APPENDIX A

HEALTH AND SAFETY PLAN (HASP)

DVSAP HEALTH AND SAFETY PLAN

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Appendix A
Health and Safety Plan
for
Verification Investigation Work Plan for The Naval School EOD Sites at The Naval Explosive Ordnance Disposal Technology Division NSWC, Stump Neck Annex Indian Head Division

Indian Head, Maryland

Engineering Field Activity Chesapeake
Naval Facilities Engineering Command

Northern Division Contract Number N62472-90-D-1298
Contract Task Order 222

September 1995

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APPENDIX A
HEALTH AND SAFETY PLAN
for
Verification Investigation Work Plan
for
The Naval School EOD Sites
at
The Naval Explosive Ordnance Disposal Technology Division
Naval Surface Warfare Center
Stump Neck Annex, Indian Head Division
Indian Head, Maryland

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

Submitted by:
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CONTRACT NUMBER N62472-90-D-1298
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A-IV	OSHA Poster
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1.0 PURPOSE

The purpose of this plan is to assign responsibilities, establish personnel protection standards and mandatory safety practices and procedures, and provide for contingencies that may arise while operations are being conducted during the Verification Investigation, Naval School, Explosive Ordnance Disposal, Stump Neck Annex, Indian Head Division Indian Head, Maryland - CTO-222.

2.0 APPLICABILITY

The provisions of the plan are mandatory for all on-site employees engaged in hazardous material management activities including, but not limited to, initial site reconnaissance, soil borings, collection of soil samples, collection of sediment samples, groundwater sampling, installation of monitoring wells and demobilization. This plan has been developed under U.S. Environmental Protection Agency (EPA) guidelines and complies with all regulations including OSHA 29 CFR 1910 (specifically 1910.120), and applicable 1926 OSHA Construction Industry standards, and State and local regulations as applicable. This plan is based on available information regarding possible contaminants and physical hazards that may exist at the site. If more information concerning the nature and/or concentrations of contaminants becomes available, this HASP will be modified accordingly. It will be the Halliburton NUS Project Manager's responsibility to communicate any such information to the Project Site Safety Officer (SSO) who will, in turn, determine the need for modifying the HASP.

2.1 AUTHORITY

The Northern Division of the Naval Facilities Engineering Command issued Contract Task Order (CTO) 222, under the Comprehensive Long-term Environmental Action Navy (CLEAN) Contract No. N62472-90-D-1298 to HALLIBURTON NUS Corporation (HALLIBURTON NUS).

This Health and Safety Plan (HASP) for four sites at the Stump Neck Annex, NAVSURWARCEN, INDIAN HEAD, MARYLAND facility has been prepared by HALLIBURTON NUS under Contract N62472-90-D-1298, Contract Task Order 222.

PERSONNEL ASSIGNMENTS

Site Name: Naval School, Explosive Ordnance Disposal, Stump Neck Annex

Client Contact: Mr. Shawn Philips 202/685-3274

Site Contact: Mr. Shawn Jorgenson 301/743-6745

Address: Stump Neck Annex, Indian Head, Maryland

Purpose of Fieldwork: To perform field activities, as described in Section 3.1 of this Health and Safety Plan.

Proposed Dates of Work: September 5 - October 28, 1995

Project Team:

Halliburton NUS Personnel:	Discipline/Tasks Assigned:
LeeAnn Sinagoga	Project Manager
Tom Jordan	Geologist
Dave Yost	Field Operations Leader
TBA	Site Safety Officer (SSO)
TBA	EOD Specialist
Non-Halliburton NUS Personnel:	
TBA	

Plan Preparation:

Prepared by: Clyde Snyder

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Halliburton NUS
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Health and Safety Manager: Matthew M. Soltis, CSP, CIH

Reviewed:

Halliburton NUS

Project Manager: _____

Follow Up Report:

Responsible Person: TBA

3.0 SITE DESCRIPTION

3.1 GENERAL INFORMATION

This HASP has been developed to address the potential hazards recognized in performing the Verification Investigation activities at the Naval School, Explosive Ordnance Disposal, Stump Neck Annex, Indian Head Division Indian Head, Maryland. These activities will include a Verification Investigation effort at the following FOUR sites:

1) Range 6 Site
2) Inert Ordnance Disposal (IOD) Site
3) Improvised Explosive Devices (IED) Site
4) Area 8 Site

The activities, including site reconnaissance, performing ground water and soil sampling, soil borings (using multiple drilling methods including drill rigs with hollow-stem augers and hand-operated augering) will be performed to determine the nature and extent of actual or potential site contamination. The field activities for the Verification Investigation are described in Sections 2.0 and 3.0 of the VI Work Plan.

3.2 SITE HISTORY AND FACILITY DESCRIPTION

3.2.1 Background Information

The Indian Head Division of the Naval Surface Warfare Center is located in the northwestern section of Charles County, Maryland, approximately 25 miles southwest of Washington, D.C. Stump Neck Annex is located in the northwestern section of Charles County, Maryland, 30 miles south of Washington, D.C. The principal mission of the site is research, development, and training of explosive ordnance disposal. The facility occupies two peninsulas of land along the eastern shore of the Potomac River. The Naval Explosive Ordnance Disposal Technology Division (NAVEODTECHDIV) operates as a tenant. NAVEODTECHDIV property is designated as the Stump Neck Annex (Stump Neck) and occupies approximately 1,100 acres situated on the southwest section of one peninsula. All four sites being addressed by this work plan are located on Stump Neck. This peninsula known as Stump Neck, is separated from the main peninsula by Mattawoman Creek. The location of Stump Neck is illustrated in Figure 1-2 of the VI Work Plan.

3.2.2 Site Location

The four sites being addressed in this work plan are described below:

Range 6 - Range 6 is located on the tip of the Stump Neck peninsula. Water surrounds the site on three sides, the Potomac River to the northeast and the Chicamuxen Creek the southwest. Access to the site is obtained via an asphalt road named Archer Avenue which bisects the site terminating close to the water's edge at a tidal swampy area. Access is controlled by fencing and a gate located on Archer Avenue. The site lies completely within the 100 year flood plain. The site consists of approximately 11 acres. This area is surrounded by wetlands. An illustration of this site is provided in Figure 1-4 of the VI Work Plan.

The Improvised Explosive Devices (IED) Site - The IED is located south of Archer Avenue in the vicinity of buildings 2119, 2118, and 2090. The site encompasses 51.42 acres, but the area where most activity occurs measures approximately 300 feet by 300 feet. Specific areas of the site include a sand pit test area, a demonstration area located in front of the bleachers, and the testing area located in front of building 2118. Access to the site is controlled by fencing and a gate located on Archer Avenue. No wetlands have been identified on this site. An illustration of this site is provided in Figure 1-5 of the VI Work Plan.

The Inert Ordnance Disposal (IOD) Site - The IOD is located off a dirt road in the vicinity of the intersection of Archer Avenue and Lewis Road. The site consists of a deteriorating concrete pad measuring approximately 18 by 12 feet. The pad is located on the slope of a hill. Immediately below the pad is a 4 to 5 foot culvert. Access to the site is controlled by fencing and a gate located on Archer Avenue. An illustration of this site is provided in Figure 1-6 of the VI Work Plan.

Area 8 - Area 8, also known as the Underwater Ordnance Training Area, is located on an asphalt road named Roach Road which bisects the site. Buildings 2104 and 2125 are located within the boundaries of this site. The site measures approximately 9.6 acres. Access to the site is controlled by fencing and a gate located on Archer Avenue. Two acres of wetlands have been identified on this site. An illustration of this site is provided in Figure 1-7 of the VI Work Plan.

3.2.3 Site Operations and History

The specific operations preformed by the Naval School Explosive Ordnance Disposal Detachment (NAVSCOLEOD) and the history of the specific sites effected by the school's operation are as follows:

Range 6 - Range 6 was used as a demolition training area consisting of five ranges which were used for open detonation training. Small amounts (less than two to three pounds) of explosives were used. The site operated from the early 1950's until early in 1988. It is not expected that this site will ever be used in this manor again. The frequency of training exercises at this site depended on the number of recruits (students) being trained at any one given time, but it is estimated this site was used weekly. Based on this estimate, approximately 100 pounds of ordnance was used each year. Ordnance used at this site contained various chemicals including COMPD, nitric acid, and sulfuric acid. Wastes also include small quantities of shrapnel and castings from detonation of explosives. It was reported that in 1956/1957 approximately 1500 to 2000 pounds of arsenic powder in plastic bags were buried in a pit measuring 40 feet deep and 6 feet in diameter.

Range 6 was identified in the Notice of Decision for RCRA Corrective Action Permit EPA I.D. No. MD 417 009 0001 (January 24, 1991 through January 23, 2001) as Solid Waste Management Unit number five (SWMU 5). A Verification Investigation/RCRA Facility Investigation Work Plan was prepared by Insafe/Allen & Hoshall (July 17, 1991), which establishes the field work necessary to determine the lateral and vertical extent of contamination, if any, in the soil and groundwater of Range 6. It should be noted that the RCRA Corrective Action Permit does not make mention of the arsenic disposal pit and that the Indian Head Base drawing (Dwg. No. 15455-A) indicates that SWMU 5 is only 300 feet by 300 feet and does not include the area where the pit is located.

The Improvised Explosive Devices (IED) Site - The IED was used to test the explosive potential of chemical mixtures. The site was first used in November of 1957 and it is still in use. Activities at the site are performed year round and it is estimated that approximately 10 pound (net explosive weight) of ordnance is used in this area each year. A list of the chemicals tested at this site includes but is not limited to gasoline, glycerin, nitrates, and peroxides. Historical records are maintained by the Explosive Safety Officer and are considered accurate and complete dating back to January 1990.

The Inert Ordnance Disposal (IOD) Site - The IOD was used in the disposal of inert ordnance.

Area 8 - Area 8 was used for the training and testing of underwater ordnances. This area is also used to train military personnel in the defusing of explosive devices. Activities in Area 8 are performed 10 months out of the year and it is estimated that approximately 50 to 75 pounds (net explosive weight) of ordnance is used is this area each year. The type of ordnance used includes TNT Block, Blasting Caps, Detonation Cord, and similar devices. Area 8 is defined by numerous water-shots, air-shot locations, a major stagnant water hole, and a large pond, as illustrated in Figure 1-7. The stagnant water hole has been inactive since 1993. The water-shot and air-shot locations have been the primary

locations for training and testing activities. The water-shot locations consist of depressions measuring a few feet in diameter and 6 to 9 feet deep. Water 4 to 5 feet deep fill these depressions. Historical records are maintained by the Explosive Safety Officer and are considered accurate and complete dating back to January 1990.

3.3 Hazard Evaluation

This hazard evaluation has been developed based on the planned Verification Investigation activities (as described in Section 3.1). In addition to the chemical substances (presented in Table A-3-1) which may be encountered in the conduct of planned site activities, physical hazard potentials are also addressed in Section 3.4 of this HASP. A task-specific hazard assessment summary is provided in Table A-3-2. Evaluation of the chemical hazard potentials identified will be predominantly accomplished through the use of real-time direct reading monitoring instrumentation and adherence to action level responses (specified in Section 4.0 of this HASP). To some extent, these evaluation means will be supplemented by personnel attention to substance warning properties such as appearance, characteristic odor, and recognition of symptoms as specified in Table A-3-1. Personnel should be aware that some of the sites may contain unknown explosive contaminants. Table A-3-3, A-3-4 contains the Target 8330 analytes that could be encountered.

Evaluation of physical hazards will be predominantly accomplished through direct observations by the Site Safety Officer and other field team personnel.

TABLE A-3-1

CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA

Substance	CAS No.	Air Monitoring/Sampling Information			Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Benzene	71-43-2	I.P 9.24 eV, 100% response with PID and 10.2 eV lamp	150% response with FID	Air sample using charcoal tube and carbon disulfide desorption, OSHA 07	1 ppm OSHA 10 ppm ACGIH 0.1 ppm NIOSH	Inadequate - OSHA accepts the use of air-purifying respirators with organic vapor cartridge up to 10 ppm despite the inadequate warning properties **Recommended gloves:** Nitrile	**Boiling Pt:** 80°C **Melting Pt:** 5.5°C **Solubility:** 0.07% **Flash Pt:** -11°C **LEL/LFL:** 1.3% **UEL/UFL:** 7.9% **Vapor Density:** 2.77 **Vapor Pressure:** 75 mm **Specific Gravity:** 0.88 **Incompatibilities:** Strong oxidizers, perchlorates, acids **Appearance and Odor:** Colorless to a light yellow liquid with an aromatic odor	Overexposure may result in irritation to the eyes, nose, throat, and respiratory system. CNS effects include giddiness,lightheadedness, headaches, staggered gait, fatigue, and lassitude and depression. Additional effects may include neuses. Long duration exposures may result in respiratory collapse. Regulated as an OSHA carcinogen. May cause damage to the blood forming organs and may cause a form of cancer called leukemia.
Dinitrotoluene	25321-14-6	Particulate form - unable to be detected by PID/FID	Not detectable in the solid form	None available	OSHA NIOSH 1.5 mg/m^3; skin ACGIH 0.15 mg/m^3; skin NIOSH IDLH 200 mg/m^3	In the particulate form - Can use air-purifying respirator with organic vapor cartridge up to 50 ppm **Recommended glove:** nitrile	**Boiling Pt:** 572°F;300°C **Melting Pt:** 158°F;70°C **Solubility:** Insoluble **Flash Pt:** 404°F;207°C **LEL/LFL:** Not available **UEL/UFL:** Not available however, airborne in the form of a dust this substance will support combustion **Vapor Density:** 6.27 **Vapor Pressure:** 1 mm **Specific Gravity:** 1.32 **Incompatibilities:** Strong oxidizers, caustics, metals such as tin and zinc **Appearance and Odor:** Orange to yellow crystalline solid with characteristic odor.	Overexposure to this substance may result in anemia, methemoglobinemia, cyanosis, and liver damage. This substance may result in an irritant and possible allergic reaction.
Ethylbenzene	100-41-4	I.P 8.76, High response with PID and 10.2 eV lamp	100% response with FID	Air sample using charcoal tube and carbon disulfide desorption, OSHA 07	100 ppm TWA 125 ppm STEL OSHA, ACGIH, & NIOSH	Adequate - Can use air-purifying respirator with organic vapor cartridge up to 1,000 ppm **Recommended gloves:** Neoprene or nitrile w/ silver shield when potential for saturation	**Boiling Pt:** 277°F **Melting Pt:** -139°F **Solubility:** 0.01% **Flash Pt:** 55°F **LEL/LFL:** 1.0% **UEL/UFL:** 6.7% **Vapor Density:** 3.66 **Vapor Pressure:** 10 mmhg @ 79°F **Specific Gravity:** 0.87 **Incompatibilities:** Strong oxidizers **Appearance and odor:** 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

T. E A-3-1 (CONTINUED)
CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA

Substance	CAS No.	Air Monitoring/Sampling Information			Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Diesel Fuel No.2-D	Mixture	Components of this substance will be detected readily however no documentation exists as to the relative response	Components of this substance will be detected readily however no documentation exists as to the relative response		OSHA NIOSH ACGIH 5 mg/m^3 as mineral oil mist. In addition NIOSH and ACGIH establish 10 mg/m^3 as a STEL.	Kerosene odor **Recommended gloves:** Nitrile **Recommended Air Purifying cartridges:** Organic vapor	**Boiling Pt:** <170-400°F **Melting Pt:** N.A. **Solubility:** Negligible **Flash Pt:** 125°F **LEL/LFL:** 0.6% **UEL/UFL:** 7.5% **Vapor Density:** >5 **Vapor Pressure:** <1 mmhg/ 70°F **Specific Gravity:** 0.86 **Incompatibilities:** strong oxidizers, halogens, and hypochlorites **Appearance and odor:** 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 dermatitic 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.
Toluene	108-88-3	I.P 8.82 eV, High response with PID and 10.2 eV lamp	110% response with FID	Air sample using charcoal tube and carbon disulfide desorption, OSHA 07	100 ppm TWA OSHA 150 ppm STEL OSHA 50 ppm TWA ACGIH	Adequate - Can use air-purifying respirator with organic vapor cartridge up to 500 ppm **Recommended gloves:** Butyl rubber, Viton, neoprene or nitrile	**Boiling Pt:** 232°F **Melting Pt:** -138°F **Solubility:** 0.05% (61°F) **Flash Pt:** 40°F **LEL/LFL:** 1.2% **UEL/UFL:** 7.1% **Vapor Density:** 3.14 **Vapor Pressure:** 20 mmhg @ 65°F **Specific Gravity:** 0.87 **Incompatibilities:** Strong oxidizers **Appearance and odor:** Colorless liquid with a sweet pungent aromatic odor. Odor Threshold of 0.16-37 ppm.	Overexposure to this substance may result in mild to moderate irritation at all points of contact, CNS changes. At 200-500 ppm exposure has resulted in headaches, nausea, eye irritation, loss of appetite, bad taste, impair coordination, fatigue, and weariness
Xylene **All isomers** o-,m-, p-	1330-20-7	I.P. 8.56 eV, High response with PID and 10.2 eV lamp	110% response with FID	Air sample using charcoal tube and carbon disulfide desorption, OSHA 07	100 ppm TWA 150 ppm STEL OSHA, ACGIH, & NIOSH	Adequate - Can use air-purifying respirator with organic vapor cartridge up to 1,000 ppm **Recommended gloves:** Viton, Silver shield, nitrile, or neoprene	**Boiling Pt:** 289-281°F **Melting Pt:** -13/-54/58°F **Solubility:** insoluble **Flash Pt:** 63-81°F **LEL/LFL:** 1.0% **UEL/UFL:** 7.0% **Vapor Density:** 3.66 **Vapor Pressure:** 7-9 mmhg @ 70°F **Specific Gravity:** 0.86-0.88 **Incompatibilities:** Strong oxidizers **Appearance and odor:** Colorless liquid with an aromatic odor. Odor Threshold of 20 ppm.	Regulated primarily because of its potential to irritate the eyes and respiratory system. In addition, effects may include CNS changes (i.e. dizziness, excitement, drowsiness, incoherent, staggering gait), difficulty in breathing, pulmonary edema, and possibly respiratory failure.

