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FINAL SITE SPECIFIC HEALTH AND SAFETY PLAN REMEDIAL INVESTIGATION AT SITE
70 GROUNDWATER CONTAMINATION ALONG WATER WORKS WAY NSWC INDIAN HEAD
MD
07/01/2014
H & S ENVIRONMENTAL INC

FINAL SITE SPECIFIC HEALTH AND SAFETY PLAN

**REMEDIAL INVESTIGATION
at
SITE 70 – GROUNDWATER CONTAMINATION ALONG
WATER WORKS WAY
NAVAL SUPPORT FACILITY (NSF) INDIAN HEAD
INDIAN HEAD, MARYLAND**

Prepared for:



**Naval Facilities Engineering Command
(NAVFAC) Washington
1214 Harwood Street, S.E.
Washington Navy Yard, DC 20374-5018**

Contract Number: N40080-12-D-0451
Task Order: 0003

Prepared by:



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July 2014

Signature Sheet

FINAL SITE SPECIFIC HEALTH AND SAFETY PLAN (SSHP)

REMEDIAL INVESTIGATION

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NAVAL SUPPORT FACILITY (NSF) INDIAN HEAD
INDIAN HEAD, MARYLAND
Contract No. N40085-12-D-0451
Task No. 0003**

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Edward Kearny, CIH

Team personnel assigned to this project shall be familiar with the possible hazards involved, the safety procedures, and other information outlined in this plan. Prior to the commencement of work, the Team Leader/Site Safety and Health Officer will discuss additional procedures to be implemented, addressing any other site-specific conditions that may arise. All on-site personnel of **H&S Environmental, Inc.** and all subcontractors must sign the Site Specific Health and Safety Plan Review Record.

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LIST OF TABLES

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LIST OF ACRONYMS

APR	Air Purifying Respirator
COC	Contaminant of Concern
CRZ	Contamination Reduction Zone
DPT	Direct Push Technology
EZ	Exclusion Zone
GWTP	Groundwater Treatment Plant
HASP	Health & Safety Plan
HEPA	High Efficiency Particulate Air
H&S	H&S Environmental, Inc.
IDW	Investigation-Derived Waste
IH	Indian Head
LEL	Lower Explosive Limit
MMPEH	Material Potentially Presenting and Explosive Hazard
MSDS	Material Safety Data Sheet
NAVFAC	Naval Facilities Engineering Command
NSF	Naval Support Facility
OSHA	Occupational Safety and Health Administration
PCE	Tetrachloroethene
PID	Photoionization Detector
PPE	Personal Protective Equipment
ROD	Record of Decision
SSHO	Site Safety and Health Officer
SVOC	Semi-Volatile Organic Compound
SZ	Support Zone
TCE	Trichloroethene
TT	Tetra Tech, Inc.
VOC	Volatile Organic Compound

1.0 INTRODUCTION

1.1 PURPOSE

The purpose of this Site Specific Health & Safety Plan (HASP) is to provide H&S Environmental, Inc. (H&S) personnel, clients, subcontractors, and vendors with protection standards and mandatory safety practices, procedures, and contingencies to be followed while performing a Remedial Investigation at Site 70 – Groundwater Contamination Along Water Works Way at the Naval Support Facility Indian Head, Indian Head, Maryland (NSF- IH). The Site location is provided on **Figure 1**. This HASP has been developed using the most recent available information regarding conditions at the work site in regards to chemical contaminants and potential physical hazards. In the event that new information becomes available, this HASP will be amended.

Work activities at Site 70 will consist of soil boring installation, groundwater sample collection, equipment decontamination, monitoring well drilling and surveying. One copy of this HASP will be maintained onsite for use during the scheduled activities and made available for site use/employee review. Persons who enter the Site are required to read and understand this HASP and sign the HASP Review Record (**Attachment A**).

The following regulations and guidance documents were referenced during the preparation of this HASP:

- Occupational Safety and Health Administration (OSHA) Standards for General Industry, 29 CFR 1910
- OSHA Standards for Construction Industry, 29 CFR 1926
- National Institute of Occupational Safety and Health, OSHA, U.S. Environmental Protection Agency, and U.S. Coast Guard *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*, October 1985.
- US Army Corps of Engineers Safety Manual, EM385-1-1
- Navy Installation Restoration Manual, Chapter 12, Feb. 1997
- Human Health Risk Assessment, UXO 32 Scrapyard, Naval Support Facility Indian Head, Indian Head, Maryland (TetraTech, February 2012)
- Sampling and Analysis Plan, CERCLA Remedial Investigation, UXO 32 Scrapyard, Naval Support Facility Indian Head, Indian Head, Maryland (TetraTech NUS, April 2011)

1.2 BACKGROUND

1.2.1 Site Description

Naval Support Facility Indian Head (NSF- IH) is located in northwestern Charles County, Maryland, approximately 25 miles southwest of Washington, DC (**Figure 1**). NSF-IH is a military facility consisting of the main area on the Cornwallis Neck Peninsula and the Annex on Stump Neck. The main area is bounded by the Potomac River to the northwest, west, and

south, Mattawoman Creek to the south and east, and the town of Indian Head to the northeast. Stump Neck Annex is located across Mattawoman Creek. The Stump Neck Annex is not contiguous with the main area and is operated by a tenant.

Site 70 – Groundwater Contamination Along Water Works Way was recently designated as a new site due to contamination found upgradient of the Scrap Yard – UXO 32. The Scrap Yard Area– UXO 32 Site was originally a coal storage facility starting around 1900. It later became a storage area for materials such as metal scrap, inert munitions, PCB transformers, lead-acid batteries, and items considered to be Material Potentially Presenting an Explosive Hazard (MPPEH) from the 1960s until 1988.

The Scrap Yard Area– UXO 32 Site is a fenced scrap yard approximately 750 feet long and 75 to 100 feet wide located in the southeastern portion of NSF-IH adjacent to Mattawoman Creek. A degraded concrete slab is present within most of the fenced area. The Scrap Yard was used to store metal materials and scrap, including storage drums, and furniture and is currently inactive. The site was originally designated as Site 41 under the Installation Restoration program; however, due to the large quantity of munitions-related items identified during investigations at the site, the site was transferred to the Munitions Response Program (MRP) and designated UXO 32 (TT, 2011). A Record of Decision (ROD) was signed in June of 2014 which included a remedy of land use controls for soil and no action for surface water and sediment. Groundwater was omitted from the ROD and was planned to be addressed under Site 70.

1.2.2 Scope of Work

The scope of the activities to be conducted by H&S at NSF-IH that are covered by this HASP includes the following tasks:

- Mobilization and demobilization
- Surveying
- Soil boring installation
- Monitoring Well installation and development
- Well gauging
- Groundwater water sampling
- Decontamination of sampling/gauging equipment
- Investigative Derived Waste (IDW) management

Each of the above tasks is included in the Activity Hazard Analysis (**Table 4**). If additional tasks are determined to be necessary, this HASP will be amended and a hazard evaluation of each task performed.

1.2.3 Chemicals of Concern

Site contaminants of concern (COC) have been established based upon previously conducted investigation activities and the lists have been reduced based upon recent data collection (TT, 2011). The anticipated COCs which may be encountered during groundwater sampling activities at Site 70 include:

- Arsenic
- Beryllium
- Cobalt
- Tetrachloroethene (PCE)
- Trichloroethene (TCE)

1.3 HEALTH AND SAFETY PLAN ORGANIZATION

This HASP presents the overall approach to safety during execution of investigation and monitoring activities at the Site 70. The report is divided into the following sections:

Section 1 - Introduction and Outline

Section 2 - Summary of Project Management Team

Section 3 - Hazard Communications and Environmental Monitoring during Field Operations

Section 4 - Employee Training and Medical Surveillances

Section 5 - Personal Protective Equipment

Section 6 - Emergency Response Reactions to Site Contingencies

Section 7 - Site Controls and Work Zones

Section 8 - Confined Space Entry Program

Section 9 - Control of Hazardous Energy Program

Section 10 - Fall Protection Program

Section 11 - Tool Safety Program

2.0 PROJECT MANAGEMENT

2.1 KEY PERSONNEL

The following table contains information on key project personnel:

Position	Name	Phone
Program Manager	Ed King, P.E.	484-437-4433 (W)
Project Manager	Patrick Schauble, P.E.	484-880-1896 (W)
Corporate Safety and Health Manager	Edward Kearney, CIH	508-366-7442 (W)
Field Manager	Sean Chelius, P.G.	610-603-6111 (W/C)
Site Safety and Health Officer/ Emergency Coordinator	Sean Chelius, P.G.	610-603-6111 (W/C)
NAVFAC RPM	Joseph Rail	(202) 685-3105 (O)
NAVFAC POC	Nicholas Carros	(301) 744-2263 (O)

2.2 RESPONSIBILITIES

Clear lines of authority will be established for enforcing compliance with the safety, health, and contingency procedures consistent with industry policies and procedures. Designated H&S personnel are responsible for implementation of the HASP during field activities. This includes field supervision; implementing and directing emergency operations; coordinating with onsite and offsite emergency responders; enforcing safe work practices and decontamination procedures (if needed); ensuring proper use of personal protective equipment (PPE); communicating site safety program modifications and requirements to site personnel; proper reporting of injuries, illnesses, and incidents to the appropriate internal and external organizations; and containing and controlling the loss of potentially hazardous materials to soil, air, and surface/groundwater during all phases of remediation operations.

In the event of an onsite injury, occupational illness, near-miss, or environmental contamination incident, the following organizations/individuals will be notified:

- Field Manager
- Site Safety and Health Officer/Emergency Coordinator
- Project Manager
- Program Safety and Health Manager
- Program Manager

2.2.1 Program Manager

The **Program Manager (Ed King, P.E.)** has overall responsibility for project completion and will be the primary contact during the course of project completion. The Program Manager is the main contact person for interactions with the client and applicable regulatory agencies in non-

emergency settings.

2.2.2 Project Manager

The *Project Manager (Patrick Schauble, P.E)* has overall responsibility for site activities and will be the primary contractor and subcontractor point of contact during work activities.

2.2.3 Program Safety and Health Manager (or Designee)

The *Program Safety and Health Manager (Edward Kearney, CIH)* has overall project responsibility for the development of this HASP and will provide technical safety and health information, as needed.

2.2.4 Site Safety and Health Officer/Emergency Coordinator

The *Site Safety and Health Officer/Emergency Coordinator (Sean Chelius, P.G.)* is responsible for coordination of onsite contingency operations, as well as the implementation of the Health and Safety Plan on-site. The Site Safety and Health Officer/Emergency Coordinator will be onsite throughout the project and will be responsible for daily compliance with site safety and health requirements; he will also be responsible for establishing communication with the appropriate security and emergency response personnel prior to the start of on-site work and verify all emergency telephone numbers.

During an emergency, the Field Manager and Site Safety and Health Officer/Emergency Coordinator will be responsible for initiating and coordinating emergency responses/contingency operations with offsite emergency responders.

The Program Safety and Health Manager, Field Manager, and Site Safety and Health Officer/Emergency Coordinator will have the authority to make on-the-spot corrections concerning safety, health, and environmental pollution infractions.

2.2.5 Field Manager

Mr. Chelius will dual hat as the Field Manager due to the small scope of this project. The Field Manager's responsibilities include, but are not limited to, providing technical support to the Site Safety and Health Officer/Emergency Coordinator, evaluating onsite environmental monitoring results and reporting to the Project Manager and Program Safety and Health Manager, initiating evacuation of the work site when needed, communicating with offsite emergency responders, and coordinating activities of onsite and offsite emergency responders.

2.2.6 H&S Employee and Subcontractor Responsibilities

H&S and subcontractor employees are responsible for reading, understanding, and meeting the safety and health requirements contained in this HASP. A HASP Review Record sign-off sheet is provided in **Attachment A**. Employees are required to implement these procedures when conducting daily operations. This will include receiving appropriate training and medical monitoring and utilization of H&S-provided safety and health equipment (to include PPE) to

safely conduct site operations, as well as maintain appropriate grooming standards (removal or proper trimming of beards, mustaches, and sideburns) to ensure the proper fit of respiratory protection. Employees will review each task prior to commencement to consider the potential safety and health hazards and the measures to be taken in the event of an emergency. Employees should know where Material Safety Data Sheets, first aid supplies, and emergency equipment are maintained. The Field Manager and Site Safety and Health Officer/Emergency Coordinator should be notified of potential safety and health hazards, near-miss conditions, or incidents present on the job site or unusual effects believed to be related to hazardous chemical exposures. Failure to follow established safety and health procedures could result in immediate dismissal from the Site.

2.2.7 Subcontractors

Responsibilities of H&S personnel and subcontractor personnel include: following the HASP and applicable safety and health rules, regulations, and procedures; using required controls, procedures, and safety devices, including PPE; notifying his/her supervisor of identified or suspected emergencies, safety, or health hazards; and complying with training and medical requirements. It is anticipated that Tetra Tech (TT) will assist as a subcontractor onsite. Although TT is responsible for ensuring the health and safety of their employees and have their own Health and Safety requirements, they will at a minimum be expected to comply with this HASP. H&S will provide oversight and will perform periodic site inspections to ensure that the proper health and safety requirements are being followed.

3.0 HAZARD COMMUNICATION AND ENVIRONMENTAL MONITORING DURING FIELD OPERATIONS

3.1 HAZARD COMMUNICATION

Material Safety Data Sheets for each chemical brought onsite during field activities will be kept onsite by the Field Manager. Subcontractors must inform the Field Manager and/or the Site Safety and Health Officer/Emergency Coordinator of hazardous substances brought onsite and provide appropriate material safety data sheets to the Field Manager. Chemicals brought onsite must be labeled in accordance with OSHA Hazard Communication Requirements, 29 CFR 1910.1200.

All tasks included in the scope of work for this HASP have been included in the Activity Hazard Analysis (**Table 4**).

3.2 CHEMICAL HAZARDS

3.2.1 Areas of Concern Chemical Hazards

Assumptions regarding chemical constituents were made by reviewing information provided for NSF-IH. Chemicals of concern within site groundwater, surface water, or sediment may present a hazard to site personnel during Groundwater Monitoring activities. Hazard pathways include inhalation and ingestion. Contamination from groundwater can be inadvertently ingested through eating or drinking in the project area. Contaminants can also be ingested by engaging in smoking, eating or drinking with contaminated hands, whether inside or outside the project area. Employees must wash their hands and face prior to eating or drinking in designated clean areas (Support Zone). In addition, care should be taken when onsite due to the potential contaminants within vented vapor from landfills. Employees who exhibit symptoms of overexposure to any of the Site chemicals of concern, as listed in **Table 1**, should report their condition immediately to the SSHO, who will then convey the information to the personnel listed in Section 2.1 of this HASP. **Table 1** provides a list of chemicals of concern and symptoms of overexposure.

3.2.2 Chemicals for Equipment Calibrations and Decontamination Operations

The following chemicals are typically supplied by the field team for sample collection:

- Methanol
- Sample preservatives (HCl, HNO₃)
- Isobutylene calibration gas
- Methane calibration gas
- Alconox

These chemicals will be used for equipment calibration, operation, and sampling equipment decontamination. The quantities to be used will be minimal and will be used under contained environments. Chemicals used during the field activities will be properly contained and labeled. The MSDS will be kept on-site by the Field Manager. Decontamination fluids will be

containerized as part of the IDW where required by regulations. Occupational exposures will be negligible.

3.2.3 Chemical Exposure for Groundwater Monitoring Operations

Personnel may receive exposure to fuels, their related components, through inhalation of vapors and skin absorption/contact with contaminated groundwater. Inorganic compound exposure could also occur through adsorption/contact with contaminated groundwater. These exposures could occur during groundwater sampling and related activities.

The risk of employee exposure to these compounds is variable based upon the location and degree of employee contact with contaminated media. Air monitoring will be performed when performing intrusive activities to assess the potential for employee exposures and required actions/PPE necessary to ensure employee safety. Ongoing Groundwater Monitoring work has been well documented with respect to air and environmental media monitoring. The risk if chemical exposure performing these activities is anticipated to be minimal based on the relatively low concentrations of contaminants in extracted groundwater.

3.3 PHYSICAL HAZARDS

Physical hazards can potentially be present during field activities. These physical hazards may include, but are not limited to:

- Fire/explosion hazards
- Heat/cold stress
- Equipment hazards
- Slips, trips, and falls
- Vehicle and pedestrian hazards
- Biological hazards (discussed below)
- Electrical hazards
- Utilities
- Weather hazards
- Drill rig operation
- Hot Work (not anticipated)
- Confined Space (not anticipated)
- Trenching and excavation (not anticipated)
- Entry into excavations (not anticipated)

The site will be visually inspected for the presence of general safety hazards (e.g., trip/slip hazards, unstable surfaces or steep grades, and sharp objects) prior to beginning work. If hazards are present, these hazards will be recorded and precautionary measures taken to prevent injury.

3.3.1 Fire/Explosion Hazards and Hot Work

The potential for fire and/or explosion emergencies is always present and should be noted at

NSF-IH. Workers must continuously monitor the work area for combustible or explosive gases when operations have the potential to generate sparks. Employees should always be alert for unexpected events, such as ignition of chemicals or sudden release of materials under pressure, and be prepared to act in these emergencies.

Procedures for fire hazards and fire protection include:

- Smoking is not allowed in areas where flammable or combustible materials are present or inside any buildings or in contaminated areas (inside the fence line).
- Static electricity-generating equipment requires bonding and grounding whenever transferring flammable or combustible liquids or when working in areas where these materials are present
- Use of equipment that uses open flames or creates sparks requires implementation of hot work procedures. No hot work is allowed without approval by the SSHO and completion of a “Hot Work Permit.” A combustible gas indicator is used to determine if combustible vapors or gases exceed 10 percent of the LEL before hot work in areas where flammable or combustible materials may be present. Hot work must be conducted under a fire watch with a dry chemical fire extinguisher, or equivalent. Hot work personnel should wear protective clothing (i.e., leather chaps, jacket) for protection from metal slag and sparks and eye protection with filtered lenses. Note that more restrictive requirements are enforced in confined spaces.

Field vehicles will be equipped with a fire extinguisher. Employees must be trained in the proper use of fire suppression equipment. However, professionals should handle large fires that cannot be controlled with a fire extinguisher. The proper authorities should be notified in these instances.

3.3.2 Heat Stress and Heat-Related Illness

Effects of heat stress and illness are possible during the performance of field activities at NSF-IH. Injury from heat exposure may occur to persons working outdoors during a period of high temperature conditions and when personnel are working in PPE clothing. The body’s principal means of cooling is through the evaporation of sweat. When personnel are working in PPE, sweat is trapped inside the clothing and cannot evaporate, thus raising the body’s core temperature and resulting in a heat-related illness. If work in Level C PPE or use of semi-permeable suits without the aid of respirators is required and the temperature is above 70°F, the Site Safety and Health Officer will monitor the worker’s heart rate and keep the worker’s heart rate below 110 beats per minute.

Illness resulting from exposure to extreme heat is possible during field operations. Personnel will be familiar with the signs and symptoms of heat stress, including:

- **Heat Cramps** - Muscle spasms in the abdomen or limbs.
- **Heat Exhaustion** - Dizziness, light-headedness, slurred speech, rapid pulse, confusion.

fainting, fatigue, copious perspiration, cool skin that is sometimes pale and clammy, and nausea.

- **Heat Stroke** - Hot, dry, flushed skin, delirium, and coma (in some cases). Heat stroke is a life-threatening event and requires immediate medical attention.

Some preventive measures to avoid heat stress include:

- Frequent resting in cool or shaded areas
- Consumption of large quantities of fresh potable water or diluted electrolyte beverages

A suggested work-rest regimen is:

Ambient Temperature	Work	Rest
70°F	3 hours	15 minutes
75°F	2.5 hours	15 minutes
80°F	2 hours	15 minutes
85°F	1.5 hours	15 minutes
90°F	1 hour	15 minutes

Other factors, such as a worker's acclimatization, level of physical fitness, and age, may increase or decrease his susceptibility to heat stress. Before assigning a task to an individual worker, these factors will be taken into account to ensure that the task will not endanger the worker's health.

If a heat-related illness is suspected or observed, the affected person must be moved to a cool or shaded area and given plenty of liquids to consume. If symptoms of a heat stroke are observed, the victim will be cooled immediately and transported to the hospital. Liquids will be readily available to ensure that workers stay hydrated.

3.3.3 Effects of Cold Exposure

Effects of cold exposure are possible during the performance of field activities at NSF-IH. Injury from cold exposure may occur in persons working outdoors during a period when temperatures average below freezing. The extremities, such as fingers, toes, and ears, are the most susceptible to frostbite.

Personnel will be informed about the various forms of cold stress (e.g., hypothermia, frostbite) and the symptoms of exposure, which are: **Cold Stress**: Cold stress can occur upon exposure to cold environments where there is heat loss to the body, feet, hands, and/or head. Primary cold stress injuries are hypothermia and frostbite. Cold can also adversely affect mental capabilities resulting in accidents or injuries. The body's initial response to cold is shivering, vasoconstriction, increased oxygen consumption, accelerated respiration and pulse, and increased heart output and blood pressure. **Hypothermia**: Hypothermia occurs when the body core temperature falls below 96.8°F. Symptoms include intense uncontrollable shivering, sluggish thinking, difficulty speaking, muscular rigidity, blue puffy skin, poor coordination, cessation of

shivering, dulled thinking, irrational stupor, unconsciousness, erratic heartbeat, slowed respiration, cardiac and/or respiratory failure, lung edema, and death. Treatment for hypothermia is to re-warm the body trunk, immerse in warm water (105°F) or use heat packs. **Frostbite:** Frostbite occurs due to freezing of fluid that surrounds tissues. It occurs at less than 30°F, and more rapidly with wind exposure. Frostbite affects the ears, chin, nose, fingers, and toes. Frostbite first appears as blanched skin or waxy or white skin that is firm to the touch with resilient tissue beneath. With deep frostbite, tissues are cold, pale, solid, and may turn black. Treatment for frostbite is to re-warm with warm water (105°F) (do not rub with snow), and prevent refreezing of affected body parts.

To prevent cold stress conditions and exposure symptoms, the use of personal protection by dressing for warmth, wind, and wet conditions is necessary. Wear layered clothing (i.e., wear thinner, lighter clothing next to the body with heavier clothing layered outside the inner clothing. Stay active as activity generates heat. Provide a warm break area when working in cold environments. Have first-aid equipment available. At temperatures lower than 25°F, do not permit continuous cold exposure to exposed skin. At temperatures lower than 45°F, wear warm clothing to include as needed: Boots; heavy socks (e.g., wool or polypropylene); mittens, insulated gloves; insulated head covers; thermal underwear; and insulated coveralls. Workers that get immersed in water or whose clothing becomes wet will be immediately provided with a change of clothing and be treated for hypothermia if symptoms become evident.

3.3.4 Biological Hazards

Biological hazards that may potentially be encountered during site work include:

- Poisonous plants
- Poisonous snakes
- Poisonous spiders
- Rodents
- Insects
- Ticks
- Mosquitoes

Tall unmaintained grasses and brush at the site result in a considerable risk **of exposure to ticks which may carry Lyme's or other diseases** as well as other potentially hazardous plants and animals. Access to wells should be maintained via mowing to minimize this risk. Employees should don light colored long sleeve clothing taped at the boots when walking through grassy or brush covered areas for additional protection.

Poisonous Plants

Contact with poisonous plants such as poison oak, poison ivy, or poison sumac can result in dermatitis. Poison oak and poison ivy are a biological hazard that causes reaction in more than 50 percent of the population. Poison oak/ivy has green leaves in the spring and summer, and red and yellow leaves in the fall that are found in sets of three. This trait is easily remembered by an old rhyme "leaves of three, let them be." Black dots of dried sap (resin) on the leaves are also

characteristic of the plant. It is the resin called “urushiol,” derived from the Japanese word for “sap,” that poses a threat to sensitive individuals. The skin reacts to the resin upon contact causing dermatitis characterized by linear streaks and red bumps where the plant has brushed against the skin. Contact with the smoke from burning poison oak also causes severe reactions in the respiratory tract and exposed skin in sensitive individuals. Signs and symptoms of exposure are redness, swelling, blisters, and intense itching. Blisters form within 24 hours, weeping, crusting and scaling of the blisters within a few days, and complete healing occurs in about 10 days.

Poison oak/ivy first-aid procedures are: Washing, without scrubbing, of the affected area with mild soap and water, application of a paste of baking soda and water on the area several times a day, or application of an anti-cortical cream or lotion, such as Calamine or Caladryl, to help soothe the area. Antihistamines, such as Benadryl, may also help dry up the sores. If the condition worsens or persists and affects large areas of the body or the face, see a doctor. It may be necessary to give anti-inflammatory drugs, such as corticosteroids, or other medications to relieve discomfort.

Poisonous Snakes

Poisonous snakes, primarily the copperhead, may be encountered during site work. The copperhead has a series of dark and light bands near the tail just before the rattles that are different from the rest of the body. Copperhead bite signs and symptoms of envenomation include: fang marks; metallic or rubbery taste in mouth; tingling of the tongue; numbness; swelling within 10 minutes of bite; nausea, weakness, temperature change; and discoloration within 3 hours to 6 hours.

Copperhead precautions include: Avoid walking in areas known to be populated with snakes; avoid traveling on foot at night; avoid traveling off trails or paths in grassy or brush-laden areas; do not climb into rocky areas without visual inspection for snakes; be alert when moving debris as snakes seek shelter in shaded areas; wear high-top boots and long pants when walking in grassy areas; clear brush from around buildings, check/repair leaky faucets, and keep trash in containers with secure lids. If a snake is encountered, look around, there may be others, then turn around and walk away on the same path traveled.

