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HEALTH AND SAFETY PLAN SUPPLEMENTAL REMEDIAL INVESTIGATION OF 1, 4-  
DIOXANE IN THE EASTERN PLUME AND BEDROCK NAS BRUNSWICK ME  
09/01/2008  
TETRA TECH NUS

**Health and Safety Plan**  
for  
**Supplemental Remedial  
Investigation of 1,4-Dioxane in the  
Eastern Plume and Bedrock**  
  
**Eastern Plume  
Naval Air Station Brunswick  
Brunswick, Maine**



**Naval Facilities Engineering Command  
Mid-Atlantic**

**Contract Number N62472-03-D-0057**

**Contract Task Order 069**

**September 2008**

HEALTH AND SAFETY PLAN  
SUPPLEMENTAL REMEDIAL INVESTIGATION OF 1,4-DIOXANE IN THE  
EASTERN PLUME AND BEDROCK

EASTERN PLUME  
NAVAL AIR STATION BRUNSWICK  
BRUNSWICK, MAINE

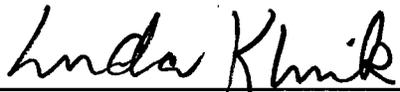
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## 1.0 INTRODUCTION

The objective of this Site Specific Health and Safety Plan (HASP) is to provide the minimum safe work practices and procedures to Tetra Tech NUS, Inc. (TtNUS) subcontractor personnel while engaged in site investigation activities (as described in this Section 1.2) at Naval Air Station Brunswick, Brunswick Maine.

**Authorization:** This Health and Safety Plan (HASP) and the work described herein have been completed under the authorization of:

**Contract:** Comprehensive Long Term Environmental Action – Navy (CLEAN IV) – Northern Division;  
Naval Facilities Engineering Command

**Contract Number:** Contract Number N62472-03-D-0057

**Contract Task Order Number (CTO):** 0069

**Prepared By:** Jennifer Choich, PhD

**Proposed Dates of Work:** October 2008 until completion

**Compliance:** The elements of this HASP are intended to be in compliance with the requirements established by:

- OSHA 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response" (HAZWOPER)
- Applicable sections of 29 CFR 1926 "Safety and Health Regulations for Construction."
- Tetra Tech NUS Health and Safety Program
- NAS Brunswick Policies and Procedures, where and as applicable.

This HASP must be accompanied by the Tetra Tech NUS, Inc. Health and Safety Guidance Manual (TtNUS HSGM). The Guidance Manual provides additional information in the areas of health and safety program elements, standard operating procedures, and safe work practices meant to supplement HASP.

**Modifications/Changes:** The following conditions are considered sufficient basis review and possible changes to this document

- The addition or modification of activities/tasks outside of those specified in Section 1.2, Scope of Work.
- New information becomes available through the course of the investigation or from outside sources.

The Tetra Tech NUS Health and Safety Manager (CLEAN HSM) will determine the need for changes.

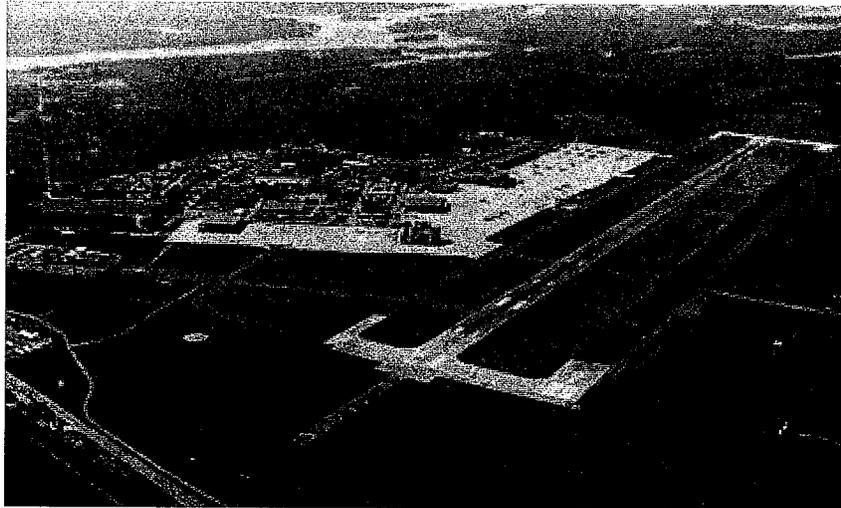
It is the responsibility of the PM to notify affected personnel of changes to this HASP.

## 1.1 SITE BACKGROUND/DESCRIPTION

**Site:** Naval Air Station Brunswick

**Location(s):** Brunswick Maine.

Naval Air Station Brunswick is the last, active-duty Department of Defense airfield remaining in the northeast, and is home to five active duty and two reserve squadrons. Flying Lockheed P-3 "Orion" long-range maritime patrol aircraft tasked by Patrol and Reconnaissance Wing Five, active duty squadrons regularly deploy overseas for six months at a time. NAS Brunswick has 29 tenant commands, including a Reserve P-3 squadron and a Reserve Fleet Logistics Support Squadron flying C-130 "Hercules" transports. In addition, over 1,600 Naval Reservists travel from throughout New England to drill at Naval Air Reserve Brunswick, SeaBee Battalion and numerous other reserve commands.



Approximately 20 percent of NAS Brunswick's activities, facilities and services are in direct support of the AEGIS Destroyer shipbuilding program at nearby Supervisor of Shipbuilding, Bath and the Bath Iron Works Corporation. Also, the Navy's only cold weather Survival, Evasion, Resistance and Escape (SERE) school is taught at Brunswick and on 12,000 acres near Rangeley in northwestern Maine.

As Maine's second largest employer, NAS Brunswick employs 4,863 military and civilian personnel, including 713 officer, 3,493 enlisted personnel and 657 civilians. The air station provides over \$187 million to the local economy, including \$115 million in salaries, \$38 million in contracts and material purchases and \$34 million in medical purchases.

With several area organizations dedicated to maintaining a seamless relationship between the military and civilian communities, NASB officials are actively working as partners with the Military-Community Council,

the Mid-Coast Council for Business Development, the combined Bath-Brunswick Chamber of Commerce, the American Red Cross, and numerous other state, regional and local organizations.

Located near great circle routes for both shipping and air lanes, NAS Brunswick is the base closest to the European theater and NATO commands. As the last active duty DOD airfield in the northeast, with room to grow, the base is poised to provide expanded services and facilities to additional fleet commands as they are needed.

*Information and photo Courtesy of the NASB Home Page.*

### **1.1.1     The Eastern Plume**

The Eastern Plume is located within the central portion of Naval Air Station (NAS) Brunswick. See Figure 1-1.

The contamination has been attributed to past solvent disposal practices from Sites 4, 11, and 13 which are located upgradient from the area of investigation. Nearby Sites 1 and 3 are include in the institutional controls boundary for the Eastern Plume.

The dissolved-phase plume associated with the disposal activities was found to consist primarily of chlorinated VOCs, including PCE, 1,1-DCE, 1,1,1-TCA, and TCE. A groundwater treatment system, which consisted of groundwater extraction wells screened through the shallow and deep zones of the overburden aquifer, and a treatment plant began operation in June 1995 to remediate both the northern and southern lobes of the Eastern Plume and provided hydraulic control of the VOC plume and removed dissolved-phase VOCs from groundwater.

The Eastern Plume covers a large area. The planned supplemental investigation will refine the extent of the 1,4-dioxane plume and bedrock contamination.

Additional NASB background information as well as Eastern Plume background information can be obtained from the UFP-SAP or by contacting the PM.

## **1.2       SCOPE OF WORK/APPLICATION**

Activities planned under this scope of work included:

- Mobilization/Demobilization of personnel, equipment, and supplies

- Removal of Vegetation – Clearing and Grubbing will be conducted using chain saws to remove trees and shrubs from access paths and work areas where the wells will be installed. The trees and shrubs will be pulled out of the immediate travel/work area. They will not be chipped or otherwise sized.
- Monitoring well installation using DPT Drilling
- Rock coring and subsurface soil sampling via Rotasonic Drilling
- Decontamination of drilling components that have come in contact with contaminated media. This activity will employ soap and water wash and rinse are conducted in 5-gallon buckets. Low pressure sprayers are then used to rinse the pieces once clean.
- Multi-media sampling:
  - Groundwater and surface water sampling using a bladder pump, nitrogen gas, dedicated tubing, and stream piezometer/staff gauge
  - IDW sampling - TCLP on drill cuttings; Composite sampling of decon/development/purge water.
- Investigative Derived Waste (IDW) Management including marshaling by the driller which includes transportation of the drums to the marshaling area and placement on pallets and/or use of a frac tank. Tetra Tech NUS, Inc. will be responsible for labeling and creating an inventory.
- Geographical Surveying – Once the wells are installed a Licensed Surveyor will locate horizontal position and vertical elevations.

### **Safe Work Packets**

The activities to be conducted have been segregated into task specific Safe Work Packets within this plan. The elements of the Safe Work Packets will be presented to the field crew prior to conducting the activity. This presentation may be conducted all at once (Site Specific Training) or through individual tail gate sessions as the work is to be completed. The Safe Work Packet addresses:

- Task(s) description
- Hazard Analysis and Control Measures
- Hazard Monitoring information including action levels and general rules of thumb for making assessments in the field.

- Task specific elements/requirements such as training, PPE, decontamination, and supporting program or permit requirements.

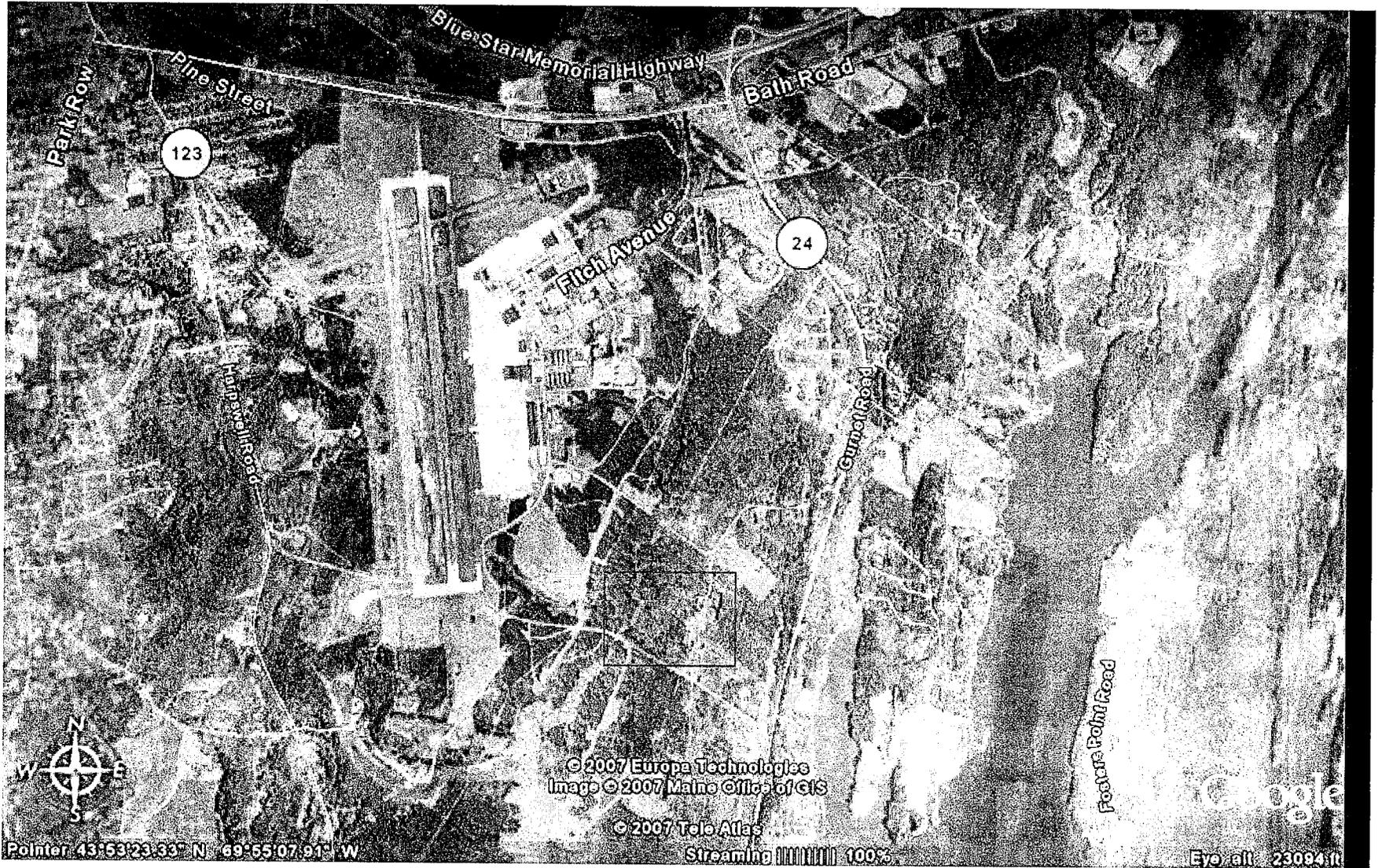
All field personnel will complete the following sections of this HASP regardless of tasks they will conduct or participate in:

- Mobilization/Demobilization Safe Work Packet (applicable sections as determined by the SSO)
- Safe Work Packet describing the Tasks to be performed
- Emergency Action Plan, Section 8.0.

This information has been provided in Safe Work Packets. It is intended to permit the applicable sections to be extracted and supplied to the field crew during the execution of each task or to review as part of Tail Gate/Safety Meetings. The Safe Work Packets shall be reviewed by the FOL with the field crew accomplishing the task initially, then as necessary based on changes of contaminants, site locations, or as new information becomes available.

The FOL/SSO is required to complete the documentation within each packet. The first page of each packet has a checklist that will be checked off when completed.

Figure 1-1, Eastern Plume  
Location



### 1.3 SITE INFORMATION AND PERSONNEL ASSIGNMENTS

This section defines responsibility for site safety and health for Tetra Tech NUS and subcontractor employees engaged in on-site activities. Personnel assigned to these positions will exercise the primary responsibility for on-site health and safety. These persons will be the primary points of contact for any questions regarding the safety and health procedures, selected control measures that are to be implemented for on-site activities.

Project Team Responsibility	Contact Information
NAS Brunswick, Brunswick Maine, Point of Contact: Mr. Mike Fagan	(207) 921-1717
NAS Brunswick, Brunswick Maine, Alternate Point of Contact: Ms. Lisa Joy, Environmental Director	(207) 921-1720
Tetra Tech NUS, Inc. Project Manager (PM) Linda Klink, P.E.	(412) 921-8650
Tetra Tech NUS, Inc. CLEAN Health and Safety Manager (HSM) Matthew Soltis, CIH, CSP	(412) 921-8912
Tetra Tech NUS, Inc. Project Health and Safety Officer (PHSO) Jennifer Choich, PhD	(412) 921-8083
Tetra Tech NUS, Inc. Field Operations Leader (FOL):	TBD
Tetra Tech NUS, Inc. Site Safety and Health Officer (SSHO):	TBD
Drilling Subcontractor(s)	TBD
Geographical Surveyor Subcontractor	TBD
IDW Disposal Subcontractor	TBD

**TBD- To be Determined** – Personnel for these positions will be identified before this document is finalized and contact information will be provided.

### 1.4 SITE CONTAMINANTS

The following information provides physical properties of the contaminants of concern. In addition, Table 1-1 provides a comparison to the contaminant of concern to worst case airborne contamination and PELs/TLVs for these substances. Contaminants of Concern (COCs) include:

- 1,4-Dioxane
- Chlorinated Solvents including Perchloroethylene (PCE), 1,1,1-Trichloroethane (1,1,1-TCA) and Trichloroethylene (TCE), 1,1-Dichloroethene (1,1-DCE).

### **1,4-Dioxane**

**Physical Properties:** 1,4-Dioxane is a colorless liquid with a pleasant odor. Odor thresholds vary from 0.003 to 278 ppm. You will not be able to distinguish this substance in soils or water. This substance has a vapor density of 3.03 meaning it will sink to the lowest point in the area. This substance is flammable and will readily burn. This substance has an ionization potential of 9.19 and is readily detected using a Photoionization Detector (PID) with a 10.6 eV Lamp.

**Acute Toxicity:** Symptoms of exposure or overexposure will include irritation specifically to the eyes, skin and upper respiratory tract. The highest concentration of 1,4-dioxane detected to date is 169 µg/l. At this concentration overexposure via inhalation is not anticipated.

### **Chlorinated Solvents (PCE, TCE, 1,1-DCE, and 1,1,1-TCA)**

**Physical Properties:** Chlorinated solvents are generally, colorless to light yellow liquid with a mild, chloroform-like odor. All of these substances will sink in an open air environment and may collect in low lying areas. With the exception of 1,1,1-TCA these substance are readily detected using a Photoionization Detector (PID) with a 10.6 eV Lamp.

Below, in Table 1-1, is a comparison of maximum detected concentrations of the COCs and the calculated worst case scenario concentrations, compared to current occupational exposure limits (OELs). Only 1,1-DCE has the potential to exceed OELs during intrusive activities.

**TABLE 1-1  
COMPARISON OF VOLATILE ORGANIC CONCENTRATIONS  
AND PARTICULATE CONCENTRATIONS  
WITH CURRENT OCCUPATIONAL EXPOSURE LIMITS**

<b>Volatile Organics</b>			
<b>Contaminant of Concern</b>	<b>Highest Concentration Previously Detected</b>	<b>Worst-Case Air Concentration That Could Be Encountered</b>	<b>Current OSHA PEL And ACGIH TLV</b>
1,4-Dioxane	169 µg/L in groundwater	0.01 ppm	OSHA: 100 ppm, TWA <sub>8</sub> ACGIH: 20 ppm TWA <sub>8</sub> Exposure can be achieved through the skin.
1,1,1-TCA	523 µg/L in groundwater	67.43 ppm	OSHA: 350 ppm, TWA <sub>8</sub> ACGIH: 350 ppm TWA <sub>8</sub>
1,1-DCE	163 ug/L in groundwater	43.89 ppm	ACGIH: 5 ppm TWA <sub>8</sub>
PCE	16.8 µg/L in groundwater	2.88 ppm	OSHA: 100 ppm, TWA C200; 300 ppm for 5-minute maximum ACGIH: 25 ppm TWA Exposure can be achieved through the skin.
TCE	354 µg/L in groundwater	26.54 ppm	OSHA: 100 ppm, TWA <sub>8</sub> 300 ppm STEL ACGIH: 50 ppm TWA <sub>8</sub> 100 ppm STEL

**SECTION 2.0**  
**MOBILIZATION/DEMOBILIZATION**  
**SAFE WORK PACKET**

## SECTION 2.0

### 2.1 ACTIVITY AND DOCUMENTATION CHECKLIST

Mobilization/Demobilization activities includes, but not limited to, the following:

- The procurement and shipping and receiving of equipment, and materials for the field investigation.
- Review of planning documents (i.e., HASP, QAPP, etc.)
- Reviewing training and medical clearance certification of onsite personnel.
- Posting employee right to know and information documents (OSHA Posters, Tetra Tech NUS, Inc. Health and Safety Policy)
- Site Reconnaissance to include selection of access points/pathways and to layout the monitoring well installation location.
- Secure, construct, or equip decontamination facilities to support the field activities.
- Secure, construct, or equip IDW storage facilities to support the field activities.

**Physical Hazards** – The hazard types associated with this task are considered primarily to be Physical hazards – Lifting, strains/sprains, lacerations achieved during unpacking of equipment and during site preparation (i.e., cutting open boxes, lifting equipment, locating sample points). During sample layout the potential exists for slips, trips, and falls along uneven ground or near embankments exist.

**Chemical Hazards** - It is not anticipated that personnel will be exposed to chemical hazards (site contaminants) during this task. The FOL and/or the SSO must establish the site-specific Hazard Communication Program to address potential hazards of chemicals brought on-site. Based on the current scope it is anticipated that the following chemicals will be brought on site.

- Portland Cement
- Bentonite
- Sand
- Sample preservatives

It is assume that these products will exist outside of consumer commodity levels and therefore will require elements of Section 5.0 of the HSGM to be completed.

The Safe Work Packet for Mobilization/Demobilization Activity contains the following information:

- Table 2-1 Mobilization/Demobilization Activity Hazard Analysis
- General Safe Work Practices – These are general safe work practices that are to be reviewed with the Activity Hazard Analysis for this task during the site briefing.
- TtNUS Health and Safety Policy (posted in a conspicuous location) Figure 2-1
- OSHA Poster (Posted in a conspicuous location or inform site personnel of the posters presence in the plan it must be readily accessible to all persons.) Figure 2-2
- Site Specific Training Documentation - Personnel who attend this training will print their name and sign the training documentation form attesting to the information provided, Figure 2-3
- Tail Gate Safety Meeting - Personnel who attend this training will print their name and sign the training documentation form attesting to the information provided, Figure 2-4
- Medical Data Sheets (provided in this Safe Work Packet), Figure 2-5
- Equipment Inspection for the DPT Drill Rig, Figure 2-6
- Utility Locating and Excavation Clearance Standard Operating Procedure (See Section 7.0 of the HSGM).

TABLE 2-1 ACTIVITY HAZARD ANALYSIS

ACTIVITY: Mobilization/Demobilization

ANALYZED BY/DATE: Jennifer Choich 08/2008

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS / CONTROLS
<p>Receiving chemicals on site</p> <p>Exposure to site contaminants are not anticipated associated with this activity. However, preparation will be necessary for receiving chemicals onsite. Those anticipated include</p> <ul style="list-style-type: none"> <li>• Sample preservatives</li> <li>• Decontamination solutions/solvents</li> <li>• Well construction materials (Sand, bentonite, grout, etc.)</li> </ul>	<p>1) Chemical Hazards</p>	<p><b>1) Chemical Hazards</b> - The onsite Hazard Communication Program (Section 5.0 TtNUS Health and Safety Guidance Manual) will be instituted</p> <ul style="list-style-type: none"> <li>- Create and maintain an accurate Chemical Inventory List (entries will match chemicals brought on-site, as the names appear on the MSDS and the label).</li> <li>- MSDS's will be maintained in a central location, accessible to all personnel.</li> <li>- All containers will have labels specifying the following information:                             <ul style="list-style-type: none"> <li>a) Chemical Identity (as it appears on the label, MSDS, and Chemical Inventory List)</li> <li>b) Appropriate Warning (i.e., Eye and skin irritation, flammable, etc.)</li> <li>c) Manufacturer's Name Address and Phone Number</li> </ul> </li> </ul> <p>It is the responsibility of the SSO's to ensure this is completed. See H&amp;S Supporting Program Requirements below.</p> <p>When handling chemicals specified in the hazard communication program review and secure any specific PPE requirements listed in the MSDS(s) not indicated in this HASP.</p>
<p>Equipment procurement and preparation</p> <p>Site Preparation</p> <ul style="list-style-type: none"> <li>a. Utility clearances</li> <li>b. Establish Site traffic patterns</li> <li>c. Construct decon and IDW storage areas</li> </ul>	<p>2) Lifting</p> <p>3) Cuts/Lacerations</p> <p>4) Pinches/Compressions</p>	<p><b>2) Lifting (strain/muscle pulls)</b></p> <ul style="list-style-type: none"> <li>- Where possible, use machinery or multiple personnel for heavy lifts, use proper lifting techniques described in Section 4.4 of the Health and Safety Guidance Manual (HSGM). Remember your muscles are most vulnerable during the first 30-minutes of work (stretch before you start) and then later in the day when fatigue sets in (increase break frequencies as needed) later in the day.</li> </ul> <p><b>3) Cuts/Lacerations</b></p> <ul style="list-style-type: none"> <li>- Inspect all cutting equipment to be used for defects.</li> <li>- When cutting items - always use a sharp knife and always cut away from your body.</li> <li>- Do not place items to be cut in your opposite hand or on your knee.</li> <li>- Where possible wear cut resistant gloves or a glove at least on your non-knife hand.</li> </ul> <p><b>4) Pinches/Compressions/Struck by/Heavy Equipment Hazards</b></p> <ul style="list-style-type: none"> <li>- Keep any machine guarding in place.</li> <li>- Use tools or equipment, to avoid contacting or placing yourself within areas vulnerable to pinch or compression points.</li> <li>- Ensure moving and rotating parts are adequately guarded to avoid contacting parts.</li> <li>- Adjust guarding to minimize distance between guards and point of operation.</li> <li>- All equipment will undergo a thorough equipment inspection. See Equipment Inspection Checklist provided in this Safe Work Packet.</li> <li>- Inspect all hand tools (handle condition, cutting attachment, as applicable) to ensure acceptable condition. See Section 4.5 of the HSGM for additional safe work practices to be employed to minimize if not eliminate pinch/compression hazards.</li> </ul>

2-3

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**TABLE 2-1 ACTIVITY HAZARD ANALYSIS**

**ACTIVITY: Mobilization/Demobilization**

**ANALYZED BY/DATE: Jennifer Choich 08/2008**

<p><b>PPE Requirements</b>                  Hazards associated with this activity are physical (lifting, site preparation, and construction of barricades around control zones). Each task shall be evaluated by the SSO to determine the need for additional PPE. For example to minimize the potential effects of these hazards (i.e., hammering – flying projectiles – safety glasses will be selected and worn; operation of power tools safety glasses and hearing protection will be employed), hard hats will be employed when for overhead hazards exist and to increase visibility. Remember the general rule of thumb – Excessive noise levels are being approached if you must raise you voice to be heard by someone within two feet of your position – Use hearing protection. Selection of additional items will be based on site-specific conditions. Reflective vests will be employed for activities in or along traffic thoroughfares.</p>		
<p><b>Training Required</b></p> <ul style="list-style-type: none"> <li>• 29 CFR 1910.120 (e) Site Specific Training (See Section 2.0 of the HSGM, See also Page 2-8).</li> <li>• Tail Gate Meeting Attendance</li> </ul> <p><b>Medical Clearance/Surveillance Required</b></p> <ul style="list-style-type: none"> <li>• Completed a Medical Data Sheet provided in this Safe Work Packet (See Section 3, Figure 3-6 of the HSGM for Blank forms)</li> </ul>	<p><b>Emergency Equipment</b></p> <ul style="list-style-type: none"> <li>- First Aid Kit (OSHA/ANSI Approved for Industrial Applications)</li> <li>- Fire Extinguisher                         <ul style="list-style-type: none"> <li>• 2A:B:C for general activities</li> <li>• At least a 10B for storage up to 5-gallons of flammable liquids</li> </ul> </li> <li>- Map to Hospital and Emergency Contact List (Posted and a copy in the First-Aid Kit)</li> <li>- Spill pads for oils or absorbent material maintained at the drill rig for immediate response.</li> </ul>	<p><b>H&amp;S Supporting Program Requirements</b></p> <ul style="list-style-type: none"> <li>• Hazard Communication Program(Section 5.0 HSGM)                         <ul style="list-style-type: none"> <li>- Review MSDSs for                                 <ul style="list-style-type: none"> <li>o Sample preservatives</li> <li>o Calibration Gas for PID or FID</li> <li>o Decontamination Solution – Liquinox</li> <li>o Well construction supplies</li> </ul> </li> </ul> </li> </ul>

## GENERAL SAFE WORK PRACTICES

In addition to the task-specific work practices identified, the following general safe work practices are to be observed when conducting work on-site. These practices establish a pattern of general precautions and measures for reducing risks associated with hazardous site operations.

- Eating, drinking, chewing gum or tobacco, taking medication, and/or smoking in contaminated or potentially contaminated areas or where the possibility for the transfer of contamination exists or within designated operational areas is prohibited. The FOL and/or SSO will select an area where smoking will be permitted.
- A copy of the Map to the hospital and the emergency telephone numbers must be maintained where it is immediately accessible to all site personnel. In addition it is recommended that a copy be maintained in the First-Aid kit.
- Attend briefings on anticipated hazards, equipment requirements, emergency procedures, and communication methods before going on site.
- Immediately report injuries, illnesses, and unsafe conditions, practices, and equipment to the Site Safety and Health Officer (SSO).
- Inform co-workers of potential symptoms of illness, such as headaches, dizziness, nausea, or blurred vision. These symptoms could be indicative of potential chemical exposure or possibly heat stress related conditions.

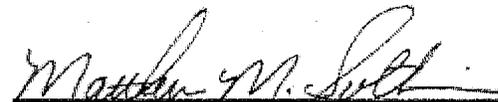
## TETRA TECH NUS, INC. HEALTH AND SAFETY POLICY

Tetra Tech NUS, Inc., is committed to providing our employees with a safe and healthful workplace. We believe that occupational injuries and illness can be prevented; and we are convinced that a strong Health and Safety Program is essential to achieve this objective.

The principal elements of our program are founded on the requirements that our managers and employees:

- Recognize a *personal responsibility* for their own health and safety and for actions that affect the health and safety of fellow employees.
- Integrate safety and health into *all aspects* of their work, with the well-being of employees as the primary concern in all activities.
- Comply with applicable *federal, state, and local regulations*, as well as with our internal Corporate and our clients' safety and health policies and procedures.
- Take an *active role* in the Health and Safety Program by providing input and constructive criticism for improvements to the program.