TABLE A-3-1 (CONTINUED)
CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA

Substance	CAS No.	Air Monitoring/Sampling Information			Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
Aluminum	7429-90-5	Particulate form - unable to be detected by PID/FID	Not detectable	NIOSH Method 7013 and 7300	OSHA 15 mg/m^3 Total dust 5 mg/m^3 Respirable fraction NIOSH 10 mg/m^3 Total dust 5 mg/m^3 Respirable fraction ACGIH 10 mg/m^3	Particulate form - No identifiable warning properties to indicate presence and thereby detection **Recommended APR Cartridge:** Suitable for dust and fume. Organic vapor acid gases with HEPA filter. **Recommended gloves:** 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).	**Boiling Pt:** 2450°C **Melting Pt:** 660°C **Solubility:** Insoluble **Flash Pt:** Nonflammable **LEL/LFL:** Nonflammable **UEL/UFL:** 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 **Vapor Density:** Not available **Vapor Pressure:** 1mm @ 1284°C **Specific Gravity:** 2.702 @ 25°C **Incompatibles:** Acids, alkalis, oxidizers, halogens and halocarbons, alcohols **Appearance and odor:** silvery gray ductile, lusterous 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 "Shevers disease" is a form of benign pneumoconiosis.
Arsenic	7440-38-2	Particulate form - This substance is unable to be detected by PID/FID	Particulate form - This substance is unable to be detected by PID/FID	NIOSH Method #7900 or Method #7300	OSHA Organic compounds 0.5 mg/m^3 Inorganic compounds 0.01 mg/m^3 NIOSH ceiling 0.002 mg/m^3 ACGIH 0.2 mg/m^3	No identifiable warning properties to indicate presence and thereby detection **Recommended APR Cartridge:** Suitable for dust and fume. Organic vapor acid gases with HEPA filter. This substance may be presented as a pesticide, therefore a cartridge suitable for pesticides (MSA-GMP) **Recommended Gloves:** 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).	**Boiling Pt:** sublimation @ 612°C **Melting Pt:** 814°C @ 36 atm **Solubility:** Insoluble in water;soluble in nitric acid **Flash Pt:** Nonflammable, however, airborne in the form of a dust this substance will support combustion **LEL/LFL:** Nonflammable **UEL/UFL:** Nonflammable **Vapor Density:** N.A. **Vapor Pressure:** 1 mm @ 372°C (sublimes) **Specific Gravity:** 5.73 **Incompatibilities:** Oxidizers, halogens,zinc, lithium, azides, and acetylides **Appearance and odor:** Gray to black, brittle, crystalline, amorphous, odorless.	Overexposure to this substance through inhalation or ingestion may result in ulceration of the nasal septum, GI disturbances resulting in violent purging and vomiting,hoarse voice, sore throat, excessive salivation, peripheral neuropathy (numbness and burning sensations beginning at the extremities followed by motor weakness), respiratory irritation leading to possible pulmonary edema. Skin or eye contact may result in irritation, conjunctive, dermatitis, and hyperpigmentation (darkening of thr areas exposed) of the skin. This substance has been judged to be a Human carcinogen by NTP, and IARC.
Sulfuric Acid	7664-93-9	This substance is unable to be detected with a PID. pH paper	This substance is unable to be detected by PID/FID	NIOSH Method # 7903	OSHA NIOSH 1 mg/m^3 ACGIH 1 mg/m^3 3 mg/m^3 Ceiling	Irritating, tingling sensation **Recommended APR Cartridge:** Suitable for dust and fume. Organic vapor acid gases with HEPA filter. **Recommended gloves:** Nitrile has been the one most widely used for the other substances and is acceptable for this substance. Other options include butyl rubber, neoprene, and Viton.	**Boiling Pt:** 290°C **Melting Pt:** 10.49°C **Solubility:** Miscible **Flash Pt:** N.A. **LEL/LFL:** N.A. **UEL/UFL:** N.A. **Vapor Density:** N.A. **Vapor Pressure:** 1 mm @ 145.8°C **Specific Gravity:** 1.84 **Incompatibilities:** Organic materials, chlorates, carbides, fulminates, water, and powdered metals. Liberates excessive heat when mixed with water. **Appearance and odor:** Colorless, oily liquid, odorless	This substance is corrosive at all points of contact. Severe exposure may result in burns, chemical pneumonitis and erosion of the teeth. Depending on the severity shock and collapse may result.

T. E A-3-1 (CONTINUED)
CHEMICAL, PHYSICAL, AND TOXICOLOGICAL DATA

Substance	CAS No.	Air Monitoring/Sampling Information			Exposure Limits	Warning Property Rating	Physical Properties	Health Hazard Information
2,4,6,-Trinitrotoluene	118-96-7	10.59 eV	This substance can be detected with moderate sensitivity with a FID.	This substance can be sampled using a Tenax tube GC with acetone desorption. (OSHA #44)	NIOSH 0.5 mg/m^3 OSHA 1.5 mg/m^3 [skin]	Adequate warning properties. **Recommended APR Cartridge:** Suitable for organic vapors / dust mists. **Recommended gloves:** Nitrile has been the most widely used for other substances and is acceptable for this substance. Other options include butyl rubber, neoprene, and Viton.	**Boiling Pt:** 464°F **Melting Pt:** 176°C **Solubility:** 0.01% @ 77°F **Flash Pt:** Explodes **LEL/LFL:** N.A. **UEL/UFL:** N.A. **Vapor Density:** N.A. **Vapor Pressure:** 0.0002 mm **Specific Gravity:** 1.65 **Incompatibilities:** Strong oxidizers, ammonia, strong alkalis, combustible materials, heat. **Appearance and odor:** Colorless to pale yellow, odorless solid or crushed flakes.	Exposure may result from inhaltion, ingestion, absorption, and contact with the skin. Symptoms of exposure include: irritation of the skin, liver damage, cyanosis, peripheral neuropathy, increased blood leukocytes, jaundice, sneezing, cough, sore throat, muscle pain, kidney damage, cataracts, anemia, cardiac irregularities. Target organs include the eyes, skin, respiratory system, blood, liver, Cardiovascular system, Central nervous system, and kidneys.
Nitroglycerine	55-63-0	Unable to be adequately detected by a PID.	This substance is unable to be detected with a FID.	This substance can be sampled using a Tenax tube GC with ethanol desorption. (OSHA #2507)	NIOSH STEL 0.1 mg/m^3 OSHA ceiling 0.2 ppm	Warning properties are not fully known. The substance does not posses adequate warning properties for use with an APR. Recommend the use of a supplied air respirator. **Recommended gloves:** Nitrile has been the most widely used for other substances and is acceptable for this substance. Other options include butyl rubber, neoprene, and Viton.	**Boiling Pt:** Begins to decompose at 122 - 140°F **Melting Pt:** N.A. **Solubility:** 0.1% **Flash Pt:** Explodes **LEL/LFL:** N.A. **UEL/UFL:** N.A. **Vapor Density:** N.A. **Vapor Pressure:** 0.0003 mm **Specific Gravity:** 1.60 **Incompatibilities:** Heat, ozone, shock, and acids. **Appearance and odor:** Colorless to pale yellow viscous liquid or solid below 56°F.	Symptoms of exposure include throbbing headache, dizziness, nausea, vomiting, abdominal pain, hypertension, flushing of the skin, palpatations, delerium, Central Nervous System depression, angina, skin irritation, and methemoglobinemia. Target organs include the Cardiovascular system, blood, skin, and Central nervous system.
Gasoline	8006-61-9	Various components of gasoline will be detected with a PID. However, the exact ionization potential of gasoline is unknown.	This substance will be detected with the use of a FID given the flammability of the compound.	Can be sampled using a charcoal tube and GC analysis. (OSHA IMIS 1340)	ACGIH 300 ppm	Adequate warning properties. **Recommended cartridge:** Organic vapor	**Boiling Pt:** 102°F **Melting Pt:** N.A. **Solubility:** Insoluble **Flash Pt:** -45°F **LEL/LFL:** 1.4% **UEL/UFL:** 7.6% **Vapor Density:** N.A. **Vapor Pressure:** 38-300 mm **Specific Gravity:** N.A. **Incompatibilities:** Strong oxidizers such as peroxides, nitric acid, and perchlorates. **Appearance and odor:** Clear gas with a pungent odor.	Exposure can occur through inhalation, ingestion, absorption, and contact with the skin. Symptoms of exposure include irritation of the eyes and mucous membranes, dermatitis, headache, fatigue, blurred vision, slurred speech, confusion, convulsions, chemcial pneumaconosis, possible liver and kindney damage. This substance is listed as a possible carcinogen. Target organs include the eyes, skin, respiratory system, liver, kidneys, and central nervous system.

TABLE A-3-2

TASK SPECIFIC HAZARD SUMMARY

VERIFICATION INVESTIGATION, THE NAVAL SCHOOL, EXPLOSIVE ORDNANCE DISPOSAL
STUMP NECK ANNEX, INDIAN HEAD DIVISION
INDIAN HEAD, MARYLAND

TASK	ASSOCIATED HAZARDS	APPLICABLE CONTROLS
Sampling activities (surface water, sediment, groundwater and soil sampling)	• Uneven or unstable terrain • Fall from elevated surfaces • Natural hazards • Exposure to site contaminants • Contact with UXO • Exposure to site contaminants • Water hazards • Natural hazards • Heat/cold stress • Inclement weather • Strain/muscle pulls	1. Strict adherence to standard work practices. 2. Proper use of appropriate PPE. 3. Performance of air monitoring. 4. Decontamination activities. 5. Strict adherence to standard work practices. 6. Follow UXO guidelines and monitoring with Magnetometer.

Soil borings	• Exposure to site contaminants • Exposure to pinch and compression points • Potential to be struck by or entangled in heavy machinery • Contact with energized sources • Noise in excess of 85 dBA • Natural hazards • Inclement weather • Contact with UXO • Heat/cold stress • Cuts from sharp objects	1. Performance of air monitoring. 2. Proper use of appropriate PPE. 3. Decontamination activities. 4. Strict adherence to standard work practices. 5. Follow UXO guidelines and monitoring with Magnetometer. 6. Use of hearing protection.

TABLE A-3-3

METHOD 8330 TARGET ANALYTES

VERIFICATION INVESTIGATION, THE NAVAL SCHOOL, EXPLOSIVE ORDNANCE DISPOSAL
STUMP NECK ANNEX, INDIAN HEAD DIVISION
INDIAN HEAD, MARYLAND

Compound	Abbreviation	CAS No.[1]
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine	HMX	2691-41-0
Hexahydro-1,3,5-trinitro-1,3,5-triazine	RDX	121-82-4
1,3,5-Trinitrobenzene	TNB	99-35-4
1,3-Dinitrobenzene	DNB	99-65-0
Methyl-2,4,6-trinitrophenylnitramine	Tetryl	479-45-8
Nitrobenzene	NB	98-95-3
2,4,6-Trinitrotoluene	TNT	118-96-7
2,4-Dinitrotoluene	24DNT	121-14-2
2,6-Dinitrotoluene	26DNT	606-20-2
o-Nitrotoluene	2NT	88-72-2
m-Nitrotoluene	3NT	99-08-1
p-Nitrotoluene	4NT	99-99-0

1 Chemical Abstracts Service Registry number

TABLE A-3-4

METHOD 8330 TARGET ANALYTES

Names & Synonyms	Chemical Abstract Service Number (CAS No.)	Safe Exposure Limit, OSHA; ACGIH; NIOSH	Method of Detection	Warning Properties and Characteristics	Signs & Symptoms of Overexposure	Physical Properties
Cyclo-1,3,5-trimethylene-2,4,6-trinitramine; Cyclonite; Trimethylenetrinitramine; T_4; RDX	121-82-4	OSHA; NIOSH; ACGIH: 1.5 mg/m^3; skin	Draeger Tubes for amines	None found (see signs and symptoms)	**Routes of exposure:** Inhalation, ingestion, skin and eye contact. The following symptoms may be experienced resulting from exposure to RDX or its intermediates. The severity of the effect will depend on the concentration, duration, and frequency of exposure. • A corrosive irritant to all points of contact.(This may be attributable to intermediates, degradation, or impurities in the product). • Headaches, excitability, irritability, dizziness, nausea, and vomiting. • Hyperactivity and possible convulsions without the premonitory signs listed above. • Seizures are often followed by transient amnesia, malaise, and fatigue. These signs and symptoms may be experienced quickly, or result several hours later.	**Boiling Pt:** Not available **Melting Pt:** Pure 204.1°C; 399°F Military grade ~10% HMX ~190°C; ~374°F **Freezing Pt:** Not available **Solubility:** Insoluble in water; soluble hot aniline, phenol, and nitric acid **Specific Gravity:** 1.816 **Vapor Pressure:** Not available **Flash Pt:** Heat (explosion in 5 seconds) 260°C; 500°F **LEL:** Not available **UEL:** Not available **Incompatibles:** Not available **Appearance and odor:** Colorless to white crystals, odorless
Cyclotetramethylene tetranitramine Octagen, (HMX)	2691-41-0	None established	None found	None found	**Routes of exposure:** Inhalation, ingestion, and skin and eye contact. Signs and symptoms of overexposure will be similar to those specified for RDX.	**Boiling Pt:** Not available **Melting Pt:** 276.7°C; 530°F **Freezing Pt:** Not available **Solubility:** Not available **Specific Gravity:** Not available **Vapor Pressure:** Not available **Flash Pt:** Not available **LEL:** Not available **UEL:** Not available **Incompatibles:** Not available **Appearance:** White

Names & Synonyms	Chemical Abstract Service Number (CAS No.)	Safe Exposure Limit, OSHA; ACGIH; NIOSH	Method of Detection	Warning Properties and Characteristics	Signs & Symptoms of Overexposure	Physical Properties
Dinitrobenzene (all Isomers) (DNB) Synonyms: Dithane	100-25-4 99-65-0 528-29-0	OSHA: 1 mg/m³ (skin) ACGIH: 0.15 ppm (skin) NIOSH: 1 mg/m³ (skin)	High-pressure liquid chromatography with ultra violet detection. HNu: 10.43 IP: 10.71	Toxic fumes of NOX	**Routes of Exposure:** Inhalation, absorption, ingestion, skin and eye contact. The following symptoms may be experienced resulting from exposure to Dinitrobenzene or its intermediates. The severity of the effect will depend on the concentrations, duration, and frequency of exposure. • Anoxia • Cyanosis • Visual disturbance • Central scotomas • Bad taste • Burning mouth • Dry throat • Thirst • Yellowing hair, eyes, skin • Anemia • Liver damage	**Boiling Pt:** 570°F - 606°F **Melting Pt:** 343°F **Freezing Pt:** NL **Solubility:** 0.01% - 0.05% **Specific Gravity:** 1.63 **Vapor Pressure:** NL **Flash Pt:** 302°F **LEL:** NL **UEL:** NL **Incompatibles:** Strong Oxidizers, caustic, metals (tin, zinc) **Appearance and Odor:** Pale white to yellow solid.
1,3,5-Trinitrobenzene (TNB) Synonyms: Trinitrobenzene (dry)	99-35-4	None established	None established	Highly flammable	***Routes of exposure:** inhalation and absorption. The following symptoms may be experienced resulting from exposure to 1,3,5-Trinitrobenzene or its intermediates. The severity of the effect will depend on the concentrations, duration, and frequency of exposure. *Acute toxicity • CWS depression • Oxygen deprivation in the blood *Chronic Toxicity • Poisoning • Anemia • Cyanosis • Fatigue • Liver and kidney damage *-based on general nitro compounds	**Boiling Pt:** NL **Melting Pt:** 122°C; 261.6°F **Freezing Pt:** NL **Solubility:** NL **Specific Gravity:** NL **Vapor Pressure:** NL **Flash Pt:** NL **LEL:** NL **UEL:** NL **Incompatibles:** Reducing materials

