive 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 a designated area surrounding the point of operation (see Table 3-1 for specific operation). The exclusion zone for this activity will be fragmented to represent the areas where the soils are disturbed through drilling, vault installation, and trench excavation activities. All exclusion zones will be delineated using barrier tape, cones and/or drive poles, and postings to inform and direct facility personnel.

#### 7.1.1 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 the facility. Access to the identified work areas of the facility will be coordinated through the site contact. Utility clearances will incorporate the combined efforts of One Call Utility location services and the site contact.

In all cases, no subsurface activities will proceed without utility clearance. In the event that a utility is encountered during a subsurface investigative activity, the appropriate emergency numbers provided in Section 11.0, Table 11-1 will be notified.

When 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.

### **7.1.2            Site Restoration**

To ensure facility personnel, contractors, and the general public are not exposed to the contaminants in question, CF Braun Engineering Corporation will institute the following mechanisms as control measures:

For soils and vegetated areas:

- 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.
  
- All surface plots in and around well heads will be restored prior to releasing these areas back to the facility.

### **7.2                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. Personnel and equipment decontamination will take place in this area. This area will also 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.

### **7.3                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.

#### **7.4 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 7-1. 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, the SSO, and if possible a NWIRP onsite representative. 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.

#### **7.5 SITE VISITORS**

Site visitors for the purpose of this document are identified as 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)
- Northern Division Navy Personnel
- Other authorized visitors

All non-DOD personnel working on this project are required to gain initial access to the facility by coordinating with the CF Braun Engineering Corporation FOL or designee and following established facility access procedures.

Once access to the facility is obtained, all personnel who require site access (areas of ongoing operations) will be required to obtain permission from the FOL. Upon gaining access to the site, all site visitors wishing to observe operations in progress from the exclusion zone will be escorted by a CF Braun Engineering Corporation representative and shall be required to meet the minimum requirements discussed below:

**FIGURE 7-1  
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 \_\_\_\_\_

CF Braun Eng. Corp NWIRP

**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"/>	<input type="checkbox"/>
Procedure for safe job completion.....	<input type="checkbox"/>	<input type="checkbox"/>	Evacuation routes.....	<input type="checkbox"/>	<input type="checkbox"/>
Contractor tools/equipment inspected.....	<input type="checkbox"/>	<input type="checkbox"/>	Assembly points.....	<input type="checkbox"/>	<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 the Health Sciences Department.

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

Permit Issued by: \_\_\_\_\_ Permit Accepted by: \_\_\_\_\_

Job Completed by: \_\_\_\_\_ Date: \_\_\_\_\_

- All site visitors will be routed to the FOL, who will sign them into the field logbook. Information to be recorded in the logbook will include the individuals name (proper identification required), who they represent, and the purpose of the visit.
- All site visitors will be required to produce the necessary information supporting clearance to the site. This include information attesting to applicable training (40-hours of HAZWOPER training required for all Northern Division Navy personnel), and medical surveillance as stipulated in Section 8.0 of this document. In addition, to enter the site operational zones during planned activities, all visitors will be required to first go through site-specific training covering the topics stipulated in Section 10.2, of this HASP.

Once the site visitors have completed the above items they will be permitted to enter the operational zone. All visitors will be escorted by CF Braun Engineering personnel and are required to observe the protective equipment and site restrictions in effect at the site 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 the unauthorized visitor is removed from the premises. Removal of unauthorized visitors will be accomplished with support from the facility. If necessary, the facility contact will be notified of any unauthorized visitors.

## **7.6 WORK SITE SECURITY**

CF Braun Engineering Corporation will retain control over active operational zones (immediate areas in which site activities discussed in the scope of work are being performed). As this activity takes place at a Navy facility, the first line of security will be performed by Navy personnel at the base gate restricting the general public. The second line of security will be performed by CF Braun Engineering Corporation and will take place at immediate areas where site work is being performed. Any visitors wishing to observe site activities will be referred to the FOL. These visitor will be escorted by CF Braun Engineering Corporation personnel at all times.

## **7.7 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. A site map to the hospital will also be provided as part of this HASP.

## **7.8 BUDDY SYSTEM**

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

## **7.9 MATERIAL SAFETY DATA SHEET (MSDS) REQUIREMENTS**

CF Braun Engineering Corporation 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. A chemical inventory of all chemicals used on site will be developed using the Health and Safety Guidance Manual. The MSDSs will then be maintained in a central location (i.e., temporary office) and will be available for anyone to review upon request.