  
\_\_\_\_\_  
Ronald J. Chu, PE  
President

  
\_\_\_\_\_  
Matthew M. Soltis, CIH, CSP  
Health and Safety Manager

 Tetra Tech NUS, Inc.  
July 2007

# Job Safety and Health It's the law!



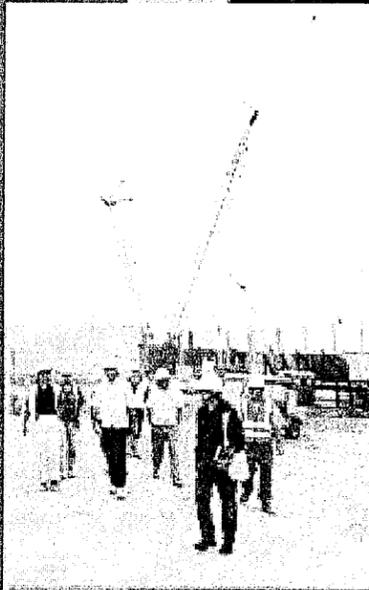
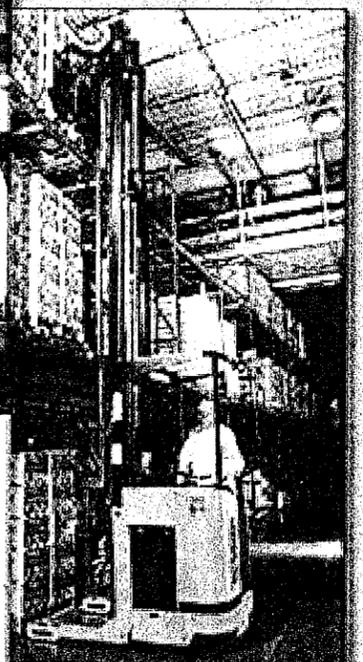
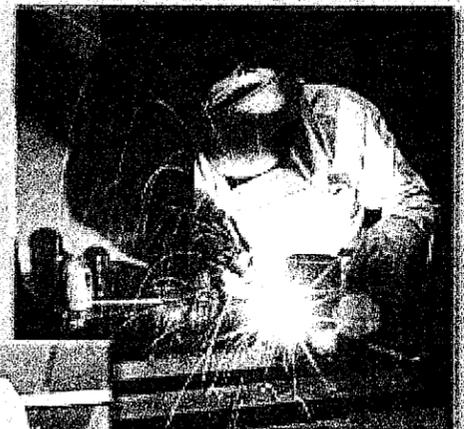
**EMPLOYEES:**

- You have the right to notify your employer or OSHA about workplace hazards. You may ask OSHA to keep your name confidential.
- You have the right to request an OSHA inspection if you believe that there are unsafe and unhealthful conditions in your workplace. You or your representative may participate in that inspection.
- You can file a complaint with OSHA within 30 days of retaliation or discrimination by your employer for making safety and health complaints or for exercising your rights under the *OSH Act*.
- You have the right to see OSHA citations issued to your employer. Your employer must post the citations at or near the place of the alleged violations.
- Your employer must correct workplace hazards by the date indicated on the citation and must certify that these hazards have been reduced or eliminated.
- You have the right to copies of your medical records and records of your exposures to toxic and harmful substances or conditions.
- Your employer must post this notice in your workplace.
- You must comply with all occupational safety and health standards issued under the *OSH Act* that apply to your own actions and conduct on the job.

**EMPLOYERS:**

- You must furnish your employees a place of employment free from recognized hazards.
- You must comply with the occupational safety and health standards issued under the *OSH Act*.

This free poster available from OSHA –  
*The Best Resource for Safety and Health*



Free assistance in identifying and correcting hazards or complying with standards is available to employers, without citation or penalty, through OSHA-supported consultation programs in each state.

**1-800-321-OSHA**  
[www.osha.gov](http://www.osha.gov)



**FIGURE 2-4**

**TAILGATE/SAFETY MEETING ATTENDANCE FORM**

*This form will be used to document Tail Gate and/or Safety Meetings. It is the responsibility of the FOL and/or the SSO to complete this form if the applicable information is not recorded in the Field Logbook.*

Project: NAS Brunswick Eastern Plume Assessment  
Address: Brunswick, Maine

Date: \_\_\_\_\_

Project Number: 112G00069

Project/Task Order Manager: Linda Klink, P.E

Field Operations Supervisor/Superintendent: \_\_\_\_\_

Site Health and Safety Health Officer: \_\_\_\_\_

Type of Tasks Being Conducted Today: \_\_\_\_\_

Topics Discussed: \_\_\_\_\_

ATTENDEE'S NAME	JOB TITLE	AFFILIATION	SIGNATURE

Instructor(s): \_\_\_\_\_

Action Items/Due Date/Responsibility: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**FIGURE 2-5  
MEDICAL DATA SHEET**

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

Project \_\_\_\_\_

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

Address \_\_\_\_\_

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

Person to notify in the event of an emergency: Name: \_\_\_\_\_

Phone: \_\_\_\_\_

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

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

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

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

Pre-existing Medical Conditions that could be aggravated by this work? \_\_\_\_\_

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

**Note: Health Insurance Portability and Accountability Act (HIPAA) Requirements**

HIPAA took effect 1996 and was amended in April 14, 2003. Loosely interpreted, HIPAA regulates the disclosure of Protected Health Information (PHI) by the entity collecting that information. PHI is any information about health status (such as that you may report on this Medical Data Sheet), provision of health care, or other information. HIPAA also requires TtNUS to ensure the confidentiality of PHI. This Act can affect the ability of the Medical Data Sheet to contain and convey information you would want a Doctor to know if you were incapacitated. So before you complete the Medical Data Sheet understand that this form will not be maintained in a secure location. It will be maintained in a file box or binder accessible to other members of the field crew so that the can accompany an injured party to the hospital.

DO NOT include information that you do not wish others to know, only information that may be pertinent in an emergency situation or treatment.

\_\_\_\_\_  
Name (Print clearly)

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

**Figure 2-6 Equipment Inspection Checklist for Drill Rigs**

Company: \_\_\_\_\_

Unit/Serial No#: \_\_\_\_\_

Inspection Date: \_\_\_\_ / \_\_\_\_ / \_\_\_\_ Time: \_\_\_\_ : \_\_\_\_

Equipment Type: \_\_\_\_\_  
(e.g, Drill Rigs Hollow Stem, Mud Rotary, Direct Push, HDD)

Project Name: \_\_\_\_\_

Project No#: \_\_\_\_\_

Yes	No	NA	Requirement	Comments
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<b>Emergency Stop Devices</b> <ul style="list-style-type: none"> <li>Emergency Stop Devices (At points of operation)</li> <li>Have all emergency shut offs identified been communicated to the field crew?</li> <li>Has a person been designated as the Emergency Stop Device Operator?</li> <li>Have all been tested and are operational?</li> </ul>	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<b>Highway Use</b> <ul style="list-style-type: none"> <li>Cab, mirrors, safety glass?</li> <li>Turn signals, lights, brake lights, etc. (front/rear) for equipment approved for highway use?</li> <li>Seat Belts?</li> <li>Is the equipment equipped with audible back-up alarms and back-up lights?</li> <li>Horn and gauges</li> <li>Brake condition (dynamic, park, etc.)</li> <li>Tires (Tread) or tracks</li> <li>Windshield wipers</li> <li>Exhaust system</li> <li>Steering (standard and emergency)</li> <li>Wheel Chocks?</li> <li>Are tools and material secured to prevent movement during transport? Especially those within the cab?</li> <li>Are there flammables or solvents or other prohibited substances stored within the cab?</li> <li>Are tools or debris in the cab that may adversely influence operation of the vehicle (in and around brakes, clutch, gas pedals)</li> </ul>	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
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<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

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**Figure 2-6  
Equipment Inspection Checklist for Drill Rigs**

Yes	No	NA	Requirement	Comments
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<b>Fluid Levels:</b> <ul style="list-style-type: none"> <li>• Engine oil</li> <li>• Transmission fluid</li> <li>• Brake fluid</li> <li>• Cooling system fluid</li> <li>• Hoses and belts</li> <li>• Hydraulic oil</li> </ul>	
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<b>High Pressure Hydraulic Lines</b> <ul style="list-style-type: none"> <li>• Obvious damage (physical degradation, signs of overheating)</li> <li>• Operator protected from accidental release</li> <li>• Coupling devices, connectors, whip checks are in good condition and in place.</li> </ul>	
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<b>Mast Condition</b> <ul style="list-style-type: none"> <li>• Structural components/tubing</li> <li>• Connection points</li> <li>• Pins</li> <li>• Welds</li> <li>• Outriggers</li> <li>• Operational</li> <li>• Plumb (when raised)</li> </ul>	Mast Height/Length=
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<b>Hooks</b> <ul style="list-style-type: none"> <li>• Are the hooks equipped with Safety Latches?</li> <li>• Does it appear that the hook is showing signs of wear in excess of 10% original dimension?</li> <li>• Is there a bend or twist exceeding 10% from the plane of an unbent hook?</li> <li>• Increase in throat opening exceeding 15% from new condition</li> <li>• Excessive nicks and/or gouges</li> <li>• Clips</li> <li>• Number of U-Type (Crosby) Clips  (cable size 5/16 - 5/8 = 3 clips minimum)  (cable size 3/4 - 1 inch = 4 clips minimum)  (cable size 1 1/8 - 1 3/8 inch = 5 clips minimum)</li> </ul>	Note:  Hook measurement= Working cable length measurements= Cable diameter= No# of clips on the cable=

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**Figure 2-6  
Equipment Inspection Checklist for Drill Rigs**

Yes	No	NA	Requirement	Comments
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Power cable and/or hoist cable <ul style="list-style-type: none"> <li>Reduction in Rope diameter π (5/16 wire rope &gt; 1/64 reduction nominal size -replace) (3/8 to 1/2 wire rope &gt; 1/32 reduction nominal size-replace) (9/16 to 3/4 wire rope &gt; 3/64 reduction nominal size-replace)</li> <li>Number of broken wires (6 randomly broken wires in one rope lay) (3 broken wires in one strand)</li> <li>Number of wire rope wraps left on the Running Drum at nominal use (≥3 required)               <ul style="list-style-type: none"> <li>Lead (primary) sheave is centered on the running drum</li> </ul> </li> <li>Lubrication of wire rope (adequate?)</li> <li>Kinks, bends - Flattened to &gt; 50% diameter</li> </ul>	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Hemp/Fiber rope (Cathead/Split Spoon Hammer) <ul style="list-style-type: none"> <li>Minimum 3/4; maximum 1 inch rope diameter (Inspect for physical damage)</li> <li>Rope to hammer is securely fastened</li> </ul>	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Safety Guards - <ul style="list-style-type: none"> <li>Around rotating apparatus (belts, pulleys, sprockets, spindles, drums, flywheels, chains) all points of operations protected from accidental contact?</li> <li>Hot pipes and surfaces exposed to accidental contact?</li> <li>High pressure lines</li> <li>Nip/pinch points</li> </ul>	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Operator Qualifications <ul style="list-style-type: none"> <li>Does the operator have proper licensing where applicable, (e.g., CDL)?</li> <li>Does the operator, understand the equipment's operating instructions?</li> <li>Is the operator experienced with this equipment?</li> <li>Is the operator 21 years of age or more?</li> </ul>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	PPE Required for Drill Rig Exclusion Zone <ul style="list-style-type: none"> <li>Hardhat</li> <li>Safety glasses</li> <li>Work gloves (Over surgeons nitrile gloves)</li> <li>Chemical resistant gloves _____</li> <li>Steel toed Work Boots</li> <li>Chemical resistant Boot Covers</li> <li>Apron</li> <li>Coveralls Tyvek, Saranex, cotton)</li> </ul>	

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**Figure 2-6  
Equipment Inspection Checklist for Drill Rigs**

Yes	No	NA	Requirement	Comments
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Other Hazards	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> <li>• Excessive Noise Levels? _____ dBA</li> </ul>	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> <li>• Chemical hazards (Drilling supplies - Sand, bentonite, grout, fuel, etc.)</li> </ul>	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> <li>- MSDSs available?</li> </ul>	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> <li>• Will On-site fueling occur</li> </ul>	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> <li>- Safety cans available?</li> </ul>	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<ul style="list-style-type: none"> <li>- Fire extinguisher (Type/Rating - _____ )</li> </ul>	

Approved for Use     Yes     No     See Comments

\_\_\_\_\_  
Site Health and Safety Officer

\_\_\_\_\_  
Operator

**SECTION 3.0**  
**SITE CLEARING – REMOVAL OF VEGETATION**  
**SAFE WORK PACKET**

## SECTION 3.0

### 3.1 ACTIVITY AND DOCUMENTATION CHECKLIST

Site clearing – Removal of vegetation will consist of identifying the location where the well is to be installed; selecting the most favorable route to that location to move equipment and personnel; then clearing that route using chainsaws and hand tools. Debris (tress, shrubs, and branches) will be pulled to the side out of the travel path. No additional sizing or chipping will take place.

**Physical Hazards** – The hazard types associated with this task are considered primarily to be Physical hazards –

- Lacerations are our primary concern during chainsaw and hand tool operation.
- Struck by (when falling trees)
- Lifting, strains/sprains, moving branches and debris out of the travel path

**Chemical Hazards** - It is not anticipated that personnel will be exposed to chemical hazards (site contaminants) during this task.

**Natural hazards** are a concern within wooded areas as the vegetation that will be moved may also serve as a nest or a hiding area for mammals, snakes and insects. Deadfalls serve as bees nests.

The Safe Work Packet for Mobilization/Demobilization Activity contains the following information or requires the FOL and/or the SSO to insure personnel conducting this activity have the necessary skill set:

- Table 3-1 Removal of Vegetation Activity Hazard Analysis
- Chainsaw Inspection Checklist
- Chainsaw Operator knowledge/Operators Manual

**TABLE 3-1 ACTIVITY HAZARD ANALYSIS**

**ACTIVITY: Removal of Vegetation**

**ANALYZED BY/DATE: Tom Dickson 08/2008**

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS / CONTROLS
Selecting the route to the selected Monitoring well location	1) Slips, trips, and falls	<p><b>1) Slips, trips, and falls</b> – Evaluate the following conditions when selecting your route to the monitoring well installation point.</p> <ul style="list-style-type: none"> <li>• Select the flattest route/easiest access to the installation point. Remember it may also be necessary to get emergency services to you.</li> <li>• Review all points of approach.</li> <li>• Where possible, select the route with the least vegetation. This will minimize wholesale slaughter of the forested areas while minimizing the number of stumps sticking up that create trip hazards.</li> <li>• The chainsaw operator should cut as close to the ground as possible to reduce trip hazards. Those stumps that remain that pose a trip hazard should be painted with fluorescent paint to draw persons attention to their location.</li> <li>• Where possible, paths should avoid low lying areas prone to flooding and movement along banks.</li> <li>• When clearing clear a sufficient size area to permit the tasks to be completed. This means clear past the well points so the driller and helper have sufficient room to work. This will be beneficial when you return to sample.</li> </ul>
Clearing vegetation using <ul style="list-style-type: none"> <li>• Chainsaws</li> <li>• Hand tools including                             <ul style="list-style-type: none"> <li>- Hand saws</li> <li>- Brush hooks</li> <li>- Machetes</li> </ul> </li> </ul>	2) Cuts and lacerations Lifting	<p><b>2) Cuts/Lacerations</b></p> <p><b><i>Chainsaw Operations Before</i></b></p> <ul style="list-style-type: none"> <li>• Read the operators manual. To read it, it must be on site. Know the hazards and precautions recommended to control those hazards.</li> <li>• Inspect the chainsaw prior to each use. Insure the blade is adjusted (adequately tight so that it does not roll side to side on the bar) and sharp, and all parts are lubricated per the manufacturer's instruction. The Operator's manual will provide valuable information concerning the chain, adjustments and when maintenance is required. If the cuttings are larger curly the chain is adequately sharp. If it is powdery the chain needs sharpened or changed out. The chainsaw will be inspected according to the Inspection Checklist provided in this Safe Work Packet.</li> <li>• Test all safety devices initially and then periodically to insure operational status.</li> <li>• When starting, place the chainsaw on the ground or some other firm surface (make sure the chain is not touching anything). Place your foot in the hand guard at the rear of the saw, grip the top handle of the saw with one hand, pull the start cord with the free hand. Never attempt to start the saw free hand or by placing on your knee.</li> <li>• Never cut with tip of the chain saw blade due to kick back hazards.</li> <li>• Plan the cut. Know where the tree will fall. Have a clear escape plan when dropping trees greater than 2 inches in girth.</li> </ul>

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TABLE 3-1 ACTIVITY HAZARD ANALYSIS

ACTIVITY: Removal of Vegetation

ANALYZED BY/DATE: Tom Dickson 08/2008

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS / CONTROLS
		<ul style="list-style-type: none"> <li>• Preview the tree to be dropped. Often, bees or some other insect may nest in hollowed out trunks and in tree tops.</li> <li>• Do not stand between falling trees and branches and fix items or other trees.</li> <li>• Do not cut over your head.</li> <li>• Do not cut materials other than wood with the chain saw.</li> <li>• Where prescribed safety equipment. Hard hat with earmuffs and screened/mesh face shield; safety glasses; chainsaw chaps; steel toed work boot; leather work gloves. The helper moving vegetation from the pathway will wear the same articles with the exception of the chaps.</li> </ul> <p><b>During cutting</b></p> <ul style="list-style-type: none"> <li>• Monitor, the condition of the saw during use, make adjustments, as necessary.</li> <li>• When limbing a tree, to the extent possible cut from the other side of the trunk, which will serve as a shield.</li> <li>• Be attentive as to which way the trunk may move when removing limbs, place yourself out of the anticipated pathway when cutting.</li> <li>• Be attentive to movement of the trunk as an indication of the stability of the tree and brush pile.</li> <li>• Keep the work area free from clutter to avoid potential slip, trip, and fall hazards.</li> <li>• When carrying the saw to a work location – Shut it off; carry the saw with the blade to the back with the scabern on the blade.</li> <li>• Site control boundary for this operation will be the height of the tree x 2.</li> <li>• Where knowledge of operation supports it, change out operation of the chainsaw with the helper periodically to avoid fatigue and possibly an accident.</li> </ul> <p><b>Fueling</b></p> <ul style="list-style-type: none"> <li>• Shut the saw off and allow it to cool before fueling.</li> <li>• To the extent possible move it from brush piles and other potential combustible materials.</li> </ul> <p><b>Hand tools</b></p> <p>If hand tools (brush hooks, machetes, etc.) are necessary to clear brush and small trees in the area of operation the following precautions are recommended:</p> <ul style="list-style-type: none"> <li>• Insure handles are of good construction (no cracks, splinters, loose heads/cutting apparatus.</li> <li>• Machetes will be equipped with an adequately sized hilt to prevent hand from slipping down the handle onto the blade.</li> <li>• Insure all cutting tools are maintained. Blades shall be sharp without nicks and gouges in the blade.</li> </ul>

**TABLE 3-1 ACTIVITY HAZARD ANALYSIS**

**ACTIVITY:** Removal of Vegetation

**ANALYZED BY/DATE:** Tom Dickson 08/2008

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS / CONTROLS
	<p>3) Lifting and muscle strains and sprains</p> <p>4) Natural Hazards</p> <ul style="list-style-type: none"> <li>• Poisonous Plants</li> </ul>	<ul style="list-style-type: none"> <li>• All hand tools (brush hooks, machetes, etc.) with cutting blades shall be provided with a sheath to protect individuals, when not in use.</li> <li>• All personnel will maintain a 10-foot perimeter around persons clearing brush.</li> </ul> <p><b>3) Lifting (strain/muscle pulls)</b></p> <ul style="list-style-type: none"> <li>• Use proper lifting techniques described in Section 4.4 of the Health and Safety Guidance Manual (HSGM).</li> <li>• Remember your muscles are most vulnerable during the first 30-minutes of work (stretch before you start) and then later in the day when fatigue sets in (increase break frequencies as needed) later in the day.</li> <li>• Do not over compromise yourself when pulling vegetation as the sudden release may result in a fall.</li> </ul> <p><b>4) Natural Hazards – Poisonous Plants</b></p> <p>The primary effort will be directed at isolation. If we must move through an area where these plants are identified the level of PPE will be increased to include Tyvek coveralls and enhanced decontamination procedures for the removal of oils from the tooling and/or equipment. Examples of these plants are provided in this safe work packet.</p>
<p><b>PPE Requirements</b></p> <p>When working within 50-feet of the chainsaw operation supporting personnel</p> <ul style="list-style-type: none"> <li>• Hard hats</li> <li>• Safety Glasses</li> <li>• Steel toed work boots</li> <li>• Leather work gloves</li> <li>• Hearing protection with at least a 25dB NRR</li> </ul>		
<p><b>Hazard Monitoring Required:</b></p> <p>Visual observation of work practices by the FOL and/or the SSO to minimize potential physical hazards (i.e., improper lifting, improper cutting methods of the chainsaw/cutting practices, etc.).</p>	<p><b>Decontamination Procedures:</b></p> <p>Structured decontamination is not required for this task. Good personal hygiene practices should be employed prior to breaks lunch or other period when hand to mouth contact occurs. This will minimize potential ingestion exposures. Examine yourself for ticks and other insects when exiting the brush. Wash with warm to cool water with soap or to remove poison ivy/sumac/oak oils and resins.</p>	<p><b>Permits/Requirements:</b></p> <ul style="list-style-type: none"> <li>- Complete Equipment Inspection for the Chainsaw contained in this Safe Work Packet.</li> </ul>

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**TABLE 3-1 ACTIVITY HAZARD ANALYSIS**

**ACTIVITY:** Removal of Vegetation

**ANALYZED BY/DATE:** Tom Dickson 08/2008

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS / CONTROLS
<p><b>Training Required</b></p> <ul style="list-style-type: none"> <li>• Chainsaw operation (Operators manual)/Tail Gate Meeting Attendance (Chainsaw operation)</li> </ul>	<p><b>Emergency Equipment</b></p> <ul style="list-style-type: none"> <li>• First Aid Kit (OSHA/ANSI Approved for Industrial Applications). The type of accidents associated with chainsaw operations include significant lacerations, struck by/crushing accidents; slips trips and falls. Prepare for these!!! Damage to an artery can cause you to bleed out in a matter of minutes. Carry extra gauzes bandages, towels, etc. to permit pressure bandage application. Review procedures for stopping arterial bleeds (pressure; tourniquets). Ask those questions – How will I get someone out from underneath a tree? Equipment? Additional chain saws – Create a plan!</li> <li>• Fire Extinguisher             <ul style="list-style-type: none"> <li>• 2A:B:C for general activities</li> <li>• At least a 10B for storage up to 5-gallons of flammable liquids</li> </ul> </li> <li>- Map to Hospital (Posted and a copy in the First-Aid Kit)</li> <li>- Emergency Contact List (Posted and a copy in the First-Aid Kit)</li> <li>- A Spill pads should be placed under the chainsaw when fueling and adding bar oil.</li> </ul>	<p><b>H&amp;S Supporting Program Requirements</b></p> <ul style="list-style-type: none"> <li>• Hearing Conservation</li> <li>• Personal Protective Equipment (Site specific recommendations)</li> <li>• Chainsaw Inspection completed and documented</li> <li>• PPE Inspected – Unserviceable Items replaced before work begins</li> </ul>

## HAND AND POWER TOOL CHECKLIST

(Complete applicable sections)

General Requirements				
Yes	No	NA	General Requirements	Comments
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are all tools and equipment (both company and employee owned) used by employees at their workplace in good condition?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Any loose parts?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Missing pins and/or bolts?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are broken or fractured handles on hammers, axes and similar equipment replaced promptly?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are hand tools such as chisels and punches, which develop mushroomed heads during use, reconditioned or replaced as necessary?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are worn or bent wrenches replaced regularly?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are appropriate handles used on files and similar tools?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are employees made aware of the hazards caused by faulty or improperly used hand tools?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are jacks checked periodically to ensure they are in good operating condition?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are tool handles wedged tightly in the head of all tools?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are tool cutting edges kept sharp so the tool will move smoothly without binding or skipping?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are tools stored in dry, secure locations where they won't be tampered with?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are appropriate safety glasses, face shields, etc. used while using hand tools or equipment which might produce flying materials or be subject to breakage?	
Power Tool Inspection Checklist				
Yes	No	NA	Requirement	Comments
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are grinders, saws and similar equipment provided with appropriate safety guards?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are power tools used with the correct shield, guard, or attachment, recommended by the manufacturer?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are portable circular saws equipped with guards above and below the base shoe? Are circular saw guards checked to assure they are not wedged up, thus leaving the lower portion of the blade unguarded?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are rotating or moving parts of equipment guarded to prevent physical contact?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are all cord-connected, electrically operated tools and equipment effectively grounded or of the approved double insulated type?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are effective guards in place over belts, pulleys, chains, sprockets, on equipment such as concrete mixers, and air compressors?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are portable fans provided with full guards or screens having openings 1/2 inch or less?	

## HAND AND POWER TOOL CHECKLIST

(Complete applicable sections)

			General Requirements	Comments
Yes	No	NA		
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Is hoisting equipment available and used for lifting heavy objects, and are hoist ratings and characteristics appropriate for the task?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are ground-fault circuit interrupters provided on all temporary electrical 15 and 20 ampere circuits, used during periods of construction?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are pneumatic and hydraulic hoses on power operated tools checked regularly for deterioration or damage?	
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	Air compressor: <ul style="list-style-type: none"> <li>• Is the air compressor equipped with a Surge Check Valve?</li> <li>• Pressure regulator gauge and valve?</li> <li>• Pressure relief valve?</li> <li>• Water trap and filter?</li> </ul>	
Chainsaws				
Yes	No	NA	Requirement	Comments
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Is the chain sharp, well oiled, and properly adjusted (Chain tension)?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Is the Bar straight? <ul style="list-style-type: none"> <li>• Are there indications of excessive wear?</li> </ul>	
<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	Does the chain brake lever move freely? Does chain brake stop the chain when applied?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Does the chain move when idling?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Are the cans used to fuel the chainsaw safety cans?	
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Does the on/off switch function properly?	
<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	Does the throttle lock function properly? Is the chainsaw equipped with continuous pressure throttle control?	
<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	PPE: Is the following PPE in serviceable condition? Hardhat with mesh visor and ear muffs? Safety glasses? Chainsaw chaps? Gloves with protection also on the back of the hands?	
<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/>	Emergency Equipment: Is a Fire extinguisher (2A:B:C) available for immediate use? Is a First-Aid Kit immediately available for use? Does it contain the minimum content as required in the HASP? Are additional items added based on projected hazards(chainsaw operations)?	



## POISONOUS PLANTS

Various plants which can cause allergic reactions may be encountered during field work. These include, poison ivy, poison oak, and poison sumac. Contact with these plants may occur when accessing remote locations as a result of movement through these plants or clearing and grubbing. An irritating, allergic reaction can occur after direct contact with the plant or indirect contact through some piece of equipment or clothing article. Oils are transferred from the plant to exposed skin, clothing, or piece of equipment. The degree of the irritating, allergic reaction can vary significantly from one person to the next.

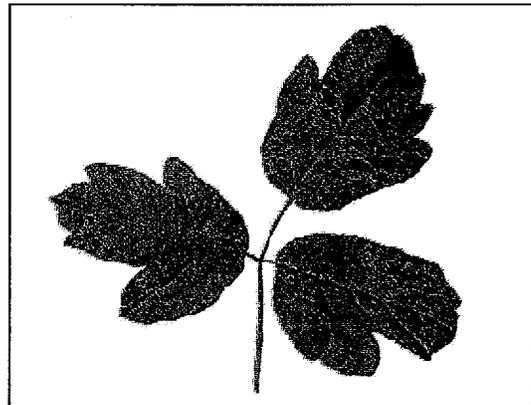
### Poison Ivy

Poison Ivy - Characterized by climbing vines, three leaf configuration ovate to elliptical in shape, deep green leaves with a reddish tint, greenish flowers, and white berries.



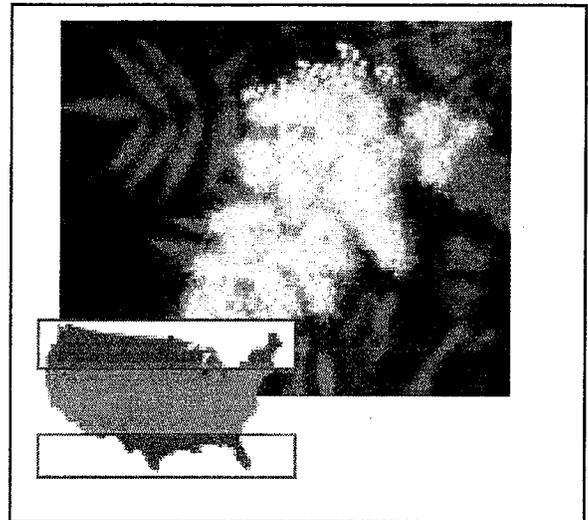
### Poison Oak

Poison Oak – Characterized as similar to poison ivy consisting of a scrub, stems erect 1-6-feet in height, leaflets consist of broad thick lobes, some are coarsely serrated, denser at the base, less at the top.



### Poison Sumac

Poison Sumac - Characterized as a tall bush of the sumac family bearing compound leaves (7-13 entire leaflets), branched from a central axis, drooping, with axillary clusters of white fruit: However, these white fruits and berries may exist only during pubescent stages.



Prevention is based on the ability to recognize the hazards and to employ PPE, barrier creams, washes to isolate and remove these oils.

**SECTION 4.0**

**MONITORING WELL INSTALLATION/SOIL BORING AND  
SUBSURFACE SAMPLING USING DPT DRILLING**

**SAFE WORK PACKET**

## 4.0 ACTIVITY AND DOCUMENTATION CHECKLIST

The Safe Work Packet for DPT Soil Boring and Monitoring Well Installation activities to be conducted at NASB at the Eastern Plume.

This activity entails the following activities:

- Table 4-1, Soil Boring/Monitoring Well Installation using DPT Drilling, Activity Hazard Analysis
- Drilling Safe Work Practices

**Remember:**

- The Utility Locate and Excavation clearance must be completed prior to drilling.
- Complete site specific portion of the Hazard Communication Program.
  - Collect MSDSs for drilling supplies (grout, bentonite and sand), as applicable.
- Complete site specific portion of the Hearing Conservation Program

Note: Monitoring and/or dosimetry is not prescribed for this activity. Therefore, you may ignore this section of the Site-Specific Hearing Conservation Program. Should it be determined that it is necessary, you will have it as a reference.