Copperhead bite first-aid procedures are: Summon emergency medical help immediately; have victim stay calm and remain motionless; position victim so that bite is kept below heart level; do not use ice, cold packs, sprays, alcohol, or any drugs; do not use a tight tourniquet but instead apply a light constricting band above the bite (be able to insert finger under band) and do not release the band unless it is too tight from swelling; do not make an incision across the bite to suck out the venom; and do not wait to see if symptoms develop, seek medical attention as soon as possible.

Poisonous Spiders

Poisonous spiders, such as the black widow spider or the brown recluse spider, may be encountered during site work. Spiders are usually found in dark, cool, protected areas and such

areas should be inspected before placing hands or feet in these areas. Poisonous spiders are commonly found in woodpiles, sheds, basements, garages, and privies.

The primary species of black widow spider encountered has a glossy black appearance with an orange-red hourglass shape on the underside of the body. Black widow spider bite signs and symptoms are: Initial pain followed by dull, occasionally numbing pain in the affected extremity; pain and cramps in one or several of the large body muscles; abdominal pain and cramping; sweating, increased salivation, anxiety, weakness, headache, and dizziness; and severe cases can result in uncontrollable muscle spasms, coma, and respiratory failure. Black widow spider bite first-aid procedures are: wash wound; apply a cold pack; and get medical care (e.g., muscle relaxants; antivenin).

The brown recluse spider is also known as the "violin or fiddle back" spider and is light brown in color with a darker brown violin-like marking on the top of the body. The brown recluse spider is non aggressive, and most bites occur when the spider is trapped in clothing being put on, stepped on, and when areas where the spider resides are disturbed. Brown recluse spider bite signs and symptoms are: Localized burning sensation within 2 hours to 8 hours with itching and redness; small blanched area around immediate bite area appears; reddened area enlarges and becomes purple during subsequent 1 hour to 8 hours; and fever, malaise, stomach cramps, nausea, vomiting, and some cases have resulted in death. Brown recluse spider bite first-aid procedures are: wash wound; apply a cold pack; and seek immediate medical care.

Rodents

Rodents include rats, mice, squirrels, and other related mammals and are characterized by gnawing and nibbling traits. Rodents can act as a vector for many diseases that may be transmitted directly or through other vectors such as fleas or ticks. Diseases that can be transmitted include plague, typhus, Leptospirosis, relapsing fever, and others including Hantavirus pulmonary syndrome. A discussion of Hantavirus pulmonary syndrome is presented below, as it is a relatively recent disease transmitted by rodents.

Hantavirus Pulmonary Syndrome: Hantavirus pulmonary syndrome is a serious, often deadly, respiratory disease that has been found mostly in rural areas of the western United States. The disease is caused by a Hantavirus that is carried by rodents and passed on to humans through infected rodent urine, saliva, or droppings. The deer mouse is the primary carrier of the virus that causes Hantavirus pulmonary syndrome. This type of rodent is found throughout the United States, except in the Southeast and East Coast. In the Southeast, the cotton rat is known to carry Hantavirus. A deer mouse is 4 inches to 9 inches long from head to tip of tail. It is pale gray to reddish brown; has white fur on its belly, feet, and underside of the tail; and has oversized ears. A mouse nest (burrow) is usually a pile of material under which the mouse lives. This pile can contain many different materials, such as twigs, insulation, Styrofoam, and grass.

Hantavirus is spread from wild rodents to people. The virus gets in the air as mist from urine and saliva or dust from feces. Breathing in the virus is the most common way of becoming infected; however, infection can also occur by touching the mouth or nose after handling contaminated materials. A rodent's bite can also spread the virus. Hantavirus is not spread from person to

person. Infection will not occur from being near a person who has Hantavirus pulmonary syndrome. The virus, which is able to survive in the environment (e.g., contaminated dirt and dust), can be killed by most household disinfectants, such as chlorine bleach or alcohol.

Symptoms of Hantavirus pulmonary syndrome usually appear within two weeks of infection but can appear as early as 3 days to as late as 6 weeks after infection. First symptoms are general and flu-like: Fever (101-104°F); headache; abdominal, joint, and lower back pain; sometimes nausea, and vomiting. However, the primary symptom of this disease is difficulty in breathing, which is caused by fluid build-up in the lungs and quickly progresses to an inability to breathe.

Precautionary measures to avoid exposure to Hantavirus include: avoid and/or be cautious when working near wood piles, inside sheds or other known deer mouse habitats; when evidence of deer mice is observed, stop work and notify supervisor immediately; establish specific work procedures, protective clothing, respiratory protection, and decontamination protocol for work in the area, and review hazards and control measures with workers; spray a concentrated solution of chlorine bleach (10 percent minimum) on areas where rodent feces or nesting materials are present and let the disinfectant sit for a period of time before working in the area; wear protective clothing (i.e., disposable coveralls, gloves, boots, or booties) and respirator (air-purifying respirator [APR] with high-efficiency particulate air [HEPA] filter); remove contaminated materials carefully; minimize dust generation; use HEPA filter vacuum equipment as needed; collect contaminated materials and place in plastic bags/seal for disposal as directed by the SSHO; upon exit from the work area; wash gloved hands in 1 percent chlorine bleach solution; remove clothing being careful not to contact potentially contaminated surfaces; and thoroughly wash with soap and water immediately following removal of PPE.

Insects

Ant bites and bee stings can be deadly to those who are hypersensitive. Anaphylactic shock can occur to sensitized individuals upon stinging. Signs and symptoms of envenomation are usually local pain, redness, itching, and swelling. Sensitive individuals may have more serious symptoms such as welts, itching palms and feet, headache, nausea, vomiting, labored breathing, and in severe cases respiratory paralysis or heart failure. Bee precautions include: Conduct a reconnaissance of areas where bee, hornet and wasp hives may be encountered (i.e., clearing and grubbing) before beginning work in an area; apply insecticide (where allowed) to rid the work area of bees; ensure that site personnel who have a recent history of bee, hornet and/or wasp stings have reported this to the SSHO; hypersensitive individuals should carry a bee sting injection kit prescribed by the physician with them in case of emergency; and over-the-counter antihistamine medication should be available in case of a bee sting.

Infected mosquitoes can act as a vector for many diseases including West Nile Virus. The increased spread of the West Nile virus in the United States is a major health concern. West Nile encephalitis is caused by the West Nile virus, a flavivirus commonly found in Africa, West Asia, and the Middle East. Encephalitis is an inflammation of the brain and can be caused by viruses and bacteria, including viruses transmitted by mosquito bites. Transmission is a vicious circle. Mosquitoes become infected when they feed on infected birds. The virus gets into the mosquito's salivary glands. Then the mosquito bites a human or an animal, injecting the virus, which can

multiply and cause illness. Symptoms vary depending on the severity of the infection. Mild infections include flu-like symptoms: fever, headaches and body aches, skin rash, and swollen lymph glands. Severe infections include symptoms such as higher fever, neck stiffness, disorientation, coma, paralysis, convulsions and muscle weakness. The methods of reducing risks of transmission of West Nile Virus include staying indoors at dawn, dusk, and in the early evening, wearing long-sleeved shirts and long pants when outdoors, spraying clothing with repellents containing Permethrin or DEET, and applying insect repellent sparingly to exposed skin.

Ticks

Infected wood ticks and dog ticks can act as a vector for many diseases including Rocky Mountain spotted fever, Q fever, relapsing fever, Lyme disease, and tularemia. Adult ticks are reddish brown in color and may have white markings on the back. They are usually 1/4-inch long, are oblong or seed-shaped, and have eight legs. The adult wood tick appears during the spring and early summer months in the northwestern states, and the dog tick appears throughout the summer in the eastern and southern states. The disease-carrying organism is transmitted to humans through the bite of the tick or by contact with crushed tick blood or feces through a scratch or wound.

The early signs and symptoms of Lyme disease are a bull's eye rash, fever or chills, and fatigue or body aching. Later skin lesions may develop as well as heart, neurological or muscle complications. It is often difficult to diagnose since people often do not notice the tick bite, rashes may not appear, or symptoms imitate other diseases or infections.

To avoid contact with ticks, wear clothing that fully covers the legs, arms and hands. Avoid walking in wooded or brush-laden areas whenever possible. Inspect the body and clothing during rest periods and immediately remove any ticks found, being careful not to crush them. Have someone else help to inspect the neck, back, head, and other hard-to-see areas of the body. If ticks are found on the body, try to remove the tick without crushing or leaving any part of the tick in the wound. Use fine-pointed tweezers for tick removal by insertion under the tick. Do not crush the tick on your body or between the fingers. Apply gentle but firm traction on the tick, being careful not to leave the mouthparts in the skin. Do not use force; a slow steady pull is required. Wash hands thoroughly with soap and warm water after handling ticks, apply antiseptic to the wound with iodine, Mercurochrome, or Merthiolate and apply a corticosteroid lotion.

Mosquitoes

Mosquitoes present health hazards primarily due to their potential for transmitting diseases, including Dengue fever and several forms of encephalitis, including St. Louis Encephalitis and West Nile Encephalitis. Recently, mosquitoes have posed an increased risk due to their transmittal of West Nile Virus.

All of the mosquito-borne diseases can cause flu-like symptoms, including fever, headache, and fatigue. Dengue fever can also cause blood hemorrhaging. Encephalitis (including the West Nile, St. Louis, Eastern Equine, and LaCross-California varieties) is an infection of the brain, causing inflammation, swelling, and destruction of nerve cells. Symptoms include high fever, headache,

neck stiffness, stupor, disorientation, and tremors; and can lead to convulsions, coma, paralysis, and death. Anyone experiencing several of these symptoms after being bitten by mosquitoes should seek medical attention immediately. There is no vaccine for West Nile Virus.

The best protection from mosquito-borne diseases includes wearing long-sleeved shirts and pants, applying a mosquito repellent containing 20 percent to 30 percent DEET (n,n-diethyl-m-toluamide), and avoiding perfumes and colognes when outdoors for any prolonged time.

3.3.5 Heavy Equipment Hazards

Heavy equipment work must be conducted only by trained, experienced, and licensed/certified personnel. If possible, personnel must remain outside the turning radius of large, moving equipment. At a minimum, personnel must maintain visual contact with the equipment operator. No guards, safety appliances, or other devices may be removed or made ineffective unless repairs or maintenance are required, and then only after power has been shut off, tagged, and locked out. Safety devices must be replaced once repair or maintenance is complete. Exhaust from equipment must be directed so that it does not endanger workers or obstruct the view of the operator. When not operational, equipment must be set and locked so that it cannot be activated, released, dropped, etc.

Drill rig operation is required for installation of new permanent monitoring wells. Direct Push Technology (DPT) drilling is required for soil boring installation. All drilling and DPT operations will be performed by a licensed well driller. Before drilling begins, a review of the drilling site for underground and overhead utilities must be completed. The review includes inspection of the drilling site and contact with the utility locator service. On site munitions items were demilitarized and have been removed from the site (TT, 2011). Operator/drivers must have current licenses with appropriate class to operate the size and weight of the vehicle. Operator/drivers should know the vehicle dimensions and avoid all obstructions such as carports, canopies, low hanging wires, narrow alleys, etc. Operator/drivers should complete a standard vehicle safety check for brakes, lights, gauges, fluids, tires, battery charge, fuel amount, equipment secured, etc. prior to operating the vehicle. An inspection should be performed to assure all locks, latches, compartment doors, brakes, tie-downs and clips are in place prior to moving the vehicle or equipment. An abbreviated inspection should be completed each time the drill rig is moved from hole to hole on the drill site.

Manufacturer's recommendations should be followed in regard to which equipment and machinery must be stowed and secured prior to vehicle movement. Safe operation of the drill rig requires the use of the following safety equipment. Tire blocks should be placed under the front wheels of the parked vehicle. The vehicle should not be parked on non-level ground that presents a risk of roll-over. Where parking on non-level ground is necessary, the vehicle shall preferably be positioned perpendicular to the sloping surface. Park or position the machine to allow the wind to carry engine exhaust fumes away from the operator. Exhaust fumes from engines can be lethal. Have exhaust piping rerouted on the vehicle if exhaust fumes are a routine problem in the operating area. Be aware of reducing the amount of time the engine operates or idles. Break times, clearing, setting up, planning times, and site meeting times may be occasions when the vehicle engines can be turned off. Increase the time and number of breaks if localized conditions

such as high humidity, terrain gullies and depressions, or other conditions do not allow the diesel fumes to dissipate.

No vehicle, extended probe, or load shall be permitted within a 50-ft radius of energized sources with nominal voltage below 50 kilovolts (kV). No vehicle, extended probe, or load shall be permitted within a 100-ft radius of energized sources with nominal voltage above 50 kV and below 300 kV. No work will occur during electrical storms. Temporary power should be limited in use as much as practical. For example, daylight operations should be performed in lieu of nighttime operations requiring artificial lighting. Energized equipment should be protected by over-current and ground-fault devices. The equipment should be designed for outdoor and weatherproof conditions. When driven by the rig, use electrical equipment and tools that are compatible with the rig's electrical systems. Operating controls and gauges should be kept free of debris, grease, oil, etc. These devices should remain clear to operate, and should remain visible during operations. Periodic wipe downs and washes of controls and gauges should be included in the normal operating procedures. Noncombustible and nonflammable cleaners should be used when cleaning the vehicle and equipment.

3.3.6 Noise Hazards

Work around large equipment often creates excessive noise. Noise can cause workers to be startled, annoyed, or distracted; can cause physical damage to the ear, pain, and temporary and/or permanent hearing loss; and can interfere with communication. If workers are subjected to noise exceeding an 8-hour time-weighted average sound level of 85 dBA (decibels on the A-weighted scale), hearing protection will be selected with an appropriate noise reduction rating to comply with 29 CFR 1910.95 and to reduce noise levels to or below the permissible values. Therefore, during the field activities where workers are using heavy equipment, such as drill rigs and backhoes, etc., hearing protection must be utilized at these times.

3.3.7 Electrical Hazards

Overhead power lines, electrical wiring, electrical equipment (electrical generators), and buried cables pose risks to workers of electric shock, burns, muscle twitches, heart fibrillation, and other physical injuries, as well as fire and explosion hazards. Workers will take appropriate protective measures when working near live electrical parts, including inspection of the work area, to identify potential spark sources, maintenance of a safe distance, proper illumination of the work areas, provision of barriers to prevent inadvertent contact, and use of nonconductive equipment. If overhead lines cannot be de-energized prior to the start of work, a 10-ft distance must be maintained between overhead energized power lines with a voltage of 50 kV and elevated equipment parts. This distance will be increased 4 in. for every 10 kV greater than 50 kV. For example, workers must maintain a distance of 11.7 ft from energized power lines with a voltage of 100 kV. Ground Fault Circuit Interrupters (GFCI) shall be used for electrical cords in use while utilizing any generators on site.

3.3.8 Utilities

Underground utilities pose hazards to workers involved in excavation, drilling, and other

invasive operations. These hazards include electrical hazards, explosion, and asphyxiation, as well as costly and annoying hazards associated with damaging communication, sewer, and water lines. If required, a drilling/dig permit will be obtained prior to beginning any subsurface activities.

Personnel should be aware that although an area may be cleared, it does not mean that unanticipated hazards will not appear. Workers should always be alert for unanticipated events such as snapping cables, excavating into unmarked underground utilities, and excavating into a heavily contaminated zone, etc. Such occurrences should prompt involved individuals to halt work immediately and take appropriate corrective measures to gain control of the situation.

3.3.9 Weather Hazards

Weather conditions should always be taken into consideration. Heavy rains or snowfall, electrical storms, high winds, and extreme temperatures, for example, may create extremely dangerous situations for employees. Equipment performance may also be impaired because of inclement weather. Whenever unfavorable conditions arise, the Site Safety and Health Officer/Emergency Coordinator will evaluate both the safety hazards and ability of the employees to effectively perform given tasks under such conditions. Activities will be halted at their discretion.

In cases of inclement weather for outside work locations or other adverse environmental conditions (i.e., strong winds, rain, snow, lightning, hurricane, tornado, earthquake) the following safety instructions are required:

- Presence of strong winds requires stoppage of affected work activities at elevated work locations (e.g., towers, roofs, ladders, scaffolds, platforms) and stoppage of use of equipment whose safe operation can be affected by high winds (i.e., drill rigs, aerial lifts, cranes)
- Presence of heavy rain or snow requires stoppage of affected work activities where the heavy rain or snow can create safety hazards due to limited visibility, wet work surfaces, slippery equipment controls, increased electrical hazards, cold stress, etc.
- Presence of lightning requires stoppage of affected work activities where lightning presents an increased safety hazard of electrocution (e.g., working in open space or waterways)
- Occurrence of a hurricane, tornado, or earthquake requires stoppage of affected work activities and evacuation of personnel from excavations and trenches, confined spaces, and buildings of questionable stability
- In case of work stoppage due to inclement weather conditions or other adverse environmental conditions, work will not resume until an all clear signal has been communicated by the SSHO to affected personnel. In case of work stoppage due to lightning, an “all clear” will not be given until no lightning has appeared in the area for a period of 10 minutes. SSHO will also notify the PM upon stoppage of work and commencement of work.
- In the case of severe weather conditions, emergency evacuation procedures shall be established where high winds, strong storms, tornadoes, hurricanes, and floods are a

potential occurrence. The SSHO shall monitor the local weather conditions and advise the PM when the U.S. Weather Service issues severe storm warnings. When a severe weather warning is issued, the PS and SSHO will begin taking actions to secure the worksite. In the event of impending severe weather conditions, personnel will be advised of the hazard, and an evacuation order will be issued by the SSHO. All site personnel shall immediately evacuate the work area to a designated location (i.e., hotel). The SSHO will notify the PM and advise him that all site personnel are evacuating the area. The SSHO shall maintain contact with site personnel and provide the PM with periodic updates as to the whereabouts of all site personnel. Site personnel shall remain outside the evacuation area at a designated location until notified by the PM that it is safe to return to the work area. After severe weather conditions have passed, the PS and SSHO will mobilize to the worksite, inspect the condition and security of the site, and make any necessary response actions to correct unacceptable conditions

- Wind direction should be accounted for when positioning equipment at sampling locations. If exposure to organic vapors is anticipated, workers should locate upwind of sampling point. Wind direction often changes abruptly and without warning, so personnel should always be prepared to reposition, if necessary.

3.3.10 Trenching and Excavation Hazards

Open excavations and trenches pose a variety of hazards to site workers and equipment working near or inside them, including cave-in hazards (worsened by water accumulation in some excavations), contact with underground utilities, vehicle and pedestrian traffic hazards, dangers from falling loads, hazardous atmospheres inside and emitted from excavations, stability of adjacent structures, and loose rock and soil. OSHA's standard for Excavations (29 CFR 1926.650-.652) will be enforced at excavation sites.

Personnel are not permitted underneath any loads, including those being removed from an excavation. When mobile equipment is operated adjacent to an excavation or will approach the edge of an excavation, a warning system will be utilized such as barricades, hand or mechanical signals, or stop logs. Where the stability of adjacent building walls or other structures is endangered by excavation operations, support systems such as shoring, bracing, or underpinning will be provided to ensure the stability of such structures for the protection of employees.

No site personnel are permitted to enter excavations greater than 4 ft in depth (considered a Confined Space) without permission SSHO. Excavation of 5 ft or greater require specialized shoring, shielding, or sloping and must be inspected by a competent person prior to anyone entering an excavation. The competent person will document his/her findings, including assumptions used in determining that the excavation is safe for entry, and the conditions of the excavation. If deemed necessary by the competent person, protective systems (e.g., sloping, benching, and supports/shields) will be designed by a professional engineer according to the requirements of 29 CFR 1926.652 and implemented prior to personnel entering the excavation. Excavations will however, be inspected daily by the SSHO as part of routine daily inspections to ensure that safe conditions exist and that no hazards exist within them. Personnel will not work in excavations in which water has accumulated or is accumulating, regardless of depth.

No excavation entry is planned for this Task Order.

3.4 SAFE WORK PRACTICES

3.4.1 Site-Specific Work Practices

Safe work practices that must be followed by site workers include:

- Eat and drink only in those areas designated by the Site Safety and Health Officer/Emergency Coordinator. These activities will not take place within any work zone.
- In the event the potential for chemical contamination exists onsite, employees will wash and conduct appropriate decontamination activities.
- Defective PPE must be repaired or replaced immediately.
- Each employee required to take prescription drugs will notify the Field Manager and Site Safety and Health Officer/Emergency Coordinator prior to the start of work. Controlled or unauthorized drugs will **not** be permitted onsite at any time.

3.5 ENVIRONMENTAL MONITORING

For any potential intrusive work conducted onsite, the environmental monitoring for hazardous gases will be performed as needed using a photo ionization detector (PID) and a four-gas meter. Only employees who have been trained in the proper operation, use limitations, and calibration of the monitoring instruments will use the PID and FGM. Monitoring will be conducted at intervals not greater than once every 30 minutes. Instrument calibration and measurements taken will be logged in the field notebook.

Environmental monitoring will include sufficient monitoring of air quality in work zones during intrusive field operations to assess levels of employee exposure and to verify that the level of PPE being worn by personnel is adequate. Monitoring will be conducted to ensure that contaminants are not migrating offsite to minimize the exposure to nearby populations and/or workers. See **Table 3** for site contaminant monitoring requirements.

Visible dust in the breathing zone will be suppressed by dust suppression techniques or work practices. If visual dust in the breathing zone continues, dust monitoring will be implemented.

3.5.1 Calibration and Maintenance

Direct-reading instruments will be calibrated on a daily basis and prior to use with a known concentration of calibration following the instrument manufacturer's guidance. Instructions in the manufacturer's operations manual regarding storage, cleaning, and maintenance of the instruments will be followed. Calibration will be properly recorded in the field logbook to show the date, calibration material type and concentration, and the actual reading obtained. Equipment failing to meet the manufacturer's standards for accuracy and repeatability will be considered suspect and replaced with an alternate, properly functioning piece of equipment.

3.5.2 Spill Containment Procedures

Appropriate spill kits must be available in the work area. If a spill or leak is detected, efforts must be made to contain the spilled or leaking material and prevent spreading. If the spilled or leaking material is of a hazardous nature and appropriate PPE is not available, no attempt should be made to manage the spill until such time as appropriate PPE is available. The Navy site contact should be informed if the spill is significant or reaches navigable waters or sewer systems. Measures to contain spilled or leading materials include the following:

- If feasible, attempt to stop the leak or spillage.
- Absorb the spill if a liquid using vermiculite, sand, or absorbent pillows.
- Collected material should be placed into drums bearing appropriate labels and disposed of in accordance with governing waste disposal regulations.

4.0 EMPLOYEE TRAINING AND MEDICAL SURVEILLANCE

4.1 SITE WORKERS

Personnel who will be performing construction-related, non-intrusive, non-hazardous onsite tasks are not required to have been trained according to U.S. Department of Labor OSHA Standard 29 CFR 1926.65 *Hazardous Waste Operations and Emergency Response*. These workers will have appropriate safety and health training based upon their specific job tasks and activities.

The Field Manager, Site Safety and Health Officer/Emergency Coordinator, or other personnel conducting the field sampling and monitoring for site gases and vapors during intrusive operations and sampling activities will be trained as required to meet the U.S. Department of Labor OSHA Standard 29 CFR 1926.65, *Hazardous Waste Operations and Emergency Response*, to qualify as hazardous waste site workers and supervisors. Training will include:

- A minimum of 40 hours of initial offsite instruction
- A minimum of 3 days of actual field experience under the direct supervision of a trained, experienced supervisor
- An 8-hour “refresher” training period annually
- Additional training that addresses unique or special hazards/operational requirements.

Onsite supervisors who are directly responsible for or who supervise employees will receive at least 8 additional hours of hazardous waste operations training for supervisors. Copies of training certificates and dates of attendance for H&S personnel are included as **Attachment D**.

4.1.1 Subcontractor Training

The Project Manager will obtain a written list of subcontractor personnel to be onsite for intrusive site activities only. The subcontractor will provide written certification from subcontractor management that these workers meet the training requirements for their assigned tasks to conduct intrusive activities such as drilling or excavation.

4.1.2 Pre-Entry Orientation Session

Prior to entering the Site, personnel will attend a pre-entry orientation session presented by the Site Safety and Health Officer/Emergency Coordinator. Personnel will verify attendance of this meeting by signing the HASP Review Record provided in **Attachment A**. Visitors entering designated work areas will be subject to applicable safety and health regulations during field operations at the Site. The Field Manager and/or Site Safety and Health Officer/Emergency Coordinator is responsible for briefing the personnel onsite of potential hazards that may be encountered on the Site, the presence and location of the Site HASP, and emergency response procedures. Visitors will be under the direct supervision of the Field Manager and/or Site Safety and Health Officer/Emergency Coordinator or his/her representative.

At a minimum, the pre-entry orientation session will discuss the contents of this HASP, PPE,

potential hazards, and health effects of hazards associated with onsite activities and the potential hazards presented by unearthing unidentified hazardous materials. Personnel will be instructed in emergency procedures, to include onsite communications and implementation of the site-specific contingency plans.

4.2 MEDICAL SURVEILLANCE

Non-hazardous waste site workers will be medically examined to meet OSHA requirements specific to their job. Hazardous waste site workers must have satisfactorily completed a comprehensive medical examination by a licensed physician within 12 months (or 24 months, pending physician's approval) prior to the start of site operations. Subcontractors will provide this information in writing to the Project Manager for their workers prior to mobilization onsite. Copies of this information will be kept onsite by the Site Safety and Health Officer/Emergency Coordinator. A licensed physician who is certified in Occupational Medicine by the American Board of Preventative Medicine will review medical surveillance protocol and examination results. Medical surveillance protocols will comply with 29 CFR 1910.120. The content of medical examinations will be determined by the attending physician and will be based upon the guidelines in the *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*. Medical examinations and consultations will be provided for employees covered by this program on the following schedule:

- Prior to field work assignment
- At least annually for employees covered by the program
- At termination of employment
- As soon as possible upon the development of signs or symptoms that may indicate an overexposure to hazardous substances or other health hazards or that an unprotected person has been exposed in an emergency situation
- More frequently if the physician deems such examination necessary to maintain employee health.