## **7.10 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 submitted for approval by NWIRP for use while at the facility.

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 NWIRP, the FOL will determine and arrange for telephone communications, if it is determined a cellular means will not be used.

## **8.0 MEDICAL SURVEILLANCE**

### **8.1 REQUIREMENTS FOR CF BRAUN ENGINEERING CORPORATION PERSONNEL**

All CF Braun Engineering Corporation personnel participating in project field activities will have had a physical examination meeting the requirements of CF Braun Engineering Corporation'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 CF Braun Engineering Corporation Pittsburgh office and made available as necessary.

### **8.2 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" (Figure 8-1) can 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 Figure 8-1 with a letter, on company letterhead, containing all of the information in the example letter presented as Figure 8-2. Figures 10-1 and 8-2 can be combined into one letter.

### **8.3 REQUIREMENTS FOR ALL FIELD PERSONNEL**

Each field team member (including subcontractors) shall be required to complete and submit a copy of Figure 8-3 (Medical Data Sheet). This shall be provided to the SSO prior to participating in site activities.

FIGURE 8-1

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 found to be medically -

- qualified to perform work at the NWIRP, Calverton work site
- not qualified to perform work at the NWIRP, Calverton work site

and,

2. Undergone a physical examination as per OSHA 29 CFR 1910.134(b)(10) and 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 which 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 8-1  
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 \_\_\_\_\_ work site, this participant

- may  
 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 8-2**

**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. David Brayack, P.E.  
Project Manager  
CF Braun Engineering Corporation  
661 Andersen Drive  
Pittsburgh, Pennsylvania 15220

Subject: Medical Surveillance - NWIRP, Calverton

Dear Mr. Brayack:

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 NWIRP, Calverton.

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 of Company Officer)

**FIGURE 8-3**

**MEDICAL DATA SHEET**

This brief Medical Data Sheet will be completed by all onsite personnel and will be kept in the command post during the conduct of site operations. This data sheet will accompany any personnel when medical assistance is needed or if transport to hospital facilities is required.

Project \_\_\_\_\_

Name \_\_\_\_\_ Home Telephone \_\_\_\_\_

Address \_\_\_\_\_

Age \_\_\_\_\_ Height \_\_\_\_\_ Weight \_\_\_\_\_

Name of Next Kin \_\_\_\_\_

Drug or other Allergies \_\_\_\_\_

Particular Sensitivities \_\_\_\_\_

Do You Wear Contacts? \_\_\_\_\_

Provide a Checklist of Previous Illnesses or Exposure to Hazardous Chemicals \_\_\_\_\_

\_\_\_\_\_

What medications are you presently using? \_\_\_\_\_

\_\_\_\_\_

Do you have any medical restrictions? \_\_\_\_\_

\_\_\_\_\_

Name, Address, and Phone Number of personal physician: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

I am the individual described above. I have read and understand this HASP.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

## **9.0 DECONTAMINATION**

### **9.1 PERSONNEL DECONTAMINATION REQUIREMENTS**

The decontamination of personnel and their protective clothing shall be performed in three stages. Stage 1 includes removing contamination from reusable and disposable protective clothing with a detergent/water solution and soft bristle scrub brushes. Stage 2 shall include removal of protective clothing (grossly contaminated disposable items shall be discarded into a container conspicuously marked "Potentially Contaminated Clothing". Disposable items deemed noncontaminated shall be disposed of as normal refuse on base). Stage 3 shall consist of workers washing hands and face with potable water and soap and/or leave the exclusion (or "Hot") zone. Additional decontamination procedures are discussed in Table 3-1 of this HASP and module 2 of the Brown & Root Environmental Health and Safety Guidance Manual.

### **9.2 DECONTAMINATION OF SAMPLING TOOLS**

All sampling equipment that will be leaving the site will require a thorough decontamination. This can be accomplished either by steam cleaning or by a detergent wash and potable water rinse until tools are visibly clean. Decontamination of sampling tools to prevent cross contamination of samples shall be performed in accordance with the RFI Quality Assurance Project Plan.

Waste fluids generated through decontamination shall be handled as described in Section 9.5. Any tools or equipment that cannot be satisfactorily decontaminated shall be treated as wastes, and be handled and disposed of accordingly.