- Make sure you have your well permits.
- Complete elements of the Safe Work Packet, where and as applicable.
- Calibrate instruments in accordance with the Manufacturers Instruction

**Remember:**

According to Tetra Tech NUS, Inc. Utility Location and Excavation Clearance Procedure, if we are within the diameter of the utility + 2-feet then we must pothole or locate the suspect utility within the area of excavation/boring to insure we miss it prior to employing mechanical means, the DPT in this case.

**TABLE 4-1 ACTIVITY HAZARD ANALYSIS**

**ACTIVITY:** Soil Boring/Monitoring Well Installation Using DPT

**ANALYZED BY/DATE:** Jennifer Choich 08/2008

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS / CONTROLS
<p>DPT Drilling Activities</p> <p><b>Soil Borings –</b> subsurface soil samples collected via MacroCore Samplers are obtained as follows: The MacroCore Sampler is a 2" diameter steel tube equipped with a cutting shoe and internal acetate liner. The MacroCore is advanced into the ground via hydraulic pressure, percussion hammering, or a combination of both to the desired depth. The sampler is then extracted and the cutting shoe is removed and the acetate liner filled with the soil it was forced through is then extracted. The sampler will then cut the acetate tube open to expose the sample material.</p> <p><b>Monitoring Well Installation:</b> Monitoring well</p>	<p><i>Physical hazards:</i></p> <p>1) Heavy equipment hazards (pinch/compressions points, chain failure, hydraulic lines, etc.)</p>	<p><b>1) Heavy Equipment Hazards</b> - The DPT unit will be inspected prior to use.</p> <ul style="list-style-type: none"> <li>• The inspections will be documented using the Equipment Inspection Checklist found in the Mobilization/Demobilization Safe Work Packet of this HASP, Figure 2-6. The recommended frequency of inspection is upon arrival, after major maintenance, or depending on the duration of the project at least once/month.</li> <li>• Equipment will be operated and supported by certified operators and knowledgeable ground crew.</li> <li>• Site control boundaries for this operation will be set at least the height of the mast + 5-feet or a minimum 25 feet from the point of operation. This distance has been established to remove unauthorized and non-essential personnel from physical hazards associated with this operation.</li> </ul> <p><b>Pinches/Compressions</b></p> <ul style="list-style-type: none"> <li>• During these activities, drive rods are screwed onto the MacroCore or continuous tube extensions are added to increase depth range. During this addition, the potential exists to get hands/fingers trapped between the hammer and work piece. In addition, during outer tube extraction, the potential exists to get fingers caught within the chain as it is tightened. To combat these hazards.             <ul style="list-style-type: none"> <li>▪ Number 1 - Keep hands from between pinch points.</li> <li>▪ Number 2 – The Driller when engaging the hammer as extensions are added or as the chain is tighten will move slow to permit the removal of hands and/or fingers from pinch points.</li> <li>▪ Number 3 – Compression hazard sometimes result from separating drive rods or tube sections. Generally, one section is secured in a vise while a pipe wrench is used to free the other section. Compression occurs when the piece releases and the wrench and hand or fingers slam into a fixed object. To control this                 <ul style="list-style-type: none"> <li>▪ Inspect threads on drive rods and continuous tubes. From excessive use these begin to mushroom making removal difficult. Replace as necessary if you suspect this to be the case.</li> <li>▪ Do not over extend yourself when applying force to the wrench. If you are over compromised and the work piece releases you may fall or experience muscle strain or possible ligament sprain or damage.</li> <li>▪ Make sure the path of the wrench does not encounter fixed objects.</li> </ul> </li> </ul> </li> </ul> <p><b>Rigging – Chains</b> A Chain Inspection Checklist has been provided (Figure 4-5) in this Safe Work Packet for you to inspect the chain employed to extract the continuous tube during monitoring</p>

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**TABLE 4-1 ACTIVITY HAZARD ANALYSIS**

**ACTIVITY:** Soil Boring/Monitoring Well Installation Using DPT

**ANALYZED BY/DATE:** Jennifer Choich 08/2008

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS / CONTROLS
<p>installation employs a 3" diameter tube with a disposable tip sometimes referred to as a Dual tube system. Once at the desired depth, the drive tip is knocked out and a temporary well with a pre-pack sand pack is slid into the tube. The outer tube using a chain hitch is extracted (because the extraction fitting cannot be used) while the temporary well is held in place. During this process additional sand pack or a betonite seal and/or grout seal may be added as the work plan prescribes. Often the natural formation is permitted to collapse around the well.</p>	<p>Structural Failure</p> <p>Pressurized Hazards</p> <p>2) Energized systems (contact with underground or overhead utilities)</p>	<p>well installation. This checklist will provide you the information concerning what needs to be inspected and what information needs to be gathered. This initial inspection is critical!! Besides a visual inspection to insure there are no structural deficiencies measures should be collected of the chain length and hook dimensions. With chains they will stretch and fail (this is why measuring these devices is critical).</p> <p>⚡ <b>Tip:</b> As you will not see these chains or hooks when they are new, take measurements of the chain and hooks upon arrival on-site. Through this you will be able to determine if distortion is occurring through the course of the work being performed at NASB.</p> <ul style="list-style-type: none"> <li>• Mast/Structural members – During extraction – Make sure the Mast is maintained straight. Make sure the foot is not sinking effecting the angle during extraction. If necessary add padding to increase the foot surface area.</li> <li>• Examine welds to insure they are not broke or cracked. This exists more in DPT rigs with dual feet because of opposing pressure.</li> <li>• Insure when the rig is over the hole that the driller has a level to insure it is plum so stress during lifting is well supported and even on support structures.</li> </ul> <p><b>Pressurized Lines</b></p> <ul style="list-style-type: none"> <li>• The drill rig will be equipped with physical guards between high pressure components and the driller and the driller's helper. During inspection, the inspector will examine the lines for wear, physical damage, and indication of overheating often indicated when the friction outer cover is dried and flaking off or missing. The steel fibers or bands may also be discolored.</li> <li>• Connections on pressurized lines must be of compatible, threaded (not quick-disconnect) design</li> <li>• Whip checks will be employed to retain lines not guarded.</li> <li>• All connections will be examined to insure they are not leaking.</li> <li>• Provisions shall be put in place to respond to potential spills. This includes             <ul style="list-style-type: none"> <li>▪ Place plastic under the back of the rig where the hydraulic line components are located. That way if a spill/rupture of a line occurs the release has been contained.</li> <li>▪ Have spill provisions at the ready (Spill pads, oil dry, cat litter, etc.)</li> </ul> </li> </ul> <p><b>2) Energized Systems</b> - All drilling activities will proceed in accordance with the NASB and Tetra Tech NUS, Inc. Utility Locating and Excavation Clearance SOP provided in Section 7.0 of the HSGM. Remember</p> <ul style="list-style-type: none"> <li>• The Mast of the drill rig will not get any closer than 10-feet for overhead lines 0-</li> </ul>

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TABLE 4-1 ACTIVITY HAZARD ANALYSIS

ACTIVITY: Soil Boring/Monitoring Well Installation Using DPT

ANALYZED BY/DATE: Jennifer Choich 08/2008

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS / CONTROLS
	<p>3) Noise in excess of 85dBA</p> <p>4) Lifting (strain/muscle pulls)</p> <p>5) Slips, trips, and falls</p>	<p>50kV. This 10-feet is measured to the distance to the mast anywhere along the radius if the mast were to tip over towards the line.</p> <ul style="list-style-type: none"> <li>• Drilling closer than 2-feet + the diameter of a buried utility requires the bore hole to be dug by hand (the same size as the drill tool) or the excavator/driller to pothole and confirm the location of the utility.</li> <li>• Walk the area along the road as surface monuments may indicate the presence of subsurface utilities.</li> </ul> <p><b>3) Noise in Excess of 85 dBA</b> – Noise levels associated with this operation can range from 87-92 dBA during advancement of tooling. This level may actually be increased in situations where structures may reflect the noise generated. Controlling this hazard shall be accomplished employing two separate approaches as follows:</p> <ul style="list-style-type: none"> <li>- Boundaries will be established to limit the affect of the noise hazard (25-foot or the height of the mast +5-feet boundary, whichever is greater).</li> <li>- Use of hearing protection (ear plugs, muffs, etc.) with a noise reduction rating (NRR) of 25dB when working within the 25-foot boundary.</li> <li>- Remember the general rule of thumb - <i>Excessive noise levels (&gt;85dBA) are being approach when you have to raise your voice to talk to someone within 2 feet of your location.</i></li> </ul> <p><b>4) Lifting Hazards</b> – A number of lifting hazards may be associated with this activity including:</p> <ul style="list-style-type: none"> <li>• Bags of Portland Cement 94lbs</li> <li>• Bags of sand 50-80 lbs</li> <li>• Buckets of wash waters 42 lbs.</li> </ul> <p>Most lifting injuries occur when lifting relatively light weights but twisting/turning during lifting.</p> <p>Use proper lifting techniques as described in Section 4.4 of the HSGM. Take frequent breaks when fatigue begins to set in. Site set up may also aid in minimizing these hazards. Examine how tooling is pulled from racks, used in the process, the rack placement, and how tools are extracted. An examination of this process and minor modification may provide a smoother process.</p> <p><b>5) Slips, Trips, and Falls</b> - The most effective method for controlling this hazard in this setting is</p> <ul style="list-style-type: none"> <li>• Housekeeping - Maintain a clutter free work area.</li> <li>• Keep the ground level to the extent possible around the point of operation at the</li> </ul>

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**TABLE 4-1 ACTIVITY HAZARD ANALYSIS**

**ACTIVITY:** Soil Boring/Monitoring Well Installation Using DPT

**ANALYZED BY/DATE:** Jennifer Choich 08/2008

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS / CONTROLS
	<p>6) Cuts/lacerations</p> <p><i>Natural hazards:</i></p> <p>7) Inclement weather</p>	<p>back of the rig.</p> <ul style="list-style-type: none"> <li>• When clearing vegetation, cut trees as close to the ground as possible to eliminate trip hazards. If this is not possible, paint or flag those along pedestrian travel routes.</li> <li>• The Helper should maintain an area for the continuous tube sections and drill rods to be stacked and secured to prevent collapse or create tripping hazards.</li> </ul> <p><b>6) Cuts and Lacerations</b> - To prevent cuts and lacerations associated with soil sampling activity, the following provisions are required:</p> <ul style="list-style-type: none"> <li>- Use the Geoprobe or Similar manufacturer Acetate Tube Retention Kit and Knife system. This kit holds the tube in place while it is cut to access the sample.</li> <li>- Always cut away from yourself and others, then, if a knife slips, you will not impale yourself or others.</li> <li>- Do not place items to be cut in your hand or on your knee.</li> <li>- Change out blades as necessary to maintain a sharp cutting edge. Many accidents result from struggling with dull cutting attachments.</li> <li>- Whenever practical, wear cut resistant gloves (e.g., leather or heavy cotton work gloves) at least on the non-knife hand and arm.</li> <li>- Keep cutting surfaces clean and smooth.</li> <li>- When transporting glassware (such as glass sample containers) keep it in a hard sided container such as a cooler then if there is a fall it will be less likely that you will get cut from broken glass.</li> <li>- DO NOT throw broken sample jars into the garbage bag but place them into a hard sided container such as a card board box or directly into the dumpster. DO NOT reach into garbage bags to retrieve any item accidentally thrown away. Dump the contents onto a flat surface to avoid punctures and lacerations from reaching where you cannot see.</li> </ul> <p><b>Natural hazards:</b></p> <p><b>7) Inclement Weather</b> – As this is an Air Station, the tower will have periodic weather reports or warning of approaching weather systems. See your NASB POC, where possible if these are made available follow instruction provided on station from the tower.</p> <p>If not, follow the 30/30 Rule  <i>If there are less than 30 seconds between thunder and lightning go inside for at least 30 minutes after the last thunder.</i></p>

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**TABLE 4-1 ACTIVITY HAZARD ANALYSIS**

**ACTIVITY:** Soil Boring/Monitoring Well Installation Using DPT

**ANALYZED BY/DATE:** Jennifer Choich 08/2008

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS / CONTROLS
<b>Chemical hazards</b>		
<p><b>Chemical hazards:</b> See Section 1.4 for information concerning COCs identified within this area of the eastern plume. Reported concentrations are not significant enough to present an exposure through inhalation concern because the source concentration is insufficient. Utilize the PID with the 10.6eV Lamp to monitor airborne concentrations at source locations (borehole and breathing zones of the driller and sampler). See Table 1-1 for more information.</p> <p>Skin exposure and possible hand to mouth transfer however could be a contributing factor to exposure. PPE and Good work hygiene practices will be employed to control incidental exposure. Nitrile and natural rubber gloves of sufficient protection for incidental contact. Aprons coveralls etc. should be worn to control the soiling and saturation of clothing when handling auger flights close to the body.</p> <p>Keep the sample table wiped down to remove surface contamination. If clip boards or other items are placed on the table insure they are also decontaminated before removal.</p> <p>In addition, the following substances will be employed in support of this task:                      Decontamination fluids – Liquinox and Isopropanol                      Grout/Concrete – Used to finish the well pads or seal the well.</p> <p>To protect persons from potential hazards associated with the use of these chemicals, the following measures will be employed:</p> <ul style="list-style-type: none"> <li>Review applicable MSDSs, know the hazards and follow precautions provided in these documents. Have emergency equipment at the ready to provide first aid.</li> <li>Obtain and use PPE described in the MSDS, unless this HASP is more conservative or the SSO has deemed additional measures are required.</li> </ul> <p>Emergency equipment for handling grout include a mechanism to flush skin and eyes should they become irritated. A 10% white vinegar and water solution can combat skin irritation caused by cement dermatitis. Methods including water spray should be used when necessary to knock down visible dust.</p>		
<p><b>Hazard Monitoring Required:</b>                      Photo Ionization Detector (PID) 10.6 eV Lamp</p> <p>Action level                      Any reading &gt;83(PID) and &gt;35(FID) sustained &gt;10 minutes Contact PHSO &gt;2mg/m<sup>3</sup> d(Visible dust) during</p>	<p><b>Decontamination Procedures:</b></p> <p><b>Equipment –</b>                      Soil Boring/Monitoring Well Installation – This applies to the continuous tube sections,</p>	<p><b>Permits/Requirements:</b></p> <ul style="list-style-type: none"> <li>- Obtain Drillers License/Certification</li> <li>- Obtain well permits for planned drilling activities.</li> </ul>

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**TABLE 4-1 ACTIVITY HAZARD ANALYSIS**

**ACTIVITY:** Soil Boring/Monitoring Well Installation Using DPT

**ANALYZED BY/DATE:** Jennifer Choich 08/2008

<p>well construction requires dust to be knocked down using water spray. Add grout to water to minimize the dust when mixing for grout seals or pads.</p> <p>The PID will be calibrate twice/day using a isobutylene in air mixture. The calibration will be done in the morning and evening (to determine if significant instrument drift has occurred due to battery loss or equipment malfunction. Figure 4-1 will be used to record these calibration efforts.</p>	<p>MacroCore sampler, drive rods, and cutting shoe as well as any drilling component that have come in contact with contaminated media. This activity usually takes place near the DPT rig:</p> <ol style="list-style-type: none"> <li>1. Visible soils are washed off (inside and out) in a 5-gallon bucket containing soapy water until visibly clean.</li> <li>2. The piece is then rinsed with a low pressure sprayer using potable water into a rinse bucket. Rinsing will insure all soap residue is removed.</li> <li>3. The cutting shoe of the MacroCore Sampler will require, a light spray of isopropanol to be applied.</li> <li>4. The isopropanol solvent then will be rinsed with potable water, then deionized water.</li> <li>5. The components will be permitted to air dry.</li> <li>6. The SSO will scan the decontaminated parts with the PID to insure potential contamination and decontamination solvents have been removed.</li> </ol> <p>Note: The acetate liners are dedicated one time use items and therefore will not require decontamination. It is imperative that these items be kept from areas or supplies that may cause contamination.</p> <p><b>Personnel –</b></p> <ul style="list-style-type: none"> <li>• Secure all drilling operations.</li> <li>• Wash and rinse dedicated and reusable PPE, top down outside in.</li> <li>• Dispose of dedicated PPE as general refuse.</li> <li>• Wash hands and face with soap and water or use a hygienic wipes to remove potential contaminants from the hands and face. This will minimize potential ingestion exposures.</li> </ul>	
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**TABLE 4-1 ACTIVITY HAZARD ANALYSIS**

**ACTIVITY:** Soil Boring/Monitoring Well Installation Using DPT

**ANALYZED BY/DATE:** Jennifer Choich 08/2008

**PPE Required**

- |                               |   |  |                                       |   |  |
|-------------------------------|---|--|---------------------------------------|---|--|
| Hard-hat.....                 | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No            | Hearing Protection (Plugs/Muffs)..... | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No            |
| Safety Glasses .....          | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No            | Safety belt/harness .....             | <input type="checkbox"/> Yes            | <input checked="" type="checkbox"/> No |
| Chemical/splash goggles ..... | <input type="checkbox"/> Yes            | <input checked="" type="checkbox"/> No | Radio/Cellular Phone .....            | <input type="checkbox"/> Yes            | <input type="checkbox"/> No            |
| Splash Shield .....           | <input type="checkbox"/> Yes            | <input checked="" type="checkbox"/> No | Barricades.....                       | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No            |
| Splash suits/coveralls .....  | <input type="checkbox"/> Yes            | <input checked="" type="checkbox"/> No | Gloves (Type – See Note) .....        | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No            |
| Impermeable apron.....        | <input type="checkbox"/> Yes            | <input type="checkbox"/> No            | Work/rest regimen .....               | <input type="checkbox"/> Yes            | <input checked="" type="checkbox"/> No |
| Steel toe work shoes/boots... | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No            | Chemical Resistant Boot Covers.....   | <input type="checkbox"/> Yes            | <input type="checkbox"/> No            |
| High Visibility vest .....    | <input type="checkbox"/> Yes            | <input type="checkbox"/> No            | Tape up/use insect repellent .....    | <input type="checkbox"/> Yes            | <input type="checkbox"/> No            |
| First Aid Kit.....            | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No            | Fire Extinguisher.....                | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No            |
| Safety Shower/Eyewash .....   | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No            | Other.....                            | <input type="checkbox"/> Yes            | <input type="checkbox"/> No            |

Modifications/Exceptions: High visibility vests for within 15-feet of established traffic areas; Nitrile outer gloves and where necessary impermeable aprons for handling contaminated drilling equipment that may result in saturation of work clothes. Nitrile surgeon gloves for handling sampling tools. Hard hats are required when working near operating equipment, when overhead hazards exist, or when required in the area. Hearing protection will also be required when working in the vicinity (25-feet or less) of the drill rig. Fire extinguishers are required as follows: 2A:B:C for all general activities. When greater than 5-gallons of flammable liquid is stored or dispensed on site a fire extinguisher rated at least 10B will be required. Those blocks not checked above will require the SSO to evaluate site-specific conditions and direct the employees based on site specific conditions. Annotation of these changes will be incorporated into the Safe Work Packet. Reduction in PPE levels and equipment shall be discussed with the PHSO.

**Training Required**

- 29 CFR 1910.120 (e) 40-Hour General Site Worker Training
- 29 CFR 1910.120 (e) (8) 8-Hour General Site Worker Refresher Training
- 29 CFR 1910.120 (e) (4) 8-Hour General Site Worker Supervisory Training
- 29 CFR 1910.120 (e) Site Specific Training (See Mobilization/Demobilization Figure 2-3 of this HASP.
- Tail Gate Meeting Attendance (Figure 2-4 of this HASP)

Driller – Certified in the State of Maine. A copy of the License or Certification will be required.

**Medical Clearance/Surveillance Required**

- Be a participant in a Medical Surveillance Meeting the Requirements of 29 CFR 1910.120 (f)..
- Completed a Medical Data Sheet (See Figure 2-5)

**Emergency Equipment**

- First Aid Kit
- Eyewash – As we are handing corrosives as part of this effort (concrete) an eyewash will be required.
- Fire Extinguisher
- Map to Hospital and Emergency Contact List
- (Posted and one copy placed within the First Aid Kit)
- Spills
  - o Place plastic under the rig.
  - o Have spill pads, oil

**H&S Supporting Program Requirements**

- On Site Hazard Communication Program (Section 5.0 HSGM)
  - Collect and review MSDSs for
    - Collect and review MSDS for Decontamination Solution – Liquinox
    - Drilling supplies
    - Add chemicals to the On site Chemical Inventory List (Figure 2-7)
- MSDSs for 2-Propanol, concrete (grout) Liquinox have been included in this Safe Work Packet. The FOL and/or the SSO shall insure these are replaced once the Supplier or Manufacturers MSDS arrives with the products.

**TABLE 4-1 ACTIVITY HAZARD ANALYSIS**

**ACTIVITY:** Soil Boring/Monitoring Well Installation Using DPT

**ANALYZED BY/DATE:** Jennifer Choich 08/2008

<p>Mobilization/Demobilization Safe Work Packet.</p> <p>The documentation (Certificates, etc) of the training and medical surveillance described above will be maintained onsite and be available for review should it be necessary.</p>	<p>dry, or cat litter for oils maintained at the DPT rig.</p>	<ul style="list-style-type: none"> <li>• Hearing Conservation Program – Complete the Site-Specific Portion.</li> </ul> <p>Note: It is not anticipated that monitoring or noise dosimetry will be conducted as part of this site effort as sufficient data has been collected for this activity. It will be necessary however to record hearing protection types with accompanying NRR for each person.</p>
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## DPT DRILLING SAFE WORK PRACTICES

The following safe work practices are to be followed when working on or around DPT Drilling operations.

### **Before Drilling**

Identify all underground utilities and buried structures before DPT drilling. Use the Utility Locating and Excavation Clearance SOP provided in Section 7.0 of the HSGM. Note: NAS Brunswick requires that a digging permit be issued before any intrusive activities take place. No intrusive activities can take place unless this permit has been issued and posted at the job site. 811 may be used for the Nationwide Dig Permit utilization or Dig Safe System, Inc. 1-888-344-7233.

All Drill rigs will be inspected by a Competent Person (the SSO or designee) prior to the acceptance of the equipment at the site and prior to the use of the equipment. All repairs or deficiencies identified will be corrected prior to use. The inspection will be accomplished using the Equipment Inspection Checklist for Drill Rigs are provided in this Safe Work Packet. Inspection frequencies will be once/month, following repairs, or when the equipment leaves and returns to the site. Special emphasis will be directed to Emergency Stop Devices.

The trip hazards within the work area will be graded to the extent possible to remove any trip hazards near or surrounding DPT Drilling equipment.

The driller's helper will establish an equipment staging and lay down plan. The purpose of this is to keep the work area clear of clutter and slip, trip, and fall hazards. Mechanisms to secure heavy objects such as drill flights will be provided to avoid the collapse of stacked equipment.

### **During Drilling**

Minimize contact to the greatest extent possible with contaminated tooling and environmental media.

Support functions (sampling and screening stations) will be maintained a minimum distance from the Drill Rig of the height of the mast plus five feet to remove these activities from within physical hazard boundaries.

Only qualified operators and knowledgeable ground crew personnel will participate in the operation of the DPT rig.

Only personnel absolutely essential to the work activity will be allowed in the exclusion zone. Site visitors will be escorted at all times.

**After Drilling**

All equipment used within the exclusion zone that has contacted contaminated media will undergo a complete decontamination and evaluation by the SSO to determined cleanliness prior to moving to the next location, exiting the site, or prior to down time for maintenance.

All motorized equipment will be fueled prior to the commencement of the day's activities. During fueling operations all equipment will be shutdown and grounded to the fuel provider.

When not in use all wheeled Drill rigs will be shut down and emergency brakes set.

All areas subjected to subsurface investigative methods will be restored to equal or better condition than original to remove any contamination brought to the surface and to remove any physical hazards. In situations where these hazards cannot be removed these areas will be barricaded to minimize the impact on field crews and Base personnel working in the area.

FIGURE 4-1

DOCUMENTATION OF FIELD CALIBRATION

SITE NAME: NAS BRUNSWICK  
BRUNSWICK, MAINE

PROJECT NO.: CTO 0069; 112G00645

Date of Calibration	Instrument Name and Model	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot Number)	Remarks/Comments
				Pre-Calibration	Post-Calibration	Pre-Calibration	Post-Calibration		
				0.0/100.0	0.0/100.0				
				0.0/100.0	0.0/100.0				
				0.0/100.0	0.0/100.0				
				0.0/100.0	0.0/100.0				
				0.0/100.0	0.0/100.0				
				0.0/100.0	0.0/100.0				
				0.0/100.0	0.0/100.0				
				0.0/100.0	0.0/100.0				
				0.0/100.0	0.0/100.0				
				0.0/100.0	0.0/100.0				

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CTO 0069

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 September 2008

FIGURE 4-2

NASB EASTERN PLUME FIELD CHEMICAL INVENTORY LIST

This chemical inventory is to be completed for hazardous chemicals known to be present at project sites. Chemical inventories may be maintained separately (Tetra Tech NUS, Inc. and Subcontractors) or they may be maintained separately.

Site Name: NASB/Eastern Plume CTO/Project: 0069; 112G00645

TtNUS Hazard Communication On-site Program Administrator: \_\_\_\_\_ (SSO)

Subcontractor Hazard Communication On-site Program Administrator/Point of Contact: \_\_\_\_\_

Chemical/Product Name/Synonym	Owner	Quantity	Location	Hazards	Supplier/Manufacturer
Alconox/Liquinox Synonym: Anionic Detergent	Tetra Tech NUS, Inc.	1-gallon	Field Office Support Trailer <b>Note:</b> Smaller amounts are maintained at work sites.	- Irritating to the eyes. - May cause drying of the skin.	Alconox, Inc. 215 Park Avenue South New York, New York 10003 (212) 473-1300
Isobutylene/Air Synonym: Isobutene Methylpropene	Tetra Tech NUS, Inc.	( )Cylinders	Field Office Support Trailer	Inhalation hazard – May act as a simple asphyxiant in closed or confined spaces.  Pressurized cylinder hazard – Containers may rupture in a fire	Scott Specialty Gases 6141 Easton Road Plumsteadville, PA 18949 (215) 766-8861  Liquid Carbonic 135 South LaSalle Street Chicago Illinois 80603-4282 (504) 673-8831 Chemtrec (800) 424-9300
2- Propanol Synonym: Isopropanol	Tetra Tech NUS, Inc.	4-liters (1.05 gallons)	Field Office Support Trailer <b>Note:</b> Smaller amounts are maintained at work sites.	- Flammable - Eyes, skin, and respiratory irritant	Fisher Scientific 1 Reagent Lane Fairlawn, New Jersey 07410 Emergency #: (201)796-7100

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**FIGURE 4-2**

**NASB EASTERN PLUME FIELD CHEMICAL INVENTORY LIST**

*This chemical inventory is to be completed for hazardous chemicals known to be present at project sites. Chemical inventories may be maintained separately (Tetra Tech NUS, Inc. and Subcontractors) or they may be maintained separately.*

Site Name: NASB/Eastern Plume CTO/Project: 0069; 112G00645

TtNUS Hazard Communication On-site Program Administrator: \_\_\_\_\_ (SSO)

Subcontractor Hazard Communication On-site Program Administrator/Point of Contact: \_\_\_\_\_

<b>Chemical/Product Name/Synonym</b>	<b>Owner</b>	<b>Quantity</b>	<b>Location</b>	<b>Hazards</b>	<b>Supplier/Manufacturer</b>

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**FIGURE 4-2**

**NASB EASTERN PLUME FIELD CHEMICAL INVENTORY LIST**

*This chemical inventory is to be completed for hazardous chemicals known to be present at project sites. Chemical inventories may be maintained separately (Tetra Tech NUS, Inc. and Subcontractors) or they may be maintained separately.*

Site Name: NASB/Eastern Plume CTO/Project: 0069; 112G00645

TtNUS Hazard Communication On-site Program Administrator: \_\_\_\_\_ (SSO)

Subcontractor Hazard Communication On-site Program Administrator/Point of Contact: \_\_\_\_\_

<b>Chemical/Product Name/Synonym</b>	<b>Owner</b>	<b>Quantity</b>	<b>Location</b>	<b>Hazards</b>	<b>Supplier/Manufacturer</b>

**FIGURE 4-3 PORTLAND CEMENT  
MATERIAL SAFETY DATA SHEET**



# MATERIAL SAFETY DATA SHEET

Material: Portland Cement

## Section I - Identification

<p><b>Supplier:</b></p> <p><b>Name:</b> Holcim (US) Inc.</p> <p><b>Address:</b> 6211 N. Ann Arbor Road Dundee, MI 48131</p> <p><b>Telephone:</b> 800-854-4656</p>	<p><b>Emergency Contact Information: (CHEMTREC)</b></p> <p>Health 1-800-424-9300</p> <p>Transportation 1-800-424-9300</p>
<p><b>Product Codes:</b> Portland Cement Type I, IA, II, III, IV, V, White Cement. CSA Type 10, 20, 30, 40, &amp; 50. This MSDS covers many products. Individual constituents will vary.</p>	<p><b>Formula:</b> This product consists of finely ground Portland cement clinker mixed with a small amount of calcium sulfate (gypsum).</p>
<p><b>Chemical Family:</b> Chemical compounds. Calcium silicate components and other calcium compounds containing iron and aluminum make up the majority of this product.</p>	<p><b>Chemical Name and Synonyms:</b> Portland cement. Portland cement is also known as hydraulic cement.</p>

## Section II - Components

### HAZARDOUS INGREDIENTS

Component (%)	CAS No.	OSHA PEL (8-hour TWA)	ACGIH TLV-TWA (2002)
Tri-calcium silicate (20-70)	12168-85-3	see Nuisance Dust PEL	see Nuisance Dust TLV
Di-calcium silicate (10-60)	10034-77-2	see Nuisance Dust PEL	see Nuisance Dust TLV
Tetra-calcium- alumino-ferrite (5-15)	12068-35-8	see Nuisance Dust PEL	see Nuisance Dust TLV
Calcium sulfate (2-10)	---	see Nuisance Dust PEL	see Nuisance Dust TLV
Tri-calcium Aluminate (1-15)	12042-78-3	see Nuisance Dust PEL	see Nuisance Dust TLV
Magnesium oxide (0-4)	1309-48-4	see Nuisance Dust PEL	see Nuisance Dust TLV
Nuisance Dusts	---	15 mg/m <sup>3</sup> (total dust); 5 mg/m <sup>3</sup> (respirable dust)	10 mg/m <sup>3</sup> (total dust); 3 mg/m <sup>3</sup> (respirable dust)
Crystalline Silica (Quartz) * (0-1%)	14808-60-7	10 mg/m <sup>3</sup> /percent silica + 2 (respirable dust) 30 mg total dust/m <sup>3</sup> /percent silica + 2 (total dust)	0.10 mg/m <sup>3</sup>
Hexavalent Chromium (measured as chromic acid and chromates)	18540-29-9	(100 mg/m <sup>3</sup> )	

*Trace constituents:* Portland Cement has a variable composition depending upon the cementitious products produced in the cement kiln. Small amounts of naturally occurring, but potentially harmful, chemical compounds might be detected during chemical analysis. These trace compounds might include free crystalline silica, potassium and sodium compounds; heavy metals including cadmium, chromium, nickel and lead; and organic compounds. Other trace constituents may include calcium oxide (also known as free lime or quick lime).