An accurate record of the medical surveillance will be maintained for each employee for a period of no less than 30 years after the termination of employment. Records must include at least the following information about the employee:

- Name and social security number
- Physician's written opinions, recommendations, limitations, and test results
- Employee medical complaints related to hazardous waste operations
- Information provided to the physician by the employee concerning possible exposures, accidents, etc.

4.3 HAZARD COMMUNICATION PROGRAM

4.3.1 Hazard Communication

The Site Safety and Health Officer/Emergency Coordinator will conduct regularly scheduled

safety meetings with site workers to discuss the planned activities, since these activities and workers may change over the duration of the project. The objective of instituting a Hazard Communication Program is to ensure that hazards associated with the Site and with chemicals brought onsite by H&S or subcontractors are evaluated and that information concerning these hazards is transmitted to site employees. Site personnel include H&S and subcontractor employees, manufacturer's representatives, local agency employees, and other workers who observe or perform services onsite. Employee awareness of chemical identities, health and physical hazards, properties, and characteristics is essential to safely handle chemicals and to minimize potential hazards. The Hazard Communication Program must follow OSHA requirements listed in 29 CFR 1926.1200.

4.3.2 Hazard Communication Labeling

The Site Safety and Health Officer/Emergency Coordinator will ensure that containers are properly labeled and that workers know the contents of containers. Container labels will contain, at a minimum, information on name of product on container, chemical(s) in product, manufacturer's name and address, protective equipment required for the safe handling of the product, and first aid procedures in case of overexposure to product contents.

4.3.3 Material Safety Data Sheets

The Site Safety and Health Officer/Emergency Coordinator will maintain a current file of complete MSDS's for each substance stored or used at the work site. The file must be easily accessible to employees. Subcontractors and visitors to the workplace will be informed of the existence and location of this file. Workers and visitors will be instructed on how to read and understand the information shown on the MSDS's. Subcontractors must inform the Site Safety and Health Officer/Emergency Coordinator about hazardous substances which they bring onsite and provide MSDS's. MSDS's anticipated to be brought onsite are included as **Attachment C**.

4.3.4 Hazard Communication Training

Site workers and visitors will be informed of the Hazard Communication Program, their legal rights under the program, the location of the chemical inventory, and the location of the MSDS file. Prior to site work or potential exposure to hazardous substances, the Site Safety and Health Officer/Emergency Coordinator will describe hazardous substances routinely used and provide information about:

- Nature of potential chemical hazards
- Appropriate work practices
- Appropriate control programs
- Appropriate protective measures
- Methods to detect presence or release of hazardous substances
- Emergency procedures.

5.0 PERSONAL PROTECTIVE EQUIPMENT

5.1 PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS

Based upon currently available information from several years of performing this work, the Site will require Level D protection for anticipated conditions during Groundwater Monitoring activities. In the event that potential chemical hazards are identified, the level of protection may be upgraded appropriately to the potential hazard conditions. Only those personnel identified and qualified for hazardous waste work as defined in 29 CFR 1926.65 will be allowed to upgrade beyond Level D or provide support of hazardous material/substance contingency operations. Only the Site Safety and Health Officer/Emergency Coordinator, in conjunction with the Program Safety and Health Manager, will be allowed to approve PPE upgrade beyond Level D and site re-entry for the purpose of hazardous conditions assessment.

The following is a list of the Level D PPE components for the minimum level of protection authorized for use during this project.

- Coveralls or appropriate work clothes
- Steel-toe, steel-shank safety boots/shoes
- Hard hats (with overhead activities such as drilling, excavation, and other heavy equipment operation)
- Chemical-resistant gloves (nitrile) as appropriate to prevent contact with contaminated groundwater.
- Leather work gloves (as needed)
- Safety glasses with side shields and face shield (as needed) or impact-resistant chemical goggles; safety glasses, goggles, and face shields will meet American National Standards Institute requirements for impact resistance and safety
- Hearing protection (as needed).

The following is a list of the Modified Level D PPE components for the minimum level of protection authorized for use during this project.

- Tyvek (as needed)
- Steel-toe, steel-shank safety boots/shoes
- Boot covers for steel-toe boots (as needed)
- Hard hats (with overhead activities such as drilling, excavation, and other heavy equipment operation)
- Chemical-resistant gloves (nitrile) as appropriate to prevent contact with contaminated soil
- Leather work gloves (as needed)
- Safety glasses with side shields and face shield (as needed) or impact-resistant chemical goggles; safety glasses, goggles, and face shields will meet American National Standards Institute requirements for impact resistance and safety
- Hearing protection (as needed).

The following is a list of the Level C PPE components for the maximum levels of protection authorized for use during this project:

- Full-face, air purifying respirator equipped with combination organic vapor and high efficiency particulate cartridges
- Poly-coated Tyvek coveralls
- Steel-toe, steel-shank safety boots/shoes
- Chemical-resistant boot covers
- Hard hat
- Hearing protectors
- Chemical-resistant gloves (neoprene or nitrile) as appropriate to prevent contact with contaminated soil.

6.0 EMERGENCY RESPONSE AND REACTION TO SITE CONTINGENCIES

6.1 EMERGENCY RECOGNITION

Prior to work startup, personnel must be familiar with emergency condition identification, notification, and response procedures. The emergency telephone numbers for local emergency response and reporting organizations and directions to the nearest hospital are provided in **Table 2. Figure 2** shows the map with directions to the hospital. The Field Manager, along with the Site Safety and Health Officer/Emergency Coordinator, will rehearse/review emergency procedures and/or applicable site contingencies initially during site orientation and as part of the ongoing site safety program with H&S and subcontractor personnel. Offsite emergency personnel will ultimately handle onsite emergencies. Initial response and first aid treatment, however, will be provided onsite.

Person(s) identifying an accident, injury, emergency condition, or a scenario requiring implementation of a response in support of this HASP will immediately take action to report the situation to the Field Manager and Site Safety and Health Officer/Emergency Coordinator. Notification may take place by runner, hand-held radio, or telephone. The Field Manager and Site Safety and Health Officer/Emergency Coordinator will initiate the required response based upon the type of incident following the procedures contained in this HASP. Chain-of-command and sign-in sheets for personnel on the Site will be established at the beginning of each work day to ensure personnel are accounted for and establish who will take control should the Field Manager and/or Site Safety and Health Officer/Emergency Coordinator become injured. The following items constitute those site conditions requiring an emergency response or contingency action in accordance with this HASP:

- Fire/explosion
- Heavy equipment accident
- Natural disaster
- Medical emergency
- Discovery of unanticipated hazards (e.g., unmarked utility lines, heavily contaminated material).
- Follow-on operations to evaluate and control the source of fire, explosions, and hazardous materials incidents will occur only after discussion with the Project Manager, Field Manager, and/or Site Safety and Health Officer/Emergency Coordinator. The Field Manager and/or Site Safety and Health Officer/Emergency Coordinator will act as the Emergency Coordinator at the Site to coordinate onsite activities and contingencies with outside response organizations. If the Field Manager is unable to act as the Emergency Coordinator, the authority to take action will be transferred to the Site Safety and Health Officer/Emergency Coordinator, or other designee, as indicated in the daily updated chain-of-command.

6.2 OPERATIONS SHUTDOWN

The Site Manager, the Site Safety and Health Officer/Emergency Coordinator, or the Project Manager may mandate operations shutdown. Conditions warranting work stoppage will include, but are not limited to:

- Uncontrolled visible dust migration
- Uncontrolled fire
- Explosion
- Uncovering of potentially dangerous buried hazardous materials
- Conditions immediately dangerous to life and health or the environment
- Potential for electrical storms
- Treacherous weather-related conditions
- Limited visibility
- Air contaminant concentrations in excess of the action levels contained in **Table 3**.

6.3 PROCEDURES FOR HANDLING EMERGENCY INCIDENTS

In the event of an emergency, the information available at that time must be properly evaluated and the appropriate steps taken to implement the emergency response plan. The Site Safety and Health Officer/Emergency Coordinator will assume command of the situation. He/she will alert the emergency management system per **Table 2** and evacuate personnel to the pre-designated evacuation location. The Site Safety and Health Officer/Emergency Coordinator will make required notifications to include, but not be limited to, the H&S Project Manager and H&S Program Safety and Health Manager, as defined in this HASP and **Table 2**, and the appropriate federal and state agencies.

Site personnel will have the capability of notifying emergency responders directly from the Site using the phone in the company vehicle or in the site support office.

The Site Safety and Health Officer will complete and submit to the Project Manager an Accident/Loss and Incident Report. The following information will be provided when reporting an emergency:

1. Name and location of person reporting
2. Location of accident/incident
3. Name and affiliation of injured party
4. Description of injuries, fire, spill, or explosion
5. Status of medical aid and/or other emergency control efforts
6. Details of chemicals involved
7. Summary of accident, including suspected cause and time it occurred
8. Temporary control measures taken to minimize further risk.

This information is not to be released under any circumstances to parties other than those listed in this section and emergency response team members. Once emergency response agencies have

been notified, the Project and Program Managers will be immediately notified.

6.4 MEDICAL EMERGENCIES

Personnel should always be alert for signs and symptoms of illnesses related to chemical, physical, and onsite health hazards. Severe injuries resulting from accidents must be recognized as emergencies and treated as such. At least one person currently trained in first aid/ cardiopulmonary resuscitation must be present onsite. This will normally be the Site Safety and Health Officer/Emergency Coordinator.

In a medical emergency, the Site Safety and Health Officer/Emergency Coordinator must sound the emergency alarm, upon which work must stop and personnel must move to the predesignated evacuation location. **If the emergency situation cannot be conveyed by word of mouth, a vehicle horn will be sounded. Three short blasts, separated by a 2-second silence, will be used as the emergency signal.** Personnel currently trained in first aid will evaluate the nature of the injury, decontaminate the victim (if necessary), and initiate first aid assistance immediately and transport if appropriate. First aid will be administered only to limit further injury and stabilize the victim. The local Emergency Medical Services must be notified immediately if needed. **The route to the nearest hospital is shown on Figure 2. Figure 2** shows a large-scale view and the distance to the hospital from NSF Indian Head.

Although not anticipated, victims who are heavily contaminated with toxic or dangerous materials must be decontaminated before being transported from the Site. Since heavy contamination is not anticipated, a formal decontamination station will not be available. Decontamination will consist of removal of contaminated coveralls/clothing and wrapping the victim in a sheet or other clothlike material. No persons will re-enter the site of injury/illness until the cause of the injury or symptoms has been determined and controlled. At no time will personnel transport victims to emergency medical facilities unless the injury does not pose an immediate threat to life and transport to the emergency medical facility can be accomplished without the risk of further injury. Emergency Medical Services will be used to transport serious injuries offsite unless deemed otherwise by the Site Safety and Health Officer/Emergency Coordinator.

The Site Safety and Health Officer/Emergency Coordinator must complete an Accident/Loss and Incident Report and submit it to the Project and Program Managers within 24 hours of the following types of incidents:

- Job-related injuries and illnesses
- Accidents resulting in loss or damage to property
- Accidents involving vehicles and/or vessels, whether or not they result in damage to property or personnel
- Accidents in which there may have been no injury or property damage but which have a high probability of recurring with at least a moderate risk to personnel or property
- Near-miss incidents that could have resulted in any of the conditions defined above.

An accident that results in a fatality or the hospitalization of three or more employees must be reported within 8 hours to the U.S. Department of Labor through the Project Manager. Subcontractors are responsible for their reporting.

In order to support onsite medical emergencies, first aid/emergency medical equipment will be available at the following locations:

- First-aid kit Company vehicle
- Emergency alarm Horn on the company vehicle
- Copy of the HASP Company vehicle
- Cell Phone With each field personnel
- Fire extinguisher Company vehicle

The eyewash kit must be portable and capable of supplying at least a 15-minute supply of potable water to the eyes.

6.5 FIRE/EXPLOSION EMERGENCIES

Fire and explosion must be immediately recognized as an emergency. The Site Safety and Health Officer/Emergency Coordinator must sound an emergency signal, and personnel must be decontaminated (if necessary) and evacuated to the pre-designated evacuation location. Only persons properly trained in fire suppression and other emergency response procedures will support control activities. Control activities will consist of the use of onsite portable fire extinguishers for limited fire suppression and employee evacuation. Upon sounding the emergency alarm, personnel will evacuate the hazard location and assemble at the designated site meeting area. Only the Site Safety and Health Officer/Emergency Coordinator, or those site personnel trained in the use of portable fire extinguisher use, will attempt to suppress a site fire. Small, multi-purpose dry chemical extinguishers will be maintained in each H&S vehicle onsite. Fires not able to be extinguished using onsite extinguishers will require the support of the local Fire Department. The Site Safety and Health Officer/Emergency Coordinator should take measures to reduce injury and illness by evacuating personnel from the hazard location as quickly as possible. The Site Safety and Health Officer/Emergency Coordinator must then notify the local Fire Department. The Site Safety and Health Officer/Emergency Coordinator will determine proper follow-up actions. Site personnel will not resume work during or after a fire/explosion incident until the Emergency Coordinator has directed that the incident is over and work may resume. During the incident, site personnel will remain outside the incident area and obey the instructions of the Emergency Coordinator.

6.6 EMERGENCY TELEPHONE NUMBERS

Communications will be by telephones located in the H&S vehicle onsite, and field personnel will have access to this telephone to directly contact offsite emergency response organizations. Refer to **Table 2** for a listing of emergency telephone numbers.

7.0 SITE CONTROL AND WORK ZONES

The following work zones will be established during implementation of the activities at NSF Indian Head as a means of site control.

7.1 WORK ZONES

Work zones will be established in accordance with the following:

- **Exclusion Zone (EZ)** - The EZ at the Site will be designated prior to field activities. For the purposes of this HASP, the active investigation area will be considered as the EZ. Personnel entering the EZ must wear the prescribed level of protective equipment. Unauthorized personnel will not be allowed in this area. This area has either known or potential contamination and has the highest potential for exposure to chemicals onsite. Persons who enter the EZ must wear the appropriate level of PPE for the degree and types of hazards present at the site. If the EZ is subdivided, different levels of PPE may be appropriate. Each sub-area of the EZ should be clearly marked to identify hazards and required level of PPE.
- **Contamination Reduction Zone (CRZ)** - The purpose of the CRZ is to reduce the possibility that the Support Zone (SZ) will become contaminated or affected by the site hazards. Because of both distance and decontamination procedures, the degree of contamination in the CRZ generally will decrease as one moves from the EZ to the SZ. The CRZ will be established outside the areas of known or potential contamination. Contamination Reduction Corridors, which are access control points between the EZ and CRZ, should be established for both personnel and heavy equipment. These corridors should consist of an appropriate number of decontamination stations necessary to address the contaminants of the particular site (see National Institute of Occupational Safety and Health/OSHA/U.S. Coast Guard/U.S. Environmental Protection Agency *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*, October 1985, for information on decontamination procedures and work zones).
- **Support Zone** - The SZ is the uncontaminated area where workers are unlikely to be exposed to hazardous substances or dangerous conditions. The SZ is the appropriate location for the command post, equipment and supply center, field laboratory, and other administrative or support functions that are necessary to keep site operations running efficiently. Potentially contaminated clothing, equipment, and samples must remain outside the SZ until decontaminated. However, personnel located in the SZ must receive instruction in proper evacuation procedures in case of a hazardous substance emergency. The SZ should be upwind and as far from the EZ as practicable.

The level of PPE will depend upon the type of work performed and site monitoring data. Level D will be the minimum protection in the EZ and the CRZ. No specific PPE requirements are needed in the SZ, as contaminated materials are prohibited from being stored in this area. Only authorized personnel will be permitted in the EZ and CRZ. Entering these zones will require donning the required PPE prior to entry. These zones will be established prior to

beginning the field activities.

Safe work practices to be followed by site workers include:

- Eating, drinking, chewing gum or tobacco, and smoking are prohibited in the EZ and CRZ.
- Hands and face must be thoroughly washed upon leaving the work area.
- Personnel must not take prescription drugs unless specifically approved by a licensed physician who is familiar with the issues of worker exposure to hazardous materials.
- When respirators are required, facial hair that interferes with the face-to-facepiece fit of the respirator will not be permitted.
- Personnel onsite must use the buddy system; visual contact must be maintained between team members.
- Work is allowed during daylight hours only.
- If dust is being visually generated in the EZ, the Site Safety and Health Officer/ Emergency Coordinator will advise on procedures for misting or wetting the soil to prevent possible exposure from inhalation of soil contaminants.
- Possessing, using, purchasing, distributing, selling, or having controlled substances in your system during the workday, including meal or break periods onsite, is strictly prohibited.
- The use or possession of alcoholic beverages onsite is prohibited. Similarly, reporting to work or performing one's job assignments with excessive levels of alcohol in one's system will not be permitted.

8.0 CONFINED SPACE ENTRY PROGRAM

Purpose

The Confined Space Entry Program is provided to protect authorized H&S employees that will enter confined spaces and may be exposed to hazardous atmospheres, engulfment in materials, conditions which may trap or asphyxiate due to converging or sloping walls, or contains any other safety or health hazards. Reference: OSHA-Permit-Required Confined Spaces (29 CFR 1910.146).

No confined space entries are currently anticipated for this Task Order.

Definitions

Confined space:

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

Permit required confined space (permit space) is a confined space that has one or more of the following characteristics:

- Contains or has a potential to contain a hazardous atmosphere. This includes oxygen deficient atmospheres which frequently occur in confined spaces due to oxidation processes.
- Contains a material that has the potential for engulfing an entrant.
- Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly covering walls or by a floor which slopes downward and tapers to a smaller cross-section.
- Contains any other recognized serious safety or health hazard.

Each Permit-Required Confined Space will be marked "Confined Space - Entry Permit Required".

Confined Space Entry – Procedures

Each employee who enters or is involved in a Confined Space entry must:

1. Understand the procedures for Confined Space Entry. (Permit & Non-Permit)
2. Know the Hazards of the specific space.
3. Review and follow the specific procedures for each confined space entry.
4. Understand how to use appropriate entry and rescue equipment.

Permit Required Confined Space

Confined Space Entry – Permits

Confined Space Entry Permits must be completed before any Employee enters a **Permit-Required Confined Space**. The Permit must be completed and signed by an Authorized Member of Management before entry. Permits will expire before the completion of the shift or if any pre-entry conditions change. Permits will be maintained on file for a minimum of 12 months.

Permit Required Confined Space Entry - General Rules

During all Confined Space Entries, the following Safety Rules must be strictly enforced:

- Prior to entry, all personnel should be briefed on the hazards and the entry plan should be discussed.
- Emergency responders (typically the local Fire Department) shall be notified to ensure they are prepared to make a confined space rescue should the need occur.
- Only Authorized and Trained Employees may enter a Confined Space or may act as an Attendant. Appropriate personal protective equipment (PPE) will be utilized.
- No Smoking is permitted in a Confined Space or near entrance/exit area.
- During Confined Space Entries, an Attendant must be present at all times.
- Constant visual or voice communication will be maintained between the Safety Attendant and Entrant(s) entering a Confined Space. As the Attendant cannot perform any other tasks and cannot leave the entry, typically a third person will be onsite to perform any other duties that may be needed.
- No bottom or side entry will be made or work conducted below the level any hanging material or material which could cause engulfment.
- Ensure proper retrieval system is used. Typically the entrant is secured using a tripod and lanyard/full body harness arrangement to facilitate retrieval.
- Proper lockout/tag out procedures will be followed to ensure the confined space is isolated from any energy or material sources.
- Air and Oxygen Monitoring is required before entering any Permit-Required Confined Space. Oxygen Levels in a Confined Space must be between 19.5 and 23.5 percent. Levels above or below will require consultation with the Health and Safety Program Manager to determine whether or not engineering controls/ventilation can remedy the situation or whether upgraded PPE is needed in the case of an oxygen deficient atmosphere. Additional ventilation and Oxygen Level Monitoring is required when welding is performed. The monitoring will check Oxygen Levels, Explosive Gas Levels and Carbon Monoxide Levels. Entry will not be permitted if explosive gas is detected above 10% of the Lower Explosive Limit (LEL). Any LEL reading should be evaluated for toxicity concerns and LEL concerns. All measurements will be recorded on the permit.
- To prevent injuries to others, a barricade will protect all openings to Confined Spaces when covers are removed.

Responsibilities

Management:

- Ensure proper training for confined space entrants and attendants. Note that rescue certification requires additional training which H&S employees typically do not have. The local Fire Department should be consulted prior to any confined space entry to ensure they can execute a rescue if the need arises.
- Provide proper equipment
- Ensure confined space assessments have been conducted
- Ensure all permit required confined spaces are posted
- Annually review this program and all Entry Permits

Employees:

- Follow program requirements
- Report any previously un-identified hazards associated with confined spaces

Entrants:

- All entrants must be authorized by the entry supervisor to enter permit spaces, have received the required training, used the proper equipment, and observes the entry procedures and permit. The following entrant duties are required:
- Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure.
- Properly use the equipment required for safe entry.
- Communicate with the attendant as necessary to enable the attendant to monitor the status of the entrants and to enable the attendant to alert the entrants of the need to evacuate the space if necessary.
- Alert the attendant whenever, the entrant recognizes any warning signs or symptoms of exposure to a dangerous situation, or any prohibited condition is detected.
- Exit the permit space as quickly as possible whenever; the attendant or entry supervisor gives an order to evacuate the permit space, the entrant recognized any warning signs or symptoms of exposure to a dangerous situation, the entrant detects a prohibited condition, or an evacuation alarm activated.

Entry Supervisor:

- Entry supervisors are responsible for the overall permit space entry and must coordinate all entry procedures, tests, permits, equipment and other relevant activities. The following entry supervisor duties are required:
- Know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure.
- Verifies, by checking that the appropriate entries have been made on the permit, all test specified by the permit have been conducted and that all procedures and equipment specified by the permit are in place before endorsing the permit and allowing entry to begin.

- Terminate the entry and cancel the permit when the entry is complete or there is a need for terminating the permit.
- Verify that rescue services are available and that the means for summoning them are operable.
- Remove unauthorized persons who enter or attempt to enter the space during entry operations.
- Determine whenever responsibility for a permit space entry operation is transferred and at intervals dictated by the hazards and operations performed within the space that entry operations remain consistent with the permit terms and that acceptable entry conditions are maintained.

Entry Attendants:

- At least one attendant is required outside the permit space into which entry is authorized for the duration of the entry operation. Responsibilities include:
- To know the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure.
- *To be aware of possible behavioral effects of hazard exposure on entrants.*
- To continuously maintain an accurate count of entrants in the permit space and ensures a means to accurately identify authorized entrants.
- To remain outside the permit space during entry operations until relieved by another attendant (once properly relieved, they may participate in other permit space activities, including rescue if they are properly trained and equipped).
- To communicate with entrants as necessary to monitor entrant status and alert entrants of the need to evacuate.
- To monitor activities inside and outside the space to determine if it is safe for entrants to remain in the space and orders the entrants to immediately evacuate if the attendant detects a prohibited condition, detects entrant behavioral effects of hazard exposure, detects a situation outside the space that could endanger the entrants; or if the attendant cannot effectively and safely perform all the attendant duties.
- To summon rescue and other emergency services as soon as the attendant determines the entrants need assistance to escape the permit space hazards.
- To perform non-entry rescues as specified by that rescue procedure and entry supervisor.
- Not to perform duties that might interfere with the attendants' primary duty to monitor and protect the entrants.
- To take the following action when unauthorized persons approach or enter a permit space while entry is under way.
- Warn the unauthorized persons that they must stay away from the permit space.
- Advise unauthorized persons that they must exit immediately if they have entered the space.
- Inform the authorized entrants and the entry supervisor if unauthorized persons have entered the permit space.

Hazards

- Explosive / Flammable Atmospheres
- Toxic Atmospheres
- Engulfment
- Asphyxiation
- Entrapment
- Slips & falls
- Chemical Exposure
- Electric Shock
- Thermal / Chemical Burns
- Noise & Vibration

Hazard Control - Engineering Controls

- Locked entry points
- Temporary ventilation
- Temporary Lighting

Hazard Control - Administrative Controls

- Signs
- Employee training
- Entry procedures
- Atmospheric Monitoring
- Rescue procedures
- Use of prescribed PPE

Entry Standard Operating Procedures

A Standard Operating Procedure (SOP) has been developed for each space to standardize the entry procedure. Standardized SOPs should be reviewed periodically to ensure that they are still applicable and that conditions haven't changed. The SOP outlines:

- Hazards
- Hazard Control & Abatement
- Acceptable Entry Conditions
- Means of Entry
- Entry Equipment Required
- Emergency Procedures

Contractor Entry

All work by non-company employees that involves the entry into confined spaces will follow the procedures of this program. The information of this program and specific hazards of the confined

spaces to be entered will be provided to Contractor Management prior to commencing entry or work.

Training

Training for Confined Space Entry includes:

1. Duties of Entry Supervisor, Entrant and Attendants
2. Confined Space Entry permits
3. Hazards of Confined Spaces
4. Use of Air Monitoring Equipment
5. First Aid and CPR Training
6. Emergency Action & Rescue Procedures
7. Confined Space Entry & Rescue Equipment
8. Rescue training, including entry and removal from representative spaces

Confined Space Hazards

Flammable Atmospheres

A flammable atmosphere generally arises from enriched oxygen atmospheres, vaporization of flammable liquids, byproducts of work, chemical reactions, concentrations of combustible dusts, and desorption of chemical from inner surfaces of the confined space.