MSDS for any solvents or chemicals used during decontamination activities will be obtained and reviewed by site personnel to determine necessary personal protective equipment and control measures that must be used when using these products.

### **9.3 CORING/DRILLING AND EXCAVATION EQUIPMENT DECONTAMINATION**

Coring/drilling and excavation equipment will be thoroughly decontaminated as necessary to remove detectable contamination utilizing a method stipulated by the CF Braun Engineering Corporation subcontractor that will not damage the equipment. All decontamination fluids shall be contained and handled as in Section 9.5.

#### **9.4 DECONTAMINATION EVALUATION**

The evaluation of the decontamination process shall be performed in the following manner:

- Visual Observation - Discolorations, stains, visible material, and the degradation of the article being assessed.
- Monitoring Instrumentation - Sweeping of the decontaminated article with the screening instruments described in section 5.0 will be used in conjunction with visual observation.
- Laboratory analyses - The laboratory analyses of the samples obtained from the various site locations used in conjunction with the above methods can be used for the eventual disposal of containerized PPE.

This evaluation will determine first the overall effectiveness of the process and second the disposal method to be employed with regards to PPE. Unfavorable results will require the process and procedures to be reevaluated.

#### **9.5 DISPOSAL OF POTENTIALLY CONTAMINATED PPE**

- Personnel are responsible for drumming and staging all (grossly contaminated and clothing waiting final evaluation) disposable PPE, and for labeling such containers appropriately. Questions regarding this practice should be directed to the PM.

NOTE: Clothing and equipment favorably passing the evaluation may be moved to another location for use, or disposal as refuse, relative to the purpose of the evaluation.

## 10.0 TRAINING REQUIREMENTS

This section describes the minimum training requirements for site personnel including initial 40-hour, 8-hour refresher, supervisory, and site-specific training.

### 10.1 INTRODUCTORY AND REFRESHER TRAINING

#### 10.1.1 Requirements for CF Braun Engineering Corporation Personnel

All CF Braun Engineering Corporation personnel must complete 40 hours of introductory hazardous waste site training prior to performing work at NWIRP Calverton. Additionally, CF Braun Engineering Corporation 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. Those individuals functioning in the Supervisory capacity will also be required to show documentation of the successful completion of a Supervisory course in accordance with OSHA 29 CFR 1910.120 (e).

Documentation of CF Braun Engineering Corporation introductory and refresher training will be maintained at the project. Copies of certificates or other official documentation will be used to fulfill this requirement.

#### 10.1.2 Requirements for Subcontractors

All CF Braun Engineering Corporation 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 NWIRP, Calverton. CF Braun Engineering Corporation subcontractors must certify that each employee has had such training by sending CF Braun Engineering Corporation copies of the appropriate training certificates and a letter, on company letterhead, containing the information in the example letter provided as Figure 10-1. Figures 10-1 and 8-2 can be combined into one letter.

**FIGURE 10-1**

**OSHA TRAINING CERTIFICATION**

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. David Brayack, P.E.  
Project Manager  
CF Braun Engineering Corporation  
661 Andersen Drive  
Pittsburgh, Pennsylvania 15220

Subject: Hazardous Waste Site Training - NWIRP, Calverton

Dear Mr. Brayack:

The employees listed below have had introductory hazardous waste site training or equivalent work experience as required by 29 CFR 1910.120(e). In addition, those employees listed below who have received their introductory training more than 12 months ago have also received 8 hours of refresher training in accordance with 29 CFR 1910.120 (e)(8) within the past 12 months. Copies of training certificates are enclosed with this letter.

**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 of Company Officer)

Enclosed: Training Certificates

## **10.2 SITE-SPECIFIC TRAINING**

CF Braun Engineering Corporation will provide site-specific training to all CF Braun Engineering Corporation employees and subcontractor personnel who will perform work at this project. Site-specific training will include:

- Names of 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
- The contents of the health and safety plan and addendum
- Emergency response procedures (evacuation and assembly points)
- Review the contents of relevant Material Safety Data Sheets

### **10.2.1 Site-Specific Training Documentation**

CF Braun Engineering Corporation and subcontractor personnel will be required to sign a statement indicating receipt of site-specific training and understanding of site hazards and control measures. Figure 10-2 will be used to document site-specific training.