## Section III – Hazards Identification

### Emergency Overview

Portland cement is a light gray powder that poses little immediate hazard. A single short-term exposure to the dry powder is not likely to cause serious harm. However, exposure to wet portland cement can cause serious, potentially irreversible tissue (skin or eye) destruction in the form of chemical (caustic) burns or an allergic reaction. The same type of tissue destruction can occur if wet or moist areas of the body are exposed for sufficient duration to dry portland cement.

### Potential Health Effects

- *Relevant Routes of Exposure:* Eye contact, skin contact, inhalation, and ingestion
- *Effects resulting from eye contact:* Exposure to airborne dust may cause immediate or delayed irritation or inflammation. Eye contact with larger amounts of dry powder or splashes of wet Portland cement may cause effects ranging from moderate eye irritation to chemical burns and blindness. Such exposures require immediate first aid (see section IV) and medical attention to prevent significant damage to the eye.
- *Effects resulting from skin contact:* Discomfort or pain cannot be relied upon to alert a person to a hazardous skin exposure. Consequently, the only effective means of avoiding skin injury or illness involves minimizing skin contact, particularly contact with wet cement. Exposed persons may not feel discomfort until hours after the exposure has ended and significant injury has occurred. Exposure to dry Portland cement may cause drying of the skin with consequent mild irritation or more significant effects attributable to aggravation of other conditions. Dry portland cement contacting wet skin or exposure to moist or wet portland cement may cause more severe skin effects including thickening, cracking or fissuring of the skin. Prolonged exposure can cause severe skin damage in the form of (caustic) chemical burns. Some individuals may exhibit an allergic response (e.g., allergic contact dermatitis) upon exposure to portland cement, possibly due to trace amounts of chromium. The response may appear in a variety of forms ranging from a mild rash to severe skin ulcers. Persons already sensitized may react to the first contact with the product. Other persons may experience this effect after years of contact with portland cement products.
- *Effects resulting from inhalation:* Portland cement contains small amounts of free crystalline silica. Prolonged exposure to respirable free crystalline silica can aggravate other lung conditions and cause silicosis, a disabling and potentially fatal lung disease and/or other diseases. Risk of injury or disease depends on duration and degree of exposure. (Also see "Carcinogenic potential" below.) Exposure to Portland cement may cause irritation to the moist mucous membranes of the nose, throat, and upper respiratory system. It may also leave unpleasant deposits in the nose.
- *Effects resulting from ingestion:* Although small quantities of dust are not known to be harmful, ill effects are possible if larger quantities are consumed. Portland cement should not be eaten.
- *Carcinogenic potential:* NTP, OSHA, or IARC has not listed Portland cement as a carcinogen. It may, however, contain trace amounts of substances listed as carcinogens by these organizations. Crystalline silica, which is present in Portland cement in small amounts, has been listed by IARC and NTP as a known human carcinogen (Group I) through inhalation. Hexavalent chromium is listed by IARC, EPA, NTP and OSHA as Group I known carcinogen by inhalation.
- *Medical conditions which may be aggravated by inhalation or dermal exposure:*
  - Pre-existing upper respiratory and lung diseases
  - Unusual (hyper) sensitivity to hexavalent chromium (chromium<sup>+6</sup>) salts.

## Section IV - First Aid

*Eyes:* Immediately flush eyes thoroughly with water. Continue flushing eye for at least 15 minutes, including under lids, to remove all particles. Call physician immediately.

*Skin:* Wash skin with cool water and pH-neutral soap or a mild detergent. Seek medical treatment in all cases of prolonged exposure to wet cement, wet cement mixtures, wet concrete liquids from fresh cement products, or prolonged wet skin exposure to dry cement.

*Inhalation of Airborne Dust:* Remove to fresh air. Seek medical help if coughing or other symptoms do not subside. (Inhalation of gross amounts of portland cement requires immediate medical attention.)

*Ingestion:* Do not induce vomiting. If conscious, have the victim drink plenty of water and call a physician immediately.

## Section V - Fire & Explosion Data

Flash point:	<i>None</i>	Auto ignition temperature:	<i>Not Combustible</i>
Lower Explosive Limit:	<i>None</i>	Upper Explosive Limit:	<i>None</i>
Extinguishing media:	<i>Not Combustible</i>	Unusual fire & explosion hazards	<i>None</i>
Hazardous combustion products:	<i>None</i>		
Special fire fighting procedures:	<i>None. (Although portland cement poses no fire-related hazards, a self-contained breathing apparatus is recommended to limit exposure to combustion products when fighting any fire.)</i>		

## Section VI - Accidental Release Measures

Collect dry material using a scoop. Avoid actions that cause dust to become airborne. Avoid inhalation of dust and contact with skin. Wear appropriate personal protective equipment as described in Section VIII. Scrape up wet material and place in an appropriate container. Allow the material to "dry" before disposal. Do not attempt to wash portland cement down drains. Dispose of waste material according to local, state, and federal regulations.

## Section VII - Handling & Storage

Keep portland cement dry until used. Normal temperatures and pressures do not affect the material. Promptly remove dusty clothing or clothing which is wet with cement fluids and launder before reuse. Wash thoroughly after exposure to dust or wet cement mixtures or fluids.

## Section VIII - Exposure Control/Personal Protection

**Skin Protection:** Prevention is essential to avoiding potentially severe skin injury. Avoid contact with unhardened wet portland cement products. If contact occurs, promptly wash affected area with soap and water. Where prolonged exposure to unhardened portland cement products might occur, wear impervious clothing and gloves to prevent skin contact. Where required, wear sturdy boots that are impervious to water to eliminate foot and ankle exposure. Do not rely on barrier creams; barrier creams should not be used in place of impervious gloves and clothing. Periodically wash areas contacted by dry portland cement or wet cement or concrete with a pH neutral soap. Wash again at the end of the work. If irritation occurs, immediately wash the affected area and seek treatment. If clothing becomes saturated with wet concrete, it should be removed and replaced with clean, dry clothing.

**Respiratory protection:** Avoid actions that cause dust to become airborne. Use local or general ventilation to control exposures below applicable exposure limits. Use NIOSH/MSHA-approved (under 30 CFR 11) or NIOSH-approved (under 42 CFR 84) respirators in poorly ventilated areas, if an applicable exposure limit is exceeded, or when dust causes discomfort or irritation. (Advisory: Respirators and filters purchased after July 10, 1998, must be certified under 42 CFR 84.)

**Ventilation:** Use local exhaust or general dilution ventilation to control exposure within applicable limits.

**Eye Protection:** In conditions where user may be exposed to splashes or puffs of cement, wear safety glasses with side shields or goggles. In extremely dusty or unpredictable environments, wear unvented or indirectly vented goggles to avoid eye irritation or injury. Contact lenses should not be worn when working with portland cement or fresh cement products.

## Section IX - Physical & Chemical Properties

Appearance:	<i>Gray or white powder</i>	Vapor Pressure:	<i>Not applicable</i>
Odor:	<i>No distinct odor</i>	Vapor density:	<i>Not applicable</i>
Physical state:	<i>Solid (powder)</i>	Boiling point:	<i>Not applicable (i.e., &gt; 1000 °C)</i>
pH (in water):	<i>12 to 13</i>	Melting point:	<i>Not applicable</i>
Solubility in water:	<i>Slightly (0.1 to 1.0%)</i>	Specific gravity (H <sub>2</sub> O = 1.0):	<i>3.15</i>
Evaporation Rate:	<i>Not applicable</i>		

## Section X - Stability & Reactivity

Stability:	<i>Stable.</i>
Incompatibility:	<i>Wet portland cement is alkaline. As such it is incompatible with acids, ammonium salts, and aluminum metal.</i>
Conditions to avoid:	<i>Unintentional contact with water.</i>
Hazardous decomposition:	<i>Will not spontaneously occur. Adding water produces (caustic) calcium hydroxide as a result of hydration.</i>
Hazardous polymerization:	<i>Will not occur.</i>

## Section XI - Toxicological Information

For a description of available, more detailed toxicological information, contact Holcim (US) Inc. (in Section I).

## Section XII - Ecological Information

Ecotoxicity: *No recognized unusual toxicity to plants or animals*  
Relevant physical and chemical properties: *See Sections IX & X*

## Section XIII - Disposal

Dispose of waste material according to local, state, and federal regulations. (Since portland cement is stable, uncontaminated material may be saved for future use.) Dispose of bags in an approved landfill or incinerator.

## Section XIV - Transportation Data

Hazardous materials description/proper shipping name: *Portland cement is not hazardous under U.S. Department of Transportation (DOT) regulations*  
Hazard class: *Not applicable*  
Identification class: *Not applicable*  
Required label text: *Not applicable*  
Hazardous substances/reportable quantities (RQ): *Not applicable*

## Section XV - Other Regulatory Information

Status under USDOL-OSHA Hazard Communication Rule, 29 CFR 1910.1200: *Portland cement is considered a "hazardous chemical" under this regulation, and should be part of any hazard communication program.*

Status under CERCLA/Superfund, 40 CFR 117 and 302: *Not listed.*

Hazard Category under SARA (Title III), Sections 311 & 312: *Portland cement qualifies as a "hazardous substance" with delayed health effects.*

Status under SARA (Title III) Section 313: *Not subject to reporting requirements under section 313.*

Status under TSCA (as of May 1997): *Some substances in portland cement are on the TSCA inventory list.*

Status under the Federal Hazardous Substances Act: *Portland cement is a "hazardous substance" subject to statutes promulgated under the subject act.*

Status under California Proposition 65: *WARNING: This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. California law requires the manufacturer to give the above warning in the absence of definitive testing to prove that the defined risks do not exist.*

Status under Canadian Environmental Protection Act: *Not listed.*

Workplace Hazardous Material Information System (Canada): *Portland cement is considered to be a hazardous material under the Hazardous Product Act as defined by the Controlled Products Regulations (Class E - Corrosive Material) and is therefore subject to the labeling and MSDS requirements of the Workplace Hazardous Materials Information System (WHMIS).*

## Section XVI - Other Information

Approved by: Susan Diehl, Vice President  
Revision Date: February 9, 2005

**Other important information:** Portland cement should only be used by knowledgeable persons. While the information provided in the material safety data sheet is believed to provide a useful summary of the hazards of portland cement as it is commonly used, the sheet cannot anticipate and provide all of the information that might be needed in every situation. Inexperienced product users should obtain proper training before using this product. A key to using the product safely requires the user to recognize that portland cement chemically reacts with water, and that some of the intermediate products of this reaction (that is, those present while a portland cement product is "setting") pose a more severe hazard than does portland cement itself. These hazards include potential injuries to eyes and skin. The data furnished in this sheet do not address hazards that may be posed by other materials mixed with portland cement to produce portland cement products. Users should review other relevant material safety data sheets before working with this portland cement or with portland cement products, including, for example, portland cement concrete.

SELLER MAKES NO WARRANTY, EXPRESSED OR IMPLIED, CONCERNING THE PRODUCT OR THE MERCHANTABILITY OR FITNESS THERE OF FOR ANY PURPOSE OR CONCERNING THE ACCURACY OF ANY INFORMATION PROVIDED BY HOLCIM (US) INC., EXCEPT THAT THE PRODUCT SHALL CONFORM TO CONTRACTED SPECIFICATIONS.

**FIGURE 4-4 MATERIAL SAFETY DATA SHEET  
DECONTAMINATION FLUID - ISOPROPANOL**

MSDS Number: P6401 \* \* \* \* \* Effective Date: 11/04/04 \* \* \* \* \* Supercedes: 05/07/03



## Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.  
222 Red School Lane  
Phillipsburg, NJ 08865



24 Hour Emergency Telephone: 908-859-2151  
CHEMTREC: 1-800-424-9300

National Response in Canada  
CANUTEC: 613-996-6666

Outside U.S. And Canada  
Chemtrec: 703-527-3887

**NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.**

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

## 2-PROPANOL

### 1. PRODUCT IDENTIFICATION

**Synonyms:** Isopropyl alcohol; sec-propyl alcohol; isopropanol; sec-propanol; dimethylcarbinol

**CAS No.:** 67-63-0

**Molecular Weight:** 60.10

**Chemical Formula:** (CH<sub>3</sub>)<sub>2</sub>CHOH

**Product Codes:** 5373, 5582, 5863, 5870, 5873, 5890, 5967, 5977, 5986, 5996, 9026, 9045, 9055, 9059, 9062, 9078, 9079, 9081, 9082, 9083, 9084, 9088, 9089, 9095, 9334, 9827, XM-181, XM-198

### 2. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredient	CAS No	Percent	Hazardous
Isopropyl Alcohol	67-63-0	90 - 100%	Yes
Water	7732-18-5	0 - 10%	No

### 3. HAZARDS IDENTIFICATION

#### Emergency Overview

WARNING! FLAMMABLE LIQUID AND VAPOR. HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM. MAY BE HARMFUL IF ABSORBED THROUGH SKIN. MAY CAUSE IRRITATION TO SKIN.

**SAF-T-DATA<sup>(tm)</sup>** Ratings (Provided here for your convenience)

---

Health Rating: 2 - Moderate

Flammability Rating: 3 - Severe (Flammable)

Reactivity Rating: 2 - Moderate

Contact Rating: 3 - Severe

Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER

Storage Color Code: Red (Flammable)

---

**Potential Health Effects**

**Inhalation:** Inhalation of vapors irritates the respiratory tract. Exposure to high concentrations has a narcotic effect, producing symptoms of dizziness, drowsiness, headache, staggering, unconsciousness and possibly death.

**Ingestion:** Can cause drowsiness, unconsciousness, and death. Gastrointestinal pain, cramps, nausea, vomiting, and diarrhea may also result. The single lethal dose for a human adult = about 250 mls (8 ounces).

**Skin Contact:** May cause irritation with redness and pain. May be absorbed through the skin with possible systemic effects.

**Eye Contact:** Vapors cause eye irritation. Splashes cause severe irritation, possible corneal burns and eye damage.

**Chronic Exposure:** Chronic exposure may cause skin effects.

**Aggravation of Pre-existing Conditions:** Persons with pre-existing skin disorders or impaired liver, kidney, or pulmonary function may be more susceptible to the effects of this agent.

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**4. FIRST AID MEASURES**

**Inhalation:** Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

**Ingestion:** Give large amounts of water to drink. Never give anything by mouth to an unconscious person. Get medical attention.

**Skin Contact:** Immediately flush skin with plenty of water for at least 15 minutes. Call a physician if irritation develops.

**Eye Contact:** Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

---

## 5. FIRE FIGHTING MEASURES

**Fire:** Flash point: 12C (54F) CC

Autoignition temperature: 399C (750F)

Flammable limits in air % by volume: lel: 2.0; uel: 12.7

Listed fire data is for Pure Isopropyl Alcohol.

**Explosion:** Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Contact with strong oxidizers may cause fire or explosion. Vapors can flow along surfaces to distant ignition source and flash back. Sensitive to static discharge.

**Fire Extinguishing Media:** Water spray, dry chemical, alcohol foam, or carbon dioxide. Water spray may be used to keep fire exposed containers cool, dilute spills to nonflammable mixtures, protect personnel attempting to stop leak and disperse vapors.

**Special Information:** In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

---

## 6. ACCIDENTAL RELEASE MEASURES

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures.

J. T. Baker SOLUSORB® solvent adsorbent is recommended for spills of this product.

---

## 7. HANDLING AND STORAGE

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product. Small quantities of peroxides can form on prolonged storage. Exposure to light and/or air significantly increases the rate of peroxide formation. If evaporated to a residue, the mixture of peroxides and isopropanol may explode when exposed to heat or shock.

---

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### **Airborne Exposure Limits:**

For Isopropyl Alcohol (2-Propanol):

-OSHA Permissible Exposure Limit (PEL): 400 ppm (TWA)

-ACGIH Threshold Limit Value (TLV): 200 ppm (TWA), 400 ppm (STEL), A4 - not classifiable as a human carcinogen.

**Ventilation System:** A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

**Personal Respirators (NIOSH Approved):** If the exposure limit is exceeded, a full facepiece respirator with organic vapor cartridge may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. **WARNING:** Air purifying respirators do not protect workers in oxygen-deficient atmospheres.

**Skin Protection:** Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact. Neoprene and nitrile rubber are recommended materials.

**Eye Protection:** Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

---

## 9. PHYSICAL AND CHEMICAL PROPERTIES

**Appearance:** Clear, colorless liquid.

**Odor:** Rubbing alcohol.

**Solubility:** Miscible in water.

**Specific Gravity:** 0.79 @ 20C/4C

**pH:** No information found.

**% Volatiles by volume @ 21C (70F):** 100

**Boiling Point:** 82C (180F)

**Melting Point:** -89C (-128F)

**Vapor Density (Air=1):** 2.1

**Vapor Pressure (mm Hg):** 44 @ 25C (77F)

**Evaporation Rate (BuAc=1):** 2.83

---

## 10. STABILITY AND REACTIVITY

**Stability:** Stable under ordinary conditions of use and storage. Heat and sunlight can contribute to instability.

**Hazardous Decomposition Products:** Carbon dioxide and carbon monoxide may form when heated to decomposition.

**Hazardous Polymerization:** Will not occur.

**Incompatibilities:** Heat, flame, strong oxidizers, acetaldehyde, acids, chlorine, ethylene oxide, hydrogen-palladium combination, hydrogen peroxide-sulfuric acid combination, potassium tert-butoxide, hypochlorous acid, isocyanates, nitroform, phosgene, aluminum, oleum and perchloric acid.

**Conditions to Avoid:** Heat, flames, ignition sources and incompatibles.

---

## 11. TOXICOLOGICAL INFORMATION

Oral rat LD50: 5045 mg/kg; skin rabbit LD50: 12.8 gm/kg; inhalation rat LC50: 16,000 ppm/8-hour; investigated as a tumorigen, mutagen, reproductive effector.

-----\Cancer Lists\-----

---NTP Carcinogen---

Ingredient	Known	Anticipated	IARC Category
Isopropyl Alcohol (67-63-0)	No	No	3
Water (7732-18-5)	No	No	None

---

## 12. ECOLOGICAL INFORMATION

**Environmental Fate:** When released into the soil, this material is expected to quickly evaporate. When released into the soil, this material may leach into groundwater. When released into the soil, this material may biodegrade to a moderate extent. When released to water, this material is expected to quickly evaporate. When released into the water, this material is expected to have a half-life between 1 and 10 days. When released into water, this material may biodegrade to a moderate extent. This material is not expected to significantly bioaccumulate. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life between 1 and 10 days. When released into the air, this material may be removed from the atmosphere to a moderate extent by wet deposition.

**Environmental Toxicity:** The LC50/96-hour values for fish are over 100 mg/l. This material is not expected to be toxic to aquatic life.

---

### 13. DISPOSAL CONSIDERATIONS

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

---

### 14. TRANSPORT INFORMATION

#### Domestic (Land, D.O.T.)

**Proper Shipping Name:** ISOPROPANOL

**Hazard Class:** 3

**UN/NA:** UN1219

**Packing Group:** II

**Information reported for product/size:** 355LB

#### International (Water, I.M.O.)

**Proper Shipping Name:** ISOPROPANOL

**Hazard Class:** 3

**UN/NA:** UN1219

**Packing Group:** II

**Information reported for product/size:** 355LB

---

### 15. REGULATORY INFORMATION

#### -----\Chemical Inventory Status - Part 1\-----

Ingredient	TSCA	EC	Japan	Australia
------------	------	----	-------	-----------

Isopropyl Alcohol (67-63-0)	Yes	Yes	Yes	Yes
-----------------------------	-----	-----	-----	-----

Water (7732-18-5)	Yes	Yes	Yes	Yes
-------------------	-----	-----	-----	-----

#### -----\Chemical Inventory Status - Part 2\-----

--Canada--

Ingredient	Korea	DSL	NDSL	Phil.
------------	-------	-----	------	-------

Isopropyl Alcohol (67-63-0)	Yes	Yes	No	Yes
-----------------------------	-----	-----	----	-----

Water (7732-18-5)                      Yes   Yes   No   Yes

-----\Federal, State & International Regulations - Part 1\-----

-SARA 302-    -----SARA 313-----

Ingredient                      RQ   TPQ   List   Chemical Catg.

-----  
Isopropyl Alcohol (67-63-0)                      No   No   Yes   No

Water (7732-18-5)                      No   No   No   No

-----\Federal, State & International Regulations - Part 2\-----

-RCRA-    -TSCA-

Ingredient                      CERCLA    261.33    8(d)

-----  
Isopropyl Alcohol (67-63-0)                      No      No      No

Water (7732-18-5)                      No      No      No

Chemical Weapons Convention: No    TSCA 12(b): No    CDTA: No

SARA 311/312: Acute: Yes    Chronic: Yes    Fire: Yes    Pressure: No

Reactivity: No    (Mixture / Liquid)

**Australian Hazchem Code:** 2[S]2

**Poison Schedule:** None allocated.

**WHMIS:** This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

**16. OTHER INFORMATION**

**NFPA Ratings:** Health: 1    Flammability: 3    Reactivity: 0

**Label Hazard Warning:** WARNING! FLAMMABLE LIQUID AND VAPOR. HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM. MAY BE HARMFUL IF ABSORBED THROUGH SKIN. MAY CAUSE IRRITATION TO SKIN.

**Label Precautions:** Keep away from heat, sparks and flame. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling. Avoid breathing vapor or mist. Avoid contact with eyes, skin and clothing.

**Label First Aid:** If swallowed, give large amounts of water to drink. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases, get medical

attention.

**Product Use:** Laboratory Reagent.

**Revision Information:** MSDS Section(s) changed since last revision of document include: 16.

**Disclaimer:** \*\*\*\*\*

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**Prepared by:** Environmental Health & Safety

Phone Number: (314) 654-1600 (U.S.A.)

<b>Figure 4-5, ALLOY CHAIN/CHAIN SLING INSPECTION CHECKOUT LIST</b>	Size _____ Length _____		Rated Capacity _____	Proof Test Capacity _____
	Hook Throat Opening _____		Allowable Throat Opening _____	
<i>Inspection Criteria</i>	<i>Yes</i>	<i>No</i>	<i>Remarks</i>	
1) Bent or deformed links?				
2) Maximum allowable wear at any point of the link(s)?				
3) Cracks in weld areas, shoulders, or any other section of the link?				
4) Transverse nicks and/or gouges? Locations?				
5) Corrosion pitting? Weld spatter?				
6) Length measurement?			Initial _____ Periodic _____	
7) Chain is adequately lubricated?				
8) Hooks bent greater than 5° out of vertical plane?			Initial _____ Periodic _____	
9) Hook Throat measured opening in excess of 15% original opening?			Initial _____ Periodic _____	
Date Inspection ____/____/____		Inspectors Signature _____ Position _____		

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Revision 0  
September 2008

## **ATTACHMENT A**

### **Naval Air Station Brunswick**

### **SITE-SPECIFIC HEARING CONSERVATION PROGRAM**

**SITE SPECIFIC HEARING CONSERVATION PROGRAM**

The following information pertaining to the use of hearing protection is to be completed by the Site Safety Officer (SSO), their duly appointed representative, or the Field Operations Leader (FOL). This work site portion of the Hearing Conservation Program (HCP) will be completed only if hearing protection is to be used in the completion of the assigned tasks as identified per the scope of work, in the work plan, the health and safety plan, bid specifications, or as determined through hazard assessment of the tasks and potential hazards which may be involved. It is not anticipated that personal or area noise dosimetry will be conducted in support of this activity as sufficient data has been collected.

**Personnel Responsible For Program Completion**

The following persons are available to provide assistance in all elements of this program including question/conflict resolution and modification variances. These persons exercise the primary responsibility for the implementation of this site-specific program.

- I) **Site Safety Officer (Site HCP Administrator):** \_\_\_\_\_ **Phone #:** \_\_\_\_\_
- Field Operations Leader:** \_\_\_\_\_ **Phone #:** \_\_\_\_\_
- Project Health and Safety Officer:** Jennifer Choich, PhD **Phone #:** (412) 921-8083; \_\_\_\_\_
- Health and Safety Manager:** Matthew M. Soltis, CIH, CSP **Phone #:** (412) 921-8912 \_\_\_\_\_

**Personnel Who (by Way of Assignment) Will Wear Hearing Protection**

The following list represents TtNUS or subcontractor personnel working under the provisions of this HCP. The persons listed below are included in this site-specific HCP and are required to wear hearing protection when performing tasks producing excessive noise.

II)

Personnel	Make/Model of Hearing Protective Devices to be used	Hearing Protection Noise Reduction Rating (NRR #)

### III) NOISE EVALUATION TECHNIQUE OR QUANTITATIVE NOISE EVALUATIONS

Noise level monitoring performed on-site will be done to quantify noise levels generated during certain operations. Documentation of these measurements will be performed using either the Sound Level Measurement Log or the Noise Dosimetry Log provided as Figure 4-3 and Figure 4-4.

#### The Sound Level Monitoring

Sound level measurements will only be conducted if it has been directed within the safe work packet. Sound level measurements can be used in establishing noise levels for persons working within the exclusion zone. Sound level monitoring will be performed using a Type II Sound Level Meter (SLM) set on the A-Weighted scale and on the SLOW response setting. This type of SLM survey is necessary when the general rule of thumb for noise levels is exceeded, in order to determine if hearing conservation is an issue, and if so, to set the boundaries for where hearing protection will be required. SLM surveys are also used to identify areas or operations where more specific noise exposure evaluations (using noise dosimetry) are appropriate.

#### GENERAL RULE OF THUMB FOR DETERMINING THAT NOISE LEVELS MAY BE EXCESSIVE

*If noise levels are loud enough that you need to raise your voice in order to communicate with another person who is within two feet of you, then noise levels may be excessive. In this case, hearing conservation issues must be considered and hearing protection must be used until and unless sound level monitoring or noise dosimetry indicate that it is not necessary.*

To perform a SLM survey, first make sure that the SLM is on the proper settings as noted above, and ensure that it is properly calibrated in accordance with the manufacturer's instructions. Then, take **at least 3 random readings at each location** starting at the spot where the noise source is loudest and working your way away from the noise source, until you have readings that are below an average of 85 decibels on the A-weighted scale (dBA). You should position the SLM so that it is pointing perpendicular to the noise source (do not point the microphone directly at the noise source. This can result in inaccurate readings). "Random readings" means that you should hold the SLM in place and occasionally glance at the readout and record the reading that you see. You should not watch the readout and record the highest peak reading that you see. Pay particular attention to taking readings at any employee or subcontractor employee typical work locations (such as at the controls of a drill rig, at the area where samples are taken, etc.). Record your readings on a draft sketch of the work area (or on a floorplan if working inside of a building).

After you have taken enough readings to adequately characterize the work area, post calibrate the SLM and record the distance from the noise source where the average of the 3 readings was no more than 85 dBA (using Figure 4-3). All areas inside of the 85 dBA boundary line are to be designated as requiring hearing protection, and this must be communicated to all members of the field team. This can be accomplished by placing appropriate signs at the boundary line, posting Figure 4-3 at the work area, and by reviewing Figure 4-3 with the field team as part of a daily tailgate meeting or Safe Work Packet review.

Also, areas where average sound levels are 85 dBA or greater should be brought to the attention of the PHSO for considerations for noise dosimetry.

The Sound Level Measurement Log will be used in the following circumstances

- Setting exclusion zone boundaries based on noise levels generated.
- Establishing noise contours surrounding operations.

### **Noise Dosimetry Log**

Noise dosimetry is used to accurately characterize the noise exposure that a person actually experiences during a working period. Dosimetry is much simpler to perform than a SLM survey, but it does involve the participation and cooperation of more people (namely, the workers who will wear the dosimeters). As with the use of any instrumentation, you need to closely follow the recommendations of the dosimeter manufacturer. Complete a Noise Dosimetry Log (Figure 4-4) for each dosimetry evaluation. In general, make sure that each dosimeter is properly calibrated before use, then attach the device to the worker so that the microphone is near the area of their head (i.e., at the collar). The worker should wear the device for the entire day, including breaks, and you should periodically check the device and record any notations of activities performed during the shift, using the Worker Activity Log. At the end of the shift, remove the dosimeter from the worker and post-calibrate it.

### **Noise Monitoring Results - Notification**

The results of the noise monitoring (Sound Level Measurement Log and/or the Noise Dosimetry Log) will be copied and attached to the Safe Work Permit(s), where applicable. Copies of these documents will be forwarded to the PHSO for evaluation. In addition, a copy or the original shall be posted to inform personnel involved in the test as to the results. The SSO will also provide a narrative of the results to all personnel and subcontractor personnel who wish further explanation.

### **Calibration**

All instruments used for sound level measurements and noise dosimetry will require calibration prior to use. All calibration will proceed as per manufacturer's instructions provided with the instruments.

Information required for calibration is provided on the Sound Level and Noise Dosimetry Logs. Pre-and post-calibrations must be performed and recorded for all noise evaluations performed.