An atmosphere becomes flammable when the ratio of oxygen to combustible material in the air is neither too rich nor too lean for combustion to occur. Combustible gases or vapors will accumulate when there is inadequate ventilation in areas such as a confined space. Flammable gases such as acetylene, butane, propane, hydrogen, methane, natural or manufactured gases or vapors from liquid hydrocarbons can be trapped in confined spaces, and since many gases are heavier than air, they will seek lower levels as in pits, sewers, and various types of storage tanks and vessels. In a closed top tank, it should also be noted that lighter than air gases may rise and develop a flammable concentration if trapped above the opening.

The byproducts of work procedures can generate flammable or explosive conditions within a confined space. Specific kinds of work such as spray painting can result in the release of explosive gases or vapors. Welding in a confined space is a major cause of explosions in areas that contain combustible gas.

Chemical reactions forming flammable atmospheres occur when surfaces are initially exposed to the atmosphere, or when chemicals combine to form flammable gases. This condition arises when dilute sulfuric acid reacts with iron to form hydrogen or when calcium carbide makes contact with water to form acetylene. Other examples of spontaneous chemical reactions that may produce explosions from small amounts of unstable compounds are acetylene-metal compounds, peroxides, and nitrates. In a dry state, these compounds have the potential to explode upon percussion or exposure to increased temperature. Another class of chemical reactions that form flammable atmospheres arise from deposits of pyrophoric substances (carbon, ferrous

oxide, ferrous sulfate, iron, etc.) that can be found in tanks used by the chemical and petroleum industry. These tanks containing flammable deposits will spontaneously ignite upon exposure to air.

Combustible dust concentrations are usually found during the process of loading, unloading, and conveying grain products, nitrated fertilizers, finely ground chemical products, and any other combustible material. High charges of static electricity, which rapidly accumulate during periods of relatively low humidity (below 50%), can cause certain substances to accumulate electrostatic charges of sufficient energy to produce sparks and ignite a flammable atmosphere. These sparks may also cause explosions when the right air or oxygen to dust or gas mixture is present.

Toxic Atmospheres

The substances to be regarded as toxic in a confined space can cover the entire spectrum of gases, vapors, and finely-divided airborne dust in industry. The sources of toxic atmospheres encountered may arise from the following:

The manufacturing process (for example, in producing polyvinyl chloride, hydrogen chloride is used as well as vinyl chloride monomer, which is carcinogenic).

The product stored [removing decomposed organic material from a tank can liberate toxic substances, such as hydrogen sulfide (H₂S)].

The operation performed in the confined space (for example, welding or brazing with metals capable of producing toxic fumes).

During loading, unloading, formulation, and production, mechanical and/or human error may also produce toxic gases which are not part of the planned operation.

Carbon monoxide (CO) is a hazardous gas that may build up in a confined space. This odorless, colorless gas that has approximately the same density as air is formed from incomplete combustion of organic materials such as wood, coal, gas, oil, and gasoline; it can be formed from microbial decomposition of organic matter in sewers, silos, and fermentation tanks. Carbon monoxide is an insidious toxic gas because of its poor warning properties. Early stages of CO intoxication are nausea and headache. Carbon monoxide may be fatal at 1000 ppm in air, and is considered dangerous at 200 ppm, because it forms carboxyhemoglobin in the blood which prevents the distribution of oxygen in the body.

Carbon monoxide is a relatively abundant colorless, odorless gas; therefore, any untested atmosphere must be suspect. It must also be noted that a safe reading on a combustible gas indicator does not ensure that CO is not present. Carbon monoxide must be tested for specifically. The formation of CO may result from chemical reactions or work activities; therefore fatalities due to CO poisoning are not confined to any particular industry. There have been fatal accidents in sewage treatment plants due to decomposition products and lack of ventilation in confined spaces. Another area where CO results as a product of decomposition is in the formation of silo gas in grain storage elevators. In another area, the paint industry, varnish is

manufactured by introducing the various ingredients into a kettle, and heating them in an inert atmosphere, usually town gas, which is a mixture of carbon dioxide and nitrogen.

In welding operations, oxides of nitrogen and ozone are gases of major toxicological importance, and incomplete oxidation may occur and carbon monoxide can form as a byproduct.

Another poor work practice, which has led to fatalities, is the recirculation of diesel exhaust emissions. Increased CO levels can be prevented by strict control of the ventilation and the use of catalytic converters.

Irritant (Corrosive) Atmospheres

Irritant or corrosive atmospheres can be divided into primary and secondary groups. The primary irritants exert no systemic toxic effects (effects on the entire body). Examples of primary irritants are chlorine, ozone, hydrochloric acid, hydrofluoric acid, sulfuric acid, nitrogen dioxide, ammonia, and sulfur dioxide. A secondary irritant is one that may produce systemic toxic effects in addition to surface irritation. Examples of secondary irritants include benzene, carbon tetrachloride, ethyl chloride, trichloroethane, trichloroethylene, and chloropropene. Irritant gases vary widely among all areas of industrial activity. They can be found in plastics plants, chemical plants, the petroleum industry, tanneries, refrigeration industries, paint manufacturing, and mining operations.

Prolonged exposure at irritant or corrosive concentrations in a confined space may produce little or no evidence of irritation. This may result in a general weakening of the defense reflexes from changes in sensitivity. The danger in this situation is that the worker is usually not aware of any increase in his/her exposure to toxic substances.

Asphyxiating Atmospheres

The normal atmosphere is composed approximately of 20.9% oxygen and 78.1% nitrogen, and 1% argon with small amounts of various other gases. Reduction of oxygen in a confined space may be the result of either consumption or displacement. The consumption of oxygen takes place during combustion of flammable substances, as in welding, heating, cutting, and brazing. A more subtle consumption of oxygen occurs during bacterial action, as in the fermentation process. Oxygen may also be consumed during chemical reactions as in the formation of rust on the exposed surface of the confined space (iron oxide). The number of people working in a confined space and the amount of their physical activity will also influence the oxygen consumption rate.

A second factor in oxygen deficiency is displacement by another gas. Examples of gases that are used to displace air, and therefore reduce the oxygen level are helium, argon, and nitrogen. Carbon dioxide may also be used to displace air and can occur naturally in sewers, storage bins, wells, tunnels, wine vats, and grain elevators. Aside from the natural development of these gases, or their use in the chemical process, certain gases are also used as inerting agents to displace flammable substances and retard pyrophoric reactions. Gases such as nitrogen, argon, helium, and carbon dioxide, are frequently referred to as non-toxic inert gases but have claimed many

lives. The use of nitrogen to inert a confined space has claimed more lives than carbon dioxide. The total displacement of oxygen by nitrogen will cause immediate collapse and death. Carbon dioxide and argon, with specific gravities greater than air, may lie in a tank or manhole for hours or days after opening. Since these gases are colorless and odorless, they pose an immediate hazard to health unless appropriate oxygen measurements and ventilation are adequately carried out.

Oxygen deprivation is one form of asphyxiation. While it is desirable to maintain the atmospheric oxygen level at 21% by volume, the body can tolerate deviation from this ideal. When the oxygen level falls to 17%, the first sign of hypoxia is a deterioration to night vision which is not noticeable until a normal oxygen concentration is restored. Physiologic effects are increased breathing volume and accelerated heartbeat. Between 14-16% physiologic effects are increased breathing volume, accelerated heartbeat, very poor muscular coordination, rapid fatigue, and intermittent respiration. Between 6-10% the effects are nausea, vomiting, inability to perform, and unconsciousness. Less than 6%, spasmodic breathing, convulsive movements, and death in minutes.

Mechanical Hazards

If activation of electrical or mechanical equipment would cause injury, each piece of equipment should be manually isolated to prevent inadvertent activation before workers enter or while they work in a confined space. The interplay of hazards associated with a confined space, such as the potential of flammable vapors or gases being present, and the build-up of static charge due to mechanical cleaning, such as abrasive blasting, all influence the precautions which must be taken.

To prevent vapor leaks, flashbacks, and other hazards, workers should completely isolate the space. To completely isolate a confined space, the closing of valves is not sufficient. All pipes must be physically disconnected or isolation blanks bolted in place. Other special precautions must be taken in cases where flammable liquids or vapors may re-contaminate the confined space. The pipes blanked or disconnected should be inspected and tested for leakage to check the effectiveness of the procedure. Other areas of concern are steam valves, pressure lines, and chemical transfer pipes. A less apparent hazard is the space referred to as a void, such as double walled vessels, which must be given special consideration in blanking off and inerting.

Thermal Effects

Four factors influence the interchange of heat between people and their environment. They are (1) air temperature, (2) air velocity, (3) moisture contained in the air, and (4) radiant heat. Because of the nature and design of most confined spaces, moisture content and radiant heat are difficult to control. As the body temperature rises progressively, workers will continue to function until the body temperature reaches approximately 102°F. When this body temperature is exceeded, the workers are less efficient, and are prone to heat exhaustion, heat cramps, or heat stroke. In a cold environment, certain physiologic mechanisms come into play, which tend to limit heat loss and increase heat production. The most severe strain in cold conditions is chilling

of the extremities so that activity is restricted. Special precautions must be taken in cold environments to prevent frostbite, trench foot, and general hypothermia.

Protective insulated clothing for both hot and cold environments will add additional bulk to the worker and must be considered in allowing for movement in the confined space and exit time. Therefore, air temperature of the environment becomes an important consideration when evaluating working conditions in confined spaces.

Noise

Noise problems are usually intensified in confined spaces because the interior tends to cause sound to reverberate and thus expose the worker to higher sound levels than those found in an open environment. This intensified noise increases the risk of hearing damage to workers which could result in temporary or permanent loss of hearing. Noise in a confined space which may not be intense enough to cause hearing damage may still disrupt verbal communication with the emergency standby person on the exterior of the confined space. If the workers inside are not able to hear commands or danger signals due to excessive noise, the probability of severe accidents can increase.

Vibration

Whole body vibration may affect multiple body parts and organs depending upon the vibration characteristics. Segmental vibration, unlike whole body vibration, appears to be more localized in creating injury to the fingers and hands of workers using tools, such as pneumatic hammers, rotary grinders or other hand tools which cause vibration.

Other Hazards

Some physical hazards cannot be eliminated because of the nature of the confined space or the work to be performed. These hazards include such items as scaffolding, surface residues, and structural hazards. The use of scaffolding in confined spaces has contributed to many accidents caused by workers or materials falling, improper use of guard rails, and lack of maintenance to insure worker safety. The choice of material used for scaffolding depends upon the type of work to be performed, the calculated weight to be supported, and the surface on which the scaffolding is placed, and the substance previously stored in the confined space.

Surface residues in confined spaces can increase the already hazardous conditions of electrical shock, reaction of incompatible materials, liberation of toxic substances, and bodily injury due to slips and falls. Without protective clothing, additional hazards to health may arise due to surface residues.

Structural hazards within a confined space such as baffles in horizontal tanks, trays in vertical towers, bends in tunnels, overhead structural members, or scaffolding installed for maintenance constitute physical hazards, which are exacerbated by the physical surroundings. In dealing with structural hazards, workers must review and enforce safety precautions to assure safety.

9.0 CONTROL OF HAZARDOUS ENERGY PROGRAM

Purpose

The purpose of the Lock-out/Tag-Out Program is the control of hazardous energy that could harm workers. This program establishes the requirements for isolation of both kinetic and potential electrical, chemical, thermal, hydraulic and pneumatic and gravitational energy prior to equipment repair, adjustment or removal. Reference: OSHA Standard 29 CFR 1910. 147, (The Control of Hazardous Energy).

Encountering hazardous energy is not anticipated during completion of this Task Order.

Definitions

Authorized (Qualified) Employees: are the only ones certified to lock and tag-out equipment or machinery. Whether an employee is considered to be qualified will depend upon various circumstances in the workplace. It is likely for an individual to be considered "qualified" with regard to certain equipment in the workplace, but "unqualified" as to other equipment. An employee who is undergoing on-the-job training and who, in the course of such training, has demonstrated an ability to perform duties safely at his or her level of training and who is under the direct supervision of a qualified person, is considered to be "qualified" for the performance of those duties.

Affected Employees: are those employees who operate machinery or equipment upon which lock-out or tagging out is required under this program. Training of these individuals will be less stringent in that it will include the purpose and use of the tag-out and lock-out procedures.

Other Employees: are identified as those that do not fall into the authorized, affected or qualified employee category. Essentially, it will include all other employees. These employees will be provided instruction in what the program is and not to touch any machine or equipment when they see that it has been locked-out or tagged-out.

Training

Authorized Employees Training

All Maintenance Employees, Department Supervisors and Janitorial employees will be trained to use the Lock-Out/Tag-Out Procedures. The training will be conducted by the Maintenance Supervisor or Safety Coordinator at time of initial hire. Retraining shall be held at least annually.

The training will consist of the following:

1. Review of General Procedures;
2. Review of Specific Procedures for machinery, equipment and processes;
3. Location and use of Specific Procedures, and
4. Procedures when questions arise.

Affected Employee Training

1. Only trained and authorized Employees will repair, replace or adjust machinery, equipment or processes;
2. Affected Employees may not remove Locks, locking devices or tags from machinery; equipment or circuits, and
3. Purpose and use of the lock-out procedures.

Other Employee Training

1. Only trained and authorized Employees will repair, replace or adjust machinery or Equipment, and
2. Other Employees may not remove Locks, locking devices or tags from machinery, equipment or circuits.

Preparation for Lock-Out and Tag-Out Procedures

A Lock-out/Tag-out survey has been conducted to locate and identify all energy sources to verify which switches or valves supply energy to machinery and equipment. Dual or redundant controls have been removed.

A Tag-out Schedule has been developed for each piece of equipment and machinery. This schedule describes the energy sources, location of disconnects, type of disconnect, special hazards and special safety procedures. The schedule will be reviewed each time to ensure employees properly lock-out and tag-out equipment and machinery. If a Tag-out Schedule does not exist for a particular piece of equipment, machinery and process, one must be developed prior to conducting a Lock-out/Tag-out. As repairs and/or renovations of existing electrical systems are made, standardized controls will be used.

Routine Maintenance & Machine Adjustments

Lock-Out and Tag-Out procedures are not required if equipment must be operating for proper adjustment. This rare exception may be used only by trained and authorized Employees when specific procedures have been developed to safely avoid hazards with proper training. All consideration shall be made to prevent the need for an employee to break the plane of a normally guarded area of the equipment by use of tools and other devices.

Locks, Hasps and Tags

All Qualified Maintenance Personnel will be assigned a lock with one key, hasp and tag. All locks will be keyed differently, except when a specific individual issues a series of locks for complex lock-out/tag-out tasks. In some cases, more than one lock, hasp and tag are needed to completely de-energize equipment and machinery. Additional locks may be checked out from the Department of Maintenance Supervisor on a shift-by-shift basis. All locks and hasps shall be uniquely identifiable to a specific employee.

SOP: General Lock-Out/Tag-Out Procedures

Before working on, repairing, adjusting or replacing machinery and equipment, the following procedures will be utilized to place the machinery and equipment in a neutral or zero mechanical state.

Preparation for Shutdown

Before authorized or affected employees turn off a machine or piece of equipment, the authorized employee will have knowledge of the type and magnitude of the energy, the hazards of the energy to be controlled, and the means to control the energy.

Notify all affected Employees that the machinery, equipment or process will be out of service.

Machine or Equipment Shutdown

The machine or equipment will be turned or shut down using the specific procedures for that specific machine. An orderly shutdown will be utilized to avoid any additional or increased hazards to employees as a result of equipment de-energization.

If the machinery, equipment or process is in operation, follow normal stopping procedures (depress stop button, open toggle switch, etc.).

Move switch or panel arms to "Off" or "Open" positions and close all valves or other energy isolating devices so that the energy source(s) is disconnected or isolated from the machinery or equipment.

Machine or Equipment Isolation

All energy control devices that are needed to control the energy to the machine or equipment will be physically located and operated in such a manner as to isolate the machine or equipment from the energy source.

Lock-Out or Tag-Out Device Application

Lock-out or tag-out devices will be affixed to energy isolating devices by authorized employees. Lock-out devices will be affixed in a manner that will hold the energy isolating devices from the "safe" or "off" position.

Where tag-out devices are used they will be affixed in such a manner that will clearly state that the operation or the movement of energy isolating devices from the "safe" or "off" positions is prohibited.

The tag-out devices will be attached to the same point a lock would be attached. If the tag cannot be affixed at that point, the tag will be located as close as possible to the device in a position that will be immediately obvious to anyone attempting to operate the device.

Lock and tag-out all energy devices by use of hasps, chains and valve covers with assigned individual locks.

Stored Energy

Following the application of the lock-out or tag-out devices to the energy isolating devices, all potential or residual energy will be relieved, disconnected, restrained, and otherwise rendered safe.

Where the re-accumulation of stored energy to a hazardous energy level is possible, verification of isolation will be continued until the maintenance or servicing is complete.

Release stored energy (capacitors, springs, elevated members, rotating fly wheels, and hydraulic/air/gas/steam systems) must be relieved or restrained by grounding, repositioning, blocking and/or bleeding the system.

Verification of Isolation

Prior to starting work on machines or equipment that have been locked or tagged-out, the authorized employees will verify that isolation or de-energization of the machine or equipment have been accomplished.

After assuring that no Employee will be placed in danger, test all lock and tag-outs by following the normal start up procedures (depress start button, etc.).

Caution: After test, place controls in neutral position.

Extended Lock-Out/Tag-Out

Should the shift change before the machinery or equipment can be restored to service, the lock and tag-out must remain. If the task is reassigned to the next shift, those Employees must lock and tag-out before the previous shift may remove their lock and tag.

SOP: Release from Lock-Out/Tag-Out

Before lock-out or tag-out devices are removed and the energy restored to the machine or equipment, the following actions will be taken:

1. The work area will be thoroughly inspected to ensure that nonessential items have been removed and that machine or equipment components are operational.
2. The work area will be checked to ensure that all employees have been safely positioned or removed. Before the lock-out or tag-out devices are removed, the affected employees will be notified that the lock-out or tag-out devices are being removed.
3. Each lock-out or tag-out device will be removed from each energy isolating device by the employee who applied the device.

SOP: Lock-Out/Tag-Out Procedure: Electrical Plug-Type Equipment

This procedure covers all Electrical Plug-Type Equipment such as Battery Chargers, some Product Pumps, Office Equipment, Powered Hand Tools, Powered Bench Tools, Lathes, Fans, etc.

When working on, repairing, or adjusting the above equipment, the following procedures must be utilized to prevent accidental or sudden startup:

1. Unplug Electrical Equipment from wall socket or in-line socket;
2. Attach "Do Not Operate" Tag and Plug Box & Lock on end of power cord. An exception is granted to not lock & tag the plug if the cord & plug remain in the exclusive control of the Employee working on, adjusting or inspecting the equipment;
3. Test Equipment to assure power source has been removed by depressing the "Start" or "On" Switch;
4. Perform required operations;
5. Replace all guards removed;
6. Remove Lock & Plug Box and Tag, and
7. Inspect power cord and socket before plugging equipment into power source. Any defects must be repaired before placing the equipment back in service.

NOTE: Occasionally used equipment may be unplugged from power source when not in use.

SOP: Lock-Out/Tag-Out Procedures Involving Multiple Employees

In the preceding SOPs, if more than one Employee is assigned to a task requiring a lock and tag-out, each must also place his or her own lock and tag on the energy isolating device(s).

SOP: Management's Removal of Lock-Out/Tag-Out

Only the Employee that locks and tags out machinery, equipment or processes may remove his/her lock and tag. However, should the Employee leave the facility before removing his/her locks and tags, the Maintenance Manager may remove them. The Maintenance Manager must be assured that all tools have been removed, all guards have been replaced and all Employees are free from any hazard before the lock and tag are removed and the machinery, equipment or process is returned to service. Notification of the employee who placed the lock is required prior to lock removal.

Contractors

Contractors, working on project sites and equipment must use this Lock-Out/Tag-Out procedure while servicing or maintaining equipment, machinery or processes.

10.0 FALL PROTECTION PROGRAM

Purpose

Slips, trips, and falls constitute the majority of general industry accidents. They cause 15% of all accidental deaths, and are second only to motor vehicles as a cause of fatalities. Active participation by management, supervisors and employees is necessary to prevent hazardous conditions that could result in slips, trips or falls.

Working at heights is not anticipated during completion of this Task Order.

Responsibilities

Management

1. Conduct routine inspections to ensure all walking and working surfaces are free from slip, trip and fall hazards.
2. Conduct training for employees who use ladders, scaffolds or other elevated platforms
3. Conduct training in use and inspection of fall prevention & arrest equipment
4. Ensure proper ladders are used for specific tasks
5. Provide adequate fall prevention & arrest equipment

Employees

1. Maintain work areas free from slip, trip & fall hazards
2. Correct or immediately report slip, trip and fall hazards
3. Use proper ladders for assigned tasks

Hazard Control

Engineering Controls

1. Proper construction of elevated locations
2. Use of hand, knee and toe rails where required
3. Proper design of fixed ladders & stairs
4. Adequate lighting in all areas

Administrative Controls

1. Training for all employees who work at elevated location
2. Routine inspections of ladders, stairs, walking and working surfaces
3. Following Housekeeping Program requirements
4. Immediate cleanup of material spills

GENERAL REQUIREMENTS:

Housekeeping

Simple Housekeeping methods can prevent slip-trip-fall hazards:

1. All work areas, passageways, storerooms, and service rooms shall be kept clean and orderly and in a sanitary condition.
2. The floor of every area shall be maintained in a clean and, so far as possible, a dry condition. Where wet processes are used, drainage shall be maintained and gratings, mats, or raised platforms shall be provided.
3. Every floor, work area and passageway shall be kept free from protruding nails, splinters, holes, or loose boards.

Aisles and Passageways

1. Aisles and passageways shall be kept clear and in good repair with no obstruction across or in aisles that could create a hazard.
2. Permanent aisles and passageways shall be appropriately marked.
3. Where mechanical handling equipment is used, aisles shall be sufficiently wide. Improper aisle widths coupled with poor housekeeping and vehicle traffic can cause injury to employees, damage the equipment and material, and can limit egress in emergencies.

Floor Loading Protection

Load rating limits shall be marked on plates and conspicuously posted. It shall be unlawful to place, or cause, or permit to be placed, on any floor or roof of a building or other structure, a load greater than that for which such floor or roof is approved.

Guarding Floor & Wall Openings

Floor openings and holes, wall openings and holes, and the open sides of platforms may create hazards. People may fall through the openings or over the sides to the level below. Objects, such as tools or parts, may fall through the holes and strike people or damage machinery on lower levels.

Protection for Floor Openings

Standard railings shall be provided on all exposed sides of a stairway opening, except at the stairway entrance. For infrequently used stairways, where traffic across the opening prevents the use of a fixed standard railing, the guard shall consist of a hinged floor opening cover of standard strength and construction along with removable standard railings on all exposed sides, except at the stairway entrance.

A "standard railing" consists of top rail, mid rail, and posts, and shall have a vertical height of 42 inches nominal from the upper surface of top rail to floor, platform, runway, or ramp level.

Nominal height of mid rail is 21 inches. A "standard toeboard" is 4 inches nominal in vertical height, with not more than 1/8-inch clearance above floor level.

Floor openings may be covered rather than guarded with rails. When the floor opening cover is removed, a temporary guardrail shall be in place, or an attendant shall be stationed at the opening to warn personnel.

Every floor hole into which persons can accidentally walk shall be guarded by either:

1. A standard railing with toeboard, or
2. A floor hole cover of standard strength and construction.

While the cover is not in place, the floor hole shall be constantly attended by someone or shall be protected by a removable standard railing.

Protection of Open-Sided Floors, Platforms, and Runways

Every open-sided floor or platform 4 feet or more above adjacent floor or ground level shall be guarded by a standard railing on all open sides, except where there is an entrance to a ramp, stairway, or fixed ladder. The railing shall be provided with a toeboard wherever, beneath the open sides:

1. Persons can pass,
2. There is moving machinery, or
3. There is equipment with which falling materials could create a hazard.

Every runway shall be guarded by a standard railing, or the equivalent, on all sides 4 feet or more above floor or ground level. Wherever tools, machine parts, or materials are likely to be used on the runway, a toeboard shall also be provided on each exposed side.

Stairway Railings and Guards

Every flight of stairs with four or more risers shall have standard stair railings or standard handrails as specified below. Stair width is measured clear of all obstructions except handrails.

1. On stairways less than 44 inches wide having both sides enclosed, at least one handrail shall be affixed, preferably on the right side descending.
2. On stairways less than 44 inches wide with one open side, at least one stair rail shall be affixed on the open side.
3. On stairways less than 44 inches wide having both sides open, two stair rails shall be provided, one for each side.
4. On stairways more than 44 inches wide, but less than 88 inches, one handrail shall be provided on each enclosed side and one stair rail on each open side.
5. On stairways 88 inches or more in width, one handrail shall be provided on each enclosed side, one stair rail on each open side, and one intermediate stair rail placed approximately in the middle of the stairs.

A "standard stair railing" (stair rail) shall be of construction similar to a standard railing, but the vertical height shall be not more than 34 inches nor less than 30 inches from the upper surface of the top rail to the surface of the tread in line with the face of the riser at the forward edge of the tread.

Fixed Industrial Stairs

Fixed Industrial Stairs shall be provided for access to and from places of work where operations necessitate regular travel between levels. Requirements include:

1. Fixed industrial stairs shall be strong enough to carry five times the normal anticipated live load.
2. At the very minimum, any fixed stairway shall be able to carry safely a moving concentrated load of 1000 pounds.
3. All fixed stairways shall have a minimum width of 22 inches.
4. Fixed stairs shall be installed at angles to the horizontal of between 30' and 50'.
5. Vertical clearance above any stair tread to an overhead obstruction shall be at least 7 feet measured from the leading edge of the tread.