Names & Synonyms	Chemical Abstract Service Number (CAS No.)	Safe Exposure Limit, OSHA; ACGIH; NIOSH	Method of Detection	Warning Properties and Characteristics	Signs & Symptoms of Overexposure	Physical Properties
2,4-and 2,4,6-phenylmethylnitramine (DNT) Synonyms: Dinitrotoluene	All isomers	OSHA: 1.5 mg/m³ (skin) ACGIH: 0.15 mg/m³ (skin) NIOSH: 1.5 mg/m³ (skin) IDLH: 200 mg/kg	None available	Combustible and flammable when exposed to heat	**Routes of Exposure:** inhalation and absorption. The following symptoms may be experienced resulting from exposure to 2,4 and 2,6-phenylmethylnitramine or its intermediates. The severity of the effect will depend on the concentrations, duration, and frequency of exposure. Acute Toxicity: • Anoxia • Jaundice • Cyanosis • Anemia Chronic Toxicity: • Cancer* • Neoplastigen* • Reproductive Effects* • Mutagen • Liver • Cardiovascular * - Experimental	**Boiling Pt:** 286°C, 572°F **Melting Pt:** 158°F **Freezing Pt:** NL **Solubility:** Insoluble **Specific Gravity:** 1.32 **Vapor Pressure:** 1 mm Hg **Flash Pt:** 102°C; 404°F **LEL:** NL **UEL:** NL **Incompatibles:** Strong oxidizers, caustics, metals (tin, zinc) **Appearance and Odor:** Orange-yellow crystalline solid with a characteristic odor.
Nitrobenzene	0098-95-3	OSHA/NIOSH: 1 ppm ACGIH: 1 ppm IDLH: 200 ppm	Air Sampling Using Silica Gel Tub (Methanol)	A colorless to pale yellow oily liquid with a pungent odor of almond	Routes of exposure: This product is a deadly poison and can be rapidly absorbed through the skin: May produce cyanosis or headache. Acute Toxicity: • Anoxia • Cyanosis • Headache Chronic Toxicity • Poison	**Boiling Pt:** 210°C **Melting Pt:** 6°C **Solubility:** Slight **Flash Pt:** 88°C **LEL:** 1.8% **UEL:** Not found **Vapor Density:** 4.25 **Vapor Density:** <1 Torr **Incompatibles:** Nitric Acid, phenols, Aluminum Chloride, aniline, glycerine, silver perchlorate, metals, dinitrogentetroide, caustics **Appearance and Odor:** Yellow oily liquid with a pungent order.

Names & Synonyms	Chemical Abstract Service Number (CAS No.)	Safe Exposure Limit, OSHA; ACGIH; NIOSH	Method of Detection	Warning Properties and Characteristics	Signs & Symptoms of Overexposure	Physical Properties
2,4,6-trinitrotoluene (TNT) Synonyms: Trinitrotoluene (dry)	118-96-7	OSHA: 0.5 mg/m³ (skin) ACGIH: 0.5 mg/m³ (skin) NIOSH: 0.5 mg/m³ (skin)	Not listed	Rapid heating will cause detonation	**Routes of Exposure:** inhalation, absorption, ingestion, and skin & eye contact. The following symptoms may be experienced resulting from exposure to 2,4,6-trinitrotoluene or its intermediates. The severity of the effect will depend on the concentrations, duration, and frequency of exposure. Acute Toxicity: • Sneezing, coughing, sore throat • Muscle pain • Peripheral nerve sensitization Chronic Toxicity: • Liver damage • Jaundice • Canosis • Kidney damage • Anemia • Cataract • Leukoaytosis	**Boiling Pt:** 231.1°F **Melting Pt:** 176°F **Detonation Pt:** 464°F **Solubility:** No **Specific Gravity:** 1.65 **TDP:** Highly toxic fumes of NOx **Vapor Density:** 7.8 **Vapor Pressure:** @ 178°F = 0.057 **Flash Pt:** Explodes **LEL:** NL **UEL:** NL **Incompatibles:** Strong oxidizers, ammonia, combustible materials **Appearance and odor:** Colorless to light yellow solid or crushed flakes.
o,m,p nitrotoluene	o = 88-72-2 m = 99-08-1 p = 99-99-0	OSHA: 5 ppm NIOSH: 2 ppm ACGIH: 2 ppm	FID, Air Sampling using Silica Gel Tub (Methanol)	Reacts with strong oxidizers, sulfuric acid	**Exposure causes:** anoxia, cyanosis, headache, weakness, dizziness, nausea, vomiting, and skin damage.	**Boiling Pt:** o = 432°F; m = 450°F; p = 460°F **Melting Pt:** p= 126°F **Detonation Pt:** 0 **Solubility:** o = 0.07%; m = 0.05%; p = 0.04% **Specific gravity:** o = 1.16; m = 1.16; p = 1.12 **TDP** **Vapor Density:** **Vapor Pressure:** 0.01 **Flash Pt:** 223°F **LEL:** o = 2.2%; m = 1.6%; p = 1.6% **UEL:** ? **Incompatibles:** Strong oxidizers, sulfuric acid **Appearance and Odor:** o = Yellow liquid with a weak aromatic odor m = Yellow liquid with a weak aromatic odor p = Crystalline solid w[illegible] veak aromatic odor.

Names & Synonyms	Chemical Abstract Service Number (CAS No.)	Safe Exposure Limit, OSHA; ACGIH; NIOSH	Method of Detection	Warning Properties and Characteristics	Signs & Symptoms of Overexposure	Physical Properties
Methyl-2,4,6-Trinitrophenylnitramine (Tetryl)	479-45-8	OSHA: 1.5 mg/m³ (Skin) NIOSH: 1.5 mg/m³ (Skin) ACGIH: 1.5 mg/m³	Particulate filter Visible spectrophotometry	Colorless to yellow, odorless crystalline solid.	Sensitive to skin causes redness, itch, and dermatitis. Edema may appear on nasal folds, cheeks, neck, and inflammation on the cornea. Sneezing, anemia, fatigue, cough, irritability, malaise, exhaustion, headache, nausea, insomnia, nausea, and liver/kidney damage. Acute Toxicity: • Anemia • Liver damage • Kidney damage Chronic Toxicity: • Anemia • Liver damage • Kidney damage	**Boiling Pt:** 356 - 374°F (Explodes) **Melting Pt:** 268° **Detonation Pt:** Explodes **Solubility:** 0.02% **Specific Gravity:** 1.57 **TDP:** -- **Vapor Density:** **Vapor Pressure:** <1 mm **Flash Pt:** Explodes **LEL:** ? **UEL:** ? **Incompatibilities:** Oxidizing materials, hydrazine **Appearance and Odor:** Colorless to yellow, odorless, crystalline solid.
3,5-Dinitroanaline[1]	97-02-9	Not established	Not listed	Combustible and explosive when exposed to flame	**Routes of exposure:** ingestion, and intraperitoneal routes. The following symptoms may be experienced resulting from exposure to 3,5-Dinitroanaline or its intermediates. The severity of the effect will depend on the concentrations, duration, and frequency of exposure. Acute Toxicity: • Eye Irritant Chronic Toxicity • Teratogen (experimental) • Reproductive Effects • Mutagen	**Boiling Point:** NL **Melting Pt.:** 188° **Delineation Pt.:** NL **Solubility:** insoluble **Specific Gravity:** NL **Vapor Density:** 6.31 **Vapor Pressure:** NL **TDP:** NL **Flash Pt.:** 210°C, 435°F **UEL:** NL **LEL:** NL **Incompatibilities:** Oxidizing Materials

(1) All information listed on this material is based on 2,4,Dinitroanaline
TDP = Thermal Decomposition Products
LEL = Lower Explosive Limit
UEL = Upper Explosive Limit
NL = Not listed

Based on limited available information, the following have been identified as primary hazards of concern for the sites to be investigated:

Contaminant(s):

Volatile Organic Compounds
Unexploded Ordnance (UXO)

The exposure limits, recognition qualities, acute and chronic effects, and first aid treatments are presented in Table A-3-1.

Upon arrival at the base, the Halliburton NUS TL/SSO will meet with personnel from the Base Fire Protection Department, Base Security, Emergency Services, Public Works, OSH, Safety, and Environmental Department to notify coordinators of the activities to be undertaken and where. All personnel will be required to follow base emergency procedures when needed. Emergency medical services will be obtained from off-site services as needed.

3.4 PHYSICAL HAZARDS

Physical hazards which could be involved in the execution of this scope of work include, but are not limited to, the following items:

- Uneven or unstable terrain (slip/trip hazards)
- Strain/muscle pulls from manual lifting
- Fall from elevated surfaces
- Exposure to pinch/compression points
- The potential for a worker to be struck by or entangled in heavy machinery
- Contact with energized sources
- Noise in excess of 85 dBA
- Water hazards
- Natural hazards (e.g., snakes, ticks, mosquitos, poisonous plants, etc.)
- Inclement weather
- Heat stress
- Cold stress
- Contact with UXO

Control efforts for these potential hazards will encompass and possibly combine use of proper equipment maintenance, guarding, and operation. Additionally, adherence to proper standard work practices and standard operating procedures will aid in the elimination of these hazards. Each of the above-mentioned items is further detailed below.

No confined space entry is planned during this field investigation.

3.4.1 Uneven/Unstable Terrain

Planned activities described in the scope of work for this investigation will bring field personnel into areas where this potential hazard may exist (e.g., river and pond banks, marshy areas, and loose and shifting ground). At no time shall workers or equipment be located within 2 feet of the edge of an area that is susceptible to cave-ins. Personnel will not be permited to enter any excavation.

As it has been determined that this hazard may exist in various locations, it will be the Task Leader's responsibility (in accordance with SOP and Safe Work Practices) to inspect, document, and put in place control measures to prevent placing equipment or personnel at risk.

3.4.2 Strain/Muscle Pulls

Strain/muscle pulls may result from improper lifting techniques during mobilization, sampling, or demobilization. Proper lifting techniques or help should be used in activities involving manual material handling, such as placement, positioning, packing, or unpacking of heavy equipment. This information will be covered as part of the Site-Specific Training.

3.4.3 Elevated Working Surfaces

Due to variations in elevation at Area #8 and the IOD Site (e.g. steep terrain), employees should be aware of the hazards associated with such features. In view of the hazards associated with a vertical drop, employees should execute extreme caution when working at these sites. Geophysical work and any sampling shall be restricted to no closer than 5 feet from the edge of a drop-off area.

3.4.4 Pinch/Compression Points

Pinch and Compression Points of sampling equipment may result in injury. All equipment must be maintained in proper working order, with machine guarding devices in place. Any equipment found to be

lacking in these areas shall be removed from service. Additionally, all personnel shall be properly trained in the use and function of all equipment used within the investigating activity. All equipment associated with this operation will be initially and periodically inspected by the SSO in an effort to avert hazards of this type. All equipment on which maintenance has been performed will be reinspected by the SSO prior to its return to service.

3.4.5 Struck by or Entangled in Heavy Machinery

The performance of soil borings will be accomplished through drilling operations which will require the use of a drill rig. The most predominant physical hazard associated with this type of work is entanglement of safety equipment or clothing into the rotating augers. To address this hazard, a thorough inspection of all equipment will be performed to remove potential snag points and to ensure emergency stop devices operate properly and all members of the field team know the location and operation of these devices. Persons working in close proximity of the drill rig will be required to secure all loose clothing or protective equipment to avoid possible entanglement. The use of a long-handled shovel or the equivalent will be used to remove drill cuttings away from the hole and from rotating tools. In addition, pins that protrude from augers shall not be allowed.

All mechanized equipment brought on-site to complete this scope of work will be inspected initially prior to the commencement of on-site activities and then periodically thereafter. These inspections will be performed by the SSO and will include that the following are ensured:

- All safety guards are in place
- All safety-restraints (i.e. seatbelts) are in place and functioning properly as required by Federal regulations
- All mobile equipment is equipped with a backup alarm and emergency stop device
- All operators are qualified to do so. All drivers will be required to have their Commercial Drivers License
- Traffic Control Measure Routes and regulations will be established and adherence required.
- All maintenance performed on the equipment will employ manufacturers recommended parts, and be inspected prior to returning to services by the SSO.

In addition to the requirements established by this HASP, all heavy equipment and/or the movement of, may also be required to meet local or site-specific regulations. Control measures for these hazards are presented in Section 9.0 "Standard Work Practices".

3.4.6 Contact with Energized Sources

One of the hazards associated with the execution of this scope of work is the potential for encountering energized sources (i.e. pressurized lines, water lines, telephone lines, buried utility lines), primarily while engaged in drilling activities. Due to the obvious ramifications associated with this hazard, extreme caution and strict adherence to procedures to detect, identify, and take evasive action shall be followed during the completion of the scope of work. Efforts will be made through local contacts, as built drawings (where available) along with geophysical surveys to identify potential locations. Positive readings will require the relocation of a soil boring point. To further avoid hazards of this type, no drilling mast, boom, 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. Any such utilities identified shall be physically marked and avoided.

3.4.7 Noise in Excess of 85 dBA

Noise exposures exceeding the OSHA Permissible Exposure Limit could be encountered during certain phases of site operations. Personnel who are repeatedly overexposed could experience a permanent reduction in their hearing ability. Appropriate hearing protectors will be worn when in close proximity to drilling operations, as determined by the SSO. It shall also be the responsibility of the SSO to ensure the application, use, and maintenance of occupational noise protective measures shall be determined and proceed in accordance with OSHA 29 CFR 1910.95.

3.4.8 Water Hazards

As proposed in the scope of work, activities will take place near the water's edge. To avoid potential hazards associated with working near water (e.g. falling in, or sinking in the mud) the field team will use extreme caution when working within 4 feet of the water's edge, or when working in marsh/wetland areas. However, surface water bodies at the site consist only of shallow low flowing streams. Due to the obvious hazards associated with near water's edge during inclement weather, all field activities may be temporarily suspended or terminated at the discretion and direction of the Task Leader, or Site Safety Officer representative.

3.4.9 Natural Hazards (ticks, snakes, and other indigenous creatures)

Natural hazards such as poisonous plants, bites from poisonous or disease carrying animals or insects (e.g., snakes, ticks, mosquitoes) cannot be avoided in this type of environment. However in an effort to offset the impact of this hazard, field personnel will have access to commercially available snake bite kits, and insect repellents. Nesting areas in and about sampling points shall be avoided and another point selected within the same vicinity. Lastly, within recent years a marked increase in Lyme Disease has been reported. For this operation, this is a significant point as ticks (which are the primary vectors of this disease) have been encountered during previous visits to this site. In an effort to control this hazard, close attention will be given during operations and decontamination with regard to personal hygiene to detect and remove ticks once they adhere to the body. A discussion on Lyme Disease (including issues of recognition, evaluation and control) has been included as Attachment A-III of this Health and Safety Plan. It should be noted that the primary constituents associated with insect repellant agents may jeopardize sample integrity. Therefore, care must be taken not to contaminate samples collected in these site operations.

3.4.10 Inclement Weather

As all work will be conducted outdoors, inclement weather may be encountered. As conditions may vary, it will be at the discretion and direction of the Task Leader and the Site Safety Officer representative to temporarily suspend or terminate activities as conditions dictate. All activities will be terminated in the advent of electrical storms. Activities in areas with possible UXO will also cease in the event of thunderstorms and personnel within these areas will be required to leave the area immediately. The Stump Neck Explosive Safety Officer (ESO) will be notified in advance of any work in areas which may contain UXO.

3.4.11 Heat 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 significant. To combat this problem the Task Leader and the Site Safety Officer shall initiate heat stress monitoring, and effect the appropriate control measures. American Conference of Governmental Industrial Hygienists (ACGIH)-recommended control measures for this hazard are included in Attachment A-I.

3.4.12 Cold Stress

The cold stress Threshold Limit Values (TLVs) are intended to protect workers from the most severe effects of cold stress (hypothermia) and cold injury and to describe exposures to cold working conditions under which it is believed that nearly all workers can be repeatedly exposed without adverse health effects. The TLV objective is to prevent the deep body temperature from falling below 36°C (96.8°F) and to prevent cold injury to body extremities (deep body temperature is the core temperature of the body determined by conventional methods for rectal temperature measurements). For a single, occasional exposure to a cold environment, a drop in core temperature to no lower than 35°C (95°F) is permitted. In addition to provisions for total body protection, the TLV objective is to protect all parts of the body with emphasis on hands, feet, and head from cold injury.

For more information concerning cold stress effects and control measures see Attachment A-I.