### **IIIA) Sound Level Measurement Log**

The Sound Level Measurement Log (Figure 4-3) is to be used as a general record for sound level measurements recorded during operations. The diagram of the work area is to be completed by the SSO and/or the FOL. Information should include operator/helpers positions, support functions (sample tables, etc.), and noise measurements along the contours provided below. When designating the 85 dBA boundary line, make the approximate distance from the noise source so that it is clearly evident to site personnel where hearing protection is needed. A better approach would be to put signs in place where noise levels are above 85 dBA that hearing protection is required in this area. The contours provided below are set at ten feet intervals from the center, if alternate distances are desired indicate as such on the contour boundaries.

### SOUND LEVEL MEASUREMENT LOG

Date of Survey	Location of Survey	Surveyed By
Sound Level Meter(Type)	Model #	Serial #
Calibration Date	Calibrated By	
Pre-Calibration Reading	Post-Calibration Reading	
Activity Being Conducted: _____ _____		
Equipment Used: _____		
Duration of Activity: _____		
Hearing Protection Used? _____ Type: _____ NRR: _____		
Comments: _____ _____		

**IIIB) NOISE DOSIMETRY LOG**

Noise dosimetry will only be conducted if it has been directed in the Safe Work Packet. This log will be employed when conducting Noise Dosimetry of operations or job classifications. This log contains the necessary information queues for worker information as well as calibration of the noise dosimeters to insure complete documentation. On the reverse side a running log of worker activity is provided. Upon completion of this log, a copy should be made for the file on site, and the original sent to the PHSO for evaluation.

### NOISE DOSIMETRY LOG

Sampler: \_\_\_\_\_ DATE OF SAMPLE: \_\_\_\_\_

Individuals conducting the dosimetry initials below indicate that noise dosimeter(s) were calibrated, and the unit(s) test parameters verified, prior to sampling:

_____ 90 dB Criterion	_____ Pre-sample Calibration @ _____ dBA
_____ 5 dB Exchange	_____ Post-sample Calibration @ _____ dBA
_____ 80 dB Cut-off Threshold	Calibrator: _____

Type of Noise Dosimeter employed: \_\_\_\_\_

Worker Sampled: \_\_\_\_\_ Dosimeter Identification No. \_\_\_\_\_

S.S. Number: \_\_\_\_\_

Job Classification: \_\_\_\_\_

Job/Task being performed: \_\_\_\_\_

Equipment/Tools used: \_\_\_\_\_

Type of Hearing Protection Employed: \_\_\_\_\_ Noise Reduction Rating: \_\_\_\_\_

Representative Exposure: \_\_\_\_\_

For: \_\_\_\_\_

Start-time: \_\_\_\_:\_\_\_\_ Lmax. \_\_\_\_\_ Lavg. \_\_\_\_\_ Lpk. \_\_\_\_\_

Stop-time: \_\_\_\_:\_\_\_\_

Elapsed-time: \_\_\_\_:\_\_\_\_ Dose: \_\_\_\_\_% Projected Dose: \_\_\_\_\_%

Comments: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Supervisor in Charge \_\_\_\_\_

SSO and/or FOL \_\_\_\_\_

**ALSO COMPLETE WORKER ACTIVITY LOG ON REVERSE SIDE**

**WORKER ACTIVITY LOG**

TEST HOUR	TASK(S)	*	LOCATION(S)
1			
2			
3			
4			
5			
6			
7			
8			

#### **IV) Audiometric Testing**

Audiometric testing is a standard part of the examination protocol in the Tetra Tech NUS Medical Surveillance Program. If based on scope of work, personnel or subcontractor personnel are required to wear hearing protection as part of their task assignment, it will be the SSO's or the FOL's responsibility to inquire whether their medical evaluation included audiometric testing. At all Tetra Tech NUS, Inc. project sites where hearing protection is required it is imperative that personnel be in a program of audiometric testing. For those who have not had even an initial (or baseline) evaluation, hearing protection will be required if Time-weighted are 8 hour exposure > 85 dBA.

#### **V) Information Access**

The implementation of this HCP requires information be made available to the participants of this program. Information to be made available include the following:

- Code of Federal Regulations, Subsection 1910.95 - This standard shall be posted on site accessible to all personnel. (retrievable at [http://www.osha-slc.gov/OshStd\\_data/1910\\_0095.html](http://www.osha-slc.gov/OshStd_data/1910_0095.html)). This information has been provided in the following pages.
- Monitoring Results – Information concerning quantitative monitoring will be posted accessible to all site personnel.
- Informational materials pertaining to the standard supplied to the employer by the Department of Labor.

#### **IV) Record-Keeping**

The following information will be maintained at the project site by the SSO and/or the FOL during the course of on-site activities.

- Exposure monitoring documentation (Sound Level Measurement and Noise Dosimetry Logs shall be maintained with the Safe Work Permit, where applicable). This information at project completion will be maintained in the project files for a period of no less than two years.
- Medical Surveillance information – Information concerning the individual's fitness for duty should include a declaration that the medical evaluation included establishing a baseline quantification of that persons hearing capabilities.
- Training – On project sites where noise is recognized as a potential hazard (either in the SSHASP-A or Master HASP, by following the general rule-of-thumb, or as a result of noise monitoring), hearing conservation training must be provided to all personnel working in these areas. This can be accomplished using this Site Specific Hearing Conservation Program. If training is provided, in part or in whole regarding the subject matter minimum content documentation should be provided attesting to such.

CODE OF FEDERAL REGULATIONS, SUBSECTION 1910.95

Occupational Safety and Health Admin., Labor

§ 1910.95

FR 5322, Feb. 10, 1984; 55 FR 32015, Aug. 6, 1990; 58 FR 35308, June 30, 1993]

§ 1910.95 Occupational noise exposure.

(a) Protection against the effects of noise exposure shall be provided when the sound levels exceed those shown in Table G-16 when measured on the A scale of a standard sound level meter at slow response. When noise levels are determined by octave band analysis, the equivalent A-weighted sound level may be determined as follows:

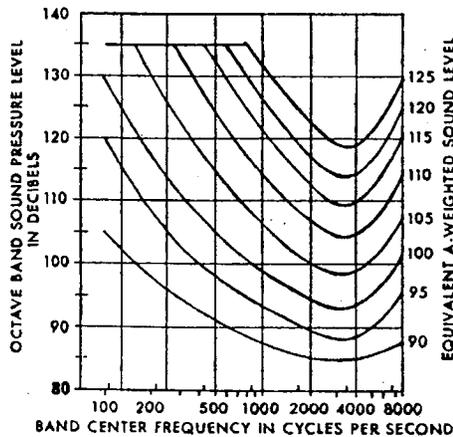


FIGURE G-9

Equivalent sound level contours. Octave band sound pressure levels may be converted to the equivalent A-weighted sound level by plotting them on this graph and noting the A-weighted sound level corresponding to the point of highest penetration into the sound level contours. This equivalent A-weighted sound level, which may differ from the actual A-weighted sound level of the noise, is used to determine exposure limits from Table 1.G-16.

(b)(1) When employees are subjected to sound exceeding those listed in Table G-16, feasible administrative or engineering controls shall be utilized. If such controls fail to reduce sound levels within the levels of Table G-16, personal protective equipment shall be provided and used to reduce sound levels within the levels of the table.

(2) If the variations in noise level involve maxima at intervals of 1 second or less, it is to be considered continuous.

TABLE G-16—PERMISSIBLE NOISE EXPOSURES<sup>1</sup>

Duration per day, hours	Sound level dBA slow response
8.....	90
6.....	92
4.....	95
3.....	97
2.....	100
1½.....	102
1.....	105
½.....	110
¼ or less.....	115

<sup>1</sup> When the daily noise exposure is composed of two or more periods of noise exposure of different levels, their combined effect should be considered, rather than the individual effect of each. If the sum of the following fractions:  $C_1/T_1 + C_2/T_2 + C_n/T_n$ , exceeds unity, then, the mixed exposure should be considered to exceed the limit value.  $C_n$  indicates the total time of exposure at a specified noise level, and  $T_n$  indicates the total time of exposure permitted at that level. Exposure to impulsive or impact noise should not exceed 140 dB peak sound pressure level.

(c) *Hearing conservation program.*

(1) The employer shall administer a continuing, effective hearing conservation program, as described in paragraphs (c) through (o) of this section, whenever employee noise exposures equal or exceed an 8-hour time-weighted average sound level (TWA) of 85 decibels measured on the A scale (slow response) or, equivalently, a dose of fifty percent. For purposes of the hearing conservation program, employee noise exposures shall be computed in accordance with appendix A and Table G-16a, and without regard to any attenuation provided by the use of personal protective equipment.

(2) For purposes of paragraphs (c) through (n) of this section, an 8-hour time-weighted average of 85 decibels or a dose of fifty percent shall also be referred to as the action level.

(d) *Monitoring.* (1) When information indicates that any employee's exposure may equal or exceed an 8-hour time-weighted average of 85 decibels, the employer shall develop and implement a monitoring program.

(i) The sampling strategy shall be designed to identify employees for inclusion in the hearing conservation program and to enable the proper selection of hearing protectors.

(ii) Where circumstances such as high worker mobility, significant variations in sound level, or a significant

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component of impulse noise make area monitoring generally inappropriate, the employer shall use representative personal sampling to comply with the monitoring requirements of this paragraph unless the employer can show that area sampling produces equivalent results.

(2)(i) All continuous, intermittent and impulsive sound levels from 80 decibels to 130 decibels shall be integrated into the noise measurements.

(ii) Instruments used to measure employee noise exposure shall be calibrated to ensure measurement accuracy.

(3) Monitoring shall be repeated whenever a change in production, process, equipment or controls increases noise exposures to the extent that:

(i) Additional employees may be exposed at or above the action level; or

(ii) The attenuation provided by hearing protectors being used by employees may be rendered inadequate to meet the requirements of paragraph (j) of this section.

(e) *Employee notification.* The employer shall notify each employee exposed at or above an 8-hour time-weighted average of 85 decibels of the results of the monitoring.

(f) *Observation of monitoring.* The employer shall provide affected employees or their representatives with an opportunity to observe any noise measurements conducted pursuant to this section.

(g) *Audiometric testing program.* (1) The employer shall establish and maintain an audiometric testing program as provided in this paragraph by making audiometric testing available to all employees whose exposures equal or exceed an 8-hour time-weighted average of 85 decibels.

(2) The program shall be provided at no cost to employees.

(3) Audiometric tests shall be performed by a licensed or certified audiologist, otolaryngologist, or other physician, or by a technician who is certified by the Council of Accreditation in Occupational Hearing Conservation, or who has satisfactorily demonstrated competence in administering audiometric examinations, obtaining valid audiograms, and properly using,

maintaining and checking calibration and proper functioning of the audiometers being used. A technician who operates microprocessor audiometers does not need to be certified. A technician who performs audiometric tests must be responsible to an audiologist, otolaryngologist or physician.

(4) All audiograms obtained pursuant to this section shall meet the requirements of Appendix C: *Audiometric Measuring Instruments.*

(5) *Baseline audiogram.* (i) Within 6 months of an employee's first exposure at or above the action level, the employer shall establish a valid baseline audiogram against which subsequent audiograms can be compared.

(ii) *Mobile test van exception.* Where mobile test vans are used to meet the audiometric testing obligation, the employer shall obtain a valid baseline audiogram within 1 year of an employee's first exposure at or above the action level. Where baseline audiograms are obtained more than 6 months after the employee's first exposure at or above the action level, employees shall wear hearing protectors for any period exceeding six months after first exposure until the baseline audiogram is obtained.

(iii) Testing to establish a baseline audiogram shall be preceded by at least 14 hours without exposure to workplace noise. Hearing protectors may be used as a substitute for the requirement that baseline audiograms be preceded by 14 hours without exposure to workplace noise.

(iv) The employer shall notify employees of the need to avoid high levels of non-occupational noise exposure during the 14-hour period immediately preceding the audiometric examination.

(6) *Annual audiogram.* At least annually after obtaining the baseline audiogram, the employer shall obtain a new audiogram for each employee exposed at or above an 8-hour time-weighted average of 85 decibels.

(7) *Evaluation of audiogram.* (i) Each employee's annual audiogram shall be compared to that employee's baseline audiogram to determine if the audiogram is valid and if a standard threshold shift as defined in paragraph (g)(10) of this section has oc-

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curred. This comparison may be done by a technician.

(ii) If the annual audiogram shows that an employee has suffered a standard threshold shift, the employer may obtain a retest within 30 days and consider the results of the retest as the annual audiogram.

(iii) The audiologist, otolaryngologist, or physician shall review problem audiograms and shall determine whether there is a need for further evaluation. The employer shall provide to the person performing this evaluation the following information:

(A) A copy of the requirements for hearing conservation as set forth in paragraphs (c) through (n) of this section;

(B) The baseline audiogram and most recent audiogram of the employee to be evaluated;

(C) Measurements of background sound pressure levels in the audiometric test room as required in Appendix D: Audiometric Test Rooms.

(D) Records of audiometer calibrations required by paragraph (h)(5) of this section.

(8) *Follow-up procedures.* (i) If a comparison of the annual audiogram to the baseline audiogram indicates a standard threshold shift as defined in paragraph (g)(10) of this section has occurred, the employee shall be informed of this fact in writing, within 21 days of the determination.

(ii) Unless a physician determines that the standard threshold shift is not work related or aggravated by occupational noise exposure, the employer shall ensure that the following steps are taken when a standard threshold shift occurs:

(A) Employees not using hearing protectors shall be fitted with hearing protectors, trained in their use and care, and required to use them.

(B) Employees already using hearing protectors shall be refitted and retrained in the use of hearing protectors and provided with hearing protectors offering greater attenuation if necessary.

(C) The employee shall be referred for a clinical audiological evaluation or an otological examination, as appropriate, if additional testing is necessary or if the employer suspects that a

medical pathology of the ear is caused or aggravated by the wearing of hearing protectors.

(D) The employee is informed of the need for an otological examination if a medical pathology of the ear that is unrelated to the use of hearing protectors is suspected.

(iii) If subsequent audiometric testing of an employee whose exposure to noise is less than an 8-hour TWA of 90 decibels indicates that a standard threshold shift is not persistent, the employer:

(A) Shall inform the employee of the new audiometric interpretation; and

(B) May discontinue the required use of hearing protectors for that employee.

(9) *Revised baseline.* An annual audiogram may be substituted for the baseline audiogram when, in the judgment of the audiologist, otolaryngologist or physician who is evaluating the audiogram:

(i) The standard threshold shift revealed by the audiogram is persistent; or

(ii) The hearing threshold shown in the annual audiogram indicates significant improvement over the baseline audiogram.

(10) *Standard threshold shift.* (i) As used in this section, a standard threshold shift is a change in hearing threshold relative to the baseline audiogram of an average of 10 dB or more at 2000, 3000, and 4000 Hz in either ear.

(ii) In determining whether a standard threshold shift has occurred, allowance may be made for the contribution of aging (presbycusis) to the change in hearing level by correcting the annual audiogram according to the procedure described in Appendix F: *Calculation and Application of Age Correction to Audiograms.*

(h) *Audiometric test requirements.*

(1) Audiometric tests shall be pure tone, air conduction, hearing threshold examinations, with test frequencies including as a minimum 500, 1000, 2000, 3000, 4000, and 6000 Hz. Tests at each frequency shall be taken separately for each ear.

(2) Audiometric tests shall be conducted with audiometers (including microprocessor audiometers) that

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meet the specifications of, and are maintained and used in accordance with, American National Standard Specification for Audiometers, S3.6-1969.

(3) Pulsed-tone and self-recording audiometers, if used, shall meet the requirements specified in Appendix C: *Audiometric Measuring Instruments*.

(4) Audiometric examinations shall be administered in a room meeting the requirements listed in Appendix D: *Audiometric Test Rooms*.

(5) *Audiometer calibration.* (i) The functional operation of the audiometer shall be checked before each day's use by testing a person with known, stable hearing thresholds, and by listening to the audiometer's output to make sure that the output is free from distorted or unwanted sounds. Deviations of 10 decibels or greater require an acoustic calibration.

(ii) Audiometer calibration shall be checked acoustically at least annually in accordance with Appendix E: *Acoustic Calibration of Audiometers*. Test frequencies below 500 Hz and above 6000 Hz may be omitted from this check. Deviations of 15 decibels or greater require an exhaustive calibration.

(iii) An exhaustive calibration shall be performed at least every two years in accordance with sections 4.1.2; 4.1.3; 4.1.4.3; 4.2; 4.4.1; 4.4.2; 4.4.3; and 4.5 of the American National Standard Specification for Audiometers, S3.6-1969. Test frequencies below 500 Hz and above 6000 Hz may be omitted from this calibration.

(i) *Hearing protectors.* (1) Employers shall make hearing protectors available to all employees exposed to an 8-hour time-weighted average of 85 decibels or greater at no cost to the employees. Hearing protectors shall be replaced as necessary.

(2) Employers shall ensure that hearing protectors are worn:

(i) By an employee who is required by paragraph (b)(1) of this section to wear personal protective equipment; and

(ii) By any employee who is exposed to an 8-hour time-weighted average of 85 decibels or greater, and who:

(A) Has not yet had a baseline audiogram established pursuant to paragraph (g)(5)(ii); or

(B) Has experienced a standard threshold shift.

(3) Employees shall be given the opportunity to select their hearing protectors from a variety of suitable hearing protectors provided by the employer.

(4) The employer shall provide training in the use and care of all hearing protectors provided to employees.

(5) The employer shall ensure proper initial fitting and supervise the correct use of all hearing protectors.

(j) *Hearing protector attenuation.*

(1) The employer shall evaluate hearing protector attenuation for the specific noise environments in which the protector will be used. The employer shall use one of the evaluation methods described in Appendix B: *Methods for Estimating the Adequacy of Hearing Protection Attenuation*.

(2) Hearing protectors must attenuate employee exposure to at least to an 8-hour time-weighted average of 90 decibels as required by paragraph (b) of this section.

(3) For employees who have experienced a standard threshold shift, hearing protectors must attenuate employee exposure to an 8-hour time-weighted average of 85 decibels or below.

(4) The adequacy of hearing protector attenuation shall be re-evaluated whenever employee noise exposures increase to the extent that the hearing protectors provided may no longer provide adequate attenuation. The employer shall provide more effective hearing protectors where necessary.

(k) *Training program.* (1) The employer shall institute a training program for all employees who are exposed to noise at or above an 8-hour time-weighted average of 85 decibels, and shall ensure employee participation in such program.

(2) The training program shall be repeated annually for each employee included in the hearing conservation program. Information provided in the training program shall be updated to be consistent with changes in protective equipment and work processes.

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(3) The employer shall ensure that each employee is informed of the following:

- (i) The effects of noise on hearing;
- (ii) The purpose of hearing protectors, the advantages, disadvantages, and attenuation of various types, and instructions on selection, fitting, use, and care; and
- (iii) The purpose of audiometric testing, and an explanation of the test procedures.

(1) *Access to information and training materials.* (1) The employer shall make available to affected employees or their representatives copies of this standard and shall also post a copy in the workplace.

(2) The employer shall provide to affected employees any informational materials pertaining to the standard that are supplied to the employer by the Assistant Secretary.

(3) The employer shall provide, upon request, all materials related to the employer's training and education program pertaining to this standard to the Assistant Secretary and the Director.

(m) *Recordkeeping*—(1) *Exposure measurements.* The employer shall maintain an accurate record of all employee exposure measurements required by paragraph (d) of this section.

(2) *Audiometric tests.* (i) The employer shall retain all employee audiometric test records obtained pursuant to paragraph (g) of this section:

- (ii) This record shall include:
  - (A) Name and job classification of the employee;
  - (B) Date of the audiogram;
  - (C) The examiner's name;
  - (D) Date of the last acoustic or exhaustive calibration of the audiometer; and
  - (E) Employee's most recent noise exposure assessment.

(F) The employer shall maintain accurate records of the measurements of the background sound pressure levels in audiometric test rooms.

(3) *Record retention.* The employer shall retain records required in this paragraph (m) for at least the following periods.

- (i) Noise exposure measurement records shall be retained for two years.

(ii) Audiometric test records shall be retained for the duration of the affected employee's employment.

(4) *Access to records.* All records required by this section shall be provided upon request to employees, former employees, representatives designated by the individual employee, and the Assistant Secretary. The provisions of 29 CFR 1910.20 (a)-(e) and (g)-(i) apply to access to records under this section.

(5) *Transfer of records.* If the employer ceases to do business, the employer shall transfer to the successor employer all records required to be maintained by this section, and the successor employer shall retain them for the remainder of the period prescribed in paragraph (m) (3) of this section.

(n) *Appendices.* (1) Appendices A, B, C, D, and E to this section are incorporated as part of this section and the contents of these appendices are mandatory.

(2) Appendices F and G to this section are informational and are not intended to create any additional obligations not otherwise imposed or to detract from any existing obligations.

(o) *Exemptions.* Paragraphs (c) through (n) of this section shall not apply to employers engaged in oil and gas well drilling and servicing operations.

(p) *Startup date.* Baseline audiograms required by paragraph (g) of this section shall be completed by March 1, 1984.

(Approved by the Office of Management and Budget under control number 1218-0048)

**APPENDIX A TO § 1910.95—NOISE EXPOSURE COMPUTATION**

*This Appendix is Mandatory*

I. Computation of Employee Noise Exposure

(1) Noise dose is computed using Table G-16a as follows:

(i) When the sound level, L, is constant over the entire work shift, the noise dose, D, in percent, is given by:  $D = 100 C/T$  where C is the total length of the work day, in hours, and T is the reference duration corresponding to the measured sound level, L, as given in Table G-16a or by the formula shown as a footnote to that table.

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(ii) When the workshift noise exposure is composed of two or more periods of noise at different levels, the total noise dose over the work day is given by:

$$D = 100 (C_1/T_1 + C_2/T_2 + \dots + C_n/T_n),$$

where  $C_n$  indicates the total time of exposure at a specific noise level, and  $T_n$  indicates the reference duration for that level as given by Table G-16a.

(2) The eight-hour time-weighted average sound level (TWA), in decibels, may be computed from the dose, in percent, by means of the formula:  $TWA = 16.61 \log_{10} (D/100) + 90$ . For an eight-hour workshift with the noise level constant over the entire shift, the TWA is equal to the measured sound level.

(3) A table relating dose and TWA is given in Section II.

TABLE G-16a

A-weighted sound level, L (decibel)	Reference duration, T (hour)
80.....	32
81.....	27.9
82.....	24.3
83.....	21.1
84.....	18.4
85.....	16
86.....	13.9
87.....	12.1
88.....	10.6
89.....	9.2
90.....	8
91.....	7.0
92.....	6.1
93.....	5.3
94.....	4.6
95.....	4
96.....	3.5
97.....	3.0
98.....	2.6
99.....	2.3
100.....	2
101.....	1.7
102.....	1.5
103.....	1.3
104.....	1.1
105.....	1
106.....	0.87
107.....	0.76
108.....	0.66
109.....	0.57
110.....	0.5
111.....	0.44
112.....	0.38
113.....	0.33
114.....	0.29
115.....	0.25
116.....	0.22
117.....	0.19
118.....	0.16
119.....	0.14
120.....	0.125
121.....	0.11
122.....	0.095
123.....	0.082

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TABLE G-16a—Continued

A-weighted sound level, L (decibel)	Reference duration, T (hour)
124.....	0.072
125.....	0.063
126.....	0.054
127.....	0.047
128.....	0.041
129.....	0.036
130.....	0.031

In the above table the reference duration, T, is computed by

$$T = \frac{8}{2^{(L-90)/5}}$$

where L is the measured A-weighted sound level.

II. Conversion Between "Dose" and "8-Hour Time-Weighted Average" Sound Level

Compliance with paragraphs (c)-(r) of this regulation is determined by the amount of exposure to noise in the workplace. The amount of such exposure is usually measured with an audiodosimeter which gives a readout in terms of "dose." In order to better understand the requirements of the amendment, dosimeter readings can be converted to an "8-hour time-weighted average sound level." (TWA).

In order to convert the reading of a dosimeter into TWA, see Table A-1, below. This table applies to dosimeters that are set by the manufacturer to calculate dose or percent exposure according to the relationships in Table G-16a. So, for example, a dose of 91 percent over an eight hour day results in a TWA of 89.3 dB, and, a dose of 50 percent corresponds to a TWA of 85 dB.

If the dose as read on the dosimeter is less than or greater than the values found in Table A-1, the TWA may be calculated by using the formula:  $TWA = 16.61 \log_{10} (D/100) + 90$  where TWA=8-hour time-weighted average sound level and D=accumulated dose in percent exposure.

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TABLE A-1—CONVERSION FROM "PERCENT NOISE EXPOSURE" OR "DOSE" TO "8-HOUR TIME-WEIGHTED AVERAGE SOUND LEVEL" (TWA)

Dose or percent noise exposure	TWA
10.....	73.4
15.....	76.3
20.....	78.4
25.....	80.0
30.....	81.3
35.....	82.4
40.....	83.4
45.....	84.2
50.....	85.0
55.....	85.7
60.....	86.3
65.....	86.9
70.....	87.4
75.....	87.9
80.....	88.4
81.....	88.5
82.....	88.6
83.....	88.7
84.....	88.7
85.....	88.8
86.....	88.9
87.....	89.0
88.....	89.1
89.....	89.2
90.....	89.2
91.....	89.3
92.....	89.4
93.....	89.5
94.....	89.6
95.....	89.6
96.....	89.7
97.....	89.8
98.....	89.9
99.....	89.9
100.....	90.0
101.....	90.1
102.....	90.1
103.....	90.2
104.....	90.3
105.....	90.4
106.....	90.4
107.....	90.5
108.....	90.6
109.....	90.6
110.....	90.7
111.....	90.8
112.....	90.8
113.....	90.9
114.....	90.9
115.....	91.1
116.....	91.1
117.....	91.1
118.....	91.2
119.....	91.3
120.....	91.3
125.....	91.6
130.....	91.9
135.....	92.2
140.....	92.4
145.....	92.7
150.....	92.9
155.....	93.2
160.....	93.4
165.....	93.6
170.....	93.8
175.....	94.0

TABLE A-1—CONVERSION FROM "PERCENT NOISE EXPOSURE" OR "DOSE" TO "8-HOUR TIME-WEIGHTED AVERAGE SOUND LEVEL" (TWA)—Continued

Dose or percent noise exposure	TWA
180.....	94.2
185.....	94.4
190.....	94.6
195.....	94.8
200.....	95.0
210.....	95.4
220.....	95.7
230.....	96.0
240.....	96.3
250.....	96.6
260.....	96.9
270.....	97.2
280.....	97.4
290.....	97.7
300.....	97.9
310.....	98.2
320.....	98.4
330.....	98.6
340.....	98.8
350.....	99.0
360.....	99.2
370.....	99.4
380.....	99.6
390.....	99.8
400.....	100.0
410.....	100.2
420.....	100.4
430.....	100.5
440.....	100.7
450.....	100.8
460.....	101.0
470.....	101.2
480.....	101.3
490.....	101.5
500.....	101.6
510.....	101.8
520.....	101.9
530.....	102.0
540.....	102.2
550.....	102.3
560.....	102.4
570.....	102.6
580.....	102.7
590.....	102.8
600.....	102.9
610.....	103.0
620.....	103.2
630.....	103.3
640.....	103.4
650.....	103.5
660.....	103.6
670.....	103.7
680.....	103.8
690.....	103.9
700.....	104.0
710.....	104.1
720.....	104.2
730.....	104.3
740.....	104.4
750.....	104.5
760.....	104.6
770.....	104.7
780.....	104.8
790.....	104.9
800.....	105.0
810.....	105.1

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TABLE A-1—CONVERSION FROM "PERCENT NOISE EXPOSURE" OR "DOSE" TO "8-HOUR TIME-WEIGHTED AVERAGE SOUND LEVEL" (TWA)—Continued

Dose or percent noise exposure	TWA
820	105.2
830	105.3
840	105.4
850	105.4
860	105.5
870	105.6
880	105.7
890	105.8
900	105.8
910	105.9
920	106.0
930	106.1
940	106.2
950	106.2
960	106.3
970	106.4
980	106.5
990	106.5
999	106.6

APPENDIX B TO § 1910.95—METHODS FOR ESTIMATING THE ADEQUACY OF HEARING PROTECTOR ATTENUATION

*This Appendix is Mandatory*

For employees who have experienced a significant threshold shift, hearing protector attenuation must be sufficient to reduce employee exposure to a TWA of 85 dB. Employers must select one of the following methods by which to estimate the adequacy of hearing protector attenuation.

The most convenient method is the Noise Reduction Rating (NRR) developed by the Environmental Protection Agency (EPA). According to EPA regulation, the NRR must be shown on the hearing protector package. The NRR is then related to an individual worker's noise environment in order to assess the adequacy of the attenuation of a given hearing protector. This appendix describes four methods of using the NRR to determine whether a particular hearing protector provides adequate protection within a given exposure environment. Selection among the four procedures is dependent upon the employer's noise measuring instruments.

Instead of using the NRR, employers may evaluate the adequacy of hearing protector attenuation by using one of the three methods developed by the National Institute for Occupational Safety and Health (NIOSH), which are described in the "List of Personal Hearing Protectors and Attenuation Data," HEW Publication No. 76-120, 1975, pages 21-37. These methods are known as NIOSH methods #1, #2 and #3. The NRR described below is a simplification of NIOSH method

#2. The most complex method is NIOSH method #1, which is probably the most accurate method since it uses the largest amount of spectral information from the individual employee's noise environment. As in the case of the NRR method described below, if one of the NIOSH methods is used, the selected method must be applied to an individual's noise environment to assess the adequacy of the attenuation. Employers should be careful to take a sufficient number of measurements in order to achieve a representative sample for each time segment.

**NOTE:** The employer must remember that calculated attenuation values reflect realistic values only to the extent that the protectors are properly fitted and worn.