## **11.0 EMERGENCY ACTION PLAN**

### **11.1 INTRODUCTION**

This section has been developed as part of a preplanning effort to direct and guide field personnel in the event of an emergency. In the event of an emergency, which cannot be handled using onsite resources, personnel will evacuate to a safe place of refuge and the appropriate emergency response agencies will be notified. It has been determined that a majority of potential emergency situations would be better supported by outside emergency responders. Based on this determination, CF Braun Engineering Corporation and subcontractor personnel will not provide emergency response support beyond the capabilities of onsite response. Workers who are ill or who have suffered a non-serious injury may be transported by site personnel to nearby medical facilities, provided that such transport does not aggravate or further endanger the welfare of the injured/ill person. The emergency response agencies listed in this plan are capable of providing the most effective response, and as such, will be designated as the primary responders. These agencies are located within a reasonable distance from the area of site operations, which ensures adequate emergency response time. This Emergency Action Plan conforms to the requirements of 29 CFR 1910.38(a), as allowed in 29 CFR 1910.120(l)(1)(ii).

CF Braun Engineering Corporation will, through necessary services, provide the following response measures:

- Incipient stage fire fighting support and prevention
- Incipient spill control and containment measures and prevention
- Removal of personnel from emergency situations
- Initial medical support for injuries or illnesses requiring only first-aid level support
- Site control and security measures as necessary

### **11.2 PRE-EMERGENCY PLANNING**

Through the initial hazard / risk assessment effort, injuries 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 (which are the responsibility of the SSO and/or the FOL):

- Coordinating with local Emergency Response personnel to ensure that CF Braun Engineering Corporation emergency action activities are compatible with existing 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 (used on-site), with Material Safety Data Sheets.
  - On-site personnel medical records (Medical Data Sheets).
  - A log book identifying personnel on site each day.

It will be the responsibility of the CF Braun Engineering Corporation FOL to ensure the information is available and present at the site, including:

- 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 to provide early recognition and prevention where possible.
- Periodically practice and drill site workers in incidental response measures.

### **11.3 EMERGENCY RECOGNITION AND PREVENTION**

#### **11.3.1 Recognition**

Foreseeable emergency situations that may be encountered during site activities will generally be recognizable by visual observation. Visual observation is primarily relevant for physical hazards that may be associated with the proposed scope of work. Visual observation will also play a role in detecting some chemical exposures. To adequately recognize exposures to site contaminants, site personnel must have a clear knowledge of signs and symptoms of exposure associated with the site contaminants. This information is provided in Table 4-1 of this HASP. Potential site hazards, the activities that they have been associated with, and the recommended control methods are discussed in detail in Table 3-1 and Section 4.0 of this HASP. Additionally, early recognition of emergency situations will be supported by daily site surveys to eliminate any situation predisposed to an emergency. The FOL, and the SSO will be responsible for performing surveys. Site surveys will be conducted at least once a week during the initiation of this effort and will be documented in the Health and Safety Logbook. The above actions will

provide early recognition for potential emergency situations. Should an incident occur, CF Braun Engineering Corporation will take measures to control these situations. However, if the FOL and the SSO determine that an incident has progressed to a serious emergency situation, CF Braun Engineering Corporation will withdraw, and notify the appropriate response agencies listed in Table 11-1.

### **11.3.2            Prevention**

CF Braun Engineering Corporation and subcontractor personnel will minimize the potential for emergencies by following the Health and Safety Guidance Manual and ensuring compliance with the HASP and applicable OSHA regulations.

### **11.4                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 designated safe place of refuge. Safe places of refuge will be identified prior to the commencement of site activities and will be conveyed to personnel as part of the daily safety meeting conducted each morning. Whenever possible, the safe place of refuge will also serve as the telephone communications point for that area. During an evacuation, personnel will remain at the refuge location until directed otherwise by the CF Braun Engineering Corporation FOL or the on-site Incident Commander of the Emergency Response Team. The FOL or the SSO will take a head count at this location to account for and to confirm the location of all site personnel. Emergency response personnel will be immediately notified of any unaccounted personnel.

### **11.5                EVACUATION ROUTES AND PROCEDURES**

An evacuation will be initiated whenever the health, safety or welfare of site workers is compromised. Specific examples of conditions that may initiate an evacuation include, but are not limited to the following: severe weather conditions; a fire or explosion occurs; readings on monitoring instrumentation indicate levels of contamination that are greater than instituted action levels; if personnel show signs or symptoms of overexposure to potential site contaminants. In the event of an evacuation, personnel will proceed immediately to the designated place of refuge unless doing so would further jeopardize the welfare of workers. In such an event, personnel will proceed to a designated alternate location and remain until further notification from the CF Braun Engineering Corporation FOL.