3.4.13 Contact with UXO

Contact with UXO is a potential problem at Range 6. Therefore, the Range 6 site will first be surficially cleared by a UXO expert (Halliburton NUS EOD personnel) prior to initiation of activity. In addition, the Indian Head, Stump Neck ESO will be notified in advance of any work in areas which may potentially contain UXO. Particular care must be given to areas of heavy vegetation owing to the fact that the ground surface may be obscured. If suspected explosive contamination or UXO is discovered at any time during operations at a site where it was not previously suspected or which has been cleared, operations will be stopped immediately in the affected area, all personnel will be excavated to a safe distance, the location will be marked, and the following phone call will be initiated:

- Indian Head, Fire Department 743-4333

Indian Head, Stump Neck emergency protocols will assure that appropriate contacts are notified.

The following are hazards associated with encountering UXO:

- Fire
- Blast
- Heat
- Fragmentation
- Jet
- Over-pressure
- Ejection
- Propulsion

These are all produced in varying combinations as a result of the intended or unintended functioning of a high or low explosive. The most effective protection from all hazards of explosives is a safe separation distance. The risk of exposure to these hazards by personnel conducting UXO operations must be kept to the absolute minimum necessary to perform the operation. All other personnel must be at or beyond the safe separation distance. This distance will be adjusted by the HNUS UXO specialist as the situation dictates.

3.5 UNEXPLODED ORDNANCE (UXO)

Due to the potential of encountering UXO during planned field activities at Range 6, arrangements have been made to provide UXO support at this site. These UXO operations are addressed in detail in a Standard Operating Procedure (SOP) of the HASP (Attachment A-V). A copy of that SOP will be presented to all site personnel prior to the initiation of site activities, and all personnel will be required to review and sign a site-controlled copy of that document as part of their site-specific health and safety training. A summation of UXO procedures, controls, and restrictions is as follows:

a) Indian Head, Stump Neck ESO will be notified in advance of any work in areas where UXO may be present.

b) Explosive Ordnance Disposal (EOD)-qualified personnel and necessary equipment will be available for all field activities.

c) All geophysical survey locations where UXO is a potential hazard will be screened by Halliburton NUS UXO Specialists for UXO prior to the initiation of survey activities. A magnetometer will be used to conduct the screening.

If UXO is discovered at any time during site activities, operations will be stopped immediately, the location will be marked, all personnel will evacuate the area, and the following contacts will be made:

- Indian Head, Stump Neck Fire Department, 743-4333
- Indian Head, Stump Neck Waste Management, Shawn Jorgensen, 743-6745

During all UXO-related hazardous operations, a qualified UXO Specialist (who is a Master-rated EOD technician) will be mobilized to perform these services.

4.0 AIR MONITORING

This section presents requirements for the use of real-time air monitoring instruments during site activities involving potential for exposure to site contaminants. It establishes the types of instruments to be used, the frequency of which they are to be used, techniques for their use, action levels for upgrading/downgrading levels of protection, and methods for instrument maintenance and calibration.

4.1 INSTRUMENTS AND USE

4.1.1 HNu-PI101 Photoionization Detector

A HNu PI-101 photoionization detector (PID) with a 10.6 eV lamp will be used to monitor potential source areas and to screen the breathing zones of employees during soil boring, sampling, excavation of test pits, or any intrusive activities. The PID has been selected because it is capable of detecting organic gases and vapors and some inorganic gases and vapors. Detection is based on the contaminants ionization potential in comparison to the lamp energy, which has to be equal to or greater than the ionization potential of the contaminant. When calibrated with isobutylene, the PID has a one- to-one correspondence with benzene.

Prior to the commencement of any field activities, the background levels of the site must be determined and noted. Daily background readings must be taken away from areas of potential contamination to obtain accurate results. These readings, any influencing conditions (i.e., weather, temperature, humidity) and location will also be documented in the Health and Safety Logbook as a matter of reference.

Any positive instrument responses observed above background levels will be considered to indicate contaminant release. As such the following actions will be taken:

- Monitor work areas continuously, concentrating on worker breathing zones (BZ) areas (head and face regions) when positive source results are reported. If readings are observed at these areas to be at background levels, continue monitoring and work efforts.

- If sustained or repeated intermittent readings in the workers BZ are above background, workers are to retreat to an unaffected area and remain until further determinations regarding the contaminant are made or until further direction from the FOL.

- If background levels are regained, work may resume, with continuous monitoring via instrument usage.

- If background levels are not regained, the SSO shall determine what controls are necessary to permit work activities to resume (i.e. upgrading respiratory protection, additional air sampling such as colorimetric tube sampling to identify the contaminant).

4.1.2 OVA-Model 128 Flame ionization Detector

The use of an Organic Vapor Analyzer (OVA) (Flame Ionization Detector) may also be utilized to screen potential source emissions and the breathing zones of employees during the execution of the scope of work or during any intrusive activities which may release airborne emissions. The OVA has been selected because it may detect the presence of long chain hydrocarbons more efficiently than a photoionization detector (PID). The relative response for BTEX compounds range from 100-150%. Both instruments are suitable for use, and are offered here as alternative devices, based on the field technicians' knowledge and level of comfort using these instruments.

Positive readings indicated by the OVA will result in actions as discussed above for the HNu-PI101 Photoionization Detector. These devices are used as primary screening tools to detect contaminants which are readily released into the environment and that may pose an increased threat to site workers.
NOTE: A summary of air monitoring types are given in Table A-4-1. It should be realized that many of the contaminants of concern are nondetectable using these types of screening instruments, therefore primary emphasis will be given to visual observation as these contaminants may present themselves as particulates or bound to particulates.

4.2 ADDITIONAL MONITORING REQUIREMENTS

In addition to the above mentioned air monitoring devices the use of a combustible gas indicator (CGI), oxygen survey meter will be required. The types of monitoring instruments specified by the hazard and the action levels to upgrade personnel protection are shown in Table A-4-2. All monitoring equipment shall be maintained following procedures outlined in the Halliburton NUS Standard Operating Manual for Monitoring Equipment.

TABLE A-4-1

AIR MONITORING TYPE AND FREQUENCY

TASK(S)	ATMOSPHERIC HAZARD(S)	MONITORING TYPE & FREQUENCY
Soil borings	Flammable/Explosive Toxic Particulates UXO	**PID/OVA** - potential sources continuously, Breathing zone based on positive results at potential source areas. **LEL/O_2 meter** - continuously **Magnetometer** = per SOP direction **Visual Observation** - for dusty conditions since contaminants may be present in particulate form or bound to particulates
Sampling Subsurface soil Surface soil Sediment	This is a task driven specification. Each site has varying potentials for exposure. However, all sites may contain the following atmospheric hazards; Flammable/Explosive Toxic Particulates UXO	As these are intrusive activities, monitoring may be used to detect hot spots and respective airborne concentrations. Any such hot spots detected, will observe continuous monitoring requirements, as specified below. **PID/OVA** - during the initial opening of the well casing or area of surface water, then periodically if conditions so dictate **LEL/O_2 meter** - continuously **Magnetometer** = per SOP direction **Visual Observation** - for dusty conditions since contaminants may be present in particulate form or bound to particulates

TABLE A-4-2

ACTION LEVELS

INSTRUMENT	ACTION LEVEL	RESULTANT ACTION
HNu PHOTOIONIZATION DETECTOR	Any sustained readings above established background levels in workers' breathing zones.	Retreat to an unaffected area and allow the work area to ventilate. Work may not resume until further determinations as to the identity of the contaminant are made.
OVA Detector	Any sustained reading greater than background	Same actions as for the HNu Photoionization detector.

4.3 MONITORING SCHEDULE

4.3.1 Air Monitoring Requirements - HNu and OVA

Air monitoring with the HNu PI-101 and OVA will be initiated at potential sources of vapor emissions. The following potential sources are anticipated.

- All intrusive activities (i.e. soil boring, drill cuttings, sampling, etc.)
- Decontamination procedures
- Any time chemical odors are perceived
- All potential sources of exposure

4.3.2 Air Monitoring Frequency

All site readings (including indications of no positive readings) must recorded on the direct reading instrument response sheet provided in Table A-4-3. Site readings may instead be recorded in the Health and Safety Logbook provided that the same information is recorded as that specified in Table A-4-3.

The following schedule used in conjunction with Table A-3-1, will be followed, but not limited to, for air monitoring activities as specified for each activity:

> **NOTE:** The use of air purifying respirators are not suitable for protection against inhalation of vapors associated with several of the site contaminants. As a result, the presence of any concentrations in the workers breathing zone will require workers to retreat to an unaffected area. Continued work in areas in which PID readings exceed background levels will require a qualitative and semi-quantitative determination as to the chemical(s) of concern. This may be accomplished through the use of colorimetric tubes. Based on the results of this air monitoring the presence of these contaminants and the need for respiratory protection may be confirmed or dismissed.

4.4 VISUAL OBSERVATION

Based on the hazard assessment, the potential exists for contaminants to be present in the form of a particulate. Any observations of airborne dusts or particulates should be noted and attempts shall be made to minimize generation of dust emissions. Controlling particulate generation and dispersal is accomplished through work practices such as wetting down areas of potential dust generation. Control of airborne

particulates can only be attempted after consultation with the Team Leader and Site Safety Officer. Any visible dust concentrations which cannot be controlled will require discontinuation of site activities.

4.5 INSTRUMENT MAINTENANCE AND CALIBRATION

Air monitoring instruments will be maintained and pre-field calibrated by the equipment supplier. With regard to HNu usage, field calibration will be performed daily prior to the initiation of work. An additional calibration will be performed at the end of the day to determine any significant instrument drift. All calibration efforts will be documented in the Equipment Calibration Log or the Site Health and Safety Logbook. Information provided must include the following: Calibration information shall include the following:

- Dates calibration was performed
- Individual calibrating the instrument
- Instrument name, model, and serial number
- Any relevant readings (before and after) calibration
- Identification of the calibration standard (lot no., source concentration, supplier)
- Any relevant comments or remarks

Field maintenance will consist of daily cleaning of the instruments using a damp towel or rag to wipe off the instrument's outer casing and overnight battery recharging.

4.6 RECORDKEEPING

All instrument readings above and including background levels must be recorded in the field Health and Safety Logbook. This shall indicate the date, instrument operator's name, instrument used (type, model number, I.D. No.), location of the reading (eg. borehole, breathing zone, etc.), reading(s) observed, workers potentially affected, and actions taken to reduce exposures. In addition, results of any colorimetric analysis must be recorded in the log book. The absence of instrument responses (excursions above background levels) must also be recorded, at least on a daily basis. Lastly, information concerning influencing factors (i.e. weather, activities, interferences) which may have had an impact on the results shall also be recorded.

4.7 INSTRUMENT USE

The PID, OVA, and the LEL/O_2 meters will be used primarily as screening tools during, sampling activities which might release emissions of toxic contaminants. Their selection is based on chemicals readily released into the environment.

TABLE A-4-3

DIRECT-READING INSTRUMENT RESPONSE SHEET

SITE NAME_____ PROJECT

NUMBER_____

PAGE_____ OF _____

Date and Time(s)	Instrument Operator Name	Instrument Used	Instrument Reading and Duration	Location (eg. Boreholes vs. Breathing Zone)	Operation(s) being Performed	Personnel in Vicinity at Time of Readings and Level of PPE Worn
Example: 12-12-94/ 14:30	Joe Field	HNu-PI101	15 ppm / 15 min	Breathing Zone	Installation of Well No. 12	Jim Technician / Level B George Grunt / Level B

5.0 PERSONAL PROTECTIVE EQUIPMENT (PPE)

This section presents requirements for the use of personal protective equipment for each of the activities being conducted as defined in Section 3.0 of this HASP. This section includes anticipated levels of protection for each of the activities, the criteria used for selecting various levels of protection, and criteria for modifying levels of protection based on monitoring instrument readings and personal observations.

5.1 ANTICIPATED LEVELS OF PROTECTION

Most work associated with this project is anticipated to be performed in a **modified** Level D Protection, as defined in Appendix B of OSHA Standard 29 CFR 1910.120 - "Hazardous Waste Operations and Emergency Response." Many sampling activities will require the use of chemical resistant coveralls, gloves, and boot covers as presented in the task breakdown which follows. Where activities overlap, the more protective requirements will be applied It is not anticipated that an upgrade to level C respiratory protection will be required during any field activities to be undertaken at this site. However, prior to initiation of work with exclusion zones or Level A, B or C PPE, clearance will be received from Stump Neck Environmental and Public Affairs Offices.

5.1.1 Minimum Requirements (All Tasks)

Minimum requirements include steel-toe and steel shank work boots, chemical resistant boot covers, with standard field dress consisting of long pants and long-sleeved shirts. Hard hats and safety glasses will be worn when overhead or eye hazards exist based on the task or if working in and around machinery. Tyvek coveralls may be worn to provide protection against contact with natural hazards such as ticks and poisonous plant-life. It will be at the discretion of the FOL or the SSO based on tasks, site conditions, and other influencing factors for the use of optional equipment. This is of course providing action levels or the requirements of this plan are not compromised when additional elements of personal protection are required.

5.1.2 Mobilization/Demobilization, and Site Reconnaissance

As mobilization, demobilization present limited potentials for contacting the suspected hazardous materials associated with some tasks, the minimum requirements will be adhered to for these tasks. Disposable boot covers will be worn when on-site as much of the contaminants may exist on the surface.

5.1.3 Soil Borings

Minimum requirements include steel-toe, steel shank work boots, chemical resistant boot covers, Tyvek coveralls, and nitrile or butyl rubber outer gloves over inner latex or nitrile (chemical resistant) gloves. In addition, hard hat and safety glasses will be worn when working in close proximity to machinery, equipment, or when the potential for eye or overhead hazards exist. If the potential for saturation of work cloths exists, the use of PVC or PE-coated Tyvek can substituted in place of Tyvek. Additional personal protective items may include hearing protection during the operation of mechanized equipment as specified in section 3.4.7.

5.1.4 Surface and Subsurface Soil Sampling

Hard hats (when necessary), safety glasses, steel-toe, steel shank work boots, disposable boot covers, Tyvek coveralls with taped ankle and wrist seams, nitrile or latex inner gloves (layered as necessary), and nitrile or butyl rubber outer gloves. Since soil within the borings has the potential to be saturated with water, the use of PVC, or PE-coated Tyvek coveralls are required whenever there is a potential for saturation of work clothes.

5.1.5 Sediment Sampling

Hard hats (when necessary), safety glasses, steel-toe, steel shank work boots, disposable boot covers, Tyvek coveralls with taped ankle and wrist seams, nitrile or latex inner gloves (layered as necessary), and nitrile or butyl rubber outer gloves. Since sampling surface water and sediment has the potential to saturate work cloth the use of PVC, or PE-coated Tyvek coveralls are to be worn whenever this potential exists. In addition, the field team shall employ lifelines, safety harnesses, and U.S. Coast Guard approved personal flotation devices when working within four feet of the waters edge or on boats.

5.1.6 Decontamination Activities

The PPE requirements for decontamination activities will include the minimum requirements for all tasks (See Section 5.1.1) and the use of PE-coated Tyvek or PVC with nitrile outer and inner gloves when the potential for saturation of work clothing exists, and splash shield as necessary or as directed by the FOL or SSO. This will be the required level of protection when performing large scale decontamination activities such as cleaning augers and drill flights. The general rule of thumb for respiratory protection will be to require the same level as, or one below, that of the field personnel who were using the equipment.

5.2 PPE SELECTION CRITERIA

Based on the site activities, the volatility, and concentrations of contaminants, that are anticipated to be encountered (based on previous sample results), and dispersion of potential vapors via natural ventilation (i.e. wind currents), vapor concentrations in worker breathing zones are not anticipated to be at levels which would warrant respiratory protection for most tasks. However, there is always the potential for vapor concentrations to be present and the potential also exists for dust emissions containing site contaminants to be generated. Dust emissions can be inhaled or ingested and result in exposure. If dust emissions are observed and cannot be controlled (i.e. via area wetting techniques), site activities must desist until a determination as to the need for respiratory protection is made. Initiation of this action will be determined by either the FOL or SSO.

Nitrile or butyl rubber gloves were selected to provide protection against the potential site contaminants that could be encountered and to help reduce the amount of contaminants ingested as a result of incidental hand to mouth contact. Additionally, some of the site contaminants are capable of being absorbed through the skin or are a contact hazard which may result in the potential for a significant contribution to the overall exposure. Nitrile or butyl rubber gloves in conjunction with latex inner gloves have been determined to provide an adequate barrier to the skin based on the low concentrations anticipated to be directly contacted. Hard hats, safety glasses, and work boots were selected to provide protection against some of the physical hazards associated with the proposed operations and disposable boot covers were selected to help minimize the spread of contamination. Tyvek coveralls were selected to minimize the potential for contamination of street clothes, and to protect against contact with natural hazards (i.e. ticks, poisonous plant-life, etc.). PVC of PE coated Tyvek coveralls were selected for use in the event that sampling activities have the potential to result in the saturation of work clothes.