When using the NRR to assess hearing protector adequacy, one of the following methods must be used:

(i) When using a dosimeter that is capable of C-weighted measurements:

(A) Obtain the employee's C-weighted dose for the entire workshift, and convert to TWA (see appendix A, II).

(B) Subtract the NRR from the C-weighted TWA to obtain the estimated A-weighted TWA under the ear protector.

(ii) When using a dosimeter that is not capable of C-weighted measurements, the following method may be used:

(A) Convert the A-weighted dose to TWA (see appendix A).

(B) Subtract 7 dB from the NRR.

(C) Subtract the remainder from the A-weighted TWA to obtain the estimated A-weighted TWA under the ear protector.

(iii) When using a sound level meter set to the A-weighting network:

(A) Obtain the employee's A-weighted TWA.

(B) Subtract 7 dB from the NRR, and subtract the remainder from the A-weighted TWA to obtain the estimated A-weighted TWA under the ear protector.

(iv) When using a sound level meter set on the C-weighting network:

(A) Obtain a representative sample of the C-weighted sound levels in the employee's environment.

(B) Subtract the NRR from the C-weighted average sound level to obtain the estimated A-weighted TWA under the ear protector.

(v) When using area monitoring procedures and a sound level meter set to the A-weighting network.

(A) Obtain a representative sound level for the area in question.

(B) Subtract 7 dB from the NRR and subtract the remainder from the A-weighted sound level for that area.

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(vi) When using area monitoring procedures and a sound level meter set to the C-weighting network:

(A) Obtain a representative sound level for the area in question.

(B) Subtract the NRR from the C-weighted sound level for that area.

**APPENDIX C TO § 1910.95—AUDIOMETRIC MEASURING INSTRUMENTS**

*This Appendix is Mandatory*

1. In the event that pulsed-tone audiometers are used, they shall have a tone on-time of at least 200 milliseconds.

2. Self-recording audiometers shall comply with the following requirements:

(A) The chart upon which the audiogram is traced shall have lines at positions corresponding to all multiples of 10 dB hearing level within the intensity range spanned by the audiometer. The lines shall be equally spaced and shall be separated by at least ¼ inch. Additional increments are optional. The audiogram pen tracings shall not exceed 2 dB in width.

(B) It shall be possible to set the stylus manually at the 10-dB increment lines for calibration purposes.

(C) The slewing rate for the audiometer attenuator shall not be more than 6 dB/sec except that an initial slewing rate greater than 6 dB/sec is permitted at the beginning of each new test frequency, but only until the second subject response.

(D) The audiometer shall remain at each required test frequency for 30 seconds ( $\pm 3$  seconds). The audiogram shall be clearly marked at each change of frequency and the actual frequency change of the audiometer shall not deviate from the frequency boundaries marked on the audiogram by more than  $\pm 3$  seconds.

(E) It must be possible at each test frequency to place a horizontal line segment parallel to the time axis on the audiogram, such that the audiometric tracing crosses the line segment at least six times at that test frequency. At each test frequency the threshold shall be the average of the mid-points of the tracing excursions.

**APPENDIX D TO § 1910.95—AUDIOMETRIC TEST ROOMS**

*This Appendix is Mandatory*

Rooms used for audiometric testing shall not have background sound pressure levels exceeding those in Table D-1 when measured by equipment conforming at least to the Type 2 requirements of American National Standard Specification for Sound Level Meters, S1.4-1971 (R1976), and to the Class II requirements of American National Standard Specification for Octave, Half-Octave, and Third-Octave Band Filter Sets, S1.11-1971 (R1976).

**TABLE D-1—MAXIMUM ALLOWABLE OCTAVE-BAND SOUND PRESSURE LEVELS FOR AUDIO-METRIC TEST ROOMS**

Octave-band center frequency (Hz)	500	1000	2000	4000	8000
Sound pressure level (dB)	40	40	47	57	62

**APPENDIX E TO § 1910.95—ACOUSTIC CALIBRATION OF AUDIOMETERS**

*This Appendix is Mandatory*

Audiometer calibration shall be checked acoustically, at least annually, according to the procedures described in this appendix. The equipment necessary to perform these measurements is a sound level meter, octave-band filter set, and a National Bureau of Standards 9A coupler. In making these measurements, the accuracy of the calibrating equipment shall be sufficient to determine that the audiometer is within the tolerances permitted by American Standard Specification for Audiometers, S3.6-1969.

*(1) Sound Pressure Output Check*

A. Place the earphone coupler over the microphone of the sound level meter and place the earphone on the coupler.

B. Set the audiometer's hearing threshold level (HTL) dial to 70 dB.

C. Measure the sound pressure level of the tones at each test frequency from 500 Hz through 6000 Hz for each earphone.

D. At each frequency the readout on the sound level meter should correspond to the levels in Table E-1 or Table E-2, as appropriate, for the type of earphone, in the column entitled "sound level meter reading."

*(2) Linearity Check*

A. With the earphone in place, set the frequency to 1000 Hz and the HTL dial on the audiometer to 70 dB.

B. Measure the sound levels in the coupler at each 10-dB decrement from 70 dB to 10 dB, noting the sound level meter reading at each setting.

C. For each 10-dB decrement on the audiometer the sound level meter should indicate a corresponding 10 dB decrease.

D. This measurement may be made electrically with a voltmeter connected to the earphone terminals.

*(3) Tolerances*

When any of the measured sound levels deviate from the levels in Table E-1 or Table E-2 by  $\pm 3$  dB at any test frequency between 500 and 3000 Hz, 4 dB at 4000 Hz, or 5 dB at 6000 Hz, an exhaustive calibra-

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tion is advised. An exhaustive calibration is required if the deviations are greater than 15 dB or greater at any test frequency.

TABLE E-1—REFERENCE THRESHOLD LEVELS FOR TELEPHONICS—TDH-39 EARPHONES

Frequency, Hz	Reference threshold level for TDH-39 ear-phones, dB	Sound level meter reading, dB
500.....	11.5	81.5
1000.....	7	77
2000.....	9	79
3000.....	10	80
4000.....	9.5	79.5
6000.....	15.5	85.5

TABLE E-2—REFERENCE THRESHOLD LEVELS FOR TELEPHONICS—TDH-49 EARPHONES

Frequency, Hz	Refer-ence threshold level for TDH-49 ear-phones, dB	Sound level meter reading, dB
500.....	13.5	83.5
1000.....	7.5	77.5
2000.....	11	81.0
3000.....	9.5	79.5
4000.....	10.5	80.5
6000.....	13.5	83.5

APPENDIX F TO § 1910.95—CALCULATIONS AND APPLICATION OF AGE CORRECTIONS TO AUDIOGRAMS

*This Appendix Is Non-Mandatory*

In determining whether a standard threshold shift has occurred, allowance may be made for the contribution of aging to the change in hearing level by adjusting the most recent audiogram. If the employer chooses to adjust the audiogram, the employer shall follow the procedure described below. This procedure and the age correction tables were developed by the National Institute for Occupational Safety and Health in the criteria document entitled "Criteria for a Recommended Standard . . . Occupational Exposure to Noise," ((HSM)-11001).

For each audiometric test frequency;

(1) Determine from Tables F-1 or F-2 the age correction values for the employee by:

(A) Finding the age at which the most recent audiogram was taken and recording the corresponding values of age corrections at 1000 Hz through 6000 Hz;

(B) Finding the age at which the baseline audiogram was taken and recording the corresponding values of age corrections at 1000 Hz through 6000 Hz.

(ii) Subtract the values found in step (1)(B) from the value found in step (1)(A).

(iii) The differences calculated in step (ii) represented that portion of the change in hearing that may be due to aging.

EXAMPLE: Employee is a 32-year-old male. The audiometric history for his right ear is shown in decibels below.

Employee's age	Audiometric test frequency (Hz)				
	1000	2000	3000	4000	6000
26.....	10	5	5	10	5
*27.....	0	0	0	5	5
28.....	0	0	0	10	5
29.....	5	0	5	15	5
30.....	0	5	10	20	10
31.....	5	10	20	15	15
*32.....	5	10	10	25	20

The audiogram at age 27 is considered the baseline since it shows the best hearing threshold levels. Asterisks have been used to identify the baseline and most recent audiogram. A threshold shift of 20 dB exists at 4000 Hz between the audiograms taken at ages 27 and 32.

(The threshold shift is computed by subtracting the hearing threshold at age 27, which was 5, from the hearing threshold at age 32, which is 25). A retest audiogram has confirmed this shift. The contribution of aging to this change in hearing may be estimated in the following manner:

Go to Table F-1 and find the age correction values (in dB) for 4000 Hz at age 27 and age 32.

	Frequency (Hz)				
	1000	2000	3000	4000	6000
Age 32.....	6	5	7	10	14
Age 27.....	5	4	6	7	11
Difference.....	1	1	1	3	3

The difference represents the amount of hearing loss that may be attributed to aging in the time period between the baseline audiogram and the most recent audiogram. In this example, the difference at 4000 Hz is 3 dB. This value is subtracted from the hearing level at 4000 Hz, which in the most recent audiogram is 25, yielding 22 after adjustment. Then the hearing threshold in the baseline audiogram at 4000 Hz (5) is subtracted from the adjusted annual audio-

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gram hearing threshold at 4000 Hz (22). Thus the age-corrected threshold shift would be 17 dB (as opposed to a threshold shift of 20 dB without age correction).

TABLE F-1—AGE CORRECTION VALUES IN DECIBELS FOR MALES

Years	Audiometric Test Frequencies (Hz)				
	1000	2000	3000	4000	6000
20 or younger.....	5	3	4	5	8
21.....	5	3	4	5	8
22.....	5	3	4	5	8
23.....	5	3	4	6	9
24.....	5	3	5	6	9
25.....	5	3	5	7	10
26.....	5	4	5	7	10
27.....	5	4	6	7	11
28.....	6	4	6	8	11
29.....	6	4	6	8	12
30.....	6	4	6	9	12
31.....	6	4	7	9	13
32.....	6	5	7	10	14
33.....	6	5	7	10	14
34.....	6	5	8	11	15
35.....	7	5	8	11	15
36.....	7	5	9	12	16
37.....	7	6	9	12	17
38.....	7	6	9	13	17
39.....	7	6	10	14	18
40.....	7	6	10	14	19
41.....	7	6	10	14	20
42.....	8	7	11	16	20
43.....	8	7	12	16	21
44.....	8	7	12	17	22
45.....	8	7	13	18	23
46.....	8	8	13	19	24
47.....	8	8	14	19	24
48.....	9	8	14	20	25
49.....	9	9	15	21	26
50.....	9	9	16	22	27
51.....	9	9	16	23	28
52.....	9	10	17	24	29
53.....	9	10	18	25	30
54.....	10	10	18	26	31
55.....	10	11	19	27	32
56.....	10	11	20	28	34
57.....	10	11	21	29	35
58.....	10	12	22	31	36
59.....	11	12	22	32	37
60 or older.....	11	13	23	33	38

TABLE F-2—AGE CORRECTION VALUES IN DECIBELS FOR FEMALES—Continued

Years	Audiometric Test Frequencies (Hz)				
	1000	2000	3000	4000	6000
30.....	8	6	5	5	9
31.....	8	6	6	5	9
32.....	9	6	6	6	10
33.....	9	6	6	6	10
34.....	9	6	6	6	10
35.....	9	6	7	7	11
36.....	9	7	7	7	11
37.....	9	7	7	7	12
38.....	10	7	7	7	12
39.....	10	7	8	8	12
40.....	10	7	8	8	13
41.....	10	8	8	8	13
42.....	10	8	9	9	13
43.....	11	8	9	9	14
44.....	11	8	9	9	14
45.....	11	8	10	10	15
46.....	11	9	10	10	15
47.....	11	9	10	11	16
48.....	12	9	11	11	16
49.....	12	9	11	11	16
50.....	12	10	11	12	17
51.....	12	10	12	12	17
52.....	12	10	12	13	18
53.....	13	10	13	13	18
54.....	13	11	13	14	19
55.....	13	11	14	14	19
56.....	13	11	14	15	20
57.....	13	11	15	15	20
58.....	14	12	15	16	21
59.....	14	12	16	16	21
60 or older.....	14	12	16	17	22

TABLE F-2—AGE CORRECTION VALUES IN DECIBELS FOR FEMALES

Years	Audiometric Test Frequencies (Hz)				
	1000	2000	3000	4000	6000
20 or younger.....	7	4	3	3	6
21.....	7	4	4	3	6
22.....	7	4	4	4	6
23.....	7	5	4	4	7
24.....	7	5	4	4	7
25.....	8	5	4	4	7
26.....	8	5	5	4	8
27.....	8	5	5	5	8
28.....	8	5	5	5	8
29.....	8	5	5	5	9

APPENDIX G TO § 1910.95—MONITORING NOISE LEVELS NON-MANDATORY INFORMATIONAL APPENDIX

This appendix provides information to help employers comply with the noise monitoring obligations that are part of the hearing conservation amendment.

WHAT IS THE PURPOSE OF NOISE MONITORING?

This revised amendment requires that employees be placed in a hearing conservation program if they are exposed to average noise levels of 85 dB or greater during an 8 hour workday. In order to determine if exposures are at or above this level, it may be necessary to measure or monitor the actual noise levels in the workplace and to estimate the noise exposure or "dose" received by employees during the workday.

WHEN IS IT NECESSARY TO IMPLEMENT A NOISE MONITORING PROGRAM?

It is not necessary for every employer to measure workplace noise. Noise monitoring or measuring must be conducted only when exposures are at or above 85 dB. Factors which suggest that noise exposures in the workplace may be at this level include employee complaints about the loudness of noise, indications that employees are losing

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their hearing, or noisy conditions which make normal conversation difficult. The employer should also consider any information available regarding noise emitted from specific machines. In addition, actual workplace noise measurements can suggest whether or not a monitoring program should be initiated.

HOW IS NOISE MEASURED?

Basically, there are two different instruments to measure noise exposures: the sound level meter and the dosimeter. A sound level meter is a device that measures the intensity of sound at a given moment. Since sound level meters provide a measure of sound intensity at only one point in time, it is generally necessary to take a number of measurements at different times during the day to estimate noise exposure over a workday. If noise levels fluctuate, the amount of time noise remains at each of the various measured levels must be determined.

To estimate employee noise exposures with a sound level meter it is also generally necessary to take several measurements at different locations within the workplace. After appropriate sound level meter readings are obtained, people sometimes draw "maps" of the sound levels within different areas of the workplace. By using a sound level "map" and information on employee locations throughout the day, estimates of individual exposure levels can be developed. This measurement method is generally referred to as *area* noise monitoring.

A dosimeter is like a sound level meter except that it stores sound level measurements and integrates these measurements over time, providing an average noise exposure reading for a given period of time, such as an 8-hour workday. With a dosimeter, a microphone is attached to the employee's clothing and the exposure measurement is simply read at the end of the desired time period. A reader may be used to read-out the dosimeter's measurements. Since the dosimeter is worn by the employee, it measures noise levels in those locations in which the employee travels. A sound level meter can also be positioned within the immediate vicinity of the exposed worker to obtain an individual exposure estimate. Such procedures are generally referred to as *personal* noise monitoring.

Area monitoring can be used to estimate noise exposure when the noise levels are relatively constant and employees are not mobile. In workplaces where employees move about in different areas or where the noise intensity tends to fluctuate over time, noise exposure is generally more accurately estimated by the personal monitoring approach.

In situations where personal monitoring is appropriate, proper positioning of the microphone is necessary to obtain accurate measurements. With a dosimeter, the microphone is generally located on the shoulder and remains in that position for the entire workday. With a sound level meter, the microphone is stationed near the employee's head, and the instrument is usually held by an individual who follows the employee as he or she moves about.

Manufacturer's instructions, contained in dosimeter and sound level meter operating manuals, should be followed for calibration and maintenance. To ensure accurate results, it is considered good professional practice to calibrate instruments before and after each use.

HOW OFTEN IS IT NECESSARY TO MONITOR NOISE LEVELS?

The amendment requires that when there are significant changes in machinery or production processes that may result in increased noise levels, remonitoring must be conducted to determine whether additional employees need to be included in the hearing conservation program. Many companies choose to remonitor periodically (once every year or two) to ensure that all exposed employees are included in their hearing conservation programs.

WHERE CAN EQUIPMENT AND TECHNICAL ADVICE BE OBTAINED?

Noise monitoring equipment may be either purchased or rented. Sound level meters cost about \$500 to \$1,000, while dosimeters range in price from about \$750 to \$1,500. Smaller companies may find it more economical to rent equipment rather than to purchase it. Names of equipment suppliers may be found in the telephone book (Yellow Pages) under headings such as: "Safety Equipment," "Industrial Hygiene," or "Engineers-Acoustical." In addition to providing information on obtaining noise monitoring equipment, many companies and individuals included under such listings can provide professional advice on how to conduct a valid noise monitoring program. Some audiological testing firms and industrial hygiene firms also provide noise monitoring services. Universities with audiology, industrial hygiene, or acoustical engineering departments may also provide information or may be able to help employers meet their obligations under this amendment.

Free, on-site assistance may be obtained from OSHA-supported state and private consultation organizations. These safety and health consultative entities generally give priority to the needs of small businesses. See the attached directory for a listing of organizations to contact for aid.

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OSHA ONSITE CONSULTATION PROJECT DIRECTORY		
State	Office and address	Contact
Alabama.....	Alabama Consultation Program, P.O. Box 6005, University, Alabama 35486.	(205) 348-7136, Mr. William Weems, Director.
Alaska.....	State of Alaska, Department of Labor, Occupational Safety & Health, 3301 Eagle St., Pouch 7-022, Anchorage, Alaska 98510.	(907) 276-5013, Mr. Stan Godsoe, Project Manager (Air Mail).
American Samoa.....	Service not yet available.	
Arizona.....	Consultation and Training, Arizona Division of Occupational Safety and Health, P.O. Box 19070, 1624 W. Adams, Phoenix, AZ 85005.	(602) 255-5795, Mr. Thomas Ramaley, Manager.
Arkansas.....	OSHA Consultation, Arkansas Department of Labor, 1022 High St., Little Rock, Ark. 72202.	(501) 371-2992, Mr. George Smith, Project Director.
California.....	CAL/OSHA Consultation Service, 2nd Floor, 525 Golden Gate Avenue, San Francisco, CA 94102.	(415) 557-2870, Mr. Emmett Jones, Chief.
Colorado.....	Occupational Safety & Health Section, Colorado State University, Institute of Rural Environmental Health, 110 Veterinary Science Building, Fort Collins, CO 80523.	(303) 491-6151, Dr. Roy M. Buchan, Project Director.
Connecticut.....	Division of Occupational Safety & Health, Connecticut Department of Labor, 200 Folly Brook Boulevard, Wethersfield, Conn. 06109.	(203) 566-4550, Mr. Leo Alix, Director.
Delaware.....	Delaware Department of Labor, Division of Industrial Affairs, 820 North French Street, 6th Floor, Wilmington, DE 19801.	(302) 571-3908, Mr. Bruno Salvadori, Director.
District of Columbia.....	Occupational Safety & Health Division, District of Columbia, Department Employment Services, Office of Labor Standards, 2900 Newton Street NE., Washington, DC 20018.	(202) 832-1230, Mr. Lorenzo M. White, Acting Associate Director.
Florida.....	Department of Labor & Employment Security, Bureau of Industrial Safety and Health, LaFayette Building, Room 204, 2551 Executive Center Circle West, Tallahassee, FL 32301.	(904) 488-3044, Mr. John C. Glenn, Administrator.
Georgia.....	Economic Development Division, Technology and Development Laboratory, Engineering Experiment Station, Georgia Institute of Technology, Atlanta, GA 30332.	(404) 894-3806, Mr. William C. Howard, Assistant to Director, Mr. James Burson, Project Manager.
Guam.....	Department of Labor, Government of Guam, 23548 Guam Main Facility, Agana, Guam 96921.	(671) 772-6291, Joe R. San Agustin, Director.
Hawaii.....	Education and Information Branch, Division of Occupational Safety and Health, Suite 910, 677 Ala Moana, Honolulu, HI 96813.	(808) 548-2511, Mr. Don Alper, Manager (Air Mail).
Idaho.....	OSHA Onsite Consultation Program, Boise State University, Community and Environmental Health, 1910 University Drive, Boise, ID 83725.	(208) 385-3929, Dr. Eldon Edmundson, Director.
Illinois.....	Division of Industrial Services, Dept. of Commerce and Community Affairs, 310 S. Michigan Avenue, 10 Floor, Chicago, IL 60601.	(800) 972-4140/4216 (Toll-free in State), (312) 793-3270, Mr. Stan Czwiniski, Assistant Director.
Iowa.....	Bureau of Labor, 307 E. Seventh Street, Des Moines, IA 50319.	(515) 281-3606, Mr. Allen J. Meier, Commissioner.
Indiana.....	Bureau of Safety, Education and Training, Indiana Division of Labor, 1013 State Office Building, Indianapolis, IN 46204.	(317) 633-5845, Mr. Harold Mills, Director.
Kansas.....	Kansas Dept. of Human Resources, 401 Topeka Ave., Topeka, KS 66603.	(913) 296-4086, Mr. Jerry Abbott, Secretary.
Kentucky.....	Education and Training, Occupational Safety and Health, Kentucky Department of Labor, 127 Building, 127 South, Frankfort, KY 40601.	(502) 564-6895, Mr. Larry Potter, Director.
Louisiana.....	No services available as yet (Pending FY 83).	
Maine.....	Division of Industrial Safety, Maine Dept. of Labor, Labor Station 45, State Office Building, Augusta, ME 04333.	(207) 289-3331, Mr. Lester Wood, Director.
Maryland.....	Consultation Services, Division of Labor & Industry, 501 St. Paul Place, Baltimore, Maryland 21202.	(301) 659-4210, Ms. Ileana O'Brien, Project Manager, 7(c)(1) Agreement.
Massachusetts.....	Division of Industrial Safety, Massachusetts Department of Labor and Industries, 100 Cambridge Street, Boston, MA 02202.	(617) 727-3567, Mr. Edward Noseworthy, Project Director.

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OSHA ONSITE CONSULTATION PROJECT DIRECTORY—Continued		
State	Office and address	Contact
Michigan (Health).....	Special Programs Section, Division of Occupational Health, Michigan Dept. of Public Health, 3500 N. Logan, Lansing, MI 48909.	(517) 373-1410, Mr. Irving Davis, Chief.
Michigan (Safety).....	Safety Education & Training Division Bureau of Safety and Regulation, Michigan Department of Labor, 7150 Harris Drive, Box 30015, Lansing, Michigan 48909.	(517) 322-1809, Mr. Alan Harvie, Chief.
Minnesota.....	Training and Education Unit, Department of Labor and Industry, 5th Floor, 444 Lafayette Road, St. Paul, MN 55101.	(612) 296-2973, Mr. Timothy Tierney, Project Manager.
Mississippi.....	Division of Occupational Safety and Health, Mississippi State Board of Health, P.O. Box 1700, Jackson, MS 39205.	(601) 982-6315, Mr. Henry L. Laird, Director.
Missouri.....	Missouri Department of Labor and Industrial Relations, 722 Jefferson Street, Jefferson City, MO 65101.	1-(800) 392-0208, (314) 751-3403, Ms. Paula Smith, Mr. Jim Brake.
Montana.....	Montana Bureau of Safety & Health, Division of Workers Compensation, 815 Front Street, Helena, MT 59601.	(406) 449-3402, Mr. Ed Gatzemeier, Chief.
Nebraska.....	Nebraska Department of Labor, State House Station, State Capitol, P.O. Box 94600, Lincoln, NB 68509.	475-8451 Ext. 258, Mr. Joseph Carroll, Commissioner.
Nevada.....	Department of Occupational Safety and Health, Nevada Industrial Commission, 515 E. Muffer Street, Carson City, NV 89714.	(702) 885-5240, Mr. Allen Traenkner, Director.
New Hampshire.....	For information contact.....	Office of Consultation Programs, Room N3472 200 Constitution Avenue, NW, Washington, DC 20210, Phone: (202) 523-8985.
New Jersey.....	New Jersey Department of Labor and Industry Division of Work Place Standards, CN-054, Trenton, NJ 08625.	(609) 292-2313, FTS-8-477-2313, Mr. William Clark, Assistant Commissioner.
New Mexico.....	OSHA Consultation, Health and Environment Department, Environmental Improvement Division, Occupational Health & Safety Section, 4215 Montgomery Boulevard, NE., Albuquerque, NM 87109.	(505) 842-3387, Mr. Albert M. Stevens, Project Manager.
New York.....	Division of Safety and Health, New York State Department of Labor, 2 World Trade Center, Room 6995, New York, NY 10047.	(212) 488-7746/7, Mr. Joseph Alleva, Project Manager, DOSH.
North Carolina.....	Consultation Services, North Carolina Department of Labor, 4 West Edenton Street, Raleigh, NC 27601.	(919) 733-4885, Mr. David Pierce, Director.
North Dakota.....	Division of Environmental Research, Department of Health, Missouri Office Building, 1200 Missouri Avenue, Bismarck, ND 58505.	(701) 224-2348, Mr. Jay Crawford, Director.
Ohio.....	Department of Industrial Relations, Division of Onsite Consultation, P.O. Box 825, 2323 5th Avenue, Columbus, OH 43216.	(800) 282-1425 (Toll-free in State), (614) 466-7485, Mr. Andrew Doeherl, Project Manager.
Oklahoma.....	OSHA Division, Oklahoma Department of Labor, State Capitol, Suite 118, Oklahoma City, OK 73105.	(405) 521-2461, Mr. Charles W. McGlon, Director.
Oregon.....	Consultative Section, Department of Workers' Compensation, Accident Prevention Division, Room 102, Building 1, 2110 Front Street NE., Salem, OR 97310.	(503) 378-2890, Mr. Jack Buckland, Supervisor.
Pennsylvania.....	For information contact.....	Office of Consultation Programs, Room N3472, 200 Constitution Avenue NW., Washington, DC 20210, Phone: (202) 523-8985.
Puerto Rico.....	Occupational Safety & Health, Puerto Rico Department of Labor and Human Resources, 505 Munoz Rivera Ave., 21st Floor, Hato Rey, Puerto Rico 00919.	(809) 754-2134, Mr. John Cinque, Assistant Secretary, (Air Mail).
Rhode Island.....	Division of Occupational Health, Rhode Island Department of Health, The Cannon Building, 206 Health Department Building, Providence, RI 02903.	(401) 277-2438, Mr. James E. Hickey, Chief.

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OSHA ONSITE CONSULTATION PROJECT DIRECTORY—Continued

State	Office and address	Contact
South Carolina	Consultation and Monitoring, South Carolina Department of Labor, P.O. Box 11329, Columbia, SC 29211.	(803) 758-8921, Mr. Robert Peck, Director, 7(c)(1), Project.
South Dakota	South Dakota Consultation Program, South Dakota State University, S.T.A.T.E.-Engineering Extension, 201 Pugsley Center-SDSO, Brookings, SD 57007.	(605) 688-4101, Mr. James Ceglian, Director.
Tennessee	OSHA Consultative Services, Tennessee Department of Labor, 2nd Floor, 501 Union Building, Nashville, TN 37219.	(615) 741-2793, Mr. L. H. Craig Director.
Texas	Division of Occupational Safety and State Safety Engineer, Texas Department of Health and Resources, 1100 West 49th Street, Austin, TX 78756.	(512) 458-7287, Mr. Walter G. Martin, P.E. Director.
Trust Territories	Service not yet available.	
Utah	Utah Job Safety and Health Consultation Service, Suite 4004, Crane Building, 307 West 200 South, Salt Lake City, UT 84101.	(801) 533-7927/8/9, Mr. H. M. Bergeson, Project Director.
Vermont	Division of Occupational Safety and Health, Vermont Department of Labor and Industry, 118 State Street, Montpelier, VT 05602.	(802) 828-2765, Mr. Robert Mcleod, Project Director.
Virginia	Department of Labor and Industry, P.O. Box 12064, 205 N. 4th Street, Richmond, Va. 23241.	(804) 786-5875, Mr. Robert Beard, Commissioner.
Virgin Islands	Division of Occupational Safety and Health, Virgin Islands Department of Labor, Lagoon Street, Room 207, Frederiksted, Virgin Islands 00840.	(809) 772-1315, Mr. Louis Llanos, Deputy Director-DOSH.
Washington	Department of Labor and Industry, P.O. Box 207, Olympia, WA 98504.	(206) 753-6500, Mr. James Sullivan, Assistant Director.
West Virginia	West Virginia Department of Labor, Room 451B, State Capitol, 1900 Washington Street, Charleston, WV 25305.	FTS 8-885-7890, Mr. Lawrence Barker, Commissioner.
Wisconsin (Health)	Section of Occupational Health, Department of Health and Social Services, P.O. Box 309, Madison, WI 53701.	(608) 266-0417, Ms. Patricia Natzke, Acting Chief.
Wisconsin (Safety)	Division of Safety and Buildings, Department of Industry, Labor and Human Relations, 1570 E. Moreland Blvd., Waukesha, WI 53186.	(414) 544-8686, Mr. Richard Michalski, Supervisor.
Wyoming	Wyoming Occupational Health and Safety Department, 200 East 8th Avenue, Cheyenne, Wyo. 82002.	(307) 777-7786, Mr. Donald Owsley, Health and Safety Administrator.

**APPENDIX H TO § 1910.95—AVAILABILITY OF REFERENCED DOCUMENTS**

Paragraphs (c) through (o) of 29 CFR 1910.95 and the accompanying appendices contain provisions which incorporate publications by reference. Generally, the publications provide criteria for instruments to be used in monitoring and audiometric testing. These criteria are intended to be mandatory when so indicated in the applicable paragraphs of § 1910.95 and appendices.

It should be noted that OSHA does not require that employers purchase a copy of the referenced publications. Employers, however, may desire to obtain a copy of the referenced publications for their own information.