Portable Ladders

The chief hazard when using a ladder is falling. A poorly designed, maintained, or improperly used ladder may collapse under the load placed upon it and cause the employee to fall. A ladder is an appliance consisting of two side rails joined at regular intervals by crosspieces on which a person may step to ascend or descend. The various types of portable ladders include:

1. Stepladder -A self-supporting portable ladder, non-adjustable in length, having flat steps and hinged back.
2. Single Ladder -A non-self-supporting portable ladder, nonadjustable in length, consisting of but one section. Its size is designed by overall length of the side rail.
3. Extension Ladder -A non-self-supporting portable ladder adjustable in length

Portable Ladder Requirements:

1. Portable stepladders longer than 20 feet shall not be used.
2. Stepladders shall be equipped with a metal spreader or locking device of sufficient size and strength to securely hold the front and back sections in open position.
3. Single ladders longer than 30 feet shall not be used.
4. Extension ladders longer than 60 feet shall not be used.
5. Ladders shall be maintained in good condition at all times.
6. Ladders shall be inspected frequently and those which have developed defects shall be withdrawn from service for repair or destruction and tagged or marked as "Dangerous, Do Not Use".

Proper use of ladders is essential in preventing accidents. Even a good ladder can be a serious safety hazard when used by workers in a dangerous way.

Portable Ladder Safety Precautions:

1. Ladders shall be placed with a secure footing, or they shall be lashed, or held in position.
2. Ladders used to gain access to a roof or other area shall extend at least 3 feet above the point of support.
3. The foot of a ladder shall, where possible, be used at such a pitch that the horizontal distance from the top support to the foot of the ladder is one-quarter of the working length of the ladder (the length along the ladder between the foot and the support).
4. The worker shall always face the ladder when climbing up or down.
5. Short ladders shall not be spliced together to make long ladders.
6. Ladders shall never be used in the horizontal position as scaffolds or work platforms.
7. The top of a regular stepladder shall not be used as a step.
8. Use both hands when climbing and descending ladders.
9. Metal ladders shall never be used near electrical equipment.

Fixed Ladders

A fixed ladder is a ladder permanently attached to a structure, building or equipment. A point to remember is that fixed ladders, with a length of more than 20 feet to a maximum unbroken length of 30 feet shall be equipped with cages or a ladder safety device. A "cage" is a guard that is fastened to the side rails of the fixed ladder or to the structure to encircle the climbing space of the ladder for the safety of the person who must climb the ladder. Cages shall extend a minimum of 42 inches above the top of a landing, unless other acceptable protection is provided. Cages shall extend down the ladder to a point not less than 7 feet nor more than 8 feet above the base of the ladder.

Scaffolding Safety

1. The footing or anchorage for scaffolds shall be sound, rigid and capable of carrying the maximum intended load without settling or displacement. Unstable objects, such as barrels, boxes, loose brick, or concrete blocks shall not be used to support scaffolds or planks.
2. Scaffolds and their components shall be capable of supporting at least fourtimes the maximum intended load.
3. Scaffolds shall be maintained in a safe condition and shall not be altered or moved horizontally while they are in use or occupied.
4. Damaged or weakened scaffolds shall be immediately repaired and shall not be used until repairs have been completed.
5. A safe means must be provided to gain access to the working platform level through the use of a ladder, ramp, etc.
6. Overhead protection must be provided for personnel on a scaffold exposed to overhead hazards.

7. Guardrails, midrails, and toeboards must be installed on all open sides and ends of platforms more than 10 feet above the ground or floor. Wire mesh must be installed between the toeboard and the guardrail along the entire opening, where persons are required to work or pass under the scaffolds.
8. Employees shall not work on scaffolds during storms or high winds or when covered with ice or snow.
9. As noted earlier, there are a number of scaffold types, and **29 CFR 1910.28** should be reviewed carefully for special requirements that apply to each type.

Manually-Propelled Mobile Ladder Stands and Scaffolds (Towers)

1. All exposed surfaces of mobile ladder stands and scaffolds shall be free from sharp edges, burrs, or other safety hazards.
2. The maximum work height shall not exceed four times the minimum base dimension unless outriggers, guys or braces are added to provide stability.
3. This standard requires guardrails and toeboards for work levels **10** feet or more above the ground or floor.

Other Working Surfaces

Portable dockboards (bridge plates) shall be secured in position, either by being anchored or equipped with devices which will prevent their slipping. Movement of the dockboard during material handling operations has resulted in forklifts overturning, or falling off the dock, often with serious injury or death to the driver and damage to equipment and material.

1. Handholds shall be provided on portable dockboards to permit safe handling when the dockboard must be repositioned or relocated.
2. Portable dockboards shall be inspected prior to use.
3. When not in use, portable dockboards will be stored in a manner to prevent damage

11.0 TOOL SAFETY PROGRAM

Purpose

Use of tools makes many tasks easier. However, the same tools that assist us can, if improperly used or maintained, can create significant hazards in our work areas. Employees who use tools must be properly trained to use, adjust, store and maintain tools properly. This program covers hand, electrical, pneumatic, powder driven and hydraulic tool safety.

Responsibility

Management

- Provide correct tools for assigned tasks
- Ensure tools are maintained and stored safely
- Provide employee training
- Provide for equipment repair

Employees

- Follow proper tool safety guidelines
- Report tool deficiencies and malfunctions
- Properly store tools when work is completed

Hazard Control

Engineering

- Properly designed tools
- Guards and safety devices

Administrative

- Tool sharpening program
- Use of PPE
- Control of tool issue
- Employee training
- Controlled access to equipment and tool areas

General Safety Precautions

Employees who use hand and power tools and who are exposed to the hazards of falling, flying, abrasive and splashing objects, or exposed to harmful dusts, fumes, mists, vapors, or gases must be provided with the particular personal equipment necessary to protect them from the hazard.

All hazards involved in the use of tools can be prevented by following five basic safety rules:

1. Keep all tools in good condition with regular maintenance.
2. Use the right tool for the job.
3. Examine each tool for damage before use.
4. Operate according to the manufacturer's instructions.
5. Provide and use the proper protective equipment.

Hand Tools

Hand tools are non-powered. They include anything from axes to wrenches. The greatest hazards posed by hand tools result from misuse and improper maintenance. Some examples:

- Using a screwdriver as a chisel may cause the tip of the screwdriver to break and fly, hitting the user or other employees.
- If a wooden handle on a tool such as a hammer or an axe is loose, splintered, or cracked, the head of the tool may fly off and strike the user or another worker.
- A wrench must not be used if its jaws are sprung, because it might slip.
- Impact tools such as chisels, wedges, or drift pins are unsafe if they have mushroomed heads. The heads might shatter on impact, sending sharp fragments flying.
- Appropriate personal protective equipment, e.g., safety goggles, gloves, etc., should be worn due to hazards that may be encountered while using portable power tools and hand tools.
- Floors shall be kept as clean and dry as possible to prevent accidental slips with or around dangerous hand tools.
- Around flammable substances, sparks produced by iron and steel hand tools can be a dangerous ignition source. Where this hazard exists, spark-resistant tools made from brass, plastic, aluminum, or wood will provide for safety.

Power Tool Precautions

Power tools can be hazardous when improperly used. There are several types of power tools, based on the power source they use: electric, pneumatic, liquid fuel, hydraulic, and powder-actuated.

The following general precautions should be observed by power tool users:

- Never carry a tool by the cord or hose.
- Never yank the cord or the hose to disconnect it from the receptacle.
- Keep cords and hoses away from heat, oil, and sharp edges.
- Disconnect tools when not in use, before servicing, and when changing accessories such as blades, bits and cutters.
- All observers should be kept at a safe distance away from the work area.

- Secure work with clamps or a vise, freeing both hands to operate the tool
- Avoid accidental starting. The worker should not hold a finger on the switch button while carrying a plugged-in tool.
- Tools should be maintained with care. They should be kept sharp and clean for the best performance. Follow instructions in the user's manual for lubricating and changing accessories.
- Be sure to keep good footing and maintain good balance.
- The proper apparel should be worn. Loose clothing, ties, or jewelry can become caught in moving parts.
- All portable electric tools that are damaged shall be removed from use and tagged "Do Not Use."

Guards

Hazardous moving parts of a power tool need to be safeguarded. For example, belts, gears, shafts, pulleys, sprockets, spindles, drums, fly wheels, chains, or other reciprocating, rotating, or moving parts of equipment must be guarded. Guards, as necessary, should be provided to protect the operator and others from the following:

- point of operation;
- in-running nip points;
- rotating parts, and
- flying chips and sparks.

Safety guards must never be removed when a tool is being used. For example, portable circular saws must be equipped with guards. An upper guard must cover the entire blade of the saw. A retractable lower guard must cover the teeth of the saw, except when it makes contact with the work material. The lower guard must automatically return to the covering position when the tool is withdrawn from the work.

Safety Switches

The following hand-held powered tools are to be equipped with a momentary contact "on-off" control switch: drills, tappers, fastener drivers, horizontal, vertical and angle grinders with wheels larger than 2 inches in diameter, disc and belt sanders, reciprocating saws, saber saws, and other similar tools. These tools also may be equipped with a lock-on control provided that turn-off can be accomplished by a single motion of the same finger or fingers that turn it on.

The following hand-held powered tools may be equipped with only a positive "on-off" control switch: platen sanders, disc sanders with discs 2 inches or less in diameter; grinders with wheels 2 inches or less in diameter; routers, planers, laminate trimmers, nibblers, shears, scroll saws and jigsaws with blade shanks 1/2-inch wide or less.

Other hand-held powered tools such as circular saws having a blade diameter greater than 2 inches, chain saws, and percussion tools without positive accessory holding means must be equipped with a constant pressure switch that will shut off the power when the pressure is released.

Electrical Safety

Among the chief hazards of electric-powered tools are burns and slight shocks which can lead to injuries or even heart failure. Under certain conditions, even a small amount of current can result in severe injury and eventual death. A shock also can cause the user to fall off a ladder or other elevated work surface.

To protect the user from shock, tools must either have a three-wire cord with ground and be grounded, be double insulated, or be powered by a low-voltage isolation transformer. Three-wire cords contain two current-carrying conductors and a grounding conductor. One end of the grounding conductor connects to the tool's metal housing. The other end is grounded through a prong on the plug. Anytime an adapter is used to accommodate a two-hole receptacle, the adapter wire must be attached to a known ground. The third prong should never be removed from the plug.

Double insulation is more convenient. The user and the tools are protected in two ways: by normal insulation on the wires inside, and by a housing that cannot conduct electricity to the operator in the event of a malfunction.

Electric Power Tool General Safety Practices:

- Electric tools should be operated within their design limitations.
- Gloves and safety footwear are recommended during use of electric tools.
- When not in use, tools should be stored in a dry place.
- Electric tools should not be used in damp or wet locations.
- Work areas should be well lighted.

Powered Abrasive Wheel Tools

Powered abrasive grinding, cutting, polishing, and wire buffing wheels create special safety problems because they may throw off flying fragments. Before an abrasive wheel is mounted, it should be inspected closely and sound- or ring-tested to be sure that it is free from cracks or defects. To test, wheels should be tapped gently with a light non-metallic instrument. If they sound cracked or dead, they could fly apart in operation and so must not be used. A sound and undamaged wheel will give a clear metallic tone or "ring." To prevent the wheel from cracking, the user should be sure it fits freely on the spindle. The spindle nut must be tightened enough to hold the wheel in place, without distorting the flange. Follow the manufacturer's recommendations. Care must be taken to assure that the spindle wheel will not exceed the abrasive wheel specifications. Due to the possibility of a wheel disintegrating (exploding) during start-up, the employee should never stand directly in front of the wheel as it accelerates to full operating speed. Portable grinding tools need to be

equipped with safety guards to protect workers not only from the moving wheel surface, but also from flying fragments in case of breakage.

Powered Grinder Safety Precautions:

- Always use eye protection.
- Turn off the power when not in use.
- Never clamp a hand-held grinder in a vise.

Pneumatic Tools

Pneumatic tools are powered by compressed air and include chippers, drills, hammers, and sanders. There are several dangers encountered in the use of pneumatic tools. The main one is the danger of getting hit by one of the tool's attachments or by some kind of fastener the worker is using with the tool. Eye protection is required and face protection is recommended for employees working with pneumatic tools. Working with noisy tools such as jackhammers requires proper, effective use of hearing protection. When using pneumatic tools, employees are to check to see that they are fastened securely to the hose to prevent them from becoming disconnected. A short wire or positive locking device attaching the air hose to the tool will serve as an added safeguard. A safety clip or retainer must be installed to prevent attachments, such as chisels on a chipping hammer, from being unintentionally shot from the barrel. Screens must be set up to protect nearby workers from being struck by flying fragments around chippers, riveting guns, staplers, or air drills. Compressed air guns should never be pointed toward anyone. Users should never "dead-end" it against themselves or anyone else.

Powder-Actuated Tools

Powder-actuated tools operate like a loaded gun and should be treated with the same respect and precautions. In fact, they are so dangerous that they must be operated only by specially trained employees.

Powder-Actuated Tool Safety:

- These tools should not be used in an explosive or flammable atmosphere.
- Before using the tool, the worker should inspect it to determine that it is clean, that all moving parts operate freely, and that the barrel is free from obstructions.
- The tool should never be pointed at anybody.
- The tool should not be loaded unless it is to be used immediately.
- A loaded tool should not be left unattended, especially where it would be available to unauthorized persons.
- Hands should be kept clear of the barrel end.

To prevent the tool from firing accidentally, two separate motions are required for firing: one to bring the tool into position, and another to pull the trigger. The tools must not be able to operate until they are pressed against the work surface with a force of at least 5 pounds greater than the total weight of the tool.

If a powder-actuated tool misfires, the employee should wait at least 30 seconds, then try firing it again. If it still will not fire, the user should wait another 30 seconds so that the faulty cartridge is less likely to explode, than carefully remove the load. The bad cartridge should be put in water. Suitable eye and face protection are essential when using a powder-actuated tool.

The muzzle end of the tool must have a protective shield or guard centered perpendicularly on the barrel to confine any flying fragments or particles that might otherwise create a hazard when the tool is fired. The tool must be designed so that it will not fire unless it has this kind of safety device.

All powder-actuated tools must be designed for varying powder charges so that the user can select a powder level necessary to do the work without excessive force.

If the tool develops a defect during use it should be tagged and taken out of service immediately until it is properly repaired.

Powder-Actuated Tool Fasteners

When using powder-actuated tools to apply fasteners, there are some precautions to consider. Fasteners must not be fired into material that would let them pass through to the other side. The fastener must not be driven into materials like brick or concrete any closer than 3 inches to an edge or corner. In steel, the fastener must not come any closer than one-half inch from a corner or edge. Fasteners must not be driven into very hard or brittle materials which might chip or splatter, or make the fastener ricochet.

An alignment guide must be used when shooting a fastener into an existing hole. A fastener must not be driven into a spalled area caused by an unsatisfactory fastening.

Hydraulic Power Tools

The fluid used in hydraulic power tools must be an approved fire-resistant fluid and must retain its operating characteristics at the most extreme temperatures to which it will be exposed. The manufacturer's recommended safe operating pressure for hoses, valves, pipes, filters, and other fittings must not be exceeded.

Jacks

All jacks - lever and ratchet jacks, screw jacks, and hydraulic jacks - must have a device that stops them from jacking up too high. Also, the manufacturer's load limit must be permanently marked in a prominent place on the jack and should not be exceeded.

A jack should never be used to support a lifted load. Once the load has been lifted, it must immediately be blocked up.

Use wooden blocking under the base if necessary to make the jack level and secure. If the lift surface is metal, place a 1-inch-thick hardwood block or equivalent between it and the metal jack

head to reduce the danger of slippage.

To set up a jack, make certain of the following:

- the base rests on a firm level surface,
- the jack is correctly centered,
- the jack head bears against a level surface, and
- the lift force is applied evenly.

Proper maintenance of jacks is essential for safety. All jacks must be inspected before each use and lubricated regularly. If a jack is subjected to an abnormal load or shock, it should be thoroughly examined to make sure it has not been damaged.

Hydraulic jacks exposed to freezing temperatures must be filled with an adequate antifreeze liquid.

FIGURES

FIGURE 1 – SITE LOCATION MAP
NSF INDIAN HEAD
INDIAN HEAD, MARYLAND

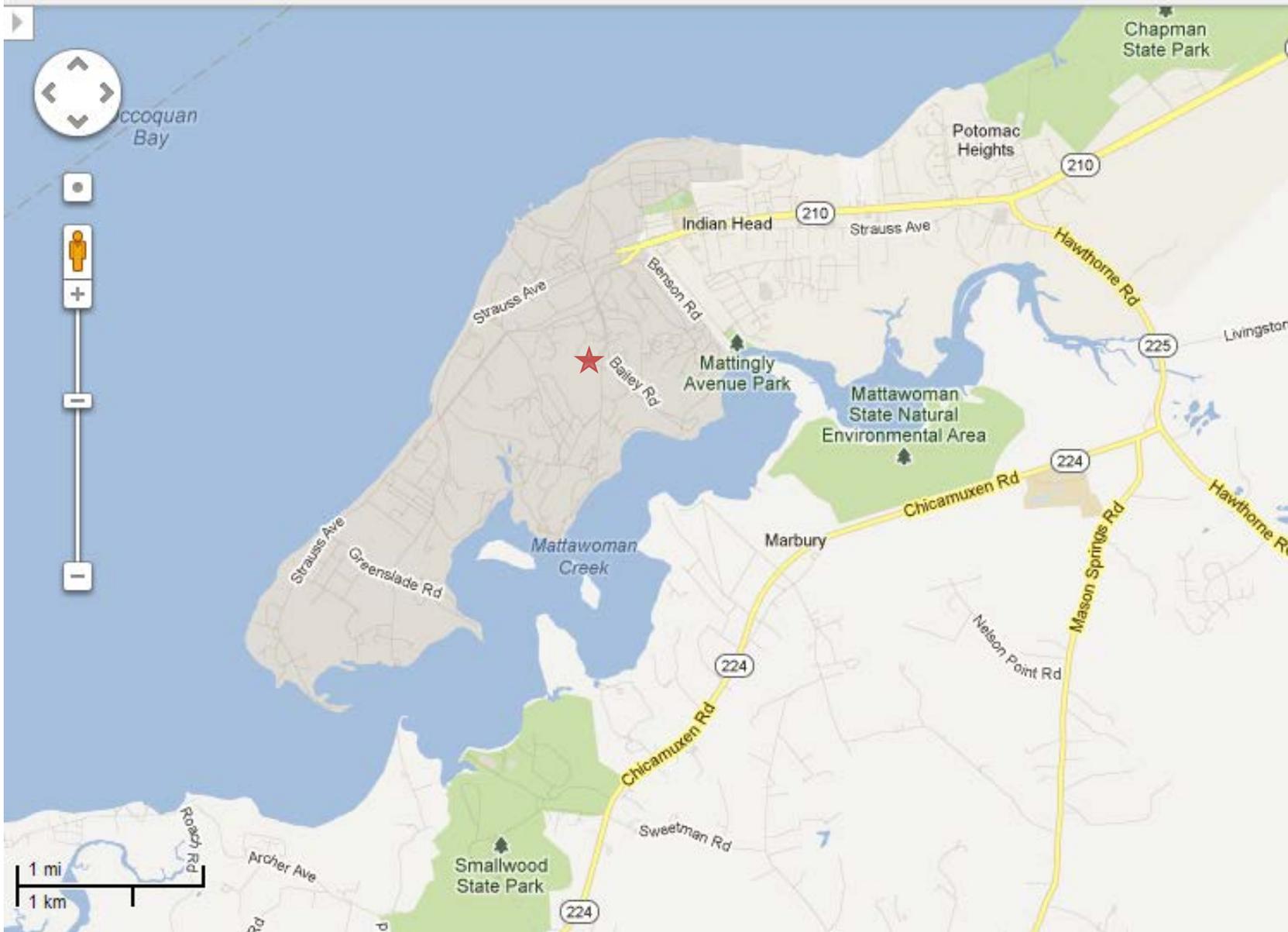


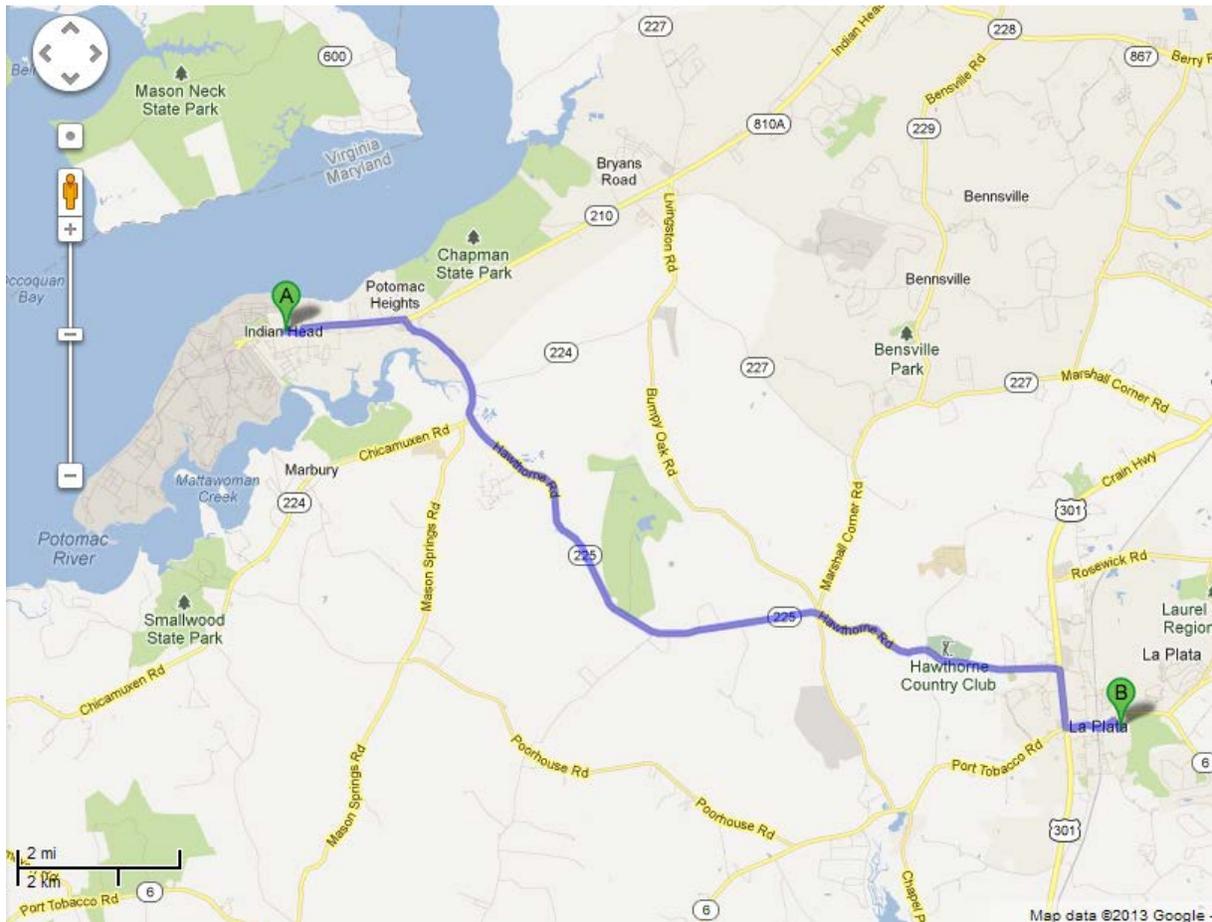
FIGURE 2 – ROUTE TO HOSPITAL NSF Indian Head, Indian Head, MD

Directions To:
Civista Medical Center
5 Garrett Avenue
La Plata, MD 20646
(301) 609-4000

Directions From:
NSF Indian Head
3767 Strauss Avenue
Indian Head, Maryland 20640

Total Distance: 13.6 Miles
Total Duration: 20 Minutes

1. Head east on Strauss Avenue toward Davis Drive (0.2 miles).
2. Take the 1st left onto Prospect Avenue (318 feet).
3. Take the 1st right onto MD-210N/Indian Head Highway (1.3 miles).
4. Turn right onto MD-225E/Hawthorne Road (10.6 miles).
5. Turn right onto US-301S (0.7 miles).
6. Turn left onto Charles Street (0.6 miles).
7. Turn right onto Garrett Avenue, hospital will be on the right (0.1 miles).