Evacuation procedures will be discussed prior to the initiation of any work at the site. Evacuation routes from the site and safe places of refuge 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) may dictate evacuation routes. As a result, assembly points will be selected and communicated to the workers relative to the site location where work is being performed.

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

During an 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 which initiates an evacuation would further endanger the lives of workers if they were to perform decontamination procedures. 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.

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

At each site, CF Braun Engineering Corporation personnel will be working in close proximity to each other. As a result, hand signals, voice commands, and air horns will be sufficient to alert site personnel of an emergency. Since two distinct teams will be working simultaneously as part of this project, two-way radios will be used to communicate between teams of workers.

If an emergency occurs, the following procedures are to be initiated:

- Initiate an evacuation by hand signals, voice commands, air horn, or two-way radios. Report to the designated refuge point.
- 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, appropriate response procedures will be enacted to control the situation.

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

- Call Base Security (516) 953-6611 and report the emergency. Give the emergency operator the location of the emergency, the type of emergency, the number of injured, the types of injuries, and a brief description of what occurred. Stay on the phone and follow

the instructions given by the operator. The operator will then notify and dispatch the proper emergency response agencies.

#### **11.8 PPE AND EMERGENCY EQUIPMENT**

A first-aid kit, eye wash units, stretcher, fire extinguishers (strategically placed), and fire blanket will be maintained on-site and shall be immediately available for use in the event of an emergency.

#### **11.9 EMERGENCY CONTACTS**

Prior to performing work at any of the sites, all personnel will be thoroughly briefed on the emergency procedures to be followed in the event of an accident. Table 11-1 provides a list of emergency contacts and their associated telephone numbers. This table must be posted on site where it is readily available to all site personnel.

#### **11.10 EMERGENCY ROUTE TO HOSPITAL**

##### Directions to the Central Suffolk Hospital:

Proceed to the north gate and turn right traveling east on Route 25 (Middle County Road). Route 25 turns into Route 58. Proceed to traffic circle. The hospital is on the left and is approximately 10 minutes away from the site.

**TABLE 11-1  
EMERGENCY REFERENCE  
NWIRP, CALVERTON, NEW YORK**

<b>EMERGENCY CONTACT</b>	<b>TELEPHONE NUMBER</b>
<b>NWIRP Base Security</b> (Emergency, fire, ambulance, and police services)	<b>(516) 953-6611</b> or <b>On Base Emergency Access Ext. 3333</b>
Riverhead Police	(516) 797-4500
Manorville Fire Department	(516) 924-5252
Central Suffolk Hospital in Riverhead	(516) 548-6000
Poison Control	1-800-962-1250
Base Contacts:  Jim Colter Al Taormina	  (610) 535-0567 (516) 346-0344
Nearest phone	
CF Braun Project Manager, David Brayack, P.E.	1-800-245-2730  (412) 921-8375
CF Braun Project Health and Safety Officer, Donald J. Westerhoff, CSP	1-800-245-2730  (412 ) 921-7281
CLEAN Health and Safety Manager, Matthew M. Soltis, CIH, CSP	1-800-245-2730  (412) 921-8912

**NOTE:** All emergency notification will be made through Base Security (516) 953-6611.

## 12.0 STANDARD WORK PRACTICES

All site investigation activities will follow the appropriate Health and Safety Standard Operating Procedures.

The following safe working procedures are to be applied in addition to the Health and Safety Standard Operating Procedures:

- Eating, drinking, chewing gum or tobacco, taking medication, and smoking are prohibited in the exclusion or decontamination zones, or any location where there is a possibility for contact with site contaminants exists.
- Upon leaving the exclusion zone, hands and face must be thoroughly washed. Any protective outer clothing is to be decontaminated and removed as specified in this HASP, and left at a designated area prior to entering the clean area.
- Contact with potentially-contaminated substances must be avoided. Contact with the ground or with contaminated equipment must also be avoided. Monitoring equipment must not be placed on potentially contaminated surfaces.
- No facial hair, which interferes with a satisfactory fit of the mask-to-face seal, is permitted on personnel required to wear respiratory protective equipment.
- All personnel must procure a site-specific Health and Safety Plan from the project Health and Safety Officer prior to commencing work on site. All site personnel must read and understand all components of this HASP. Additionally, a Site Safety Follow-up report (see Appendix A) must be filed with each trip report following completion of a task.
- All personnel must satisfy medical monitoring procedures.
- No flames or open fires will be permitted on site.
- No drilling within 20 feet in any direction of overhead power lines will be permitted. The locations of all underground utilities must be identified, documented, and marked prior to initiating any subsurface activities.