5.3 PPE MODIFICATION CRITERIA

This section presents criteria for upgrading and downgrading chemical protective clothing and/or respiratory protection. Where uncertainties arise, the more protective requirement will apply.

5.3.1 Chemical Protective Clothing Modification Criteria

Tyvek coveralls and boot covers must be worn anytime there is a reasonable potential for contamination of street clothes. Polyvinyl chloride (PVC) or PE-coated Tyvek coveralls must be worn anytime there is a reasonable potential for saturation of work clothes. Nitrile or butyl rubber gloves must be worn anytime there is a reasonable potential for contact with site contaminants. The use of PVC or PE-coated Tyvek should particularly considered when performing intrusive activities at all sites, due to the possibility of unknown contaminants being disocvered, which would expose workers to skin absorbent contaminants.

5.3.2 Respiratory Protection Modification Criteria

Site activities are to be discontinued in the event that visible dust concentrations or air monitoring equipment indicates the presence of volatile contaminants within the workers breathing zone (see Table A-4-2). Therefore, the use of respiratory protection may only be utilized after further determinations as to the identity of the chemical contaminant. Respiratory protection will only be used following identification of the chemicals of concern and notification of the Health Sciences Department.

In the event that respiratory protection is required the following criteria shall imposed. Respirators belong to, and are only to be used and maintained by, the individual to whom they have been issued. All personnel working on-site must be trained, fit-tested, and declared medically fit to wear respiratory equipment prior to participating in field activities. Respirators shall be cleaned, sanitized, and properly stored after each day's usage by the user. The SSO will periodically inspect all respiratory equipment to ensure that use, application, storage, and maintenance are in accordance with 29 CFR 1910.134.

5.4 PPE INSPECTION

As part of donning, all personnel will be responsible for performing inspections on their items of PPE. These activities will include glove leak tests and close visual inspection of all coverall seams. Proper PPE inspection techniques will be required as part of initial site-specific safety training.

5.5 PPE TRAINING

Site-specific training will include information concerning use, proper fit, donning, doffing, and the limitations of the protective garments. In addition, as part of physical hazards, the temperature extremes as associated with PPE will be discussed.

TABLE A-5-1

PROTECTIVE EQUIPMENT FOR ONSITE ACTIVITIES

Activity	Level	Protective Equipment
All site activities and sampling activities)	C[1] (not anticipated)	• Chemical-resistant (Tyvek) clothing • Outer nitrile or butyl rubber and inner latex or nitrile (chemical-resistant) gloves • Safety boots, with nitrile or butyl rubber outer boots (or rubber steel-toed boots) • Hard hat[2] • Type of respiratory protection is dependent upon identification and semi-quantitative determination of chemical contaminant.
	Modified D (anticipated level required)	• Tyvek coveralls / work clothes • Safety boots with disposable boot covers • Safety glasses/goggles • Hard hat[2] • Hearing protection (as directed) • Inner latex or nitrile and outer nitrile or butyl rubber gloves

[1] Use of Level C (respiratory protection) requires qualitative and semi-quantitative identification of site contaminants. In addition, clearance must be obtained from the Health Science Department and from NSWC Environmental and Public Affairs Offices.

[2] Halliburton NUS UXO Specialists are not required to wear hard hats or steel-toed boots, unless determined necessary by the HNUS Site Safety Officer.

6.0 DECONTAMINATION

Decontamination is the procedure to be employed to remove and/or neutralize site contaminants encountered through the execution of the scope of work. This procedure will be employed for the purpose of preventing cross contamination, protecting on-site personnel, and protecting the individuals outside this operation from the spread of contamination.

6.1 STANDARD PROCEDURES

1. As part of each site's mobilization activity the SSO and FOL will establish a personnel decontamination station suitable to handle the activities, type and the amount of anticipated contamination, and the level of protection to be used. This area will be located adjacent to the exclusion zone or work area, and will consist of the stations described in section 6.2.

2. Upon leaving the contamination area (exclusion zone), all personnel shall proceed through the appropriate contamination reduction sequence.

3. All protective gear should be left on-site during any lunch break following decontamination procedures.

4. Also as part of mobilization, a central decontamination area for heavy equipment will be established. The equipment upon completing the task at hand will require that at least the wheels and tires to be cleaned prior to moving to the decontamination area. This area should be accessible to resources and emergency services.

5. All equipment will be inspected by the FOL or SSO and approved prior to leaving the decontamination area within the contamination reduction corridor.

6. All discarded materials (i.e. drill cuttings, decontamination fluids) will be drummed, labeled, and staged to await sample analyses.

6.2 PERSONNEL DECONTAMINATION REQUIREMENTS

The decontamination of personnel and their protective clothing shall be performed in sequential stages. These stages shall include:

- Removing contamination from protective clothing and equipment with a detergent/water solution and soft bristle scrub brushes.
- Removal of protective clothing (disposable items shall be discarded into a container conspicuously marked "Potentially Contaminated Clothing").
- Workers washing hands and face with potable water and soap whenever they remove PPE and leave the exclusion zone.

The maximum decontamination layout is described in the following Table. Within this format the **bolded** sections represent the minimum requirements for all tasks conducted in an established exclusion zone. Should the task or scope require use of the material identified as optional, those sections will become mandatory (at the discretion of the on-site safety representative).

TABLE A-6-1

Maximum/Minimum Measures for Decontamination

Station 1:	Segregated Equipment Drop	Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on plastic drop cloths or in different plastic-lined containers. Segregation at the drop reduces the probability of cross contamination.
Station 2:	Boot Cover and Glove Wash	Scrub outer boot covers and gloves with detergent and water.
Station 3:	Boot Cover and Glove Rinse	Rinse off from Station 2 using as much water as necessary.
Station 4:	Suit and Safety Boot Wash. As applicable as not all operations will require the use of protective suits.	Wash splash suit, gloves, and safety boots. Scrub with long-handled scrub brush and decon solution. If disposable suits are worn (i.e. Tyvek) skip to station 6.
Station 5:	Suit and Safety Boot Rinse	Rinse off decon solution using water. Rinse Repeat as many times as necessary.
Station 6:	Tape Removal	Remove tape around boots and gloves and deposit them in the plastic-lined container.
Station 7:	Boot Cover Removal	Remove boot covers and deposit them in the plastic-lined container for decontamination and reuse.
Station 8:	Outer Glove Removal	Remove outer gloves and deposit them in a plastic-lined container for disposal.
Station 9:	Cartridge or Mask Change (Level C usage). As applicable not all operations will require respiratory protection.	If worker leaves exclusion zone to change cartridges (or mask), this is the last step in the decontamination procedure. Worker's cartridges exchanged, new outer gloves and boot covers donned, and joints taped. Worker returns to duty.
Station 10:	Splash Suit Removal	With the helper's assistance, remove splash suit. Deposit it in the plastic-lined container.
Station 11:	Respirator Removal (if worn)[1]	Remove face piece. Deposit it in a plastic-lined container. Avoid touching face with fingers.
Station 12:	Inner Glove Removal	Remove inner gloves and deposit them in the plastic-lined container.
Station 13:	Field Wash	Wash hands and face with potable water.
Station 14:	Heat stress evaluation/Break Heat stress monitoring will be conducted on a as needed basis.	If heat stress monitoring procedures are engaged, they should be performed at the very beginning of the break periods. Break areas should consist of a shaded area with the ability to provide drinking fluids to personnel, if necessary.

(1) Respirators (if worn) will be cleaned and sanitized at a latter time following the conclusion of personnel decontamination, and are therefore not considered a part of this sequence.

6.3 MINIMAL DECONTAMINATION

Less extensive procedures for decontamination can be established when Level D protection is utilized, when the type and degree of contamination are known, or when the potential for transfer is judged to be minimal by the SSO. These procedures generally may involve one or two washdowns only, and/or progressive removal (and disposal, as appropriate) of items of PPE.

6.4 EQUIPMENT DECONTAMINATION

The drill rig and all drilling tools and hand augers will be steam cleaned between boreholes. All downhole tools, samplers, and other downhole equipment will be steam cleaned between boreholes. Under muddy conditions, the back end of the drill rig and wheels will also be steam cleaned, as needed, between boreholes. A decontamination pad at will be used for steam cleaning and decontamination operations.

6.5 DECONTAMINATION OF SAMPLING TOOLS

All sampling equipment will be cleaned between sample acquisitions in accordance with the requirements established in the sampling plan. In addition, all sampling equipment that will be leaving the site will require a thorough decontamination, and approval by the FOL or SSO to verify it has been properly decontaminated, prior to leaving the site. This can be accomplished either by steam cleaning or by a detergent wash and potable water rinse until tools are visibly clean.

6.6 EMERGENCY DECONTAMINATION PROCEDURES

Any person who becomes ill or is injured in the exclusion zone must be decontaminated to the maximum extent possible. If the injury or illness is minor, full decontamination should be completed and first aid administered prior to transport to a medical facility. If the victim's condition is serious, a partial decontamination should be performed if it does not place the injured person at greater risk. (i.e., complete disrobing of the victim and redressing in clean coveralls or wrapping in a blanket). First aid should be administered while awaiting an ambulance or paramedics. In the event of a catastrophic incident (explosion or large release) personnel should evacuate to a safe location without performing any decontamination efforts, unless it can be determined that doing so would further jeopardize the welfare of the individual.

6.7 PROTECTION REQUIRED BY DECONTAMINATION PERSONNEL

Personnel assisting with decontamination procedures will wear the same level of protection as those they are decontaminating or one level below, depending on the stage of decontamination with which they are assisting. Assistants who are stationed at the first stages of decontamination will be in the same level of protection as those being assisted. At stages where the outer garments are already removed and containerized, the decontamination assistants will wear the lower level of protection.

6.8 CLOSURE OF THE PERSONNEL DECONTAMINATION STATION

All disposable PPE, clothing, and plastic sheeting used during the operation will be washed via regular decontamination procedures and contained on-site in a Halliburton NUS dumpster to await disposal by Halliburton NUS. No materials are to be placed in any dumpsters. Decontamination-generated wastes will also be contained on-site for ultimate disposal by Halliburton NUS. Reusable rubber clothing will be dried and prepared for future use. (If gross contamination has occurred, discard the item.) Cloth items will be bagged and removed from the site for final cleaning. All wash tubs, pail containers, etc., will be thoroughly washed, rinsed, and dried prior to removal from the site. The SSO will be responsible for inspecting and clearing equipment to proceed to the next location and to leave the site.

6.9 DECONTAMINATION EVALUATION

The decontamination process effectiveness will be judged in the following manner.

- Visual observation - Discoloration, stains, visible dirt, and alterations of the fabric due to chemical contact will be the primary method used to determine effectiveness.

The following methods may be used if gross contamination is encountered:

- Monitoring Instrumentation - Instruments used to detect site contaminants may be employed to scan garments and equipment for the presence of site contaminants after decontamination procedures have been employed.

- Decontamination Solution Analyses - An analyses of the solution (final rinse) and the presence of contaminants may suggest additional cleaning is required. This information may be useful in the ultimate disposal of the fluids generated.

- Sample Analyses - sample analyses may indicate the level of contamination and therefore the potential for contamination. Once again this information may be useful in the ultimate disposal.

It is suggested that a combination of methods be used to determine the effectiveness of the decontamination of the process used.

7.0 TRAINING REQUIREMENTS

This section describes the minimum requirements for initial, refresher, and site-specific training.

7.1 INTRODUCTORY AND REFRESHER TRAINING

The site-specific training form, to be signed by all onsite workers, is provided in Figure A-7-1.

7.1.1 Requirements for HALLIBURTON NUS Personnel

All Halliburton NUS personnel must complete 40 hours of introductory hazardous waste site training prior to performing work at NAVSCOLEOD. Additionally, HALLIBURTON NUS 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.

All Halliburton NUS personnel functioning in the supervisory capacity will have had Management and Supervisory training as required by 29 CFR 1910.120 (e)(4). No field personnel will function independently from a supervisor, unless they also satisfy this requirement.

Documentation of Halliburton NUS introductory, supervisory, and refresher training will be maintained at the project. Copies of certificates or other official documentation will be used to fulfill this requirement.

7.1.2 Requirements for Subcontractors

All Halliburton NUS subcontractor personnel must have completed introductory hazardous waste site training or equivalent work experience as defined in OSHA Standard 29 CFR 1910.120(e) and 8 hours of refresher training meeting the requirements of 29 CFR 1910.120(e)(8) prior to performing field work at the sites. All subcontractor personnel serving in the supervisory capacity will have had Management and Supervisory training as required by 29 CFR 1910.120 (e) (4). Halliburton NUS subcontractors must certify that each employee has had such training by sending Halliburton NUS a letter, on company letterhead, containing the information in the example letter provided as Figure A-7-2. Accompanying that letter (or submitted separately prior to the initiation of any on-site activities), copies of training certificates will be provided for all subcontractor personnel. Figures 7-2 and 8-2 can be combined into one letter.

FIGURE A-7-1

SITE-SPECIFIC TRAINING DOCUMENTATION

My signature below indicates that I am aware of the potential hazardous nature of performing sampling activities at NAVSCOLEOD DET and that I have received site-specific training which included the elements presented below:

- 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
- Emergency response procedures (evacuation and assembly points)
- Review contents of relevant Material Safety Data Sheets

I further state that I have been given the opportunity to ask questions and that all of my questions have been answered to my satisfaction.

Name	Signature	Date

FIGURE A-7-2

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

Ms. LeeAnn Sinagoga
Project Manager
Halliburton NUS Environmental Corp.
661 Andersen Drive
Pittsburgh, Pennsylvania 15220

Subject: Hazardous Waste Site Training - Verification Invesitation Stump Neck

Dear Ms. Sinagoga:

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.

LIST FULL NAMES OF EMPLOYEES AND THEIR SOCIAL SECURITY NUMBERS HERE

Should you have any questions, please contact me at _____.
(phone number)

Sincerely,

(Name of Company Officer)

NOTE: Copies of training certificates must also be attached with this letter, or otherwise provided prior to the initiation of any on-site activities.

7.1.3 Subcontractor Exceptions

Subcontractors such as surveying teams who will not perform any activities in the exclusion zone during sampling tasks or where there is no potential for exposure, will be excluded from the requirements stipulated in Section 7.1.2.

7.2 SITE-SPECIFIC TRAINING

Halliburton NUS will provide site-specific training to all Halliburton NUS employees and subcontractor personnel who will perform work on 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

7.2.1 Site-Specific Training Documentation

Halliburton NUS 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 A-7-1 will be used to document site-specific training.

7.3 OTHER TRAINING

At least one member of the field team will possess current certification in first aid and cardiopulmonary resuscitation.

8.0 MEDICAL SURVEILLANCE

8.1 REQUIREMENTS FOR HALLIBURTON NUS PERSONNEL

All Halliburton NUS personnel participating in project field activities will have had a physical examination meeting the requirements of Halliburton NUS' medical surveillance program and will be medically qualified to perform hazardous waste site work using respiratory protection. The Halliburton NUS medical surveillance program meets the requirements specified in 29 CFR 1910.120(f).

Documentation for medical clearances will be maintained on-site 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 A-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 A-8-1 with a letter, on company letterhead, containing all the information in the example letter presented as Figure A-8-2. Figures A-7-1 and A-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 Attachment A-II (Medical Data Sheet). This shall be provided to the SSO prior to participating in site activities.

FIGURE A-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 NAVSCOLEOD, work site
   ( ) not qualified to perform work at the NAVSCOLEOD, 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 A-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 NAVSCOLEOD, Indian Head, Maryland 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 A-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

Ms. LeeAnn Sinagoga
Project Manager
Halliburton NUS Environmental Corp.
661 Andersen Drive
Pittsburgh, Pennsylvania 15220

Subject: Medical Surveillance - NSWC, NAVSCOLEOD, Stump Neck, Maryland

Dear Ms. Sinagoga:

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 NAVSCOLEOD, Stump Neck, Maryland.

LIST FULL NAMES OF EMPLOYEES AND THEIR SOCIAL SECURITY NUMBERS HERE

Should you have any questions, please contact me at _____.
(phone number)

Sincerely,

(Name of Company Officer)

9.0 STANDARD WORK PRACTICES

The following Standard Work Practices are to be applied in addition to the Health and Safety SOPs (see Part C: Vol. 2):

- 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.

- Upon leaving the exclusion zone, hands and face must be thoroughly washed with soap and potable water. 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.

- 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 satisfy all training requirements (40-hr, 8-hr refresher, site specific training, emergency response training as applicable) prior to commencing site activities.

- All personnel must have a working knowledge of this HASP, including being aware of the action levels for upgrading/downgrading levels of protective equipment, and emergency procedures.

- **All personnel must satisfy medical monitoring procedures.**

- All personnel must complete a medical data sheet, to be maintained on-site (see Attachment A-II).

- All personnel working in sight restriction areas of heavy vegetation or where the topography does not permit line-of-sight contact must utilize the buddy system.