TABLES

Table 1
Potentially Present Compounds or Substances

Contaminant	PEL-TLV	IDLH	Characteristics	Routes of Exposure	Symptoms of Acute Exposure	Monitoring Equipment
Arsenic	TWA 0.010 mg/m ³	5 mg/m ³ (as As)	Silver-gray or tin-white, brittle, odorless solid.	inhalation, skin absorption, skin and/or eye contact, ingestion	Ulceration of nasal septum, dermatitis, gastrointestinal disturbances, peripheral neuropathy, resp. irritation, hyperpigmentation of skin, [potential occupational carcinogen]	Cellulose Ester Filter/ Sample Pump , Atomic absorption, flame
Beryllium	TWA 0.002 mg/m ³	4 mg/m ³ (as Be)	Hard, brittle gray-white metal solid.	Inhalation, skin and/or eye contact	Berylliosis (chronic exposure), anorexia, weight loss, lassitude (weakness, exhaustion), chest pain, cough, clubbing of fingers, cyanosis, pulmonary insufficiency; irritation eyes; dermatitis	Cellulose Ester Filter/ Sample Pump , Atomic absorption, flame
Cobalt	TWA 0.1 mg/m ³	20 mg/m ³ (as Co)	Odorless, silver-gray to black solid.	inhalation, ingestion, skin and/or eye contact	Cough, dyspnea (breathing difficulty), wheezing, decreased pulmonary function; weight loss; dermatitis; diffuse nodular fibrosis; resp. hypersensitivity, asthma	Cellulose Ester Filter/ Sample Pump , Atomic absorption, flame
Tetrachloroethylene (PCE)	TWA 100 ppm (678 mg/m ³)	150 ppm	Colorless liquid with a mild, chloroform,-like odor.	Inhalation, skin absorption, ingestion and/or eye contact	Irritation eyes, skin, throat, respiratory system; nausea; flush face, neck; dizziness, incoordination; headache, drowsiness; skin redness; liver damage	PID
Trichloroethylene (TCE)	TWA 100 ppm (537 mg/m ³)	1000 ppm	Odorless liquid (unless dyed blue) with a chloroform-like odor.	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; headache, visual disturbance, lassitude (weakness, exhaustion), dizziness, tremor, drowsiness, nausea, vomiting; dermatitis; cardiac arrhythmias, paresthesia; liver injury	PID

Table 2
Emergency Telephone Numbers

Key NSF Indian Head Project Staff

NAVFAC RPM	Joe Rail	(202) 685-3105 (O)
H&S Program Manger	Ed King P.E.	484-437-4433 (W)
H&S Project Manger/Field Manager	Patrick Schauble, P.E.	484-880-1896 (W/C)
Program Safety and Health Manager	Edward Kearney, CIH	508-366-7442 (W)
Emergency Coordinator/Site Safety & Health Officer	Sean Chelius, P.G.	610-603-6111 (W/C)
Ambulance/Fire – On Base		301-744-4333
Ambulance/Fire – Off Base		911
Police Department		911
Poison Control Center		800-222-1222
Civista Medical Center		(301) 609-4000

TABLE 3. SITE CONTAMINANT MONITORING REQUIREMENTS

Task	Instrument	Frequency and Location	Action Levels ^(a)	Required Response
Soil Borings/ Well Drilling/ Groundwater Sampling	PID	Continuously during intrusive work (drilling, borings) in the breathing zone; Test inside wellhead at initial opening for sampling.	Background	Continue work.
			>Background to 5 ppm	Evacuate to a safe upwind location and wait for levels to dissipate. Retest the area after 15 minutes. If levels have not dissipated, upgrade to Level C. Continue work in Level C personal protective equipment or retest in another 15 minutes.
			>5 ppm	Evacuate to a safe upwind location immediately. Retest area after 15 minutes wearing Level C personal protective equipment. If sampling results defined by the photoionization detector have not dissipated in 30 minutes, contact the Program Safety and Health Officer and Project Manager for further guidance.
Soil Borings/ Well Drilling	FGM	Continuously during intrusive work	2%	Continue work
			>2% to 10% LEL	Monitor continuously. Proceed with caution.
			>10% LEL	Evacuate. Allow to dissipate prior to continuing work. Contact Program Safety and Health Officer and Project Manager.
<p>(a) Action levels for PID are based upon unknown concentrations and measurements taken above background concentrations when background concentration is less than 1 ppm. When background concentrations exceed 1 ppm total volatile organic compounds (VOCs), PID action levels will be inclusive of background concentrations and so noted on the environmental monitoring record.</p> <p>NOTE: PID = Photoionization detector FGM = Four-gas meter</p>				

Activity Hazard Analysis (AHA)							
Activity/Work Task:	Mobilization, Demobilization	Overall Risk Assessment Code (RAC) (Use highest code)				L	
Project Location:	NSF Indian Head, MD	Risk Assessment Code (RAC) Matrix					
Contract Number:	N40080-12-D-0451	Severity	Probability				
Date Prepared:	11-Apr-14		Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title):	Sean Chelius / SSHO	Catastrophic	E	E	H	H	M
Reviewed by (Name/Title):	Patrick Schauble / PM	Critical	E	H	H	M	L
		Marginal	H	M	M	L	L
		Negligible	M	L	L	L	L
Notes: (Field Notes, Review Comments, etc.)		<p>Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above)</p> <p>"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.</p> <p>"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible</p> <p>Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.</p>					
		<p style="text-align: center;">RAC Chart</p> <p style="text-align: center;">E = Extremely High Risk</p> <p style="text-align: center;">H = High Risk</p> <p style="text-align: center;">M = Moderate Risk</p> <p style="text-align: center;">L = Low Risk</p>					
Job Steps	Hazards	Controls				RAC	
Transportation to and from site	Traffic accidents	Follow safe driving practices. Stay alert.				L	
Driving onsite	Risk of striking pedestrians, deer, other vehicles, or site appurtenances.	Stay alert. Look before backing. Drive at reduced speeds (as posted). Workers in open areas should don reflective clothing so they are noticeable.				L	
Loading and unloading equipment/supplies	Slip trips or fall risk. Lifting hazards. Pinch hazards.	Use legs and hold loads close to body when lifting. Lift with knees not back. Follow good house keeping practices. Stow equipment away safely. Stow chemicals appropriately. Flammables may only be stored in flammable storage lockers. Forklift may only be operated by trained persons.				L	
	Biological Hazards: Potential Exposure to poisonous plants, snakes, spiders, rodents, insects, ticks, and mosquitoes	Watch for, and avoid contact with, poisonous plants, snakes, spiders, rodents, insects, ticks and mosquitoes. Do not drink the water on site.				L	
	Physical Hazards: Fire protection overhead utilities vehicle and equipment traffic material handling tools machinery and equipment use electrical equipment and lockout/tagout noise exposure heat/cold stress inclement weather adverse environmental conditions	<u>Fire Hazards:</u> Gasoline and diesel fuel will be used for vehicle operation. Require fire extinguishers for each site location. Allow smoking only in designated areas. OSHA-approved metal safety cans, painted red with a yellow stripe, that have self-closing lids and flame arrestors must be used to store small amounts of flammable liquids. Hot work is prohibited in areas where flammable materials, equipment containing flammable materials, and contaminated soil air emissions may be present.				L	
		<u>Overhead utilities will be present.</u> Survey for overhead utilities before bringing equipment with high extensions into a work area. Do not operate equipment within 10 feet of overhead lines				L	
		<u>Concurrent use of vehicles and ground personnel will occur.</u> Establish traffic control procedures when there is vehicle and/or pedestrian traffic present. Have workers wear high-visibility safety vests with reflective striping when working near traffic areas. Advise workers to look carefully where they walk to avoid vehicles and moving equipment. Use traffic control devices as needed				L	
		<u>Material handling involving lifting, and carrying will be required.</u> Wear work gloves when handling materials. Watch for items that can cut, puncture, pinch, or crush. Use proper lifting technique. Size up load, get help for heavy or awkward items, get good grasp on object to be lifted, keep load close to body, keep back straight, lift with legs <u>not</u> with back, and do <u>not</u> twist when lifting. Review material handling procedures during safety meetings.				L	
		<u>Hand and power tools may be used.</u> Use the proper tool for the job. Use GFCIs for power tool operation. Use safety glasses. Do <u>not</u> use damaged tools. Properly secure materials when working on them. Make sure area is adequately clear when using equipment. Inspect electrical cords.				L	
		<u>Generators may be used to provide electrical power.</u> Use GFCIs for portable electrical equipment. Inspect electrical extension cords for damage and ground plugs. Keep electrical equipment/cords away from water and fuel materials. Use lockout/tagout procedures.				L	
		<u>Noise exposure above 85 dBA is expected when working near or operating machinery and equipment.</u> Monitor for noise levels. Wear earplugs for protection.				L	
		<u>Heat stress may occur when elevated ambient temperatures, moderate to heavy workloads, and/or use of impermeable protective clothing occur.</u> Adjust work-rest schedules as needed. Work at a steady pace. Drink fluids. Take rest breaks and use shaded rest area. Know the signs and symptoms of heat exposure and emergency treatment. <u>Cold stress may occur during the winter/fall/spring months.</u> Minimize exposures to cold temperatures below 45°F. Wear insulated clothing. Know the signs and symptoms of cold exposure and emergency treatment.				L	
	<u>Inclement weather conditions such as strong winds, heavy rain or lightning, and snow may occur during outdoor operations.</u> Suspend outdoor operations during inclement weather or when other adverse environmental conditions exist.				L		
Equipment to be Used	Training Requirements/Competent or	Inspection Requirements					
Hand and power tools Generator Trucks/field vehicles	Site orientation briefing and APP/HASP HazWOPER Training First Aid/CPR training	Safety Inspection Vehicle Inspection					

Activity Hazard Analysis (AHA)

Activity/Work Task: Well Gauging and Groundwater Sampling	Overall Risk Assessment Code (RAC) (Use highest code)	L
Project Location: NSF Indian Head, MD	Risk Assessment Code (RAC) Matrix	
Contract Number: N40080-12-D-0451	Severity	Probability
Date Prepared: 11-Apr-14		Frequent Likely Occasional Seldom Unlikely
Prepared by (Name/Title): Sean Chelius / SSHO	Catastrophic	E E H H M
Reviewed by (Name/Title): Patrick Schauble / PM	Critical	E H H M L
	Marginal	H M M L L
	Negligible	M L L L L
Notes: (Field Notes, Review Comments, etc.) Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above) "Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely. "Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible. Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.		
		RAC Chart E = Extremely High Risk H = High Risk M = Moderate Risk L = Low Risk

Job Steps	Hazards	Controls	RAC
Check for insects/animals around monitoring wells	Chemical hazards: Minor potential for exposure to contaminants in surface water.	A limited chemical contact hazard from surface water is expected. Conduct monitoring as described in the "Exposure Monitoring" section of the HASP. Use prescribed levels of protection described in the PPE section of the HASP for the applicable work task. Properly don and doff protective clothing. Avoid contact with contaminated surfaces whenever possible. Use prescribed decontamination measures.	L
Check for insects/animals around surface water sample locations	Biological Hazards: Potential exposure to poisonous plants, snakes, spiders, rodents, insects, ticks and mosquitoes	Biological hazards may be present. Watch for, and avoid contact with, poisonous plants, snakes, spiders, rodents, insects, ticks, and mosquitoes. Do not drink the water onsite.	L
Purge groundwater	Contact with purge water; equipment hazards	Minimal contact with purge water is expected. Use of proper PPE as well as containerizing purge water properly. Use of groundwater purge equipment including pumps, tubing, generators, etc., requires safe lifting and handling.	L
Collect groundwater samples	Contact with purge water	Use laboratory-provided sterile sample collection containers and appropriate PPE (nitrile gloves).	L
Prepare samples for shipment	Vehicle and equipment traffic	Concurrent use of vehicles and ground personnel will occur. Establish traffic control procedures when there is vehicle and/or pedestrian traffic present. Have workers wear high-visibility safety vests with reflective striping when working near traffic areas. Advise workers to look carefully where they walk to avoid vehicles and moving equipment. Use traffic control devices as needed.	L
	Material handling	Material handling involving lifting, and carrying will be required. Wear work gloves when handling materials. Watch for items that can cut, puncture, pinch, or crush. Use proper lifting technique. Size up load, get help for heavy or awkward items, get good grasp on object to be lifted, keep load close to body, keep back straight, lift with legs not with back, and do not twist when lifting. Review material handling procedures during safety meetings.	L
	Tools, machinery and equipment use	Hand and power tools may be used. Use the proper tool for the job. Use GFCIs for power tool operation. Use safety glasses. Do not use damaged tools. Properly secure materials when working on them. Make sure area is adequately clear when using equipment. Inspect electrical cords.	L
	Electrical equipment and lockout/tagout	Generators may be used to provide electrical power. Use GFCIs for portable electrical equipment. Inspect electrical extension cords for damage and ground plugs. Keep electrical equipment/cords away from water and fuel materials. Use lockout/tagout procedures.	L
	Noise exposure	Noise exposure above 85 dBA is expected when working near or operating machinery and equipment. Monitor for noise levels. Wear earplugs for protection	L

Activity Hazard Analysis (AHA)

Activity/Work Task: Well Gauging and Groundwater Sampling	Overall Risk Assessment Code (RAC) (Use highest code)	L										
Project Location: NSF Indian Head, MD	Risk Assessment Code (RAC) Matrix											
Contract Number: N40080-12-D-0451	Severity	Probability										
Date Prepared: 11-Apr-14		Frequent Likely Occasional Seldom Unlikely										
Prepared by (Name/Title): Sean Chelius / SSHO	Catastrophic	E E H H M										
Reviewed by (Name/Title): Patrick Schauble / PM	Critical	E H H M L										
	Marginal	H M M L L										
	Negligible	M L L L L										
Notes: (Field Notes, Review Comments, etc.) <p> Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above) "Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely. </p> <table style="width: 100%; border: none;"> <tr> <td style="width: 60%; border: none;"></td> <td style="text-align: center; border: none;">RAC Chart</td> </tr> <tr> <td style="border: none;"></td> <td style="text-align: center; background-color: #FF0000; color: white; border: none;">E = Extremely High Risk</td> </tr> <tr> <td style="border: none;"></td> <td style="text-align: center; background-color: #FFA500; border: none;">H = High Risk</td> </tr> <tr> <td style="border: none;"></td> <td style="text-align: center; background-color: #FFD700; border: none;">M = Moderate Risk</td> </tr> <tr> <td style="border: none;"></td> <td style="text-align: center; background-color: #00FF00; border: none;">L = Low Risk</td> </tr> </table> <p> Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA. </p>				RAC Chart		E = Extremely High Risk		H = High Risk		M = Moderate Risk		L = Low Risk
	RAC Chart											
	E = Extremely High Risk											
	H = High Risk											
	M = Moderate Risk											
	L = Low Risk											
Job Steps	Hazards	Controls										
	Heat/cold stress	Heat stress may occur when elevated ambient temperatures, moderate to heavy workloads, and/or use of impermeable protective clothing occur. Adjust work-rest schedules as needed. Work at a steady pace. Drink fluids. Take rest breaks and use shaded rest area. Know the signs and symptoms of heat exposure and emergency treatment. Cold stress may occur during the winter/fall/spring months. Minimize exposures to cold temperatures below 45°F. Wear insulated clothing. Know the signs and symptoms of cold exposure and emergency treatment.										
	Inclement weather and adverse environmental conditions	Inclement weather conditions such as strong winds, heavy rain or lightning, and snow may occur during outdoor operations. Suspend outdoor operations during inclement weather or when other adverse environmental conditions exist.										
	Miscellaneous physical hazards	General safety hazards will be present during all site tasks. Use PPE for head, eye, hand, foot, and body protection as needed. Follow safe work practices. Watch for slip, trip, and fall hazards from uneven, wet, slippery ground surfaces. Keep ground areas clear of tripping hazards such as hoses, cords, boxes, and debris. Maintain good housekeeping. Look where walking. Maintain balance. Maintain three-point contact when stepping off equipment. Use short steps when walking on slippery surfaces. Communicate general safety information during safety meetings.										
RAC	L	L										
L	L	L										
Equipment to be Used	Training Requirements/Competent or	Inspection Requirements										
Hand and power tools Generator Vehicles Sampling equipment Sample bottles with chemical preservatives	Site orientation briefing and APP/HASP HazWOPER Training First Aid/CPR training	Safety Inspection Vehicle Inspection										

Activity Hazard Analysis (AHA)

Activity/Work Task:	Decontamination of Sampling Equipment	Overall Risk Assessment Code (RAC) (Use highest code)	L
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Project Location:	NSF Indian Head, MD	Risk Assessment Code (RAC) Matrix
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Contract Number:	N40080-12-D-0451	Probability					
Date Prepared:	11-Apr-14	Severity	Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title):	Sean Chelius / SSHO	Catastrophic	E	E	H	H	M
Reviewed by (Name/Title):	Patrick Schauble / PM	Critical	E	H	H	M	L
		Marginal	H	M	M	L	L
		Negligible	M	L	L	L	L

<p>Notes: (Field Notes, Review Comments, etc.)</p>	<p>Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above)</p> <p>"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.</p> <p style="text-align: center;">RAC Chart</p> <p style="text-align: center; background-color: #FF0000; color: white;">E = Extremely High Risk</p> <p style="text-align: center; background-color: #FFA500; color: white;">H = High Risk</p> <p style="text-align: center; background-color: #FFFF00; color: black;">M = Moderate Risk</p> <p style="text-align: center; background-color: #00FF00; color: black;">L = Low Risk</p> <p>"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible</p> <p>Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.</p>
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Job Steps	Hazards	Controls	RAC
Decontaminate equipment used for event tasks	Chemical hazards: Minor potential for exposure to contaminants in decontamination fluids.	A limited chemical contact hazard from decontamination chemicals and fluid is expected. Conduct monitoring as described in the "Exposure Monitoring" section of the HASP. Use prescribed levels of protection described in the PPE section of the HASP for the applicable work task. Properly don and doff protective clothing. Avoid contact with contaminated surfaces whenever possible. Use prescribed decontamination measures.	L
	Biological Hazards: Potential Exposure to poisonous plants, snakes, spiders, rodents, insects, ticks, and mosquitoes Physical Hazards: Fire protection overhead utilities vehicle and equipment traffic material handling tools machinery and equipment use electrical equipment and lockout/tagout noise exposure heat/cold stress inclement weather adverse environmental conditions	Watch for, and avoid contact with, poisonous plants, snakes, spiders, rodents, insects, ticks and mosquitoes. Do not drink the water on site.	L
		<u>Fire Hazards:</u> Gasoline and diesel fuel will be used for vehicle operation. Require fire extinguishers for each site location. Allow smoking only in designated areas. OSHA-approved metal safety cans, painted red with a yellow stripe, that have self-closing lids and flame arrestors must be used to store small amounts of flammable liquids. Hot work is prohibited in areas where flammable materials, equipment containing flammable materials, and contaminated soil air emissions may be present.	L
		<u>Overhead utilities will be present.</u> Survey for overhead utilities before bringing equipment with high extensions into a work area. Do <u>not</u> operate equipment within 10 feet of overhead lines	L
		<u>Concurrent use of vehicles and ground personnel will occur.</u> Establish traffic control procedures when there is vehicle and/or pedestrian traffic present. Have workers wear high-visibility safety vests with reflective striping when working near traffic areas. Advise workers to look carefully where they walk to avoid vehicles and moving equipment. Use traffic control devices as needed.	L
		<u>Material handling involving lifting, and carrying will be required.</u> Wear work gloves when handling materials. Watch for items that can cut, puncture, pinch, or crush. Use proper lifting technique. Size up load, get help for heavy or awkward items, get good grasp on object to be lifted, keep load close to body, keep back straight, lift with legs <u>not</u> with back, and do <u>not</u> twist when lifting. Review material handling procedures during safety meetings.	L
		<u>Hand and power tools may be used.</u> Use the proper tool for the job. Use GFCIs for power tool operation. Use safety glasses. Do <u>not</u> use damaged tools. Properly secure materials when working on them. Make sure area is adequately clear when using equipment. Inspect electrical cords.	L
		<u>Generators may be used to provide electrical power.</u> Use GFCIs for portable electrical equipment. Inspect electrical extension cords for damage and ground plugs. Keep electrical equipment/cords away from water and fuel materials. Use lockout/tagout procedures.	L
<u>Noise exposure above 85 dBA is expected when working near or operating machinery and equipment.</u> Monitor for noise levels. Wear earplugs for protection.	L		

Activity Hazard Analysis (AHA)

Activity/Work Task:	Decontamination of Sampling Equipment	Overall Risk Assessment Code (RAC) (Use highest code)	L				
Project Location:	NSF Indian Head, MD	Risk Assessment Code (RAC) Matrix					
Contract Number:	N40080-12-D-0451						
Date Prepared:	11-Apr-14	Probability					
Prepared by (Name/Title):	Sean Chelius / SSHO	Severity					
Reviewed by (Name/Title):	Patrick Schauble / PM	Frequent	Likely				
		Occasional	Seldom				
		Unlikely					
		Catastrophic	E	E	H	H	M
		Critical	E	H	H	M	L
		Marginal	H	M	M	L	L
		Negligible	M	L	L	L	L
Notes: (Field Notes, Review Comments, etc.)		<p>Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above)</p> <p>"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.</p> <p style="text-align: center;">RAC Chart</p> <p style="text-align: center; background-color: #FF0000; color: white;">E = Extremely High Risk</p> <p style="text-align: center; background-color: #FFA500; color: white;">H = High Risk</p> <p style="text-align: center; background-color: #FFFF00; color: black;">M = Moderate Risk</p> <p style="text-align: center; background-color: #00FF00; color: black;">L = Low Risk</p> <p>Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.</p>					
Job Steps	Hazards	Controls	RAC				
		<p><u>Heat stress may occur when elevated ambient temperatures, moderate to heavy workloads, and/or use of impermeable protective clothing occur.</u> Adjust work-rest schedules as needed. Work at a steady pace. Drink fluids. Take rest breaks and use shaded rest area. Know the signs and symptoms of heat exposure and emergency treatment. <u>Cold stress may occur during the winter/fall/spring months.</u> Minimize exposures to cold temperatures below 45°F. Wear insulated clothing. Know the signs and symptoms of cold exposure and emergency treatment.</p> <p><u>Inclement weather conditions such as strong winds, heavy rain or lightning, and snow may occur during outdoor operations.</u> Suspend outdoor operations during inclement weather or when other adverse environmental conditions exist.</p>	L				
			L				
Equipment to be Used	Training Requirements/Competent or	Inspection Requirements					
Hand and power tools Generator Vehicles	Site orientation briefing and APP review HazWOPER training First Aid/CPR training	Safety Inspection					

Activity Hazard Analysis (AHA)

Activity/Work Task: IDW Management		Overall Risk Assessment Code (RAC) (Use highest code)				L	
Project Location: NSF Indian Head, MD		Risk Assessment Code (RAC) Matrix					
Contract Number: N40080-12-D-0451		Probability					
Date Prepared: 11-Apr-14		Severity	Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title): Sean Chelius / SSHO		Catastrophic	E	E	H	H	M
Reviewed by (Name/Title): Patrick Schauble / PM		Critical	E	H	H	M	L
		Marginal	H	M	M	L	L
Notes: (Field Notes, Review Comments, etc.)		Negligible	M	L	L	L	L
		<p>Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above)</p> <p>"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.</p> <p style="text-align: center;">RAC Chart</p> <p>"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible</p> <p style="text-align: center;">E = Extremely High Risk</p> <p style="text-align: center;">H = High Risk</p> <p>Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.</p> <p style="text-align: center;">M = Moderate Risk</p> <p style="text-align: center;">L = Low Risk</p>					
Job Steps	Hazards	Controls				RAC	
<p>Check for insects/animals around IDW storage</p> <p>Use care in accessing drums and containers</p> <p>Use care in transferring IDQ between containers</p>	Chemical hazards: Minor potential for exposure to contaminants in IDW.	A limited chemical contact hazard from IDW is expected. Conduct monitoring as described in the "Exposure Monitoring" section of the HASP. Use prescribed levels of protection described in the PPE section of the HASP for the applicable work task. Properly don and doff protective clothing. Avoid contact with contaminated surfaces whenever possible. Use prescribed decontamination measures.				L	
	Biological hazards: Potential exposure to poisonous plants, snakes, spiders, rodents, insects, ticks, and mosquitoes.	Biological hazards may be present. Watch for, and avoid contact with poisonous plants, snakes, spiders, rodents, insects, ticks, and mosquitoes. Apply repellent containing 20% - 30% DEET if needed.				L	
	<p>Physical Hazards:</p> <p>Fire protection</p> <p>overhead utilities</p> <p>vehicle and equipment traffic</p> <p>material handling</p> <p>tools</p> <p>machinery and equipment use</p> <p>electrical equipment and lockout/tagout</p> <p>noise exposure</p> <p>heat/cold stress</p> <p>inclement weather</p> <p>adverse environmental conditions</p>		<p><u>Fire Hazards:</u> Gasoline and diesel fuel will be used for vehicle operation. Require fire extinguishers for each site location. Allow smoking only in designated areas. OSHA-approved metal safety cans, painted red with a yellow stripe, that have self-closing lids and flame arrestors must be used to store small amounts of flammable liquids. Hot work is prohibited in areas where flammable materials, equipment containing flammable materials, and contaminated soil air emissions may be present.</p>				L
			<p><u>Overhead utilities will be present.</u> Survey for overhead utilities before bringing equipment with high extensions into a work area. Do <u>not</u> operate equipment within 10 feet of overhead lines</p>				L
			<p><u>Concurrent use of vehicles and ground personnel will occur.</u> Establish traffic control procedures when there is vehicle and/or pedestrian traffic present. Have workers wear high-visibility safety vests with reflective striping when working near traffic areas. Advise workers to look carefully where they walk to avoid vehicles and moving equipment. Use traffic control devices as needed</p>				L
			<p><u>Material handling involving lifting, and carrying will be required.</u> Wear work gloves when handling materials. Watch for items that can cut, puncture, pinch, or crush. Use proper lifting technique. Size up load, get help for heavy or awkward items, get good grasp on object to be lifted, keep load close to body, keep back straight, lift with legs <u>not</u> with back, and do <u>not</u> twist when lifting. Review material handling procedures during safety meetings.</p>				L
			<p><u>Hand and power tools may be used.</u> Use the proper tool for the job. Use GFCIs for power tool operation. Use safety glasses. Do <u>not</u> use damaged tools. Properly secure materials when working on them. Make sure area is adequately clear when using equipment. Inspect electrical cords.</p>				L
			<p><u>Generators may be used to provide electrical power.</u> Use GFCIs for portable electrical equipment. Inspect electrical extension cords for damage and ground plugs. Keep electrical equipment/cords away from water and fuel materials. Use lockout/tagout procedures.</p>				L
			<p><u>Noise exposure above 85 dBA is expected when working near or operating machinery and equipment.</u> Monitor for noise levels. Wear earplugs for protection.</p>				L
			<p><u>Heat stress may occur when elevated ambient temperatures, moderate to heavy workloads, and/or use of impermeable protective clothing occur.</u> Adjust work-rest schedules as needed. Work at a steady pace. Drink fluids. Take rest breaks and use shaded rest area. Know the signs and symptoms of heat exposure and emergency treatment. <u>Cold stress may occur during the winter/fall/spring months.</u> Minimize exposures to cold temperatures below 45°F. Wear insulated clothing. Know the signs and symptoms of cold exposure and emergency treatment.</p>				L
<p><u>Inclement weather conditions such as strong winds, heavy rain or lightning, and snow may occur during outdoor operations.</u> Suspend outdoor operations during inclement weather or when other adverse environmental conditions exist.</p>				L			
Equipment to be Used		Training Requirements/Competent or		Inspection Requirements			
Hand and power tools Generator Vehicles		Site orientation briefing and APP review HazWOPER training First Aid/CPR training		Safety Inspection			