The designation of the paragraph of the standard in which the referenced publications appear, the titles of the publications, and the availability of the publications are as follows:

Paragraph designation	Referenced publication	Available from—
Appendix B	"List of Personal Hearing Protectors and Attenuation Data," HEW Pub. No. 76-120, 1975. NTIS-PB267461.	National Technical Information Service, Port Royal Road, Springfield, VA 22161.
Appendix D	"Specification for Sound Level Meters," S1.4-1971 (R1976).	American National Standards Institute, Inc., 1430 Broadway, New York, NY 10018.
§ 1910.95(k)(2), appendix E	"Specifications for Audiometers," S3.6-1969.	American National Standards Institute, Inc., 1430 Broadway, New York, NY 10018.

**SECTION 5.0**  
**ROCK CORING VIA ROTOSONIC DRILLING**  
**SAFE WORK PACKET**

## 5.0 ACTIVITY AND DOCUMENTATION CHECKLIST

The Safe Work Packet for Rock Coring/Subsurface Sampling via Rotosonic activities to be conducted at NASB at the Eastern Plume.

This activity entails the following activities:

- Table 5-1, Rock Coring/Subsurface Sampling using Rotosonic Drilling, Activity Hazard Analysis
- Rotosonic Safe Work Practices

**Remember:**

- The Utility Locate and Excavation clearance must be completed prior to drilling.
- Complete site specific portion of the Hazard Communication Program (included in previous Section 4.0)
  - Collect MSDSs for drilling supplies, as applicable.
- Complete site specific portion of the Hearing Conservation Program (included in previous Section 4.0)
- Make sure you have your well permits.
- Complete elements of the Safe Work Packet, where and as applicable.
- Calibrate instruments in accordance with the Manufacturers Instruction

**Remember:**

According to Tetra Tech NUS, Inc. Utility Location and Excavation Clearance Procedure, if we are within the diameter of the utility + 2-feet then we must pothole or locate the suspect utility within the area of excavation/boring to insure we miss it prior to employing mechanical means, the Rotosonic in this case.

TABLE 5-1 ACTIVITY HAZARD ANALYSIS

ACTIVITY: Rock Coring/Subsurface Sampling using Rotosonic Drilling

ANALYZED BY/DATE: Jennifer Choich 08/2008

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS / CONTROLS
<p>Rotosonic Drilling Activities</p> <p><b>Rock Coring:</b> Rock Coring employs a Rotosonic Drill rig. A sonic rig uses an oscillator or head with eccentric weights driven by hydraulic motors to generate high sinusoidal force in a rotating pipe drill. The frequency of vibration (generally between 50 and 120 cycles per second) of the drill bit or core barrel can be varied to allow optimum penetration of subsurface materials. A dual string assembly allows advancement of casing with the inner casing used to collect samples. Small amounts of air and water can be used to remove the material between the inner and outer casing. When a drill bit is used, most of the cuttings are forced into the borehole wall. A thin-wall or split-spoon sampler can be used to contain</p>	<p><i>Physical hazards:</i> 1) Heavy equipment hazards (pinch/compressions points, chain failure, hydraulic lines, etc.)</p>	<p><b>1) Heavy Equipment Hazards</b> - The Rotosonic unit will be inspected prior to use.</p> <ul style="list-style-type: none"> <li>• The inspections will be documented using the Equipment Inspection Checklist found in the Mobilization/Demobilization Safe Work Packet of this HASP, Figure 2-6. The recommended frequency of inspection is upon arrival, after major maintenance, or depending on the duration of the project at least once/month.</li> <li>• Equipment will be operated and supported by certified operators and knowledgeable ground crew.</li> <li>• Site control boundaries for this operation will be set at least the height of the mast + 5-feet or a minimum 25 feet from the point of operation. This distance has been established to remove unauthorized and non-essential personnel from physical hazards associated with this operation.</li> </ul> <p><b>Pinches/Compressions</b></p> <ul style="list-style-type: none"> <li>• During these activities, the potential exists to get hands/fingers trapped. To combat these hazards. <ul style="list-style-type: none"> <li>▪ Keep hands from between pinch points.</li> <li>▪ The Driller when engaging the hammer as extensions are added or as the chain is tighten will move slow to permit the removal of hands and/or fingers from pinch points.</li> <li>▪ Compression hazard sometimes result from separating rig sections. Generally, one section is secured in a vise while a pipe wrench is used to free the other section. Compression occurs when the piece releases and the wrench and hand or fingers slam into a fixed object. To control this Inspect threads on drive rods and continuous tubes. From excessive use these begin to mushroom making removal difficult. Replace as necessary if you suspect this to be the case. Do not over extend yourself when applying force to the wrench. If you are over compromised and the work piece releases you may fall or experience muscle strain or possible ligament sprain or damage. Make sure the path of the wrench does not encounter fixed objects.</li> </ul> </li> </ul> <p><b>Rigging – Chains</b> A Chain Inspection Checklist has been provided (Figure 4-5) in the Monitoring Well Installation Safe Work Packet (Section 4.0) to inspect the chain that will extract the continuous tube during monitoring well installation. This checklist will provide the information concerning what needs to be inspected and what information needs to be gathered. This initial inspection is critical!! Besides a visual inspection to ensure there are no structural deficiencies measures should be collected of the chain length and</p>

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**TABLE 5-1 ACTIVITY HAZARD ANALYSIS**

**ACTIVITY:** Rock Coring/Subsurface Sampling using Rotasonic Drilling

**ANALYZED BY/DATE:** Jennifer Choich 08/2008

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS / CONTROLS
	<p>3) Noise in excess of 85dBA</p> <p>4) Lifting (strain/muscle pulls)</p> <p>5) Slips, trips, and falls</p>	<p>subsurface utilities.</p> <p><b>3) Noise in Excess of 85 dBA</b> – Noise levels associated with this operation can range from 87-92 dBA during advancement of tooling. This level may actually be increased in situations where structures may reflect the noise generated. Controlling this hazard shall be accomplished employing two separate approaches as follows:</p> <ul style="list-style-type: none"> <li>- Boundaries will be established to limit the affect of the noise hazard (25-foot or the height of the mast +5-feet boundary, whichever is greater).</li> <li>- Use of hearing protection (ear plugs, muffs, etc.) with a noise reduction rating (NRR) of 25dB when working within the 25-foot boundary.</li> <li>- Remember the general rule of thumb - <i>Excessive noise levels (&gt;85dBA) are being approach when you have to raise your voice to talk to someone within 2 feet of your location.</i></li> </ul> <p><b>4) Lifting Hazards</b> – A number of lifting hazards may be associated with this activity including:</p> <ul style="list-style-type: none"> <li>• Bags of Portland Cement 94lbs</li> <li>• Bags of sand 50-80 lbs</li> <li>• Buckets of wash waters 42 lbs.</li> </ul> <p>Most lifting injuries occur when lifting relatively light weights but twisting/turning during lifting.</p> <p>Use proper lifting techniques as described in Section 4.4 of the HSGM. Take frequent breaks when fatigue begins to set in. Site set up may also aid in minimizing these hazards. Examine how tooling is pulled from racks, used in the process, the rack placement, and how tools are extracted. An examination of this process and minor modification may provide a smoother process.</p> <p><b>5) Slips, Trips, and Falls</b> - The most effective method for controlling this hazard in this setting is</p> <ul style="list-style-type: none"> <li>• Housekeeping - Maintain a clutter free work area.</li> <li>• Keep the ground level to the extent possible around the point of operation at the back of the rig.</li> <li>• When clearing vegetation, cut trees as close to the ground as possible to eliminate trip hazards. If this is not possible, paint or flag those along pedestrian travel routes.</li> <li>• The Helper should maintain an area for the continuous tube sections and drill rods to be stacked and secured to prevent collapse or create tripping hazards.</li> </ul>

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**TABLE 5-1 ACTIVITY HAZARD ANALYSIS**

**ACTIVITY:** Rock Coring/Subsurface Sampling using Rotasonic Drilling

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ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS / CONTROLS
	<p>6) Cuts/lacerations</p> <p><i>Natural hazards:</i></p> <p>7) Inclement weather</p>	<p><b>6) Cuts and Lacerations</b> - To prevent cuts and lacerations associated with soil sampling activity, the following provisions are required:</p> <ul style="list-style-type: none"> <li>- Use the Geoprobe or Similar manufacturer Acetate Tube Retention Kit and Knife system. This kit holds the tube in place while it is cut to access the sample.</li> <li>- Always cut away from yourself and others, then, if a knife slips, you will not impale yourself or others.</li> <li>- Do not place items to be cut in your hand or on your knee.</li> <li>- Change out blades as necessary to maintain a sharp cutting edge. Many accidents result from struggling with dull cutting attachments.</li> <li>- Whenever practical, wear cut resistant gloves (e.g., leather or heavy cotton work gloves) at least on the non-knife hand and arm.</li> <li>- Keep cutting surfaces clean and smooth.</li> <li>- When transporting glassware (such as glass sample containers) keep it in a hard sided container such as a cooler then if there is a fall it will be less likely that you will get cut from broken glass.</li> <li>- DO NOT throw broken sample jars into the garbage bag but place them into a hard sided container such as a card board box or directly into the dumpster. DO NOT reach into garbage bags to retrieve any item accidentally thrown away. Dump the contents onto a flat surface to avoid punctures and lacerations from reaching where you cannot see.</li> </ul> <p><b>Natural hazards:</b></p> <p><b>7) Inclement Weather</b> – As this is an Air Station, the tower will have periodic weather reports or warning of approaching weather systems. See your NASB POC, where possible if these are made available follow instruction provided on station from the tower.</p> <p>If not, follow the 30/30 Rule  <i>If there are less than 30 seconds between thunder and lightning go inside for at least 30 minutes after the last thunder.</i></p>
<b>Chemical hazards</b>		
<p><b>Chemical hazards:</b> See Section 1.4 for information concerning COCs identified within this area of the eastern plume. Reported concentrations are not significant enough to present an exposure through inhalation concern because the source concentration is insufficient. Utilize the PID with the 10.6eV Lamp to monitor airborne concentrations at source locations (borehole and breathing zones of the driller and sampler). See Table 1-1</p>		

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**TABLE 5-1 ACTIVITY HAZARD ANALYSIS**

**ACTIVITY:** Rock Coring/Subsurface Sampling using Rotosonic Drilling

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for more information.

Skin exposure and possible hand to mouth transfer however could be a contributing factor to exposure. PPE and Good work hygiene practices will be employed to control incidental exposure. Nitrile and natural rubber gloves of sufficient protection for incidental contact. Aprons coveralls etc. should be worn to control the soiling and saturation of clothing when handling auger flights close to the body.

Keep the sample table wiped down to remove surface contamination. If clip boards or other items are placed on the table insure they are also decontaminated before removal.

In addition, the following substances will be employed in support of this task:  
 Decontamination fluids – Liquinox and Isopropanol  
 Grout/Concrete – Used to finish the well pads or seal the well.

To protect persons from potential hazards associated with the use of these chemicals, the following measures will be employed:

- Review applicable MSDSs, know the hazards and follow precautions provided in these documents. Have emergency equipment at the ready to provide first aid.
- Obtain and use PPE described in the MSDS, unless this HASP is more conservative or the SSO has deemed additional measures are required.

Emergency equipment for handling grout include a mechanism to flush skin and eyes should they become irritated. A 10% white vinegar and water solution can combat skin irritation caused by cement dermatitis. Methods including water spray should be used when necessary to knock down visible dust.

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<b>Hazard Monitoring Required:</b>	<b>Decontamination Procedures:</b>	<b>Permits/Requirements:</b>
<p>Photo Ionization Detector (PID) 10.6 eV Lamp</p> <p>Action level:                      Any reading &gt;83(PID) and &gt;35(FID) &gt;10 minutes Contact PHSO.                      &gt; 2mg/m<sup>3</sup> d(Visible dust) during coring requires dust to be knocked down using water spray. Add grout to water to minimize the dust when mixing for grout seals or pads.</p> <p>The PID will be calibrate twice/day using a isobutylene in air mixture. The calibration will be done in the morning and evening (to determine if significant instrument drift has occurred due to battery loss or equipment</p>	<p><b>Equipment –</b></p> <p>Rock Coring – This applies to any drilling component that have come in contact with contaminated media. This activity usually takes place near the Rotosonic rig:</p> <ol style="list-style-type: none"> <li>7. Visible soils are washed off (inside and out) in a 5-gallon bucket containing soapy water until visibly clean.</li> <li>8. The piece is then rinsed with a low pressure sprayer using potable water into a rinse bucket. Rinsing will insure all soap residue is removed.</li> </ol>	<ul style="list-style-type: none"> <li>- Obtain Drillers License/Certification</li> <li>- Obtain well permits for planned drilling activities.</li> </ul>

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**TABLE 5-1 ACTIVITY HAZARD ANALYSIS**

**ACTIVITY:** Rock Coring/Subsurface Sampling using Rotosonic Drilling

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malfunction. Figure 4-1 will be used to record these calibration efforts.

9. The piece will require, a light spray of isopropanol to be applied.
10. The isopropanol solvent then will be rinsed with potable water, then deionized water.
11. The components will be permitted to air dry.
12. The SSO will scan the decontaminated parts with the PID to insure potential contamination and decontamination solvents have been removed.

Note: The acetate liners are dedicated one time use items and therefore will not require decontamination. It is imperative that these items be kept from areas or supplies that may cause contamination.

**Personnel –**

- Secure all drilling operations.
- Wash and rinse dedicated and reusable PPE, top down outside in.
- Dispose of dedicated PPE as general refuse.
- Wash hands and face with soap and water or use a hygienic wipes to remove potential contaminants from the hands and face. This will minimize potential ingestion exposures.

**PPE Required**

- |                               |   |  |
|-------------------------------|---|--|
| Hard-hat .....                | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No            |
| Safety Glasses .....          | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No            |
| Chemical/splash goggles ..... | <input type="checkbox"/> Yes            | <input checked="" type="checkbox"/> No |
| Splash Shield .....           | <input type="checkbox"/> Yes            | <input checked="" type="checkbox"/> No |
| Splash suits/coveralls .....  | <input type="checkbox"/> Yes            | <input checked="" type="checkbox"/> No |
| Impermeable apron.....        | <input type="checkbox"/> Yes            | <input type="checkbox"/> No            |
| Steel toe work shoes/boots... | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No            |
| High Visibility vest .....    | <input type="checkbox"/> Yes            | <input type="checkbox"/> No            |
| First Aid Kit.....            | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No            |
| Safety Shower/Eyewash .....   | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No            |

- |                                       |   |  |
|---------------------------------------|---|--|
| Hearing Protection (Plugs/Muffs)..... | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No            |
| Safety belt/harness .....             | <input type="checkbox"/> Yes            | <input checked="" type="checkbox"/> No |
| Radio/Cellular Phone .....            | <input type="checkbox"/> Yes            | <input type="checkbox"/> No            |
| Barricades.....                       | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No            |
| Gloves (Type – See Note) .....        | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No            |
| Work/rest regimen .....               | <input type="checkbox"/> Yes            | <input checked="" type="checkbox"/> No |
| Chemical Resistant Boot Covers.....   | <input type="checkbox"/> Yes            | <input type="checkbox"/> No            |
| Tape up/use insect repellent .....    | <input type="checkbox"/> Yes            | <input type="checkbox"/> No            |
| Fire Extinguisher.....                | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No            |
| Other.....                            | <input type="checkbox"/> Yes            | <input type="checkbox"/> No            |

**TABLE 5-1 ACTIVITY HAZARD ANALYSIS**

**ACTIVITY:** Rock Coring/Subsurface Sampling using Rotasonic Drilling

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Modifications/Exceptions: High visibility vests for within 15-feet of established traffic areas; Nitrile outer gloves and where necessary impermeable aprons for handling contaminated drilling equipment that may result in saturation of work clothes. Nitrile surgeon gloves for handling sampling tools. Hard hats are required when working near operating equipment, when overhead hazards exist, or when required in the area. Hearing protection will also be required when working in the vicinity (25-feet or less) of the drill rig. Fire extinguishers are required as follows: 2A:B:C for all general activities. When greater than 5-gallons of flammable liquid is stored or dispensed on site a fire extinguisher rated at least 10B will be required. Those blocks not checked above will require the SSO to evaluate site-specific conditions and direct the employees based on site specific conditions. Annotation of these changes will be incorporated into the Safe Work Packet. Reduction in PPE levels and equipment shall be discussed with the PHSO.

**Training Required**

- 29 CFR 1910.120 (e) 40-Hour General Site Worker Training
- 29 CFR 1910.120 (e) (8) 8-Hour General Site Worker Refresher Training
- 29 CFR 1910.120 (e) (4) 8-Hour General Site Worker Supervisory Training
- 29 CFR 1910.120 (e) Site Specific Training (See Mobilization/Demobilization Figure 2-3 of this HASP.
- Tail Gate Meeting Attendance (Figure 2-4 of this HASP)

Driller – Certified in the State of Maine. A copy of the License or Certification will be required.

**Medical Clearance/Surveillance Required**

- Be a participant in a Medical Surveillance Meeting the Requirements of 29 CFR 1910.120 (f)..
- Completed a Medical Data Sheet (See Figure 2-5) Mobilization/Demobilization Safe Work Packet.

The documentation (Certificates, etc) of the training and medical surveillance described above will be maintained onsite and be available for review should it be necessary.

**Emergency Equipment**

- First Aid Kit
- Eyewash – As we are handling corrosives as part of this effort (concrete) an eyewash will be required.
- Fire Extinguisher
- Map to Hospital and Emergency Contact List
- (Posted and one copy placed within the First Aid Kit)
- Spills
  - o Place plastic under the rig.
  - o Have spill pads, oil dry, or cat litter for oils maintained at the DPT rig.

**H&S Supporting Program Requirements**

- On Site Hazard Communication Program (Section 5.0 HSGM)
  - Collect and review MSDSs for
  - Collect and review MSDS for Decontamination Solution – Liquinox
  - Drilling supplies
  - Add chemicals to the On site Chemical Inventory List (Figure 2-7)

MSDSs for 2-Propanol, concrete (grout) Liquinox have been included in Section 4.0. The FOL and/or the SSO shall insure these are replaced once the Supplier or Manufacturers MSDS arrives with the products.

- Hearing Conservation Program – Complete the Site-Specific Portion.

Note: It is not anticipated that monitoring or noise dosimetry will be conducted as part of this site effort as sufficient data has been collected for this activity. It will be necessary however to record hearing protection types with accompanying NRR for each person.

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## ROTOSONIC SAFE WORK PRACTICES

The following Safe Work Practices are to be followed when working in or around the Rotosonic Operations (HSGM, Section 7.0).

- Identify underground utilities and buried structures before commencing any Rotosonic operations. Follow the TtNUS Utility Locating and Excavation Clearance Standard Operating Procedure.
- Rotosonic rigs will be inspected by the SSO or designee, prior to the acceptance of the equipment at the site and prior to the use of the equipment. Repairs or deficiencies identified will be corrected prior to use. The inspection will be accomplished using the Equipment Inspection Checklist for DPT rigs provided in Attachment III. After the initial inspection and release for use on site, additional inspections will be performed at least at the beginning of every 5 or 10-day shift, or following any repairs or significant maintenance activities.
- Ensure that all machine guarding is in place and properly adjusted.
- Block the Rotosonic rig and use levelers to prevent inadvertent movement.
- The work area around the point of operation will be cleared to the extent possible to remove any trip hazards near or surrounding operating equipment.
- The driller's helper will establish an equipment staging and laydown plan. The purpose of this is to keep the work area clear of clutter and slips, trips, and fall hazards. Mechanisms to secure heavy objects such as Rotosonic flights will be provided to avoid the collapse of stacked equipment.
- Minimize contact to the extent possible with contaminated tooling and environmental media. Potentially contaminated tooling will be placed on polyethylene sheeting for storage and wrapped for transport to the centrally located equipment decontamination area.
- Support functions (sampling and screening stations) will be maintained a minimum distance from the Rotosonic rig of the height of the mast plus five feet, but not less than 25 feet around the rig.
- Only qualified operators and knowledgeable ground crew personnel will participate in the operation of the Rotosonic rig.

- During maintenance, use only manufacturer provided/approved equipment (i.e. auger flight connectors, etc.)
- In order to minimize contact with potentially contaminated tooling and media and to minimize lifting hazards, multiple personnel should be used to move auger flights and other heavy tooling.
- Only personnel absolutely essential to the work activity will be allowed in the exclusion zone.
- Equipment used within the exclusion zone will undergo a complete decontamination and evaluation by the FOL and/or the SHSO to determine cleanliness prior to moving to the next location, exiting the site, or prior to down time for maintenance.
- Motorized equipment will be fueled prior to the commencement of the day's activities.
- When not in use Rotosonic rig will be shutdown, and emergency brakes set and wheels will be chocked to prevent movement.
- Rotosonic Rig will have an operational Emergency Stop and one employee will be assigned to operate it during rig operations.

Investigative areas will be restored to equal or better condition than original to remove any contamination brought to the surface and to remove any physical hazards. In situations where these hazards cannot be immediately removed, the area will be barricaded to limit access.



**SECTION 6.0**  
**GROUNDWATER/SURFACE WATER SAMPLING SAFE**  
**WORK PACKET**

## SECTION 6.0

### 6.1 ACTIVITY AND DOCUMENTATION CHECKLIST

The Safe Work Packet is for groundwater sampling using a bladder pump. This pump utilizes nitrogen gas to compress a diaphragm that forces water to the surface and out of the tubing.

The Safe Work Packet for this activity contains the following information

- Table 6-1, Activity Hazard Analysis for Ground/Surface Water Sampling

MSDS for Sample Preservative - Hydrochloric Acid

#### Remember:

- All personnel must complete the Mobilization/Demobilization Safe Work Packet (Section 2.0) and review the Emergency Action Plan (Section 8.0) in addition to the information presented in this packet. This activity is the most intrusive and carries the greatest potential for exposure. Preparation in reviewing these other sections is crucial.
- In addition, complete Table 3-2, Chemical Inventory List with chemical identities, quantities, and emergency information for all chemical brought on site.

TABLE 6-1 ACTIVITY HAZARD ANALYSIS

ACTIVITY: Well Development/Ground and Surface Water Sampling/Water Level Measurements ANALYZED BY/DATE: Jennifer Choich 08/2008

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS / CONTROLS
<p>Surface Water Sampling Activities – This task includes installation of stream gauges and surface water-level gauging.</p> <p>Groundwater Sampling Activities – A bladder pump is lowered into the well and through a length of tubing connected to a control box. The control box is connected to the nitrogen cylinder pressure relief valve. The nitrogen compresses the bladder forcing the water up and out of a discharge tube, the control box then restricts nitrogen flow which allows the bladder to refill and the process is repeated.</p> <p>Well development in smaller temporary wells uses a peristaltic pump connected to a length of tubing into the well and pumping water. A predetermined amount of water is pumped from the well to insure stagnant</p>	<p><i>Chemical hazards:</i></p> <p>1) 1,4-Dioxane; chlorinated solvents</p> <p>2) Pressurized monitoring wells/Pressurized hazards</p>	<p><b>1)</b> The contaminants of concern do not present an inhalation hazard in an open air environment. During this activity to minimize exposure potential via skin contact or ingestion.</p> <ul style="list-style-type: none"> <li>• Wear nitrile gloves when sampling and handling contaminated equipment (tubing, horiba, m-scope, etc.).</li> <li>• Do not engage in hand to mouth activity during sampling.</li> <li>• Wash hands and face prior to breaks, lunch, etc. when hand to mouth activity is likely to occur.</li> </ul> <p><b>2) Pressurized monitoring wells/pressurized hazards</b> – Some monitoring wells due to biological processes, degradation of contaminants or simply based on location (landfill, intersects lithological abnormalities) have the potential to build through the generation of gases and become pressurized. This presents a hazard to persons opening these wells, the following practices will be employed</p> <ul style="list-style-type: none"> <li>• DO NOT place your face over the well when opening a well as this may place you in a strike zone.</li> <li>• Open at arms length, then step away and allow the well to off gas and stabilize.</li> <li>• Wear your safety glasses to protect your eyes and where indicated by site specific conditions (pressurization of these wells) a face shield.</li> </ul> <p><b>Pressurized Hazards</b> – The nitrogen gas is provided in a compressed gas cylinder at a pressure of approximately 2000 psi. Besides being able to expel a projectile with considerable force the pressure alone can cause significant damage to the eyes and/or skin. Protective measures include</p> <ul style="list-style-type: none"> <li>• Always wear Safety glasses when handling compressed gases.</li> <li>• Always administer compressed gases through a pressure reducing regulator.</li> <li>• When clearing the cylinder connection port just turn the cylinder on enough to clear foreign debris. During this process face the port away from yourself and others.</li> <li>• When the cylinder is not in use always keep the valve protection cap in place.</li> <li>• When using the nitrogen cylinder, lay the cylinder on its side to avoid the potential of it falling and knocking the valve off (and becoming a missile).</li> <li>• DO NOT use the nitrogen to clean clothing or spray of the skin. Small cuts in the protective layer of the skin may permit the nitrogen to break that layer resulting in an air (nitrogen) embolism.</li> </ul> <p>See Figure 4-5 for additional direction concerning the handling, transportation and storage of compressed gas cylinders.</p>

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**TABLE 6-1 ACTIVITY HAZARD ANALYSIS**

**ACTIVITY:** Well Development/Ground and Surface Water Sampling/Water Level Measurements **ANALYZED BY/DATE:** Jennifer Choich 08/2008

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS / CONTROLS
<p>water has been removed. Water level measurements are accomplished through lowering an electronic indicator into the well.</p>	<p>3) Lifting (strain/muscle pulls)</p> <p>4) Knee injuries</p> <p>5) Slips, trips, and falls</p> <p>6) Cuts/Lacerations</p>	<p><b>3) Lifting Hazards</b> – This hazard may be recognized when moving containers of purge water, equipment, cylinders, etc. To control these potential hazards</p> <ul style="list-style-type: none"> <li>• Do not fill purge buckets greater than 80%</li> <li>• Obtain the size cylinder necessary to complete the designated task. K Size cylinders weigh approximately 135 lbs and are difficult to handle. The M-size weighs approximately 50 lbs. and are easier to handle and move.</li> <li>• Get help lifting and moving if you need it. Minimize twisting and turning while lifting.</li> <li>• Use proper lifting techniques as described in Section 4.4 of the HSGM.</li> </ul> <p><b>4) Knee injuries</b> – Much of the installation activities will be conducted on the ground. When monitoring wells are installed as flush mounts this requires personnel to kneel to open wells, take groundwater level measurements, etc. This could result in knee injuries from kneeling on stones/foreign objects and general damage due to stress on the joints. To combat this hazard, personnel will wear hard sided knee pads. Where possible the PM will request Stick ups to minimize this hazard.</p> <p><b>5) Slips, Trips, and Falls</b> – See Table 2-1 Mobilization/Demobilization Activity Hazard Analysis under this identified hazard.</p> <p><b>6) Cuts and Lacerations</b> - To prevent cuts and lacerations associated with during groundwater sampling activity, the following provisions are required:</p> <ul style="list-style-type: none"> <li>• Always cut away from yourself and others, then, if a knife slips, you will not impale yourself or others.</li> <li>• Do not place items to be cut in your hand or on your knee.</li> <li>• Change out blades as necessary to maintain a sharp cutting edge. Many accidents result from struggling with dull cutting attachments.</li> <li>• Whenever practical, wear cut resistant gloves (e.g., leather or heavy cotton work gloves) at least on the non-knife hand and arm.</li> <li>• Keep cutting surfaces clean and smooth.</li> <li>• Secure items to be cut.</li> <li>• When transporting glassware keep it in a hard sided container such as a cooler then if there is a fall it will be less likely that you will get cut from broken glass.</li> <li>• DO NOT throw broken sample jars into the garbage bag but place in a hard sided container such as a card board box or directly into the dumpster. DO NOT reach into garbage bags to retrieve any item accidentally thrown away. Dump the contents onto a flat surface to avoid punctures and lacerations from reaching</li> </ul>

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**TABLE 6-1 ACTIVITY HAZARD ANALYSIS**

**ACTIVITY:** Well Development/Ground and Surface Water Sampling/Water Level Measurements **ANALYZED BY/DATE:** Jennifer Choich 08/2008

ACTIVITY//PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS / CONTROLS
	<p>7) Vehicular and foot traffic</p> <p><i>Natural hazards:</i></p> <p>8) Inclement weather</p> <p>9) Insect – Bites and Stings</p>	<p>where you cannot see.</p> <p><b>7) Vehicular and Foot Traffic Hazards</b> – When sampling along the roadway or near traffic patterns</p> <ul style="list-style-type: none"> <li>• Motorists may be distracted by onsite activities – ASSUME THEY DO NOT SEE YOU OR MEMBERS OF YOUR FIELD CREW.</li> <li>• DO NOT place obstructions along the sides of the road (such as vehicles) that may cause site personnel to move into the flow of traffic to avoid your activities or equipment or that will create a blindspot. <b>Provide a required Free Space of Travel.</b> Your movement may startle a motorist and cause an accident.</li> <li>• Required “Free Space”: Maintain at least 6-feet of space between you and moving traffic. Where this is not possible, use flaggers and/or signs to warn oncoming traffic of activities near or within the travel lanes.</li> <li>• Face Traffic: Whenever feasible, if you must move within the 6-feet of required space, or into traffic attempt to face moving traffic at all times. Always leave yourself an escape route.</li> <li>• Wear High Visibility Vests to increase visual recognition by motorist.</li> <li>• Do not rely on the operator’s visibility, judgment, or ability. Make eye contact with the driver. Carefully and deliberately use hand signals so they will not startle or confuse motorists or be mistaken for a flagger’s direction before moving into traffic.</li> <li>• Move Deliberately: Do not make sudden movements that might confuse a motorist.</li> </ul> <p><i>Natural hazards:</i></p> <p><b>8) Inclement Weather</b> – See Mobilization/Demobilization Safe Work Packet.</p> <p><b>9) Insect - Bites and Stings</b> - See Section 4.0 of the HSGM.</p>

**TABLE 6-1 ACTIVITY HAZARD ANALYSIS**

**ACTIVITY:** Well Development/Ground and Surface Water Sampling/Water Level Measurements **ANALYZED BY/DATE:** Jennifer Choich 08/2008

**Chemical hazards**

**Chemical hazards:** See Section 1.4 for information concerning COCs identified within this area of the eastern plume. Reported concentrations are not significant enough to present an exposure through inhalation concern because the source concentration is insufficient. Utilize the PID with the 10.6eV Lamp to monitor airborne concentrations at source locations (borehole and breathing zones of the driller and sampler). See Table 1-1 for more information.