- All personnel must be aware of and follow the action levels presented in this HASP for upgrading respiratory protection.
- Any new analytical data must be promptly conveyed via telephone to the project Health and Safety Officer by the lab technician or Field Team Leader.
- Personnel must develop hand signals with the driller.
- A copy of the attached OSHA poster must be prominently posted at each site.
- All drill rigs and other machinery with exposed moving parts must be equipped with an operational emergency stop device. Drillers and geologists must be aware of the location of this device. This device must be tested prior to job initiation, and periodically thereafter. The driller and helper shall not simultaneously handle moving augers or flights unless there is a standby person to activate the emergency stop.
- The driller must never leave the controls while the tools are rotating unless all personnel are clear of the rotating equipment.
- A long handled shovel or equivalent must be used to clear drill cuttings away from the hole and from rotating tools. Hands and/or feet are not to be used for this purpose.
- A remote sampling device must be used to sample drill cuttings if the tools are rotating. Samplers must not reach into or near the rotating equipment. If personnel must work near any tools which could rotate, the driller must shut down the rig prior to initiating such work.
- Drillers, helpers and samplers must secure all loose clothing when in the vicinity of drilling operations.
- Only equipment which has been approved by the manufacturer may be used in conjunction with site equipment and specifically to attach sections of drilling tools together. Pins that protrude from augers shall not be allowed.
- No person shall climb the drill mast while tools are rotating.

- No person shall climb the drill mast without the use of ANSI-approved fall protection (i.e., approved belts, lanyards and a fall protection slide rail) or portable ladder which meets the requirements of OSHA standards.
- No person, under any circumstances, shall enter a test pit. Personnel must use remote samplers to collect samples from test pits or collect the samples from the backhoe bucket.
- Any unidentified or uncovered drums will be avoided. Unidentified drums will not be sampled without prior approval and written procedures from the Project Manager and the CLEAN Health and Safety Manager.
- Personnel must not lean over test pits.
- Personnel must stand upwind from the test pits and away from the reach of the backhoe, tires, and outrigger.
- Personnel must stand a minimum of 3 feet from the edge of any test pit. Pits must be sloped at a ratio of 2:1 at the sides where personnel will stand or where equipment will be positioned to prevent cave-in. A lesser slope may be considered acceptable by OSHA 29 CFR 1926.651.
- No open pits will be left unattended, under any circumstances, unless adequate precautions are taken to prevent access.
- The backhoe operator shall not undermine the excavation.
- The Site Safety Officer (SSO) shall frequently inspect the test pits for slide or cave-in potential.
- "All" compressed gas cylinders (empty or full) must be stored and used in an upright position, properly secured and protected from damage.
- The site safety officer must make an entry into the Health and Safety logbook each day, including monitoring instrument calibration logs.
- A copy of the appropriate Health and Safety Standard Operating Procedures must be present on site.

- Appropriate training and medical monitoring records must be maintained on site for all site personnel including subcontractors.
- All site personnel including subcontractors must complete a medical data sheet, to be maintained on site.
- Site personnel must immediately notify the Project Manager and the CLEAN Health and Safety Manager of all incidents for OSHA record keeping purposes.
- If personnel note any warning properties of chemicals (irritation, odors, symptoms, etc.) or even remotely suspect the occurrence of exposure, they must immediately notify the SSO for further direction.
- Site personnel are not to undertake any activity which would be considered a confined-space entry without first being trained in the proper procedures by the SSO, and obtaining a Confined Space/Limited Egress Permit.
- Areas must be designated for chemical storage. Acids, bases and flammables shall all be stored separately. Storage areas must be labeled as to the contents within the storage area.