- When lifting or moving equipment or material, use proper lifting techniques.

- All work areas must be kept free of ground clutter.

- No flames or open fires will be permitted on-site. No matches or lighters (sparking devices) are permitted on-site. Hot permits must be obtained from the base fire department.

- Site personnel must immediately notify Halliburton NUS Health Sciences of all incidents for OSHA recordkeeping 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 from the Halliburton NUS Health and Safety Manager or his designee.

- A full-size copy of the OSHA poster included as Attachment A-IV of this HASP shall be conspicuously posted on-site.

- Any new information must be promptly conveyed to the Project SSO and the Task Leader.

- All compressed gas cylinders used (empty or full) must be stored, secured, and used properly to protect from damage.

- Material Safety Data Sheets for all chemical substances brought on-site will be collected and maintained at the Command Post (the site trailer). These documents will be reviewed with the users of the substances prior to any usage or handling.

DRILLING OPERATIONS

- No drilling or any other operation which will bring a drill mast or any other projecting device within 20 feet in any direction of overhead power lines will be permitted. Prior to any

subsurface investigations by the FOL shall ensure, the locations of all underground utilities will be identified and marked prior to initiating any subsurface activity.

- Hand signals with the driller will be established prior to the commencement of drilling activities.

- All drill rigs and other machinery with exposed moving parts must be equipped with an operational emergency stop device. All personnel working in a close proximity must be aware of the location of this emergency stop device and its operation. This device will be tested initially (and then periodically) to insure its operational status. The driller and the helper shall not simultaneously handle moving augers or flights unless there is a standby person able to activate the emergency stop device.

- The driller must never leave the controls while tools are rotating unless all personnel are clear of the rotating equipment.

- A long handled shovel or the 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.

- A remote sampling device must be used to sample drill cuttings near rotating tools. The driller shall shut down operations if the sampler must go near the tools to obtain samples.

- All personnel working in the vicinity of the drill rig while its operating shall secure all loose clothing.

- Only manufacturer-approved equipment may be used in conjunction with site equipment (i.e. pins for auger flights etc.). Pins or other protruding items from rotating equipment shall not be permitted.

- No person shall climb a drill mast while equipment is rotating.

- No person shall climb a drill mast without use of ANSI approved fall protection (i.e. belts, lanyards and a fall protection slide rail) or portable ladders which meet OSHA's requirements.

HEAVY EQUIPMENT MAINTENANCE AND OPERATION

- Heavy equipment must be operated in accordance with 29 CFR 1926 Subpart O.

- Heavy equipment will not be operated in a manner that could cause the equipment to roll over or slide into an excavation.

- Dump vehicles will be level before the bed is raised. Dump beds will be smooth to prevent loads from sticking at the front (top) of the bed. No one will stand on either side of the dump vehicle while the bed is being raised or lowered as it is always a possibility that the vehicle will roll on its side.

- A safety tire rack, cage, or equivalent protection must be used when inflating, mounting, or dismounting tires on split rims, or rims equipped with locking rings or other similar device.

- All cab glass will be kept clean and will not impair the safe operation of the equipment.

- All equipment will be operated at least 20 feet from overhead power lines and other electrical equipment unless otherwise permitted by 29 CFR 1926.550(a)(15).

- Equipment which has an obstructed view to the rear must be equipped with an audible reverse (backup) alarm.

- Haulage vehicles with cabs will be equipped with a cab shield or canopy to protect the operator from falling and shifting loads.

- All equipment must be equipped with seat belts except those which do not have roll-over protective structures. When seat belts are provided, they must be used.

- All equipment will be inspected at the beginning of each shift in accordance with 29 CFR 1926.601(b)(14).

- Equipment operators will wear hearing protection unless the owner of the equipment can demonstrate that noise exposures will not exceed the OSHA Permissible Exposure Limit.

UXO AREAS

- No souvenir hunting.

- Do not pick up or disturb unidentified items.

- Report all UXO or unidentified objects.
- Do not excavate or sample any areas until they have been checked for the presence of UXO.
- Do not go outside the boundaries of the access routes or work sites.
- Do not enter uncleared areas of the site.
- Do not carry any fire or spark producing devices into the site.
- Allow the screening EOD technician to lead when surveying potential UXO areas.

10.0 EMERGENCY RESPONSE

In the event of an emergency, all site personnel will be evacuated to a predetermined location away from the work place. Emergency Response Planning will follow in accordance with 29 CFR 1910.38(a). The Contractor shall coordinate site activities with Base Fire Protection and Emergency Services in order to avoid potential emergencies. The Contractor shall utilize Base Fire Protection and Emergency Services as a first response to any emergency situation. Emergency Medical Services will be provided by the Base Fire Department and Branch Medical Clinic. For Police services, the Contractor shall call Base Security first. If outside Police are required, Base Security will call off-base Police and escort them on-base.

10.1 PRE-PLANNING

Upon initial arrival at the base, the Halliburton NUS TL/SSO will meet with the Base Fire Protection Department and Emergency Services and Base Security Personnel to notify coordinators of the activities to be undertaken and where. All site personnel will be required to follow base emergency procedures and will rely on base services to handle emergency situations if encountered. Medical service will be provided by the Base Fire Department or the Branch Medical Clinic.

Another task in Emergency Pre-Planning efforts will be to designate appropriate emergency escape routes and safe places of refuge for the site activity areas. These designations may change on a daily basis due to factors such as wind direction, the type and extent of emergency situation warranting the need for evacuation, among others. The FOL will identify any changes in escape routes and refuge points in the morning briefing.

10.2 EMERGENCY ESCAPE PROCEDURES AND ASSIGNMENTS

Upon notification of a site emergency requiring evacuation, all site personnel will proceed to predetermined locations based on emergency location and wind directions. Extent of decontamination procedures will be dependent upon extent of the emergency requiring evacuation. If personnel cannot reach those locations without endangering life or health, an alternate meeting place will be selected. Personnel will be trained to remain at the refuge until directed to resume work, or leave the site.

10.3 PROCEDURE TO ACCOUNT FOR SITE PERSONNEL

The site work force will be small enough that accounting for personnel will not be a problem. Accounting for personnel will be the Task Leader's responsibility. This will be accomplished by taking a roll call using the site logbook.

10.4 RESCUE AND MEDICAL DUTIES

Site personnel will not be authorized to participate in emergency rescue operations. During UXO survey activities the attendant or buddy will remain informed of the areas cleared in order to facilitate the rescue of UXO members.

10.5 ACTIVATION OF EMERGENCY RESPONSE PROCEDURES

Should any emergency occur which requires the support of outside services, the FOL/SSO will contact:

- Indian Head (Stump Neck) Fire Department 743-4333

Emergency numbers and directions to the nearest hospital are provided in Table A-10-1.

A hand-held radio will be available on-site to provide for timely communication between the Field Team Leader and Range Control. All radio communication devices will be Hazards of Electromagnetic Radiation to Ordnance (HERO) approved prior to use.

Examples requiring outside services are as follows:

- Any field crew member involved in an accident or experiencing signs and symptoms of exposure.
- A condition discovered which suggests the activity is more hazardous than anticipated.
- Emergency services in nearby areas which directly impact operations.

Persons who observe an emergency situation must notify Base Contacts, Base Services, and Office Contacts once the situation is assessed as being out of local control.

Additional emergency response information is contained in the Standard Operating Procedure of the IHDIV-NSWC. VI Work Plan. This will be reviewed with all site personnel as part of the site-specific training, and a copy will be maintained on-site.

10.6 INCIDENT FOLLOW-UP

On receiving a report of an incident (or near-incident), the FOL/SSO shall immediately investigate and make the appropriate recommendations to prevent recurrence. The CLEAN HSM shall immediately be notified by telephone. At his discretion he may wish to participate in the investigation. Details of the incident shall be documented on an Incident Report within 24 hours of its occurrence and distributed to the Project Manager and CLEAN HSM.

TABLE A-10-1

EMERGENCY INFORMATION
(TO BE POSTED ON THE SITE)

Police	Security	(301) 743-4721
Fire	Base Fire Department	(301) 743-4333
Emergency	Base Fire Department	(301) 743-4333
Ambulance	Base Fire Department	(301) 743-4333
Hospital Branch Medical Clinic	Emergency Room Hospital Information	(301) 743-4449
Poison Control	Contact Base Fire Department	(301) 743-4333
Base Contact	Site Activities Contact Shawn Jorgensen	(301) 743-6745
HALLIBURTON NUS Project Manager	LeeAnn Sinagoga	(412) 921-8887
HALLIBURTON NUS Health & Safety Officer	Clyde Snyder	(412) 921-8904
CLEAN Health and Safety Manager	Matthew M. Soltis	(412)921-8912

Maps depicting directions from the site to the hospital shall be obtained and attached to this Health and Safety plan prior to the commencement of site activities.

Directions to Hospital:

11.0 CONFINED SPACE

No Confined-Space Operations are planned to be involved as part of the field activities. Therefore, specific procedures for such efforts are not applicable and are not addressed in this section. Should any confined-space situations arise, the site health and safety officer should be notified immediately before any action is taken.

12.0 SPILL CONTAINMENT AND CONTROL

Every member of the site team will be responsible to observe and report liquid chemical releases or conditions that could lead to releases. No release or spill of contaminated liquids is anticipated in the implementation of the investigation. Therefore, specific procedures for such efforts for spill containment and control are not applicable and are not addressed in this section. Should any spill containment or control situations arise, the site health and safety officer should be notified immediately before any action is taken.

13.0 SITE CONTROL

This section outlines the means by which Halliburton NUS will delineate work zones and use these work zones in conjunction with decontamination procedures to prevent the spread of contaminants into previously unaffected areas of the site. It is anticipated that a three-zone approach will be used during work at this site: exclusion zones, contamination reduction zones, and support zones.

13.1 EXCLUSION ZONE

Exclusion zones will be those areas of the site with known or suspected contamination. In many cases, however, significant amounts of surface contamination will not be encountered in the proposed work areas of this site unless contaminants are brought to the surface by soil boring or some other intrusive activities. Once such activities have been completed and surface contamination has been removed, the potential for exposure is again diminished and the area can 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 and/or anywhere there is believed to be the potential for inhalation or ingestion exposure to site contaminants.

The zone structure for this operation will encompass the size necessary to conduct operations; this is regarded as an area of 50 feet around the point of operation. This may be altered in specific instances based on available room, site topography, or restraining circumstances. Additional circumstances may affect zone structure and operation. In addition, due to the potential for UXO, support parameters of a zone may be increased or decreased at the direction of EOD, based on the perceived hazards.

Once the work in exclusion zones is completed the area must be restored to its former condition prior to turning over access to base personnel. Once efforts are employed to clean and restore the area of all debris and work materials, cuttings, etc., the FOL or SSO will be responsible for clearing the area to be released to the general base personnel and will document this approval.

13.2 CONTAMINATION REDUCTION ZONE

The contamination reduction zone (CRZ) will be a buffer area between the exclusion zone and any area of the site where contamination is not suspected. The personnel and equipment decontamination area

established for this project will be located in the CRZ. This area will serve both as a focal point in supporting exclusion zone activities and as the access and control point to the exclusion zone. Closure of this zone will require the same procedures as employed for the exclusion zone, as these zones are opened and closed as the operation moves about the base.

13.3 SUPPORT ZONE

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

13.4 SITE PREPARATION

In an effort to minimize as many foreseeable hazards as possible, site preparation in addition to UXO clearance will be performed by the FOL and the SSO prior to the initiation of on-site activities in any new area. Physical hazards and potential chemical hazards which cannot be removed, identified, or barricaded to prevent possible exposure will be identified as per the safety briefing prior to the commencement of activities in that area. As part of this preparation procedure, the FOL and the SSO will identify evacuation routes, assembly points, means of communication for that site, and emergency routes for medical assistance.

Staging areas for each site for investigation derived wastes will be constructed prior to the commencement of activities within that area. All resource equipment will be placed in preparation for support of all exclusion zone activities. The locations of staging areas will be approved by the Base Environmental Office.

13.5 SITE MAP

Once the areas of contamination, access routes, topography, and dispersion routes are determined, a site map illustrating the particulars of each site and the location of these planned activities will be generated, and will be adjusted as site conditions change. These maps will be posted in the trailer/office to illustrate up-to-date collection of contaminants and adjustment of zones and access points and be used for safety briefings to inform personnel of zone demarcations and restrictions.

13.6 BUDDY SYSTEM

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

13.7 MATERIAL SAFETY DATA SHEET REQUIREMENTS

Halliburton NUS personnel will provide material safety data sheets (MSDSs) for all chemicals brought on site. The contents of these documents will be reviewed by the SSO with the users of the chemical substances prior to actual use or application of the substances on-site. The MSDSs will then be maintained in a central, temporary office and will be available for anyone to review upon request. The SSO will develop and maintain an inventory of all such chemical substances brought on-site, and will perform other functions necessary to comply with the OSHA Hazard Communication Standard (1910-1200.

13.8 COMMUNICATION

As personnel will not always be working near one another during field activities, a supported means of communication may be necessary. For this purpose, two-way radio communication will be used. All means of communication will have NAVSCOLEOD and UXO approval prior to use. Radio communications for emergency services while engaged in emergency response activities on base will be curtailed, in areas identified by the base, due to the susceptibility of UXO to the hazards associated with electromagnetic radiation to ordnance.

For external communication, the locations of telephones will be identified prior to initiation of work at each site. External communication will be used primarily for the purpose of resource and emergency communications.

13.9 SITE/ZONE SECURITY

Initial lines of security for operations at each site will be established by the FOL and SSO. Zone security will be maintained by all site personnel involved in this operation. Zone identification, demarcation, and zone/access control points are to be monitored by site personnel, and a list of personnel cleared to enter the area of investigation will constitute a secondary safeguard. Lastly, the FOL and the SSO will be able to temporarily terminate all operations should this security be compromised. Only those persons who have met the requirements of this plan and are approved for site clearance may enter an exclusion zone.

14.0 DOCUMENTATION AND EQUIPMENT

This section summarizes documentation and equipment required for the support of this HASP. Its purpose is a final checklist to help ensure that all the necessary resources are available to carry out the requirements of this HASP.

14.1 DOCUMENTATION

- Health and Safety Logbook
- HASP (Signed Copy)
- OSHA Poster 11 x 14
- MSDSs (if applicable)
- Medical Data Sheets
- Employee Training Certificates
- Medical Surveillance Documentation
- Incident Reports
- Respirator Fit Test Records
- Site-specific training records

14.2 HEALTH AND SAFETY EQUIPMENT

- First Aid Kit (Physician-Approved)
- ANSI-approved Eye Wash
- Class ABC Fire Extinguishers
- Nitrile Gloves
- Inner Gloves
- Tyvek
- Chemical Resistant Tyvek - Saranex, hooded with welded seams
- Barricade Tape
- Boot Covers
- Duct Tape
- Decon Kit (Alconox tube, brush, sorbants, step stool)
- Particle Monitor

- Portable Micro-R (Micro-rem) Meter
- Portable Count-Rate Meter with GM-Pancake Detector
- Hard Hats, Safety Glasses
- Splash Shield
- Steel Toe/Shank Boots
- Photoionization Detector (PID)
- Magnetometer
- Air Purifying Respirator with cartridges

ATTACHMENT A-I

HEAT/COLD STRESS

COLD STRESS

Cold Stress

The cold stress TLVs are intended to protect workers from the severest effects of cold stress (hypothermia) and cold injury and to describe exposures to cold working conditions under which it is believed that nearly all workers can be repeatedly exposed without adverse health effects. The TLV objective is to prevent the deep body temperature from falling below 36°C (96.8°F) and to prevent cold injury to body extremities (deep body temperature is the core temperature of the body determined by conventional methods for rectal temperature measurements). For a single, occasional exposure to a cold environment, a drop in core temperature to no lower that 35°C (95°F) should be permitted. In addition to provisions for total body protection, the TLV objective is to protect all parts of the body with emphasis on hands, feet, and head from cold injury.

Introduction

Fatal exposures to cold among workers have almost always resulted from accidental exposures involving failure to escape from low environmental air temperatures or from immersion in low temperature water. The single most important aspect of life-threatening hypothermia is the fall in the deep core temperature of the body. The clinical presentations of victims of hypothermia are shown in Table A-I-1. Workers should be protected from exposure to cold so that the deep core temperature does not fall below 36°C (96.8°F); lower body temperatures will very likely result in reduced mental alertness, reduction in rational decision making, or loss of consciousness with the threat of fatal consequences.

Pain in the extremities may be the first early warning of danger to cold stress. During exposure to cold, maximum severe shivering depends when the body temperature has fallen to 35°C (95°F). This must be taken as a sign of danger to the workers and exposure to cold should be immediately terminated for any workers when severe shivering becomes evident. Useful physical or mental work is limited when severe shivering occurs.

Since prolonged exposure to cold air, or to immersion in cold water, at temperatures well above freezing can lead to dangerous hypothermia, whole body protection must be provided.