Activity Hazard Analysis (AHA)																																					
Activity/Work Task:	Drill Rig Operation/Direct Push Technology	Overall Risk Assessment Code (RAC) (Use highest code)	M																																		
Project Location:	NSF Indian Head, MD	Risk Assessment Code (RAC) Matrix																																			
Contract Number:	N40080-12-D-0451																																				
Date Prepared:	11-Apr-14																																				
Prepared by (Name/Title):	Sean Chelius / SSHO																																				
Reviewed by (Name/Title):	Patrick Schauble / PM																																				
Notes: (Field Notes, Review Comments, etc.)	<p>Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above)</p> <p>"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.</p> <p>"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible</p> <p>Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.</p>																																				
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Job Steps	Hazards	Controls	RAC																																		
Review utility clearance	Chemical Hazards: Minor potential exposure to site low-level VOC concentrations (PPE, air monitoring).	Chemical Hazards: Minor potential for exposure to site contaminants during extraction and monitoring well installation and equipment decontamination. Use prescribed levels of protection described in the PPE section of the SSHP. Properly don and doff protective clothing. Avoid contact with contaminated surfaces when possible. Use prescribed decontamination measures. Methane potential if cap is disturbed - Explosive and chemical hazard - minimize disturbance of cap; monitor area for methane.	M																																		
Set-up traffic control equipment	Biological Hazards: Potential exposure to poisonous plants, snakes, spiders, rodents, and insects.	Biological Hazards: Biological hazards may be present. Watch for, and avoid contact with, poisonous plants, snakes, spiders, rodents, and insects. Apply repellent containing 20% - 30% DEET if needed.	M																																		
Establish site work zone demarcation	Physical Hazards: Potential exposure to physical hazards: Fire protection and hot work; overhead utilities; underground utilities; heavy equipment operation; elevated work locations and fall protection; vehicle and equipment traffic; material handling; tools, machinery, and equipment use; electrical equipment; noise exposure; heat stress; cold stress; drill rig safety; compressed gas cylinders; vacuum truck operation; pressure washer operation; inclement weather and adverse environmental conditions; miscellaneous physical hazards.	Fire Protection and Hot Work: Gasoline and/or diesel fuel will be used for vehicle operation. Hot work may be conducted. Require fire extinguishers for each site location. Allow smoking only in designated areas. Use hot work safety procedures, hot work permit and fire watch for hot work. OSHA-approved metal safety cans, painted red with a yellow stripe, that have self-closing lids and flame arrestors must be used to store small quantities of flammable liquids.	M																																		
Prepare decontamination station		Overhead Utilities: Overhead utilities may be present. Keep heavy equipment away from overhead lines. Survey for overhead utilities before bringing equipment with high extensions (i.e., heavy equipment, dump truck, roll-off bin truck) into a work area. Do not operate equipment within 10-feet of overhead lines. Determine and comply with the required distance from energized overhead electric lines per EM 385-1-1 11F	M																																		
Drill Rig Operation		Underground Utilities: Underground utilities may be present. Review utility clearance information before conducting subsurface work (Miss Utility notification/ Dig Permit). Coordinate utility clearance prior to digging. Review and inspect utility mark-outs before excavating. Hand dig in immediate vicinity of marked utilities. Immediately contact the Contracting Officer should damage to underground utilities or subsurface construction occur.	M																																		
		Heavy Equipment Operation: Heavy equipment will be used for extraction well/monitoring well installation. Inspect heavy equipment daily and document. Check operation of backup alarms. Survey area for utilities prior to initiating excavation work. Have ground personnel wear high-visibility safety vests with reflective striping. Maintain positive contact between operator and ground personnel at all times. Use hand signals. Do not cross path of moving equipment or cross behind equipment. Position ground personnel out of heavy equipment operating area when possible. Require operators to look before backing.	M																																		
		Vehicle and Equipment Traffic: Concurrent use of heavy equipment, vehicles, and ground personnel will occur. Establish traffic control procedures when there is vehicle, heavy equipment, and/or pedestrian traffic present. Have workers wear high-visibility safety vests with reflective striping when working near traffic areas. Advise workers to look carefully where they walk to avoid vehicles and moving equipment and to maintain eye contact with heavy equipment operators. Use traffic control devices as needed. Use spotters if needed for backing of equipment and vehicles into tight work areas.	M																																		
		Material Handling: Material handling involving lifting and carrying will occur. Wear work gloves when handling materials. Watch for items that can cut, puncture, pinch, or crush. Use proper lifting technique: size up load, get help for heavy or awkward items, get good grasp on object to be lifted, keep load close to body, keep back straight, lift with legs not with back, and do not twist when lifting. Review material handling procedures during safety meetings.	M																																		
		Tools, Machinery and Equipment Use: Hand tools will be used and power tools may be used. Use the proper tool for the job. Use GFCIs for power tool operation. Use safety glasses. Do not use damaged tools. Properly secure materials when working on them. Make sure area is adequately clear when using equipment. Inspect electrical cords.	M																																		

Activity Hazard Analysis (AHA)							
Activity/Work Task:	Drill Rig Operation/Direct Push Technology	Overall Risk Assessment Code (RAC) (Use highest code)				M	
Project Location:	NSF Indian Head, MD	Risk Assessment Code (RAC) Matrix					
Contract Number:	N40080-12-D-0451	Severity	Probability				
Date Prepared:	11-Apr-14		Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title):	Sean Chelius / SSHO	Catastrophic	E	E	H	H	M
Reviewed by (Name/Title):	Patrick Schauble / PM	Critical	E	H	H	M	L
		Marginal	H	M	M	L	L
		Negligible	M	L	L	L	L
Notes: (Field Notes, Review Comments, etc.)		Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above) "Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely. "Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.					
		RAC Chart					
		E = Extremely High Risk					
		H = High Risk					
		M = Moderate Risk					
		L = Low Risk					
Job Steps	Hazards	Controls				RAC	
		Electrical Equipment: Generators may be used to provide electrical power. Use GFCIs for portable electrical equipment. Inspect electrical extension cords for damage and ground plugs. Keep electrical equipment/cords away from water and fuel materials. Use lockout/tagout procedures if needed				M	
		Noise Exposure: Noise exposure above 85 dBA is expected when working near or operating machinery and equipment. Wear earplugs for protection.				M	
		Heat Stress: Heat stress may occur when elevated ambient temperatures, moderate to heavy workloads, and/or use of impermeable protective clothing occur. Adjust work-rest schedules as needed. Work at a steady pace. Drink plenty of fluids. Take rest breaks and use shaded rest area. Know the signs and symptoms of heat exposure and emergency treatment.				L	
		Cold Stress: Cold stress may occur during the fall/winter/spring months when decreased ambient temperatures are present. For cold stress prevention, minimize exposure to temperatures below 45°F. Wear insulated clothing for cold temperature work. Know the signs/symptoms of cold exposure and emergency treatment. Drink adequate fluids.				L	
		Compressed Gas Cylinders: Compressed gas cylinders will be used for hot work (if needed). Gas cylinders will be moved with caps installed, and stored upright and secured with rope of chain. Acetylene and oxygen cylinders must be stored a minimum of 20 feet away from each other or separated by a 5-foot fire rated wall.				M	
		Vacuum Truck Operation: A vacuum truck may be used to pump out liquids. Use PPE especially gloves and splash protection; use proper technique in handling hoses; ground vacuum truck during transfer of flammable or combustible liquids to prevent discharge of static electricity sparks; use hose on pump exhaust and direct away from the work area as needed; clear hoses and use bucket to prevent spills when disconnecting hoses.				M	
		Pressure Washer Operation: Pressure washer equipment may be used for equipment cleaning. Use gloves, face, and eye protection during pressure washer operation. Use metatarsal guards as necessary. Keep area clear when washing. Do not clean boots with pressure washer. Watch for slippery surfaces and handling of slippery materials. Have fire extinguisher and emergency eyewash supplies immediately available.				M	
		Inclement Weather and Adverse Environmental Conditions: Inclement weather conditions such as strong winds, heavy rain or lightning, and snow may occur during outdoor operations. Establish designated take cover area. Suspend outdoor operations during inclement weather or when other adverse environmental conditions exist. In case of work stoppage due to lightning, stay under shelter 30 minutes after last show of lightning or sound of thunder clap. Work will not resume until an all-clear signal has been communicated by the SSHO to affected personnel.				M	
		Miscellaneous Physical Hazards: General safety hazards will be present during all site tasks. Use PPE for head, eye, hand, foot, and body protection. Follow safe work practices. Watch for slip, trip, and fall hazards from uneven, wet, slippery ground surfaces. Keep ground areas clear of tripping hazards such as hoses, cords, boxes, and debris. Maintain good housekeeping. Look where walking. Maintain balance. Maintain three-point contact when stepping off equipment. Use short steps when walking on slippery surfaces. Communicate general safety information during safety meetings.				L	

Activity Hazard Analysis (AHA)							
Activity/Work Task:	Drill Rig Operation/Direct Push Technology	Overall Risk Assessment Code (RAC) (Use highest code)				M	
Project Location:	NSF Indian Head, MD	Risk Assessment Code (RAC) Matrix					
Contract Number:	N40080-12-D-0451	Severity	Probability				
Date Prepared:	11-Apr-14		Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title):	Sean Chelius / SSHO	Catastrophic	E	E	H	H	M
Reviewed by (Name/Title):	Patrick Schauble / PM	Critical	E	H	H	M	L
		Marginal	H	M	M	L	L
		Negligible	M	L	L	L	L
Notes: (Field Notes, Review Comments, etc.)		Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above) "Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely. "Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.					
		RAC Chart					
		E = Extremely High Risk					
		H = High Risk					
		M = Moderate Risk					
		L = Low Risk					
Job Steps	Hazards	Controls				RAC	
		<p>Site Emergencies: Preparation for site emergencies is always a requirement for site work. Set-up emergency communications. Prepare emergency supplies. Post emergency contact and hospital route information. Maintain emergency phone list/hospital location/route map on site. Have first-aid kit, fire extinguisher, and safety supplies available. Have cell phones available. Designate evacuation location and emergency signals. See the "Emergency Response Plan" section of SSHP.</p> <p>Drill Rig/Heavy Equipment Operation: Manufacturer's recommendations should be followed in regard to which equipment and machinery must be stowed and secured prior to vehicle movement. Safe operation of the drill rig requires the use of the following safety equipment. Tire blocks should be placed under the front wheels of the parked vehicle. The vehicle should not be parked on non-level ground that presents a risk of roll-over. Where parking on non-level ground is necessary, the vehicle shall preferably be positioned perpendicular to the sloping surface. Park or position the machine to allow the wind to carry engine exhaust fumes away from the operator. Exhaust fumes from engines can be lethal. Have exhaust piping rerouted on the vehicle if exhaust fumes are a routine problem in the operating area. Be aware of reducing the amount of time the engine operates or idles. No work will occur during electrical storms. Temporary power should be limited in use as much as practical. For example, daylight operations should be performed in lieu of nighttime operations requiring artificial lighting. Energized equipment should be protected by over-current and ground-fault devices. The equipment should be designed for outdoor and weatherproof conditions. When driven by the rig, use electrical equipment and tools that are compatible with the rig's electrical systems. Operating controls and gauges should be kept free of debris, grease, oil, etc. These devices should remain clear to operate, and should remain visible during operations. Periodic wipe downs and washes of controls and gauges should be included in the normal operating procedures.</p>				M	
						M	
Equipment to be Used	Training Requirements/Competent	Inspection Requirements					
Hand tools; Power tools; Generator; Heavy equipment; Hand sprayer; 5-gallon buckets; 55-gallon drum; Pressure Washer; Trash pump; Vacuum Truck; Spill kit; Safety tote; PPE. Heavy Equipment: Drill rig	Site orientation briefing and APP/SSHP/AHA review; HAZWOPER training; Fall protection training; First-aid/CPR training (minimum two persons on site); Flagger training; Fire extinguisher training; PPE training; HAZCOM training; Lockout/tagout training Proper license(s) to operate equipment	SSHO/QC Daily Site Inspections, Heavy Equipment (Daily), Power Cord Sets (Daily), Power/Hand Tools (Daily), Fire Extinguishers (Monthly), First Aid Kits (Monthly), GFICs (Monthly).					

Activity Hazard Analysis (AHA)							
Activity/Work Task:	Well Surveying	Overall Risk Assessment Code (RAC) (Use highest code)				L	
Project Location:	NSF Indian Head, MD	Risk Assessment Code (RAC) Matrix					
Contract Number:	N40080-12-D-0451	Severity	Probability				
Date Prepared:	11-Apr-14		Frequent	Likely	Occasional	Seldom	Unlikely
Prepared by (Name/Title):	Sean Chelius / SSHO	Catastrophic	E	E	H	H	M
Reviewed by (Name/Title):	Patrick Schauble / PM	Critical	E	H	H	M	L
		Marginal	H	M	M	L	L
		Negligible	M	L	L	L	L
Notes: (Field Notes, Review Comments, etc.)		<p>Step 1: Review each "Hazard" with identified safety "Controls" and determine RAC (See above)</p> <p>"Probability" is the likelihood to cause an incident, near miss, or accident and identified as: Frequent, Likely, Occasional, Seldom or Unlikely.</p> <p>"Severity" is the outcome/degree if an incident, near miss, or accident did occur and identified as: Catastrophic, Critical, Marginal, or Negligible</p> <p>Step 2: Identify the RAC (Probability/Severity) as E, H, M, or L for each "Hazard" on AHA. Annotate the overall highest RAC at the top of AHA.</p>					
		RAC Chart					
		E = Extremely High Risk					
		H = High Risk					
		M = Moderate Risk					
		L = Low Risk					
Job Steps	Hazards	Controls				RAC	
Transportation to and from site	Traffic accidents	Follow safe driving practices. Stay alert.				L	
Driving onsite	Risk of striking pedestrians, deer, other vehicles, or site appurtenances.	Stay alert. Look before backing. Drive at reduced speeds (as posted). Workers in open areas should don reflective clothing so they are noticeable.				L	
Loading and unloading equipment/supplies	Slip trips or fall risk. Lifting hazards. Pinch hazards.	Use legs and hold loads close to body when lifting. Lift with knees not back. Follow good house keeping practices. Stow equipment away safely. Stow chemicals appropriately. Flammables may only be stored in flammable storage lockers. Forklift may only be operated by trained persons. Be aware of site traffic while performing survey duties.				L	
	Biological Hazards: Potential exposure to poisonous plants, snakes, spiders, rodents, insects, ticks, and mosquitoes	Watch for, and avoid contact with, poisonous plants, snakes, spiders, rodents, insects, ticks and mosquitoes. Do not drink the water on site.				L	
	Physical Hazards: Fire protection overhead utilities vehicle and equipment traffic material handling tools machinery and equipment use electrical equipment and lockout/tagout noise exposure heat/cold stress inclement weather adverse environmental conditions	<u>Fire Hazards:</u> Gasoline and diesel fuel will be used for vehicle operation. Require fire extinguishers for each site location. Allow smoking only in designated areas. OSHA-approved metal safety cans, painted red with a yellow stripe, that have self-closing lids and flame arrestors must be used to store small amounts of flammable liquids. Hot work is prohibited in areas where flammable materials, equipment containing flammable materials, and contaminated soil air emissions may be present.				L	
		<u>Overhead utilities will be present.</u> Survey for overhead utilities before bringing equipment with high extensions into a work area. Do <u>not</u> operate equipment within 10 feet of overhead lines				L	
		<u>Concurrent use of vehicles and ground personnel will occur.</u> Establish traffic control procedures when there is vehicle and/or pedestrian traffic present. Have workers wear high-visibility safety vests with reflective striping when working near traffic areas. Advise workers to look carefully where they walk to avoid vehicles and moving equipment. Use traffic control devices as needed				L	
		<u>Material handling involving lifting, and carrying will be required.</u> Wear work gloves when handling materials. Watch for items that can cut, puncture, pinch, or crush. Use proper lifting technique. Size up load, get help for heavy or awkward items, get good grasp on object to be lifted, keep load close to body, keep back straight, lift with legs <u>not</u> with back, and do <u>not</u> twist when lifting. Review material handling procedures during safety meetings.				L	
		<u>Hand and power tools may be used.</u> Use the proper tool for the job. Use GFCIs for power tool operation. Use safety glasses. Do <u>not</u> use damaged tools. Properly secure materials when working on them. Make sure area is adequately clear when using equipment. Inspect electrical cords.				L	
		<u>Generators may be used to provide electrical power.</u> Use GFCIs for portable electrical equipment. Inspect electrical extension cords for damage and ground plugs. Keep electrical equipment/cords away from water and fuel materials. Use lockout/tagout procedures.				L	
		<u>Noise exposure above 85 dBA is expected when working near or operating machinery and equipment.</u> Monitor for noise levels. Wear earplugs for protection.				L	
		<u>Heat stress may occur when elevated ambient temperatures, moderate to heavy workloads, and/or use of impermeable protective clothing occur.</u> Adjust work-rest schedules as needed. Work at a steady pace. Drink fluids. Take rest breaks and use shaded rest area. Know the signs and symptoms of heat exposure and emergency treatment. <u>Cold stress may occur during the winter/fall/spring months.</u> Minimize exposures to cold temperatures below 45°F. Wear insulated clothing. Know the signs and symptoms of cold exposure and emergency treatment.				L	
		<u>Inclement weather conditions such as strong winds, heavy rain or lightning, and snow may occur during outdoor operations.</u> Suspend outdoor operations during inclement weather or when other adverse environmental conditions exist.				L	
Equipment to be Used	Training Requirements/Competent or	Inspection Requirements					
Survey Equipment Trucks/field vehicles	Site orientation briefing and APP/HASP HazWOPER Training First Aid/CPR training	Safety Inspection Vehicle Inspection					

Attachment A

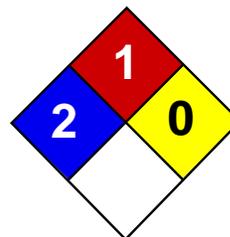
Health & Safety Plan Review Record

Attachment B

Site Entry and Exit Log

Attachment C

Material Data Safety Sheets



Health	2
Fire	1
Reactivity	0
Personal Protection	H

Material Safety Data Sheet Trichloroethylene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Trichloroethylene

Catalog Codes: SLT3310, SLT2590

CAS#: 79-01-6

RTECS: KX4560000

TSCA: TSCA 8(b) inventory: Trichloroethylene

CI#: Not available.

Synonym:

Chemical Formula: C₂HCl₃

Contact Information:

Sciencelab.com, Inc.

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:

1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Trichloroethylene	79-01-6	100

Toxicological Data on Ingredients: Trichloroethylene: ORAL (LD50): Acute: 5650 mg/kg [Rat]. 2402 mg/kg [Mouse].
DERMAL (LD50): Acute: 20001 mg/kg [Rabbit].

Section 3: Hazards Identification

Potential Acute Health Effects: Hazardous in case of skin contact (irritant, permeator), of eye contact (irritant), of ingestion, of inhalation.

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Classified + (PROVEN) by OSHA. Classified A5 (Not suspected for human.) by ACGIH.

MUTAGENIC EFFECTS: Not available. **TERATOGENIC EFFECTS:** Not available. **DEVELOPMENTAL TOXICITY:** Not available. The substance is toxic to kidneys, the nervous system, liver, heart, upper respiratory tract. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.

Skin Contact:

After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:

Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: 420°C (788°F)

Flash Points: Not available.

Flammable Limits: LOWER: 8% UPPER: 10.5%

Products of Combustion: These products are carbon oxides (CO, CO₂), halogenated compounds.

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:

SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:

Absorb with an inert material and put the spilled material in an appropriate waste disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep locked up Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapour/

spray. Wear suitable protective clothing In case of insufficient ventilation, wear suitable respiratory equipment If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes

Storage:

Keep container dry. Keep in a cool place. Ground all equipment containing material. Carcinogenic, teratogenic or mutagenic materials should be stored in a separate locked safety storage cabinet or room.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:

Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:

TWA: 50 STEL: 200 (ppm) from ACGIH (TLV) TWA: 269 STEL: 1070 (mg/m³) from ACGIH Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Not available.

Taste: Not available.

Molecular Weight: 131.39 g/mole

Color: Clear Colorless.

pH (1% soln/water): Not available.

Boiling Point: 86.7°C (188.1°F)

Melting Point: -87.1°C (-124.8°F)

Critical Temperature: Not available.

Specific Gravity: 1.4649 (Water = 1)

Vapor Pressure: 58 mm of Hg (@ 20°C)

Vapor Density: 4.53 (Air = 1)

Volatility: Not available.

Odor Threshold: 20 ppm

Water/Oil Dist. Coeff.: The product is equally soluble in oil and water; log(oil/water) = 0

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, methanol, diethyl ether, acetone.

Solubility:

Easily soluble in methanol, diethyl ether, acetone. Very slightly soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity:

Extremely corrosive in presence of aluminum. Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:

Acute oral toxicity (LD50): 2402 mg/kg [Mouse]. Acute dermal toxicity (LD50): 20001 mg/kg [Rabbit].

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: Classified + (PROVEN) by OSHA. Classified A5 (Not suspected for human.) by ACGIH. The substance is toxic to kidneys, the nervous system, liver, heart, upper respiratory tract.

Other Toxic Effects on Humans: Hazardous in case of skin contact (irritant, permeator), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Passes through the placental barrier in human. Detected in maternal milk in human.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : Trichloroethylene : UN1710 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Trichloroethylene California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Trichloroethylene Pennsylvania RTK: Trichloroethylene Florida: Trichloroethylene Minnesota: Trichloroethylene Massachusetts RTK: Trichloroethylene New Jersey: Trichloroethylene TSCA 8(b) inventory: Trichloroethylene CERCLA: Hazardous substances.: Trichloroethylene

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):

CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC). CLASS D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):

R36/38- Irritating to eyes and skin. R45- May cause cancer.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:54 PM

Last Updated: 05/21/2013 12:00 PM

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MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MATHESON TRI-GAS, INC.
150 Allen Road Suite 302
Basking Ridge, New Jersey 07920
Information: 1-800-416-2505

Emergency Contact:
CHEMTREC 1-800-424-9300
Calls Originating Outside the US:
703-527-3887 (Collect Calls Accepted)

SUBSTANCE: TETRACHLOROETHYLENE

TRADE NAMES/SYNONYMS:

MTG MSDS 238; PERCHLOROETHYLENE; 1,1,2,2-TETRACHLOROETHYLENE; ETHYLENE TETRACHLORIDE; PERC; TETRACHLORETHYLENE; PERCHLORETHYLENE; TETRACHLOROETHENE; PCE; RCRA U210; UN 1897; C2Cl4; MAT22900; RTECS KX3850000

CHEMICAL FAMILY: halogenated, aliphatic

CREATION DATE: Jan 24 1989

REVISION DATE: Dec 11 2008

2. COMPOSITION, INFORMATION ON INGREDIENTS

COMPONENT: TETRACHLOROETHYLENE
CAS NUMBER: 127-18-4
PERCENTAGE: 100.0

3. HAZARDS IDENTIFICATION

NFPA RATINGS (SCALE 0-4): HEALTH=3 FIRE=0 REACTIVITY=0



EMERGENCY OVERVIEW:

COLOR: colorless

PHYSICAL FORM: volatile liquid

ODOR: faint odor, sweet odor

MAJOR HEALTH HAZARDS: respiratory tract irritation, skin irritation, eye irritation, central nervous system depression, cancer hazard (in humans)

POTENTIAL HEALTH EFFECTS:

INHALATION:

SHORT TERM EXPOSURE: irritation, nausea, vomiting, chest pain, difficulty breathing, irregular

heartbeat, headache, drowsiness, dizziness, disorientation, mood swings, loss of coordination, blurred vision, lung congestion, kidney damage, liver damage

LONG TERM EXPOSURE: irritation, nausea, stomach pain, loss of appetite, headache, drowsiness, dizziness, disorientation, sleep disturbances, pain in extremities, loss of coordination, blurred vision, hormonal disorders, internal bleeding, heart damage, liver damage, birth defects, brain damage, tumors, cancer

SKIN CONTACT:

SHORT TERM EXPOSURE: irritation (possibly severe)

LONG TERM EXPOSURE: irritation

EYE CONTACT:

SHORT TERM EXPOSURE: irritation

LONG TERM EXPOSURE: irritation

INGESTION:

SHORT TERM EXPOSURE: same as effects reported in short term inhalation

LONG TERM EXPOSURE: same as effects reported in long term inhalation

4. FIRST AID MEASURES

INHALATION: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.

SKIN CONTACT: Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse.

EYE CONTACT: Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

INGESTION: If vomiting occurs, keep head lower than hips to help prevent aspiration. If person is unconscious, turn head to side. Get medical attention immediately.

NOTE TO PHYSICIAN: For inhalation, consider oxygen. For ingestion, consider gastric lavage. Consider oxygen.

5. FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARDS: Negligible fire hazard.

EXTINGUISHING MEDIA: carbon dioxide, regular dry chemical

Large fires: Use regular foam or flood with fine water spray.

FIRE FIGHTING: Cool containers with water spray until well after the fire is out. Stay away from the ends

of tanks. For tank, rail car or tank truck, evacuation radius: 800 meters (1/2 mile).

FLASH POINT: No data available.

6. ACCIDENTAL RELEASE MEASURES

SOIL RELEASE:

Dig holding area such as lagoon, pond or pit for containment. Dike for later disposal. Absorb with sand or other non-combustible material.

WATER RELEASE:

Absorb with activated carbon. Remove trapped material with suction hoses. Subject to California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65). Keep out of water supplies and sewers.

OCCUPATIONAL RELEASE:

Avoid heat, flames, sparks and other sources of ignition. Stop leak if possible without personal risk. Small liquid spills: Absorb with sand or other non-combustible material. Large spills: Dike for later disposal. Remove sources of ignition. Keep unnecessary people away, isolate hazard area and deny entry. Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).

7. HANDLING AND STORAGE

STORAGE: Store and handle in accordance with all current regulations and standards. Store in a cool, dry place. Store in a well-ventilated area. Avoid heat, flames, sparks and other sources of ignition. Keep separated from incompatible substances.

8. EXPOSURE CONTROLS, PERSONAL PROTECTION

EXPOSURE LIMITS:

TETRACHLOROETHYLENE:

TETRACHLOROETHYLENE (PERCHLOROETHYLENE):

100 ppm OSHA TWA

200 ppm OSHA ceiling

300 ppm OSHA peak (5 minutes in any 3 hours)

25 ppm (170 mg/m³) OSHA TWA (vacated by 58 FR 35338, June 30, 1993)

25 ppm ACGIH TWA

100 ppm ACGIH STEL

NIOSH TWA (lowest feasible concentration)

VENTILATION: Provide local exhaust or process enclosure ventilation system. Ensure compliance with applicable exposure limits.

EYE PROTECTION: Wear splash resistant safety goggles. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

CLOTHING: Wear appropriate chemical resistant clothing.

GLOVES: Wear appropriate chemical resistant gloves.

RESPIRATOR: The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA.

At any detectable concentration -

Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.

Any supplied-air respirator with a full facepiece that is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode.

Escape -

Any air-purifying full-facepiece respirator (gas mask) with a chin-style, front-mounted or back-mounted organic vapor canister.

Any appropriate escape-type, self-contained breathing apparatus.

For Unknown Concentrations or Immediately Dangerous to Life or Health -

Any supplied-air respirator with a full facepiece that is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode.

Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: liquid

APPEARANCE: clear

COLOR: colorless

PHYSICAL FORM: volatile liquid

ODOR: faint odor, sweet odor

MOLECULAR WEIGHT: 165.83

MOLECULAR FORMULA: C₁₂-C-C-C₁₂

BOILING POINT: 250 F (121 C)

FREEZING POINT: -2 F (-19 C)

VAPOR PRESSURE: 14 mmHg @ 20 C

VAPOR DENSITY (air=1): 5.83

SPECIFIC GRAVITY (water=1): 1.6227

WATER SOLUBILITY: 0.015%

PH: Not available

VOLATILITY: Not available

ODOR THRESHOLD: 50 ppm

EVAPORATION RATE: 2.8 (butyl acetate=1)

COEFFICIENT OF WATER/OIL DISTRIBUTION: Not available

SOLVENT SOLUBILITY:

Soluble: alcohol, ether, benzene, chloroform, oils

10. STABILITY AND REACTIVITY

REACTIVITY: Stable at normal temperatures and pressure.

CONDITIONS TO AVOID: Avoid heat, flames, sparks and other sources of ignition. Containers may rupture or explode if exposed to heat.

INCOMPATIBILITIES: acids, metals, bases, oxidizing materials, combustible materials

HAZARDOUS DECOMPOSITION:

Thermal decomposition products: phosgene, halogenated compounds, oxides of carbon

POLYMERIZATION: Will not polymerize.

11. TOXICOLOGICAL INFORMATION

TETRACHLOROETHYLENE:

IRRITATION DATA: 810 mg/24 hour(s) skin-rabbit severe; 500 mg/24 hour(s) skin-rabbit mild; 162 mg eyes-rabbit mild; 500 mg/24 hour(s) eyes-rabbit mild

TOXICITY DATA: 4100 ppm/6 hour(s) inhalation-rat LC50; >10000 mg/kg skin-rabbit LD50 (Dow); 2629 mg/kg oral-rat LD50

CARCINOGEN STATUS: NTP: Anticipated Human Carcinogen; IARC: Human Limited Evidence, Animal Sufficient Evidence, Group 2A; ACGIH: A3 -Confirmed Animal Carcinogen; EC: Category 2

LOCAL EFFECTS:

Irritant: inhalation, skin, eye

ACUTE TOXICITY LEVEL:

Moderately Toxic: ingestion

Slightly Toxic: inhalation

TARGET ORGANS: central nervous system

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: eye disorders, heart or cardiovascular disorders, kidney disorders, liver disorders, nervous system disorders, skin disorders and allergies

TUMORIGENIC DATA: Available.

MUTAGENIC DATA: Available.

REPRODUCTIVE EFFECTS DATA: Available.

ADDITIONAL DATA: May be excreted in breast milk. Alcohol may enhance the toxic effects. Stimulants such as epinephrine may induce ventricular fibrillation.

12. ECOLOGICAL INFORMATION

ECOTOXICITY DATA:

FISH TOXICITY: 8430 ug/L 96 hour(s) LC50 (Mortality) Flagfish (*Jordanella floridae*)

INVERTEBRATE TOXICITY: 7500 ug/L 48 hour(s) EC50 (Immobilization) Water flea (*Daphnia magna*)

ALGAL TOXICITY: 509000 ug/L 96 hour(s) EC50 (Photosynthesis) Diatom (*Skeletonema costatum*)

FATE AND TRANSPORT:

BIOCONCENTRATION: 49 ug/L 1-21 hour(s) BCF (Residue) Bluegill (*Lepomis macrochirus*) 3.43 ug/L

13. DISPOSAL CONSIDERATIONS

Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): U210. Hazardous Waste Number(s): D039. Dispose of in accordance with U.S. EPA 40 CFR 262 for concentrations at or above the Regulatory level. Regulatory level- 0.7 mg/L. Dispose in accordance with all applicable regulations.

14. TRANSPORT INFORMATION

U.S. DOT 49 CFR 172.101:

PROPER SHIPPING NAME: Tetrachloroethylene

ID NUMBER: UN1897

HAZARD CLASS OR DIVISION: 6.1

PACKING GROUP: III

LABELING REQUIREMENTS: 6.1

MARINE POLLUTANT: TETRACHLOROETHYLENE



CANADIAN TRANSPORTATION OF DANGEROUS GOODS:

SHIPPING NAME: Tetrachloroethylene

UN NUMBER: UN1897

CLASS: 6.1

PACKING GROUP/CATEGORY: III

15. REGULATORY INFORMATION

U.S. REGULATIONS:

CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4):

TETRACHLOROETHYLENE (PERCHLOROETHYLENE): 100 LBS RQ

SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355 Subpart B): Not regulated.

SARA TITLE III SECTION 304 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355 Subpart

C): Not regulated.

SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370 Subparts B and C):

ACUTE: Yes

CHRONIC: Yes

FIRE: No

REACTIVE: No

SUDDEN RELEASE: No

**SARA TITLE III SECTION 313 (40 CFR 372.65):
TETRACHLOROETHYLENE (PERCHLOROETHYLENE)**

OSHA PROCESS SAFETY (29 CFR 1910.119): Not regulated.

STATE REGULATIONS:

California Proposition 65:

Known to the state of California to cause the following:

TETRACHLOROETHYLENE (PERCHLOROETHYLENE)

Cancer (Apr 01, 1988)

CANADIAN REGULATIONS:

WHMIS CLASSIFICATION: D2

NATIONAL INVENTORY STATUS:

U.S. INVENTORY (TSCA): Listed on inventory.

TSCA 12(b) EXPORT NOTIFICATION: Not listed.

CANADA INVENTORY (DSL/NDSL): Not determined.

16. OTHER INFORMATION

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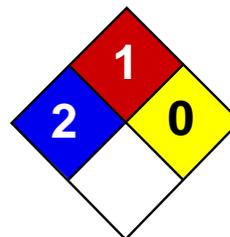
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Health	2
Fire	1
Reactivity	0
Personal Protection	E

Material Safety Data Sheet Cobalt MSDS

Section 1: Chemical Product and Company Identification

Product Name: Cobalt

Catalog Codes: SLC1684, SLC3475

CAS#: 7440-48-4

RTECS: GF8750000

TSCA: TSCA 8(b) inventory: Cobalt

CI#: Not available.

Synonym:

Chemical Formula: Co

Contact Information:

Sciencelab.com, Inc.

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:

1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Cobalt	7440-48-4	100

Toxicological Data on Ingredients: Cobalt: ORAL (LD50): Acute: 6170 mg/kg [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects: Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.

Potential Chronic Health Effects:

Hazardous in case of inhalation. **CARCINOGENIC EFFECTS:** Classified A3 (Proven for animal.) by ACGIH. **MUTAGENIC EFFECTS:** Not available. **TERATOGENIC EFFECTS:** Not available. **DEVELOPMENTAL TOXICITY:** Not available. The substance is toxic to lungs. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact: Check for and remove any contact lenses. Do not use an eye ointment. Seek medical attention.

Skin Contact:

After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:

Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:

Flammable solid. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:

Flammable solid. Stop leak if without risk. Do not touch spilled material. Use water spray curtain to divert vapor drift. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep locked up Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable protective clothing In case of insufficient ventilation, wear suitable respiratory equipment If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes

Storage:

Flammable materials should be stored in a separate safety storage cabinet or room. Keep away from heat. Keep away from sources of ignition. Keep container tightly closed. Keep in a cool, well-ventilated place. Ground all equipment containing material. Keep container dry. Keep in a cool place.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:

Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:

TWA: 0.05 (mg/m³) from OSHA Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid.

Odor: Not available.

Taste: Not available.

Molecular Weight: 58.93 g/mole

Color: Not available.

pH (1% soln/water): Not applicable.

Boiling Point: 3100°C (5612°F)

Melting Point: 1493°C (2719.4°F)

Critical Temperature: Not available.

Specific Gravity: 8.92 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Eye contact. Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 6170 mg/kg [Rat].

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH. The substance is toxic to lungs.

Other Toxic Effects on Humans: Hazardous in case of skin contact (irritant), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the original product.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 4.1: Flammable solid.

Identification: : Metal powder, Flammable, n.o.s. (Cobalt metal, powder) : UN3089 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Cobalt California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Cobalt Pennsylvania RTK: Cobalt Massachusetts RTK: Cobalt TSCA 8(b) inventory: Cobalt

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada): CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):

R36/38- Irritating to eyes and skin. R40- Possible risks of irreversible effects.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/09/2005 04:57 PM

Last Updated: 05/21/2013 12:00 PM

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beryllium dust on its internal surface poses a potentially serious fire hazard. Extinguishing using Class D fire extinguisher media and shut down or isolate the affected portion of the ventilation system. Because of this potential risk, sources of ignition such as flame, spark, etc. must not be allowed to enter the ventilation duct work. Also, duct work must be made of non-combustible material.

V HEALTH HAZARD INFORMATION

Primary Routes of Exposure: Inhalation: An exposure to airborne beryllium in excess of the occupational standard can occur during routine handling, material transfer, chemical processing or further processing of powdered material and when machining, melting, casting, gross handling, picking, welding, grinding, sanding, polishing, milling, crushing, or otherwise abrading the surface of solid beryllium in a manner which generates finely divided particles. Machining operations conducted under a flood of liquid coolant usually require local exhaust ventilation. The cycling through a machine of liquid lubricant/coolant containing finely divided beryllium in suspension can result in the concentration building to a point where the particulate may become airborne during use. A filter, centrifuge, or settling chamber can be installed in-line if necessary. The potential for exposures also may occur during repair or maintenance activities on contaminated equipment such as: furnace rebuilding, maintenance or repair of air cleaning equipment, structural renovation, welding, etc.

Acute Effects:

Inhalation: This product is insoluble and does not cause acute health effects.

Ingestion: This product is insoluble and does not cause acute health effects.

Skin: Skin abrasion may cause irritation.

Eye: Injury to the eyes can result from particulate irritation or mechanical injury to the cornea or conjunctiva by dust or particulate.

Chronic Effects:

Inhalation: Overexposure to airborne beryllium particulate may cause a serious lung disease, in certain sensitive individuals, called chronic beryllium disease (chronic berylliosis). Chronic beryllium disease is a condition in which the tissues of the lungs become inflamed, restricting the exchange of oxygen between the lungs and the bloodstream. Symptoms may include cough, chest pain, shortness of breath, weight loss, weakness, and fatigue. Long term effects may include loss of lung function, fibrosis, or subsequent secondary effects on the heart with eventual permanent impairment.

Ingestion: There are no known cases of illness resulting from ingestion of beryllium.

Skin: Skin abrasion may cause irritation.

Eye: Injury to the eyes can result from particulate irritation or mechanical injury to the cornea or conjunctiva by dust or particulate.

Carcinogenic references: Hazard communication regulations of the U.S. Occupational Safety & Health Administration require that caution labels for materials listed as potential carcinogens in either the International Agency for Cancer Research Monograph Series or the National Toxicology Program Annual Report on carcinogens must contain a cancer warning. Beryllium has also been so listed based principally on animal tests and therefore this material bears a label identifying it as a potential cancer hazard.

Medical Conditions Aggravated by Exposure: Persons with impaired pulmonary function, airway diseases, or conditions such as asthma, emphysema, chronic bronchitis, etc. may incur further impairment if excessive concentrations of dust or fume are inhaled. If prior damage or disease to the neurologic (nervous), circulatory, hematologic (blood), or urinary (kidney) system has occurred, proper screening or examinations should be conducted on individuals who may be exposed to further risk where handling and use of this material may cause excessive exposure.

EMERGENCY AND FIRST AID PROCEDURES:

INHALATION: Remove to fresh air. Although no cases in which a person stopped breathing as a result of exposure are known, if breathing has stopped, perform artificial respiration and obtain medical help.

INGESTION: Swallowing metal powder or dust can be treated by having the affected person drink large quantities of water and attempting to induce vomiting if conscious. Obtain medical help.

SKIN: Remove contaminated clothing, brush material off skin, wash affected area with soap and water. If irritation persists, seek medical attention.

EYE: Flush eyes with copious amounts of clean water. If irritation persists obtain medical help. Contact lenses should not be worn when working with metal dusts and powders because the contact lens must be removed to provide adequate treatment.

VI REACTIVITY DATA

Stability: Stable

Conditions to Avoid: Oxidation will form on solid shapes when moist.

Incompatibility (Material to Avoid): Avoid contact with mineral acids and oxidizing agents which may generate hydrogen gas. Hydrogen gas can be an explosion hazard.

Hazardous Decomposition Products: Melting and dross handling or powdering operations can emit airborne dusts or fumes.

Hazardous Polymerization: Will not Occur

VII SPILL AND LEAK PROCEDURES

Steps to Be Taken in Case Material Is Released or Spilled: In solid form this material poses no health or environmental risk. If this material is in powder or dust form, establish a restricted entry zone based on the severity of the spill. Persons entering the restricted zone must wear adequate respiratory protection and protective clothing appropriate for the severity of the spill. Cleanup should be conducted with a vacuum system utilizing a high efficiency particulate air filtration system followed by wet cleaning methods. Special care must be taken when changing filters on HEPA vacuum cleaners when used to clean up potentially toxic materials. Caution should be taken to minimize airborne generation of powder or dust and avoid contamination of air and water. Depending upon the quantity of material released, fine powder or dust spills to the environment may require reporting the National Response Center at (800) 424-8802 as well as the State Emergency Response Commission and Local Emergency Planning Committee.

Waste Disposal Method: Dispose of in accordance with State, Federal and Local regulations.

VIII SPECIAL PROTECTION INFORMATION

Respiratory Protection: When potential exposures are above the occupational limits, approved respirators must be used. Exposure to unknown concentrations of fumes or dusts requires the wearing of a pressure-dem and self-contained breathing apparatus. Pressure-demand airline respirators are recommended for jobs with high potential exposures such as changing bags in a baghouse air cleaning device.

Ventilation: Whenever possible the use of local exhaust ventilation or other engineering controls is the preferred method of controlling exposure to airborne dust and fume to meet established occupational exposure limits. Powders should be stored and transported in tightly sealed containers and must only be handled under controlled ventilated conditions.

Protective Gloves: Wear gloves to prevent metal cuts and skin abrasions particularly during handling.

Eye Protection: Wear safety glasses, goggles, face shield, or welders helmet.

Other Protective Equipment: No protective equipment or clothing is required when handling solid forms. Protective overgarment or work clothing should be worn by persons who may become contaminated with dusts, fumes, or powders.

Work Practices: Vacuum or wet cleaning methods are recommended for dust removal. Be certain to de-energize electrical systems as necessary before beginning wet cleaning. Vacuum cleaners with high efficiency particulate air (HEPA) filters are the recommended type. The use of compressed air to remove dusts should be avoided as such an activity can result in unnecessary short-term elevated exposures to dusts. Contaminated work clothing and overgarment should be managed in such a manner so as to prevent secondary exposure to persons such as laundry operators and to prevent contamination to personal clothing. Never use compressed air to clean work clothing.

IX SPECIAL PRECAUTIONS

Packaging and Labeling Requirements: The following requirements of the U.S. Dept. of Transportation apply only to beryllium metal powder or dust, not to solid shapes:

Shipping Name: RQ Flammable Solid, Poisonous, N.O.S. (Beryllium Metal Powder).

NOTE: Must be marked on shipping papers and on the outside of the shipping container.

Hazard Class: Beryllium metal powder and dust are classified as Flammable Solid and Class B Poison.
NOTE: Hazard class must be included on shipping papers.

Identification Number: UN2926
NOTE: Must be marked on shipping papers and on the outside of the shipping container.

Label(s) Required: Flammable Solid and Poison (For Beryllium Metal Powder or Dust Only).
NOTE: Place on the outside of the shipping container.

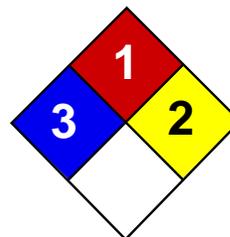
Reportable Quantity: 10 lbs. (4.54).
NOTE: The RQ is limited to particles having a diameter less than 100 micrometers.

DOT Specification Container: Suitable for Flammable Solids. Recommended double overpack when shipping powder.

Other: Emergency response information is provided within this MSDS.
NOTE: This information must be included, in some form, with the shipping papers.

SARA Title III: Beryllium is reportable under Section 313

Issued by: S. Dierks
Date: November 1992



Health	3
Fire	1
Reactivity	2
Personal Protection	E

Material Safety Data Sheet Arsenic MSDS

Section 1: Chemical Product and Company Identification

Product Name: Arsenic

Catalog Codes: SLA1006

CAS#: 7440-38-2

RTECS: CG0525000

TSCA: TSCA 8(b) inventory: Arsenic

CI#: Not applicable.

Synonym:

Chemical Name: Arsenic

Chemical Formula: As

Contact Information:

Sciencelab.com, Inc.

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:

1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Arsenic	7440-38-2	100

Toxicological Data on Ingredients: Arsenic: ORAL (LD50): Acute: 763 mg/kg [Rat]. 145 mg/kg [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:

Very hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant), of eye contact (irritant).

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH. **MUTAGENIC EFFECTS:** Not available.

TERATOGENIC EFFECTS: Not available. **DEVELOPMENTAL TOXICITY:** Not available. The substance is toxic to kidneys, lungs, the nervous system, mucous membranes. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Flammable in presence of open flames and sparks, of heat, of oxidizing materials.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:

SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards:

Material in powder form, capable of creating a dust explosion. When heated to decomposition it emits highly toxic fumes.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:

Use a shovel to put the material into a convenient waste disposal container. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep locked up.. Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable

protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents, acids, moisture.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:

TWA: 0.01 from ACGIH (TLV) [United States] [1995] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Lustrous solid.)

Odor: Not available.

Taste: Not available.

Molecular Weight: 74.92 g/mole

Color: Silvery.

pH (1% soln/water): Not applicable.

Boiling Point: Not available.

Melting Point: Sublimation temperature: 615°C (1139°F)

Critical Temperature: Not available.

Specific Gravity: 5.72 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Insoluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Reactive with oxidizing agents, acids, moisture.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 145 mg/kg [Mouse].

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH. Causes damage to the following organs: kidneys, lungs, the nervous system, mucous membranes.

Other Toxic Effects on Humans:

Very hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are as toxic as the original product.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : Arsenic UNNA: UN1558 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Arsenic California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Arsenic Pennsylvania RTK: Arsenic Massachusetts RTK: Arsenic TSCA 8(b) inventory: Arsenic

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:**WHMIS (Canada):**

CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):

R22- Harmful if swallowed. R45- May cause cancer.

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 1

Reactivity: 2

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 1

Reactivity: 2

Specific hazard:

Protective Equipment:

Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Safety glasses.

Section 16: Other Information**References:**

-Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987. -Liste des produits purs tératogènes, mutagènes, cancérogènes. Répertoire toxicologique de la Commission de la Santé et de la Sécurité du Travail du Québec. -Material safety data sheet emitted by: la Commission de la Santé et de la Sécurité du Travail du Québec. -SAX, N.I. Dangerous Properties of Industrial Materials. Toronto, Van Nostrand Reinold, 6e ed. 1984. -The Sigma-Aldrich Library of Chemical Safety Data, Edition II. -Guide de la loi et du règlement sur le transport des marchandises dangereuses au Canada. Centre de conformité international Ltée. 1986.

Other Special Considerations: Not available.

Created: 10/09/2005 04:16 PM

Last Updated: 06/09/2012 12:00 PM

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Attachment D
Personnel Records

THE NATIONAL ENVIRONMENTAL TRAINERS

Patrick Schauble

has satisfactorily passed an exam and completed an 8-hour annual refresher training course entitled
Hazardous Waste Operations and Emergency Response
meeting the requirements identified in Title 29 CFR 1910.120.

This course has been awarded 1.34 Industrial Hygiene CM Points by the American Board of Industrial Hygiene-Approval Number 13334. This course is also eligible for .66 Continuance of Certification (COC) points from the Board of Certified Safety Professionals



September 21, 2012

Course Number 1002, Awarded 8 PDH's
Florida Board of Professional Engineers
CEU Provider Number 0004284

www.nationalenvironmentaltrainers.com

Signature of Instructor

A handwritten signature in black ink, appearing to read "C. Bednarz", is written over a light gray grid background.

Clay A. Bednarz, MS, RPIH



certifies that

SEAN CHELIUS

has successfully completed ClickSafety's web-based training course:

OSHA 30 Hour Construction

This course was developed and presented by ClickSafety.com, Inc.

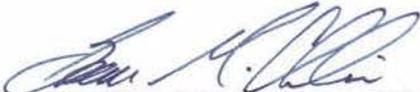


I attest to personally completing the
above course.

9923853
SERIAL NUMBER

3/10/2014
COMPLETION DATE

30.25 HOURS
COURSE DURATION


STUDENT SIGNATURE



eTraining, Inc.

Certificate of Completion

This certifies that

Sean Chelius

has received 8 hours of training for successfully completing the

2014 Hazwoper 8 Hour Refresher

OSHA 29 CFR 1910.120/1926.65

April 23, 2014

Certificate Number: **35821**

www.etraintoday.com

Handwritten signature of Niall O'Malley in black ink.

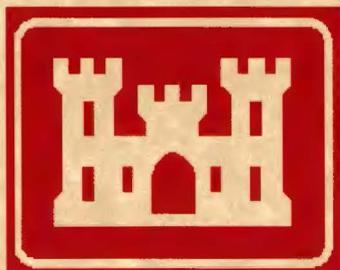
Niall O'Malley, President

Handwritten signature of Larry A. Baylor in black ink.

Larry A. Baylor, VP Content Development

U.S. ARMY CORPS OF ENGINEERS

USACE LEARNING CENTER
HUNTSVILLE, ALABAMA



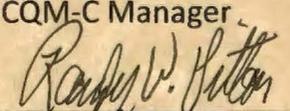
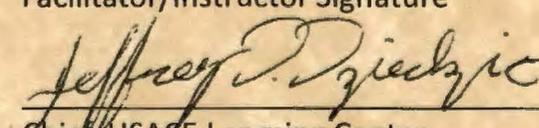
CERTIFICATE

Sean M Chelius

NAB-05-14-03007

has completed the Corps of Engineers and Naval Facility Engineering Command Training Course

CONSTRUCTION QUALITY MANAGEMENT FOR CONTRACTORS - #784

<u>Timonium, Maryland</u> Location	<u>November 7, 2013</u> Training Date(s)	<u>NAB /WA 1CEU:0.8 LU:8POH:8</u> Instructional District/ NAVFAC	<u>Randy W. Sitton</u> CQM-C Manager
<u>John S. Price / Tom Trulli</u> Facilitator/Instructor	<u>john.s.price@usace.army.mil</u> Email	<u>410-962-3032</u> Telephone	 Facilitator/Instructor Signature
THIS CERTIFICATE EXPIRES FIVE YEARS FROM DATE OF ISSUE			 Chief, USACE Learning Center



Certificate of Completion

Sean Chelius

has successfully completed requirements for

Adult First Aid/CPR/AED - valid 2 Years

conducted by
American Red Cross

Date Completed: **11/08/2013**

Instructors: **Samuel Merman**



Certificate ID: 0ULIL7

To verify, scan code or visit:
redcross.org/confirm