The SSO must make an entry into the site health and safety logbook at least daily, to include:

- Weather conditions
- Site Personnel
- New arrivals and "clearance for site work"
- Air monitoring data summary
- Indications of inhalation exposure
- PPE used per task
- Deviations from HASP
- Inspection and cleaning of respiratory equipment
- General H&S problems/corrective actions

### 13.0 CONFINED SPACE ENTRY (CSE) PROCEDURES

Personnel under the provisions of this HASP are not allowed, under any circumstances, to enter confined spaces. A confined space is defined as an area which has one or more 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, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry).
- Is not designed for continuous employee occupancy.
- Contains or has a potential to contain a hazardous atmosphere.
- Contains a material that has the potential to engulf an entrant.
- Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section.
- Contains any other recognized, serious, safety or health hazard.

For further information on confined space consult the Health and Safety Guidance Manual or call the CLEAN Health and Safety Manager. 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 and the CLEAN Health and Safety Manager. This determination shall be made by the SSO or FOL. If confined space operations are to be performed as part of the scope of work, detailed procedures and training requirements will be addressed in an addendum or the site specific health and safety plan.

## **14.0 SPILL CONTAINMENT PROGRAM**

### **14.1 SCOPE AND APPLICATION**

It is not anticipated that bulk hazardous materials (greater than 55-gallons) will be handled during any of the site activities conducted as part of the scope of work. However, significant quantities of decontamination and/or purge waters may be generated as part of site activities. It is not anticipated that spillage of any of these stored items (decontamination fluids, purge water, etc.) would constitute a significant danger to human health or the environment. As the job progresses, the potential for accumulating decontamination fluids and various soils from drill cuttings exists. Once these fluids and materials are characterized they can be removed from the staging area and disposed of in accordance with Federal, State and local regulations. As these fluids and soils remain uncharacterized while in the staging area, a spill containment program has been developed and instituted as part of this HASP.

### **14.2 POTENTIAL SPILL AREAS**

Potential spill areas will be monitored in an ongoing attempt to prevent and control further potential contamination of the environment. Currently, there are various areas vulnerable to this hazard including the areas used for central staging and decontamination activities. Additionally, areas designated for handling, loading, and unloading of potentially contaminated soils, waters, and debris present limited potential for leaks or spills. At this junction, it is anticipated that all decontamination fluids generated as a result of this scope of work will be containerized, labeled, and staged to await chemical analyses. The results of these analyses will determine appropriate disposal methods. During the turn around for the chemical analyses there exists a possibility to accumulate multiple containers of fluids, soils, and debris.

#### **14.2.1 Site Containers**

It is anticipated that all decontamination fluids will be contained in either 55-gallon drums or a 700-gallon tank located at the decontamination area. All containers (drums, tanks, and other vessels) used for containing liquids will be sealed, labeled and staged within a centralized area. Large containers or tanks will be placed in a central location within the decontamination zone away from any vehicular traffic.

### **14.3 LEAK AND SPILL DETECTION**

To establish an early detection of potential spills or leaks, a periodic walk around by the SSO will be conducted during working hours to visually determine that containers are not leaking. If a leak is detected,

appropriate containment measures will be implemented. Provisions for the transfer of tank contents will be made and appropriate emergency contacts will be notified. In most instances, leaks will be collected and contained using absorbents such as Oil-dry, vermiculite, or sand, which will be stored at the staging area in a conspicuously marked drum. This material too, will be containerized for disposal pending analyses. All inspections will be documented in the Project Logbook.

#### **14.4 PERSONNEL TRAINING AND SPILL PREVENTION**

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

#### **14.5 SPILL PREVENTION AND CONTAINMENT EQUIPMENT**

The following represents the minimum equipment which 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)
- Drum labels

#### **14.6 SPILL CONTROL PLAN**

This section describes the procedures the CF Braun Engineering Corporation 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 personnel protective equipment stored at the staging area. Take immediate actions to stop the leak or spill by plugging or patching the drum or raising the leak to the highest point. Spread the absorbent material in the area of the spill covering completely.
- 3) Transfer the material to a new container, collect and containerize the absorbent material. Label the new container appropriately. Await analyses for treatment or disposal options.

- 4) Solid spills will be recontainerized with 2-inches of top cover, and await test results for treatment or disposal options.

It is not anticipated that a spill will occur in which the field crews cannot handle. Should this occur notification of Base Security (516) 953-6611 will be carried out by the FOL or SSO. Base Security can contact a spill response truck which responds to any accidental spills at the NWIRP Calverton facility.