1. Adequate insulating dry clothing to maintain core temperatures above 36°C (96.8°F) must be provided to workers if work is performed in air temperatures below 4°C (40°F). Wind chill cooling rate and the

cooling power of air are critical factors. [Wind chill cooling rate is defined as heat loss from a body expressed in watts per meter squared which is a function of the air temperature and wind velocity upon the exposed body.] The higher the wind speed and the lower the temperature in the work area, the greater the insulation value of the protective clothing required. An equivalent chill temperature chart relating the actual dry bulb air temperature and the wind velocity is presented in Table A-I-2. The equivalent chill temperature should be used when estimating the combined cooling effect of wind and low air temperatures on exposed skin or when determining clothing insulation requirements to maintain the deep body core temperature.

2. Unless there are unusual or extenuating circumstances, cold injury to other than hands, feet, and head is not likely to occur without the development of the initial signs of hypothermia. Older workers or workers with circulatory problems require special precautionary protection against cold injury. The use of extra insulating clothing and/or a reduction in the duration of the exposure period are among the special precautions which should be considered. The precautionary actions to be taken will depend upon the physical condition of the worker and should be determined with the advice of a physician with knowledge of the cold stress factors and the medical condition of the worker.

TABLE A-I-1

PROGRESSIVE CLINICAL PRESENTATIONS OF HYPOTHERMIA[1]

Core Temperature		Clinical Signs
°C	°F	
37.6	99.6	"Normal" rectal temperature
37	98.6	"Normal" oral temperature
36	96.8	Metabolic rate increases in an attempt to compensate for heat loss
35	95.0	Maximum shivering
34	93.2	Victim conscious and responsive, with normal blood pressure
33	91.4	Severe hypothermia below this temperature
32	89.6	Consciousness clouded; blood pressure becomes difficult to obtain; pupils dilated but react to light; shivering ceases
31	87.8	
30	86.0	Progressive loss of consciousness; muscular rigidity increases; pulse and blood pressure difficult to obtain; respiratory rate decreases
29	84.2	
28	82.4	Ventricular fibrillation possible with myocardial irritability
27	80.6	Voluntary motion ceases; pupils nonreactive to light; deep tendon and superficial reflexes absent
26	78.8	Victim seldom conscious
25	77.0	Ventricular fibrillation may occur spontaneously
24	75.2	Pulmonary edema
22	71.6	Maximum risk of ventricular fibrillation
21	69.8	
20	68.0	Cardiac standstill

Core Temperature		Clinical Signs
°C	°F	
18	64.4	Lowest accidental hypothermia victim to recover
17	62.6	Isoelectric electroencephalogram
9	48.2	Lowest artificially cooled hypothermia patient to recover

1 Presentations approximately related to core temperature. Reprinted from the January 1982 issue of American Family Physician, published by the American Academy of Family Physician.

Evaluation and Control

For exposed skin, continuous exposure should not be permitted when the air speed and temperature results in an equivalent chill temperature of -32°C(-25.6°F). Superficial or deep local tissue freezing will occur only at temperatures below -1°C (30.2°F) regardless of wind speed.

At air temperatures of 2°C (35.6°F) or less, it is imperative that workers who become immersed in water or whose clothing becomes wet be immediately provided a change of clothing and be treated for hypothermia.

TLVs recommended for properly clothed workers for periods of work at temperatures below freezing are shown in Table A-I-3.

Special protection of the hands is required to maintain manual dexterity for the prevention of accidents:

1. If fine work is to be performed with bare hands for more than 10-20 minutes in an environment below 16°C (60.8°F), special provisions should be established for keeping the workers' hands warm. For this purpose, warm air jets, radiant heaters (fuel burner or electric radiator), or contact warm plates may be utilized. Metal handles of tools and control bars should be covered by thermal insulating material at temperatures below -1°C (30.2°F).

2. If the air temperature falls below 16°C (60.8°F) for sedentary, 4°C (39.2°F) for light, -7°C (19.4°F) for moderate work and fine manual dexterity is not required, then gloves should be used by the workers.

To prevent contact frostbite, the workers should wear anti-contact gloves.

1. When cold surfaces below -7°C (19.4°F) are within reach, a warning should be given to each worker by the supervisor to prevent inadvertent contact by bare skin.

2. If the air temperature is -17.5°C (0°F) or less, the hands should be protected by mittens. Machine controls and tools for use in cold conditions should be designed so that they can be handled without removing the mittens.

Provisions for additional total body protection are required if work is performed in an environment at or below 4°C (39.2°F). The workers should wear cold protective clothing appropriate for the level of cold and physical activity:

1. If the air velocity at the job site is increased by wind, draft, or artificial ventilating equipment, the cooling effect of the wind should be reduced by shielding the work area or by wearing an easily removable windbreak garment.

2. If only light work is involved and if the clothing on the worker may become wet on the job site, the outer layer of the clothing in use may be of a type impermeable to water. With more severe work under such conditions, the outer layer should be water repellent, and the outerwear should be changed as it becomes wetted. The outer garments should include provisions for easy ventilation in order to prevent wetting of inner layers of sweat. If work is done at normal temperatures or in a hot environment before entering the cold area, the employee should make sure that clothing is not wet as a consequence of sweating. If clothing is wet, the employee should change into dry clothes before entering the cold area. The workers should change socks and any removable felt insoles at regular daily intervals or use vapor barrier boots. The optimal frequency of change should be determined empirically and will vary individually and according to the type of shoe worn and how much the individual's feet sweat.

TABLE A-I-2

COOLING POWER OF WIND ON EXPOSED FLESH EXPRESSED AS EQUIVALENT TEMPERATURE

(under calm conditions)[1]

Estimated Wind Speed (in mph)	Actual Temperature Reading (°F)											
	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
	Equivalent Temperature (°F)											
Calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148

(Wind speeds greater than 40 mph have little additional effect)	**LITTLE DANGER** In < hr with dry skin. Maximum danger of false sense of security	**INCREASING DANGER** Danger from freezing of exposed flesh within one minute.	**GREAT DANGER** Flesh may freeze within 30 seconds.
	Trenchfoot and immersion foot may occur at any point on this chart.		

1 Developed by U.S. Army Research Institute of Environmental Medicine, Natick MA.

DRAFT

TABLE A-I-3

THRESHOLD LIMIT VALUES WORK/WARM-UP SCHEDULE FOR FOUR-HOUR SHIFT[5]

Air Temperature - Sunny Sky		No Noticeable Wind		5 mph Wind		10 mph Wind		15 mph Wind		20 mph Wind	
°C (approx)	°F (approx)	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks	Max. Work Period	No. of Breaks
-26° to -28°	-15° to -19°	(Norm Breaks)	1	(Norm Breaks)	1	75 min	2	55 min	3	40 min	4
-29° to -31°	-20° to -24°	(Norm Breaks	1	75 min	2	55 min	3	40 min	4	30 min	5
-32° to -34°	-25° to -29°	75 min	2	55 min	3	40 min	4	30 min	5	Non-emergency work should cease	
-35° to -37°	-30° to -34°	55 min	3	40 min	4	30 min	5	Non-emergency work should cease		Non-emergency work should cease	
-38° to -39°	-35° to -39°	40 min	4	30 min	5	Non-emergency work should cease		Non-emergency work should cease		Non-emergency work should cease	
-40° to -42°	-40° to -44°	30 min	5	Non-emergency work should cease		Non-emergency work should cease		Non-emergency work should cease		Non-emergency work should cease	
-43° & below	-45° & below	Non-emergency work should cease		Non-emergency work should cease		Non-emergency work should cease		Non-emergency work should cease		Non-emergency work should cease	

NOTES:

1. Schedule applies to moderate to heavy work activity with warm-up breaks of ten (10) minutes in a warm location. For Light-to-Moderate Work (limited phyical movement): apply the schedule one step lower. For example, at -35°C (-30°F) with no noticeable wind (Step 4), a worker at a job with little physical movement should have a maximum work period of 40 minutes with 4 breaks in a 4-hour period (Step 5).

2. The following is suggested as a guide for estimating wind velocity if accurate information is not available: 5 mph: light flag moves; 10 mph: light flag fully extended; 15 mph: raises newspaper sheet; 20 mph: blowing and drifting snow.

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3. If only the wind chill cooling rate is available, a rough rule of thumb for applying it rather than the temperature and wind velocity factors given above would be: 1) special warm-up breaks should be initiated at a wind chill cooling rate of about 1750 W/M^2; 2) all non-emergency work should have ceased at or before a wind chill of 2250 W/m^2. In general, the warm-up schedule provided above slightly under-compensates for the wind at the warmer temperatures, assuming acclimatization and clothing appropriate for winter work. On the other hand, the chart slightly over-compensates for the actual temperatures in the colder ranges, since windy conditions rarely prevail at extremely low temperatures.

4. TLVs apply only for workers in dry clothing.

NOTE: External temperatures in excess of those stated above shall be regarded as inclement weather. Work continuation, termination, or alteration of the work schedule will be at the discretion of the FTL and on site health and safety representative. The heat and cold stress related sections of this are applicable to the season when work will be completed.

5 Adapted from Occupational Health & Safety Division, Saskatchewan Department of Labor.

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3. If exposed areas of the body cannot be protected sufficiently to prevent sensation of excessive cold or frostbite, protective items should be supplied in auxiliary heated versions.

4. If the available clothing does not give adequate protection to prevent hypothermia or frostbite, work should be modified or suspended until adequate clothing is made available or until weather conditions improve.

5. Workers handling evaporative liquid (gasoline, alcohol, or cleaning fluids) at air temperatures below 4°C (39.2°F) should take special precautions to avoid soaking of clothing or gloves with the liquids because of the added danger of cold injury due to evaporative cooling. Special note should be taken of the particularly acute effects of splashes of "cryogenic fluids" or those liquids with a boiling point that is just above ambient temperature.

Work - Warming Regimen

If work is performed continuously in the cold at an equivalent chill temperature (ECT) or below -7°C (19.4°F), heated warming shelters (tents, cabins, rest rooms, etc.) should be made available nearby. The workers should be encouraged to use these shelters at regular intervals, the frequency depending on the severity of the environmental exposure. The onset of heavy shivering, frostnip, the feeling of excessive fatigue, drowsiness, irritability, or euphoria are indications for immediate return to the shelter. When entering the heated shelter, the outer layer of clothing should be removed and the remainder of the clothing loosened to permit sweat evaporation or a change of dry work clothing provided. A change of dry work clothing should be provided as necessary to prevent workers from returning to work with wet clothing. Dehydration, or the loss of body fluids, occurs insidiously in the cold environment and may increase the susceptibility of the worker to cold injury due to a significant change in blood flow to the extremities. Warm sweet drinks and soups should be provided at the work site to provide caloric intake and fluid volume. The intake of coffee should be limited because of the diuretic and circulatory effects.

For work practices at or below -12°C (10.4°F) ECT, the following should apply:

1. The worker should be under constant protective observation (buddy system or supervision).

2. The work rate should not be so high as to cause heavy sweating that will result in wet clothing; if heavy work must be done, rest periods should be taken in heated shelters and opportunity for changing into dry clothing should be provided.

3. New employees should not be required to work fulltime in the cold during the first days of employment until they become accustomed to the working conditions and required protective clothing.

4. The weight and bulkiness of clothing should be included in estimating the required work performance and weights to be lifted by the worker.

5. The work should be arranged in such a way that sitting still or standing still for long periods is minimized. Unprotected metal chair seats should not be used. The worker should be protected from drafts to the greatest extent possible.

6. The workers should be instructed in safety and health procedures. The training program should include as a minimum instruction in:

   a. Proper rewarming procedures and appropriate first aid treatment.
   b. Proper clothing practices.
   c. Proper eating and drinking habits.
   d. Recognition of impending frostbite.
   e. Recognition of signs and symptoms of impending hypothermia or excessive cooling of the body even when shivering does not occur.
   f. Safe work practices.

Special Workplace Recommendations

Special design requirements for refrigerator rooms include:

1. In refrigerator rooms, the air velocity should be minimized as much as possible and should not exceed 1 meter/sec (200 fpm) at the job site. This can be achieved by properly designed air distribution systems.

2. Special wind protective clothing should be provided based upon existing air velocities to which workers are exposed.

Special caution should be exercised when working with toxic substances and when workers are exposed to vibration. Cold exposure may require reduced exposure limits.

Eye protection for workers employed out-of-doors in a snow and/or ice-covered terrain should be supplied. Special safety goggles to protect against ultraviolet light and glare (which can produce temporary conjunctivitis and/or temperature loss of vision) and blowing ice crystals should be required when there is an expanse of snow coverage causing a potential eye exposure hazard.

Workplace monitoring is required as follows:

1. Suitable thermometry should be arranged at any workplace where the environmental temperature is below 16°C (60.8°F) so that overall compliance with the requirements of the TLV can be maintained.

2. Whenever the air temperature at a workplace falls below -1°C (30.2°F), the dry bulb temperature should be measured and recorded at least every 4 hours.

3. In indoor workplaces, the wind speed should also be recorded at least every 4 hours whenever the rate of air movement exceeds 2 meters per second (5 mph).

4. In outdoor work situations, the wind speed should be measured and recorded together with the air temperature whenever the air temperature is below -1°C (30.2°F)

5. The equivalent chill temperature should be obtained from Table A-I-2 in all cases where air movement measurements are required; it should be recorded with the other data whenever the equivalent chill temperature is below -7°C (19.4°F).

Employees should be excluded from work in cold at -1°C (30.2°F) or below if they are suffering from diseases or taking medication which interferes with normal body temperature regulation or reduces tolerance to work in cold environments. Workers who are routinely exposed to temperatures below -24°C (-11.2°F) with wind speeds less than five miles per hour, or air temperatures below -18°C (0°F) with wind speeds above five miles per hour, should be medically certified as suitable for such exposures.

Trauma sustained in freezing or subzero conditions requires special attention because an injured worker is predisposed to cold injury. Special provisions should be made to prevent hypothermia and freezing of damaged tissues in addition to providing for first aid treatment.

Note: This information has been adopted from the **1994-1995 "Threshold Limit Values** for Chemical Substances and Physical Agents and **Biological Indices**" by the American Conference of Governmental Industrial Hygienists (ACGIH).

HEAT STRESS

Heat Stress

The SSO shall visually monitor personnel to note for signs of heat stress. Field personnel will also be instructed to observe for symptoms of heat stress and methods on how to control it. One or more of the following control measures can be used to help control heat stress:

- Provide adequate liquids to replace lost body fluids. Personnel must replace water and salt lost from sweating. Personnel must be encouraged to drink more than the amount required to satisfy thirst. Thirst satisfaction is not an accurate indicator of adequate salt and fluid replacement.
- Replacement fluids can be commercial mixes such as Gatorade®.
- Establish a work regime that will provide adequate rest periods for cooling down. This may require additional shifts of workers.
- Cooling devices such as vortex tubes or cooling vests can be worn beneath protective garments.
- Breaks are to be taken in a cool rest area (77°F is best).
- Personnel shall remove impermeable protective garments during rest periods.
- Personnel shall not be assigned other tasks during rest periods.
- Personnel shall be informed of the importance of adequate rest, acclimation, and proper diet in the prevention of heat stress.

The heat stress of personnel onsite may be monitored utilizing biological monitoring.

One of the following biological monitoring procedures may be utilized by the SSO to monitor heat stress concerns.

- Heart rate (HR) shall be measured by the pulse for 30 seconds as early as possible in the resting period. The HR at the beginning of the rest period should not exceed 110 beats/minute. If the

HR is higher, the next work period should be shortened by 10 minutes (or 33 percent), while the length of rest period stays the same. If the pulse rate is 100 beats/minute at the beginning of the next rest period, the following work cycle should be shortened by 33 percent. The length of the initial work period will be determined by using the table below.

PERMISSIBLE HEAT EXPOSURE THRESHOLD LIMIT VALUES

	Work Load		
Work-Rest Regimen	Light	Moderate	Heavy
Continuous	80.0°F	80.0°F	77.0°F
75% Work - 25% Rest, Each Hour	87.0°F	82.4°F	78.6°F
50% Work - 50% Rest, Each Hour	88.5°F	85.0°F	82.2°F
25% Work - 75% Rest, Each Hour	90.0°F	88.0°F	86.0°F

- Body temperature shall be measured orally with a clinical thermometer as early as possible in the resting period. Oral temperature at the beginning of the rest period should not exceed 99°F. If it does, the next work period should be shortened by 10 minutes (or 33 percent), while the length of the rest period stays the same. However, if the oral temperature exceeds 99.7°F at the beginning of the next rest period, the following work cycle shall be further shortened by 33 percent. OT should be measured at the end of the rest period to make sure that it has dropped below 99°F. At no time shall work begin with the oral temperature above 99°F.

NOTE: External temperatures in excess of those stated above shall be regarded as inclement weather. Work continuation, termination, or alteration of the work schedule will be at the discretion of the FTL and on site health and safety representative. The heat and cold stress related sections of this are applicable to the season when work will be completed. A Standard Operating Procedure for heat stress control is also included in this Appendix.

HEAT RELATED EMERGENCIES SIGNS, SYMPTOMS, AND EMERGENCY CARE

Because some physically demanding field work is expected to take place during summer months, heat stress and exhaustion are potential problems. Therefore a "Heat Related Emergency" pamphlet is attached to this safety plan.

Heat Rash

Also known as prickly heat, this condition affects the skin. It occurs in situations where the skin remains wet most of the time. The sweat ducts become plugged and a skin rash soon appears.

Signs and Symptoms

1. Skin rash will appear on affected areas of the body.
2. Tingling or prickling sensation will be felt on the affected areas.

Emergency Care

1. Shower after working in the heat
2. Dry the skin thoroughly
3. Change underwear as needed
4. Stay in cool place after work hours.
5. Avoid repeated exposure to heated environment until condition improves, when possible.

Heat Cramps

Heat cramps are muscle pains, usually in the lower extremities, the abdomen, or both, that occur after profuse sweating with accompanying salt depletion. Heat cramps most often afflict people in good physical condition, who overwork in conditions of high temperature and humidity. Untreated, heat cramps may progress to heat exhaustion.

Treatment for heat cramps is aimed at eliminating the exposure and restoring the loss of salt and water.

Signs and Symptoms

1. Cramps in the extremities and abdomen that begin suddenly during vigorous activity. Heat cramps can be mild with only slight abdominal cramping and tingling in the extremities, but more commonly present intense and incapacitating pain in the abdomen and extremities.

2. Respiration rate will increase, decreasing after the pain subsides.

3. Pulse rate will increase

4. Skin will be pale and moist.

5 Body temperature will be normal

6. Generalized weakness will be noted as the pain subsides.

7. Loss of consciousness and airway maintenance are seldom problems with this condition.

Emergency Care

1. Move the worker to a cool environment. Have him lie down if he feels faint.

2. If the person is nauseated, avoid giving him anything orally until the nausea subsides.

3. If the person is not nauseated he may be given one or two glasses of an electrolyte solution. Have the person drink slowly. The use of salt tablets is not recommended because they may cause nausea.

4. Avoid massaging the cramping muscles. This rarely helps and may actually aggravate the pain.

5. As the salt and water level is replenished, the worker's pain will subside. He may wish to return to work; however, this is NOT recommended for a period of 12 hours. Further exertion may lead to heat exhaustion or heat stroke.

Heat Exhaustion

Heat exhaustion is a more severe response to salt and water loss, as well as an initial disturbance in the body's heat-regulations system. Like heat cramps, heat exhaustion tends to occur in people working in hot environments. Heat exhaustion may progress to heat stroke. Treatment for heat exhaustion is similar in principle to that for heat cramps.

Signs and Symptoms

1. Heat exhaustion may be accompanied present by a headache, fatigue, dizziness, or nausea with occasional abdominal cramping. More severe cases of heat exhaustion may resulting partial or complete temporary loss of respiration nd circulation due to cerebral ischemia.

2. Sweating will be profuse.

3. Pulse rate will be rapid and weak.

4. Respiration rate will be rapid and shallow.

5. The skin will be pale and clammy

6. The body temperature will be normal or decreased.

7. The person could be irritable and restless.

Emergency Care

1. Monitor the person's airway and level of consciousness. If this is a true medical emergency, prompt intervention by Emergency Medical Services is recommended.

2. Move the person to a cool environment. Take off as much of his clothing as possible and place him in a supine position with his legs elevated.

3. Sponge the person with cool water. If you fan the person, avoid chilling. When the body shivers, this energy is released in the form of heat and actually can increase the body temperature.

Heat Stroke

Heat stroke is caused by a severe disturbance in the body's heat-regulating system and is a profound emergency: The mortality rate ranges from 25 to 50 percent. It is most common in men over 40, especially alcoholics. It can also occur to people of any age having too much exposure to the sun or prolonged confinement in a hot atmosphere. Heat stroke comes on suddenly. As the sweating mechanism fails, the body temperature begins to rise precipitously, reaching 106°F (41°C) or higher within 10 to 15 minutes. If the situation is not corrected rapidly, the body cells -- especially have very vulnerable cells to the brain--are literally cooked, and the central nervous system is irreversibly damaged. The treatment for heat stroke is aimed at maintaining vital functions and causing as rapid a decrease of body temperature as possible.

Signs and Symptoms

1. The person's pulse will be strong and bounding.
2. The skin will be hot, dry, and flushed.
3. The worker may experience headache, dizziness, and dryness of mouth
4. Seizures and coma can occur.
5. Loss of consciousness and airway maintenance problems can occur.

Emergency Care

1. Establish an open airway.

2. Move the person to a cool environment. Take off as much clothing as possible, and place him in a semireclining position with the head elevated.

3. Use any means to cool the worker. Improvise with whatever is available. A bathtub filled with cold water and ice cubes is effective. Remember, speed is essential; delay may result in permanent brain damage. Vigorous efforts to cool the worker must continue until the body temperature is below 102° F (38.9°C).

4. This is a true medical emergency--prompt intervention by Emergency Medical Services is recommended.

These are only guidelines for heat related emergencies. Actual training in emergency medical care or basic first aid is recommended.

Cold Stress

The cold stress TLVs are intended to protect workers from the most severe effects of cold stress (hypothermia) and cold injury and to describe exposures to cold working conditions under which it is believed that nearly all workers can be repeatedly exposed without adverse health effects. The TLV objective is to prevent the deep body temperature from falling below 36°C (96.8°F) and to prevent cold injury to body extremities. For a single, occasional exposure to a cold environment, a drop in core temperature to no lower than 35°C (95°F) is permitted. In addition to provisions for total body protection, the TLV objective is to protect all parts of the body with emphasis on hands, feet, and head from cold injury.

For more information concerning cold stress effects and control measures see Attachment 2.

Heat Stress

As this scope of work will require the use of various types of 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 significant. To combat this problem the FOL and the SSO shall initiate heat stress monitoring, and effect the appropriate control efforts, in accordance with Halliburton NUS Standard Operating Procedures HS-09 "Heat Stress Control", (a copy of which is attached to this HASP as Appendix 3), and the ACGIH recommended control measures, (also included in Attachment 3).

ATTACHMENT A-II

MEDICAL DATA SHEET

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 _____ work site
   ( ) not qualified to perform work at the _____ 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:

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

   _____

   _____

   _____

SUBCONTRACTOR MEDICAL APPROVAL FORM
PAGE TWO

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 of 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

ATTACHMENT A-III

TICK CONTROL

LYME DISEASE

Lyme disease has become a worldwide problem since its identification in 1976. This disease is characteristically recognized as being transmitted by ticks, which may be encountered by field personnel while working at this site. As a result, this discussion has been included with this Health and Safety Plan to provide for adequate recognition, evaluation, and control efforts to minimize the occurrence and effects of this potential hazard.

The discovery of Lyme disease is credited to Dr. Allen Steere of Yale University Medical School, and is named after the community where it was reportedly first encountered, Lyme, Connecticut. This disease can be transmitted to Man through the bite of ticks that are infected with a corkscrew-shaped microbe (spirochete). The spread of this disease has been so rapid that in 1984 it surpassed Rocky Mountain Spotted Fever as the most common tick-borne disease in the United States. In this country, most of the incidents of this disease have been recorded in the Northeast, and the tick species most commonly attributed with its spread is the deer tick.

Recognition

This potential hazard exists primarily in the spring and summer, as these are the seasons that tick populations and activity flourish. In fact, 90 percent of the reported cases occur from early June through September. Also, this concern exists primarily in heavily vegetated areas. Therefore, recognition of these factors can aid in the awareness and control of this threat.

To aid in the recognition and identification of these insects, an example illustration of the tick species common to the region where this site is located has been included with this discussion. This species (the American Dog tick) is common in the eastern half of the United States, typically in areas covered with grass or underbrush. These insects attach themselves to animals (including humans) that pass through the area and rub against them. After finding a host, the tick inserts its mouthparts and sucks blood until it is fully engorged. This requires from 3 to 12 days, after which the tick drops off. This tick has also been identified as a transmitter of Rocky Mountain Spotted Fever and the organisms of tularemia and possibly relapsing fever. The wounds left by tick bites can be painful and can also have a paralyzing effect commonly referred to as tick paralysis.

The earliest symptom of the onset of this disease is usually the occurrence of an unusual red skin rash. This is commonly the first indication, since many persons who have contracted the disease were, in fact, unaware that they had been bitten. This rash can appear at the site of the bite anywhere from several days to a few weeks after the bite. It typically starts as a small red spot, and then expands as the spirochetes expand from the bite location. The size of the rash can vary, but it most commonly is 2 or 3 inches in diameter. This rash will fade (with or without treatment) after a few weeks. Body sites where rashes frequently occur include the thigh areas, groin, and armpits. It is not uncommon for a rash to develop in more than one place. Close inspection is necessary to detect this symptom, however, as the rashes are easy to miss because they very often are faint.

Other early symptoms include profound fatigue, a stiff neck, and flu-like symptoms such as headache, chills, fever, and muscle aches. Recognition of the onset of any of these symptoms is important since tick bites do not always produce a rash.

If left untreated, the disease will progress to its second stage within weeks or months after the infection. In this stage, the heart and nervous system are affected. A common second-stage symptom is paralysis on one or both sides of the face. Others include severe headache, encephalitis, or meningitis. The third and final stage, which can occur up to a year or more after the bite, involves the development of chronic inflammatory arthritis.

Evaluation

Evaluation of this hazard potential principally involves field personnel performing careful close self-inspection, especially of their head, for the presence of ticks each time they leave the site. Personnel should be aware that when a tick attaches itself to its host, it inserts its entire head under the surface of the skin.

Control

There are several steps to be taken to control this threat. First, field personnel must be aware of the climate and area conditions which are commonly associated with tick infestation. Second, when working in or walking through potentially infested areas, personnel must ensure that they have no exposed body parts (i.e., they must at least wear long-sleeved shirts and long pants, particularly when protective coveralls are not worn). In heavily vegetated areas where infestation is likely, Tyvek coveralls will be required to minimize this hazard potential. Also, several commercial products have been demonstrated as being effective in repelling ticks. Examples of these include Permanone, Off!, and Cutter. These repellents will be used only at the direction and discretion of the site Safety Officer, and only in accordance with the manufacturer's

recommendations. In most instances, however, such repellents are typically applied to the outside surfaces of clothing (and not directly onto the skin); they should also be applied to shoe tops, socks, pants cuffs, and other areas most susceptible to ticks. Care should be taken to prevent the contamination by the repellents of any samples for chemical analysis.

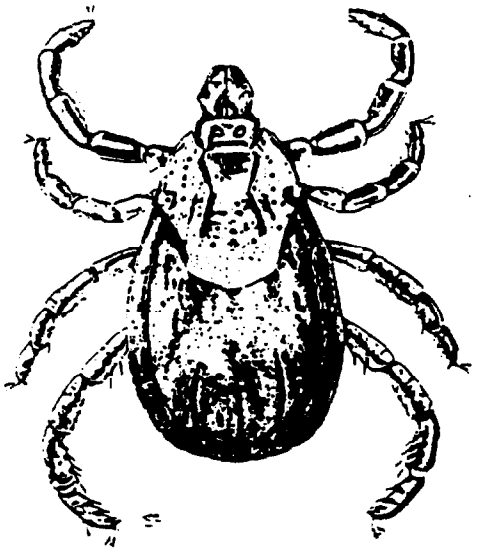
Tick Removal

In the event that a tick is discovered to be attached to a member of the field team, timely removal of the insect is critical to reducing the potential for contracting the disease. According to available information and research, at least a few hours elapse from the time of the bite until the tick transmits the microbe (spirochetes are not present in the mouth parts of the tick). However, because a tick bite is frequently unnoticed, the tick may not be discovered in time. Therefore, early removal is very important. The preferred method is to pull the tick out with tweezers or small forceps. In this method, the tick should be grasped as close to the mouth as possible and then pulled steadily upward. Care must be exercised so as not to pull in a jerking motion, as this can result in the head of the tick becoming detached. After the tick has been removed, the bite is disinfected with rubbing alcohol or povidone iodine (Betadine). The tick must not be handled, as the microbes can enter the body through any break in intact skin. The bite should be checked occasionally for at least a 2-week period to see if a rash forms. If it does, medical attention must be sought promptly.

In order to provide for proper and timely response to tick bites, the Health and Safety Officer will ensure that the site First Aid Kit is equipped with medical forceps and rubbing alcohol, in addition to the standard kit contents. Also, an adequate supply of commercial insect (tick) repellent will be maintained on-site, and all personnel will be trained in its proper application and will be required to use it, at the direction of the Health and Safety Officer.

Tick Picture

An unengorged female American dog tick, Dermacentor variabilis



ATTACHMENT A-IV

OSHA POSTER

JOB SAFETY & HEALTH PROTECTION

The Occupational Safety and Health Act of 1970 provides job safety and health protection for workers by promoting safe and healthful working conditions throughout the Nation. Requirements of the Act include the following:

Employers

All employers must furnish to employees employment and a place of employment free from recognized hazards that are causing or are likely to cause death or serious harm to employees. Employers must comply with occupational safety and health standards issued under the Act.

Employees

Employees must comply with all occupational safety and health standards, rules, regulations and orders issued under the Act that apply to their own actions and conduct on the job.

The Occupational Safety and Health Administration (OSHA) of the U.S. Department of Labor has the primary responsibility for administering the Act. OSHA issues occupational safety and health standards, and its Compliance Safety and Health Officers conduct jobsite inspections to help ensure compliance with the Act.

Inspection

The Act requires that a representative of the employer and a representative authorized by the employees be given an opportunity to accompany the OSHA inspector for the purpose of aiding the inspection.

Where there is no authorized employee representative, the OSHA Compliance Officer must consult with a reasonable number of employees concerning safety and health conditions in the workplace.

Complaint

Employees or their representatives have the right to file a complaint with the nearest OSHA office requesting an inspection if they believe unsafe or unhealthful conditions exist in their workplace. OSHA will withhold, on request, names of employees complaining.

The Act provides that employees may not be discharged or discriminated against in any way for filing safety and health complaints or for otherwise exercising their rights under the Act.

Employees who believe they have been discriminated against may file a complaint with their nearest OSHA office within 30 days of the alleged discrimination.

Citation

If upon inspection OSHA believes an employer has violated the Act, a citation alleging such violations will be issued to the employer. Each citation will specify a time period within which the alleged violation must be corrected

The OSHA citation must be prominently displayed at or near the place of alleged violation for three days, or until it is corrected, whichever is later, to warn employees of dangers that may exist there.

Proposed Penalty

The Act provides for mandatory penalties against employers of up to $1,000 for each serious violation and for optional penalties of up to $1,000 for each nonserious violation. Penalties of up to $1,000 per day may be proposed for failure to correct violations within the proposed time period. Also, any employer who willfully or repeatedly violates the Act may be assessed penalties of up to $10,000 for each such violation.

Criminal penalties are also provided for in the Act. Any willful violation resulting in death of an employee, upon conviction, is punishable by a fine of not more than $10,000, or by imprisonment for not more than six months, or by both. Conviction of an employer after a first conviction doubles these maximum penalties.

Voluntary Activity

While providing penalties for violations, the Act also encourages efforts by labor and management, before an OSHA inspection, to reduce workplace hazards voluntarily and to develop and improve safety and health programs in all workplaces and industries. OSHA's Voluntary Protection Programs recognize outstanding efforts of this nature.

Such voluntary action should initially focus on the identification and elimination of hazards that could cause death, injury, or illness to employees and supervisors. There are many public and private organizations that can provide information and assistance in this effort, if requested. Also, your local OSHA office can provide considerable help and advice on solving safety and health problems or can refer you to other sources for help such as training.

Consultation

Free consultative assistance, without citation or penalty, is available to employers, on request, through OSHA supported programs in most State departments of labor or health.

More Information

Additional information and copies of the Act, specific OSHA safety and health standards, and other applicable regulations may be obtained from your employer or from the nearest OSHA Regional Office in the following locations:

Atlanta, Georgia
Boston, Massachusetts
Chicago, Illinois
Dallas, Texas
Denver, Colorado
Kansas City, Missouri
New York, New York
Philadelphia, Pennsylvania
San Francisco, California
Seattle, Washington

Telephone numbers for these offices, and additional area office locations, are listed in the telephone directory under the United States Department of Labor in the United States Government listing.

Washington, D.C.
1985
OSHA 2203

William E. Brock, Secretary of Labor

U.S. Department of Labor
Occupational Safety and Health Administration

Under provisions of Title 29, Code of Federal Regulations, Part 1903.2(a)(1) employers must post this notice (or a facsimile) in a conspicuous place where notices to employees are customarily posted.