Skin exposure and possible hand to mouth transfer however could be a contributing factor to exposure. PPE and Good work hygiene practices will be employed to control incidental exposure. Nitrile and natural rubber gloves of sufficient protection for incidental contact.

**Hazard Monitoring Required:**

Photo Ionization Detector (PID) 10.6eV Lamp

**Action level (In the Workers Breathing Zone)**

Any reading >83(PID) and >35(FID) >10 minutes  
Contact PHSO.

The PID will be calibrate twice/day using a isobutylene in air mixture. The calibration will be done in the morning and evening (to determine if significant instrument drift has occurred due to battery loss or equipment malfunction. Figure 4-1 will be used to record these calibration efforts.

**Decontamination Procedures:**

**Equipment –**

Groundwater Sampling - Flush tubing out with potable water, dispose of as general refuse.

**Groundwater Level Measurement Indicators –**

1. Wipe down using a deionized water saturated rag to permit reuse relatively quickly.
2. Periodically, Soap and water wash and rinse using Liquinox and potable water inside and out.
3. Once washed, a light spray of deionized water.
4. The components will be permitted to Air dry.

**Personnel –**

1. Secure all sampling or associated down well activities.
  2. Wash and rinse dedicated and reusable PPE.
  3. Dispose of dedicated PPE as general refuse.
- Wash hands and face or use a hygienic wipes to remove potential contaminants from the hands and face. This will minimize potential ingestion exposures.

**Permits/Requirements:**

- None

**PPE Required**

Hard-hat .....  Yes  No

Hearing Protection (Plugs/Muffs)  Yes  No

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**TABLE 6-1 ACTIVITY HAZARD ANALYSIS**

**ACTIVITY:** Well Development/Ground and Surface Water Sampling/Water Level Measurements **ANALYZED BY/DATE:** Jennifer Choich 08/2008

Safety Glasses .....	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Safety belt/harness.....	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Chemical/splash goggles .....	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Radio/Cellular Phone .....	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Splash Shield.....	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Barricades .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Splash suits/coveralls.....	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Gloves (Type – See Note).....	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Impermeable apron.....	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	Work/rest regimen.....	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Steel toe work shoes/boots ...	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Chemical Resistant Boot Covers	<input type="checkbox"/> Yes	<input type="checkbox"/> No
High Visibility vest.....	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Tape up/use insect repellent .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No
First Aid Kit .....	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Fire Extinguisher .....	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Safety Shower/Eyewash.....	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Other .....	<input type="checkbox"/> Yes	<input type="checkbox"/> No

Modifications/Exceptions: High visibility vests for within 15-feet of established traffic areas; Nitrile surgeons gloves for handling contaminated tubing and well components and sampling tools. Hard hats are required when working near operating equipment, when overhead hazards exist, or when required in the area. Hearing protection will also be required when working in the vicinity (25-feet or less) of the DPT rig. Fire extinguishers are required as follows: 2A:B:C for all general activities. When greater than 5-gallons of flammable liquid is stored or dispensed on site a fire extinguisher rated at least 10B rating will be required. Those blocks not checked will require the SSO to evaluate site-specific conditions and direct the employees based on site specific conditions. Annotation of these changes will be incorporated into the Safe Work Packet for this task. Reduction in protection levels or equipment for this task will require the approval of the PHSO.

**Training Required**

- 29 CFR 1910.120 (e) 40-Hour General Site Worker Training
- 29 CFR 1910.120 (e) (8) 8-Hour General Site Worker Refresher Training
- 29 CFR 1910.120 (e) (4) 8-Hour General Site Worker Supervisory Training
- 29 CFR 1910.120 (e) Site Specific Training (See Mobilization/Demobilization Figure 2-3 of this HASP).
- Tail Gate Meeting Attendance (Figure 2-4 )

**Medical Clearance/Surveillance Required**

- Be a participant in a Medical Surveillance Meeting the Requirements of 29 CFR 1910.120 (f).
- Completed a Medical Data Sheet (See Figure 2-5) Mobilization/Demobilization Safe Work Packet.

The documentation (Certificates, etc) of the training and medical surveillance described above will be maintained onsite and be available for review should it be necessary.

**Emergency Equipment**

- First Aid Kit
- Eyewash – As we are handing corrosives as part of this effort (sample preservative) a portable eyewash will be required.
- Fire Extinguisher
- Map to Hospital and Emergency Contact List
- (Posted with another copy stored in the First Aid Kit)

**H&S Supporting Program Requirements**

- On Site Hazard Communication Program (Section 5.0 of the HSGM)
    - Collect and review MSDSs for
      - Decontamination Solution – Liquinox
      - Sample preservatives
      - List chemicals on the onsite Chemical inventory List (Figure 3-7)
- MSDSs for Hydrochloric Acid; and Liquinox have been included in this Safe Work Packet. The FOL and/or the SSO shall insure these are replaced once the Supplier or Manufacturers MSDS arrives with the products.

6-3

CTO 0069

Revision 0  
September 2008

**TETRA TECH NUS**  
**COMPRESSED GAS CYLINDER SAFE HANDLING PROCEDURE**

## **TETRA TECH NUS**

### **COMPRESSED GAS CYLINDER SAFE HANDLING PROCEDURE**

#### **OBJECTIVE**

The objective of this policy is to minimize the hazards and reduce the risk of injury from the handling, storage and use of compressed gases including:

- Span and Calibration gases
- Hydrogen
- Nitrogen
- Breathing Air

#### **PURPOSE**

The purpose of this policy is to establish the minimum safety requirements for the handling, use and storage of compressed gasses.

#### **RESPONSIBILITY**

It is the responsibility of the Field Operations Leader (FOL)/ Site Health and Safety Officer (SHSO) to assure that all compressed gas cylinders are handled stored and used according to the procedures outlined in this document. Further, the FOL/SHSO shall ensure that affected TtNUS personnel are trained in the safe handling procedures for compressed gases present at the site.

#### **REQUIREMENTS**

##### **Storage**

- a. Compressed hydrogen, breathing air, and nitrogen cylinders must be stored outside of buildings and away from doors, windows, and building air intakes.
- b. Compressed gas cylinders must be protected from adverse weather, heat, and any other type of adverse atmosphere to the extent possible.
- c. The storage area should be paved and easily accessible to delivery trucks and users.
- d. Cylinders must be secured and locked in an upright position with chains or straps and secured to a pole or post.
- e. Cylinder storage areas must be designed to prevent flame and spark contact with the cylinders.
- f. Empty cylinders are to be stored separately from full cylinders, and tagged with surveyor tape or an empty tag.

### **Transporting**

- a. When transported, cylinders must be secured to prevent rolling or cylinder damage. Cylinders shall only be transported when the valve cap is secured. Flammable gases such as hydrogen will not be transported or stored in the trunks of cars.
- b. It is recommended that cylinders (K Size or larger) should only be transported using a dolly or other piece of material handling equipment.
- c. Liquefied gases should be transported and used in the upright position.

### **Usage**

- a. A pressure reducing regulator must be connected to the compressed gas cylinder before usage. The cylinder shut-off valve cannot be used to control the gas discharge rate.
- b. A pressure relief device must be used with hazardous compressed gases and the pressure relief system must be designed to operate and vent safely.
- c. Cylinders of hydrogen, breathing air, and nitrogen must be secured during usage and located in a well ventilated area.
- d. Operating procedures prohibit the use of oil and grease as lubricants with all system fittings.
- e. With the exception of hydrogen, open cylinder valves slowly to clear any foreign materials prior to attaching the pressure regulator and gage. When not in use place the valve cap over the valve outlet.
- f. Do NOT force threads/connections that do not fit or match.
- g. Flammable gases and Oxygen cylinders regulators should be equipped with flash back arrestors.
- h. Never use oil or grease as a lubricant on cylinder fittings (especially oxygen).
- i. Never use oxygen or other specialty gas as a substitute for compressed air.
- j. Never drain a cylinder completely empty to avoid sucking in contamination.

**Hydrogen Cylinders** - Do not "open" hydrogen cylinder valve before connecting it, since self-ignition may occur. Hydrogen is the lightest gas known and may collect in the top of buildings with out proper ventilation. It may leak out of a system which is gas-tight for air or other gases. Leak check system with leak detection solution, never with flame. If the user experiences difficulty operating cylinder valve, discontinue use and contact supplier. Use only approved CGA connections. DO NOT USE ADAPTERS. Never insert an object (e.g., wrench, screwdriver, pry bar, etc.) into valve cap openings. Doing so may

damage valve, causing a leak to occur. Use an adjustable strap wrench to remove over-tight or rusted caps. Never strike an arc on a compressed gas cylinder or make a cylinder a part of an electrical circuit.

### **Handling**

- a. Never remove identification from cylinders.
- b. Always wear safety glasses when working with compressed gases.
- c. Always handle cylinders as they are full.
- d. Do not permit cylinders to strike violently against one another.

### **References**

- a. "Safe Handling of Compressed Gases in Containers", Compressed Gas Association, Arlington, VA 22202.
- b. Handbook of Compressed Gases, Compressed Gas Association, Arlington, VA 22202
- c. Code of Federal Regulations, Title 29 Part 1910, Subpart H – Hazardous Materials

**MATERIAL SAFETY DATA SHEET**  
**SAMPLE PRESERVATIVE - HYDROCHLORIC ACID**

**MSDS**

**Material Safety Data Sheet**

From: Mallinckrodt Baker, Inc.  
222 Red School Lane  
Phillipsburg, NJ 08865



Mallinckrodt  
**CHEMICALS**



24 Hour Emergency Telephone: 908-859-2151  
CHEMTREC: 1-800-424-9300

National Response in Canada  
CANUTEC: 613-996-6666

Outside U.S. and Canada  
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

# HYDROCHLORIC ACID, 33 - 40%

## 1. Product Identification

**Synonyms:** Muriatic acid; hydrogen chloride, aqueous

**CAS No.:** 7647-01-0

**Molecular Weight:** 36.46

**Chemical Formula:** HCl

**Product Codes:**

J.T. Baker: 5367, 5537, 5575, 5800, 5814, 5821, 5839, 5861, 5862, 5894, 5962, 5972, 5994, 6900, 7831, 9529, 9530, 9534, 9535, 9536, 9538, 9539, 9540, 9544, 9548

Mallinckrodt: 2062, 2515, 2612, 2624, 2626, 3861, 5583, 5587, H611, H613, H987, H992, H999, V078, V628

## 2. Composition/Information on Ingredients

Ingredient	CAS No	Percent
Hazardous		
-----	-----	-----
-----		
Hydrogen Chloride	7647-01-0	33 - 40%
Yes		
Water	7732-18-5	60 - 67%
No		

## 3. Hazards Identification

### Emergency Overview

**POISON! DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. INHALATION MAY CAUSE LUNG DAMAGE.**

## SAF-T-DATA<sup>(tm)</sup> Ratings (Provided here for your convenience)

---

Health Rating: 3 - Severe (Poison)

Flammability Rating: 0 - None

Reactivity Rating: 2 - Moderate

Contact Rating: 4 - Extreme (Corrosive)

Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD;  
PROPER GLOVES

Storage Color Code: White (Corrosive)

---

## Potential Health Effects

---

### **Inhalation:**

Corrosive! Inhalation of vapors can cause coughing, choking, inflammation of the nose, throat, and upper respiratory tract, and in severe cases, pulmonary edema, circulatory failure, and death.

### **Ingestion:**

Corrosive! Swallowing hydrochloric acid can cause immediate pain and burns of the mouth, throat, esophagus and gastrointestinal tract. May cause nausea, vomiting, and diarrhea.

Swallowing may be fatal.

### **Skin Contact:**

Corrosive! Can cause redness, pain, and severe skin burns. Concentrated solutions cause deep ulcers and discolor skin.

### **Eye Contact:**

Corrosive! Vapors are irritating and may cause damage to the eyes. Contact may cause severe burns and permanent eye damage.

### **Chronic Exposure:**

Long-term exposure to concentrated vapors may cause erosion of teeth. Long term exposures seldom occur due to the corrosive properties of the acid.

### **Aggravation of Pre-existing Conditions:**

Persons with pre-existing skin disorders or eye disease may be more susceptible to the effects of this substance.

---

## 4. First Aid Measures

**Inhalation:** Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

**Ingestion:** DO NOT INDUCE VOMITING! Give large quantities of water or milk if available. Never give anything by mouth to an unconscious person. Get medical attention immediately.

**Skin Contact:** In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.

Thoroughly clean shoes before reuse. Get medical attention immediately.

**Eye Contact:** Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

---

## 5. Fire Fighting Measures

**Fire:** Extreme heat or contact with metals can release flammable hydrogen gas.

**Explosion:** Not considered to be an explosion hazard.

**Fire Extinguishing Media:** If involved in a fire, use water spray. Neutralize with soda ash or slaked lime.

**Special Information:** In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Structural firefighter's protective clothing is ineffective for fires involving hydrochloric acid. Stay away from ends of tanks. Cool tanks with water spray until well after fire is out.

---

## 6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Neutralize with alkaline material (soda ash, lime), then absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker NEUTRASORB® or TEAM® 'Low Na+' acid neutralizers are recommended for spills of this product.

---

## 7. Handling and Storage

Store in a cool, dry, ventilated storage area with acid resistant floors and good drainage. Protect from physical damage. Keep out of direct sunlight and away from heat, water, and incompatible materials. Do not wash out container and use it for other purposes. When diluting, the acid should always be added slowly to water and in small amounts. Never use hot water and never add water to the acid. Water added to acid can cause uncontrolled boiling and splashing. When opening metal containers, use non-sparking tools because of the possibility of hydrogen gas being present. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

---

## 8. Exposure Controls/Personal Protection

**Airborne Exposure Limits:** For Hydrochloric acid:- OSHA Permissible Exposure Limit (PEL): 5 ppm (Ceiling)- ACGIH Threshold Limit Value (TLV):

2 ppm (Ceiling), A4 Not classifiable as a human carcinogen

**Ventilation System:** A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

**Personal Respirators (NIOSH Approved):** If the exposure limit is exceeded, a full facepiece respirator with an acid gas cartridge may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. **WARNING:** Air purifying respirators

do not protect workers in oxygen-deficient atmospheres.

**Skin Protection:** Rubber or neoprene gloves and additional protection including impervious boots, apron, or coveralls, as needed in areas of unusual exposure to prevent skin contact.

**Eye Protection:** Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

---

## 9. Physical and Chemical Properties

**Appearance:** Colorless, fuming liquid.

**Odor:** Pungent odor of hydrogen chloride.

**Solubility:** Infinite in water with slight evolution of heat.

**Density:** 1.18

**pH:** For HCL solutions: 0.1 (1.0 N), 1.1 (0.1 N), 2.02 (0.01 N)

**% Volatiles by volume @ 21C (70F):** 100

**Boiling Point:** 53C (127F) Azeotrope (20.2%) boils at 109C (228F)

**Melting Point:** -74C (-101F)

**Vapor Density (Air=1):** No information found.

**Vapor Pressure (mm Hg):** 190 @ 25C (77F)

**Evaporation Rate (BuAc=1):** No information found.

---

## 10. Stability and Reactivity

**Stability:** Stable under ordinary conditions of use and storage. Containers may burst when heated.

**Hazardous Decomposition Products:** When heated to decomposition, emits toxic hydrogen chloride fumes and will react with water or steam to produce heat and toxic and corrosive fumes. Thermal oxidative decomposition produces toxic chlorine fumes and explosive hydrogen gas.

**Hazardous Polymerization:** Will not occur.

**Incompatibilities:** A strong mineral acid, concentrated hydrochloric acid is incompatible with many substances and highly reactive with strong bases, metals, metal oxides, hydroxides, amines, carbonates and other alkaline materials. Incompatible with materials such as cyanides, sulfides, sulfites, and formaldehyde.

**Conditions to Avoid:** Heat, direct sunlight.

---

## 11. Toxicological Information

Inhalation rat LC50: 3124 ppm/1H; oral rabbit LD50: 900 mg/kg (Hydrochloric acid concentrated); investigated as a tumorigen, mutagen, reproductive effector.

-----\Cancer Lists\-----

Ingredient	---NTP Carcinogen---		IARC Category
	Known	Anticipated	
Hydrogen Chloride (7647-01-0)	No	No	3
Water (7732-18-5)	No	No	None

---

## 12. Ecological Information

**Environmental Fate:** When released into the soil, this material is not expected to biodegrade. When released into the soil, this material may leach into groundwater.

**Environmental Toxicity:** This material is expected to be toxic to aquatic life.

---

## 13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

---

## 14. Transport Information

### Domestic (Land, D.O.T.)

-----  
**Proper Shipping Name:** HYDROCHLORIC ACID

**Hazard Class:** 8

**UN/NA:** UN1789

**Packing Group:** II

**Information reported for product/size:** 475LB

### International (Water, I.M.O.)

-----  
**Proper Shipping Name:** HYDROCHLORIC ACID

**Hazard Class:** 8

**UN/NA:** UN1789

**Packing Group:** II

**Information reported for product/size:** 475LB

---

## 15. Regulatory Information

Risk and Safety Phrases:

Symbol: C

Risk: 34-37

Safety: (1/2-)26-45

-----\Chemical Inventory Status - Part 1\-----

Ingredient	TSCA	EC	Japan	Australia
Hydrogen Chloride (7647-01-0)	Yes	Yes	Yes	Yes
Water (7732-18-5)	Yes	Yes	Yes	Yes

-----\Chemical Inventory Status - Part 2\-----

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Hydrogen Chloride (7647-01-0)	Yes	Yes	No	Yes
Water (7732-18-5)	Yes	Yes	No	Yes

-----\Federal, State & International Regulations - Part 1\-----				
Ingredient Catg.	-SARA 302-		-----SARA 313-----	
	RQ	TPQ	List	Chemical
Hydrogen Chloride (7647-01-0)	5000	500*	Yes	No
Water (7732-18-5)	No	No	No	No

-----\Federal, State & International Regulations - Part 2\-----			
Ingredient	CERCLA	-RCRA-	-TSCA-
		261.33	8(d)
Hydrogen Chloride (7647-01-0)	5000	No	No
Water (7732-18-5)	No	No	No

Chemical Weapons Convention: No      TSCA 12(b): No      CDTA: Yes  
SARA 311/312: Acute: Yes      Chronic: Yes      Fire: No      Pressure: No  
Reactivity: No      (Mixture / Liquid)

**Australian Hazchem Code:** 2R  
**Poison Schedule:** None allocated.

**WHMIS:**  
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

## 16. Other Information

**NFPA Ratings:** Health: 3 Flammability: 0 Reactivity: 1  
**Label Hazard Warning:** POISON! DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. INHALATION MAY CAUSE LUNG DAMAGE.  
**Label Precautions:** Do not get in eyes, on skin, or on clothing. Do not breathe vapor or mist. Use only with adequate ventilation. Wash thoroughly after handling. Store in a tightly closed container. Remove and wash contaminated clothing promptly.  
**Label First Aid:** In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In all cases get medical attention immediately.  
**Product Use:** Laboratory Reagent.  
**Revision Information:** MSDS Section(s) changed since last revision of document include: 16.

**Disclaimer:**  
\*\*\*\*\*  
\*\*\*\*\*

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**Prepared by:** Environmental Health & Safety  
Phone Number: (314) 654-1600 (U.S.A.)

**SECTION 7.0**  
**GEOGRAPHICAL SURVEYING SAFE WORK PACKET**

## SECTION 7.0

### ACTIVITY AND DOCUMENTATION CHECKLIST

The Safe Work Packet for Geophysical/Geographical Surveying activities at NASB will include the following:

- Horizontal location and vertical elevations of the monitoring wells and associated components to be installed. These readings along with a fixed or known point(existing monitoring well, bench mark, etc.)

The Safe Work Packet for this activity contains the following information:

- Table 7-1 Geographical Surveying Activity Hazard Analysis
- Site Maps (These are to be created as information is developed)

TABLE 7-1 Activity Hazard Analysis

ACTIVITY: Geographical Surveying

ANALYZED BY/DATE: Jennifer Choich 08/2008

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS / CONTROLS
<p>Traditional land survey methods conducted by a Surveyor who is licensed in the Sate of Maine.</p>	<p>1) Slips/Trips/Falls</p> <p>2) Traffic Hazards</p> <p>3) Poisonous Plants</p> <p>4) Cuts and lacerations</p>	<p><b>1) Slips, trips, and falls</b></p> <ul style="list-style-type: none"> <li>• Remove/identify trip hazards from within the work area.</li> <li>• Maintain good housekeeping within the work area.</li> <li>• The best route of travel may not be the shortest.</li> </ul> <p><b>2) Vehicular and foot traffic</b> - Traffic and equipment considerations are to include the following:</p> <ul style="list-style-type: none"> <li>• Motorists may be distracted by onsite activities – ASSUME THEY DO NOT SEE YOU OR MEMBERS OF YOUR FIELD CREW.</li> <li>• DO NOT place obstructions along the sides of the road (such as vehicles) that may cause site personnel to move into the flow of traffic to avoid your activities or equipment. <b>Provide a required Free Space of Travel.</b> Your movement may startle a motorist and cause an accident.</li> <li>• Required "Free Space": Maintain at least 6-feet of space between you and moving traffic. Where this is not possible, use flaggers and/or signs to warn oncoming traffic of activities near or within the travel lanes.</li> <li>• Face Traffic: Whenever feasible, if you must move within the 6-feet of required space, or into traffic attempt to face moving traffic at all times. Always leave yourself an escape route.</li> <li>• Wear High Visibility Vests to increase visual recognition by motorist.</li> <li>• Do not rely on the operator's visibility, judgment, or ability. Make eye contact with the driver. Carefully and deliberately use hand signals so they will not startle or confuse motorists or be mistaken for a flagger's direction before moving into traffic.</li> <li>• Move Deliberately: Do not make sudden movements that might confuse a motorist.</li> </ul> <p><b>3) Poisonous plants/Insect Bites</b> – It is assumed that this area is well maintained (Grass is cut, etc.) and poisonous plants and insects will not be an issue. However, should this assumption be incorrect</p> <ul style="list-style-type: none"> <li>- Poisonous Plants – Within the work area we may encounter Poison Ivy, Poison Oak, Poison Sumac, etc. An irritating, allergic reaction can occur after direct contact with the plant or indirect contact through some piece of equipment or clothing article. Oils are transferred from the plant to exposed skin, clothing, or piece of equipment. The degree of the irritation or allergic reaction can vary significantly from one person to the</li> </ul>

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TABLE 7-1 Activity Hazard Analysis

ACTIVITY: Geographical Surveying

ANALYZED BY/DATE: Jennifer Choich 08/2008

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS / CONTROLS	
		next. To control exposure to these plants <ul style="list-style-type: none"> <li>o Know the plants. Avoid if at all possible. If not wear protective clothing that maybe thrown away when the task is complete.</li> <li>o Wear barrier creams or PPE, prior to entry into heavy brush.</li> <li>o Wash with cool water and soap or an over the counter solutions to remove these oils from the skin. Wash your contaminated clothes separate from your other clothes.</li> </ul> - Insects – Use repellants applied liberally to skin and clothing per the Manufacturers requirements. <ul style="list-style-type: none"> <li>- Wear light colored clothing – This will assist in controlling heat stress as well as making crawling insects on your body easier to detect</li> </ul>	
<p><b>Hazard Monitoring Required:</b>                      Visual observation of work practices by the FOL and/or the SSHO to minimize potential physical hazards (i.e., improper lifting, unsecured loads, cutting practices, etc.).</p> <p>Inclement Weather – Use the 30/30 Rule – If there is 30 seconds or less between thunder and lightning go inside for 30 minutes or more since the last thunder.</p>		<p><b>Decontamination Procedures:</b>                      Structured decontamination procedures are not required for this task. Good personal hygiene practices should be employed prior to breaks lunch or other period when hand to mouth contact occurs. This will minimize potential ingestion exposures.</p>	<p><b>Permits/Requirements:</b>                      - None</p>
<p><b>PPE Requirements</b> (<i>Italicized items are as conditions dictate or at the SSO's discretion</i>)  <b>Level D</b> – Standard field attire (sleeved shirts, long pants), work boots with adequate traction, surveyors working along highways and traffic pathways shall wear high visibility vests to increase visual recognition.</p>			
<p><b>Training Required</b></p> <ul style="list-style-type: none"> <li>• 29 CFR 1910.120 (e) Site Specific Training (See Section 2.0 of the HSGM, Attachment 2-2).</li> <li>• Tail Gate Meeting Attendance</li> </ul> <p><b>Medical Clearance/Surveillance Required</b>                      Completed a Medical Data Sheet (See Section 3, Figure 3-6 of the HSGM for Blank forms)</p>		<p><b>Emergency Equipment</b></p> <ul style="list-style-type: none"> <li>- First Aid Kit</li> <li>- Fire Extinguisher</li> <li>- Map to Hospital and Emergency Contact List (Posted/Keep a copy in your First-Aid Kit)</li> </ul>	<p><b>H&amp;S Supporting Program Requirements</b></p> <p>None required.</p>

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**SECTION 8.0**  
**INVESTIGATIVE DERIVED WASTE MANAGEMENT**  
**SAFE WORK PACKET**

## SECTION 8.0

### ACTIVITY AND DOCUMENTATION CHECKLIST

The Safe Work Packet for IDW Management activities on NASB.

The Safe Work Packet for this activity contains the following information

- Table 8-1 Activity Hazard Analysis for IDW Management.
- Investigative Derived Waste Inventory List, Figure 8-1.



**Remember:**

- Complete IDW Inventory Sheets. Provide copies to your NASB Point of Contact upon request.
- All personnel must complete the Mobilization/Demobilization Safe Work Packet and review the Emergency Action Plan in addition to Task Specific Safe Work Packets.

**TABLE 8-1 Activity Hazard Analysis**

**ACTIVITY:** IDW Management

**ANALYZED BY/DATE:** Jennifer Choich 08/2008

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS / CONTROLS
<p>IDW Management Activities will include:</p> <ul style="list-style-type: none"> <li>• Containerizing               <ul style="list-style-type: none"> <li>- purge waters</li> <li>- decontamination waters</li> <li>- soil cutting</li> </ul> </li> <li>• Staging and Labeling Containers.</li> <li>• Using 55-gallon drums or FRAC tanks</li> </ul>	<p>1) Lifting</p> <p>2) Pinches and compressions</p> <ul style="list-style-type: none"> <li>• Foot hazards</li> </ul>	<p><b>1) Lifting (strain/muscle pulls)</b></p> <ul style="list-style-type: none"> <li>• Use mechanical means (i.e. dollies, heavy equipment) to move and handle containers. Use proper lifting techniques described in Section 4.4 of the Health and Safety Guidance Manual (HSGM).</li> <li>• Fill drums only to 80% to minimize some of the weight issues</li> </ul> <p><b>Reminder:</b> The drums you are attempting to move, lift and/or relocate may weigh on the average of</p> <ul style="list-style-type: none"> <li>• 55-Gallon container of purge or decontamination waters = 475 lbs. (including the container)</li> <li>• 55-Gallon container of soils (moist) = 750 lbs. (including the container)</li> </ul> <p><b>2) Pinches and compressions</b> – During placement of drums/containers on pallets use machinery or assistance from another person where possible. Keeps hand out of the area between drums.</p> <p>Wear steel toed shoes with adequate lug to support traction when moving heavy containers.</p> <p>To further reduce material handling hazards, support spill containment and control, and sampling when necessary, the IDW storage area should be structured as follows:</p> <ul style="list-style-type: none"> <li>- Maximum 4-drums to a pallet with retaining ring bolt and label on the outside for easy access/reference.</li> <li>- Maintain a minimum of 4-feet between each row of pallets. This is the minimum distance necessary to wheel drums on a drum dolly.</li> <li>- If the site is not secured, the satellite storage area shall be fenced and signs placed indicating the following:               <ul style="list-style-type: none"> <li>a. Primary Point of Contact (make sure they know they been identified as the primary point of contact).</li> <li>b. Phone Number</li> <li>c. Emergency Contact (If different from the primary)</li> </ul> </li> <li>- Provide a Drum/Container Inventory to the Primary Point of Contact and to Emergency Services, if they deem it necessary. The inventory should contain:               <ul style="list-style-type: none"> <li>a. Each drum shall be assigned a unique identification number. This number</li> </ul> </li> </ul>

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ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS / CONTROLS
	<p>3) Slips/Trips/Falls</p> <p>4) Chemical hazards</p>	<p>shall be placed on the label and drum shell using a paint marker (Note: Do not paint the number on the lid as these have a tendency to get exchanged from time to time.)</p> <p>b. Types of waste materials (Subsurface soils, drill cuttings; purge/development waters, etc.)</p> <p>c. Volumes (Full or level associated with the container after completion of the project location)</p> <p>d. Where it was derived from (IDW should be separated by media and location)</p> <p>e. Dates (For all filled containers and at the completion of work for that area)</p> <p>f. Contact – For more information</p> <p>Ensure all lids are secured.</p> <p><b>3) Slips, trips, and falls</b></p> <ul style="list-style-type: none"> <li>Remove/identify trip hazards from the work area. This is critical when moving containers with weight of this magnitude.</li> <li>Maintain good housekeeping within the work area.</li> </ul> <p><b>4) Chemical hazards</b> – Generally encountering contaminants during this activity is low unless the contents of a container must be transferred due to a faulty container [leak(s)]. Over recent months however, containers have been staged with dirt on the outside potentially exposing all who come in contact. To remedy this the FOL and/or the SSO will</p> <ul style="list-style-type: none"> <li>Insure the outsides of all drums moved to the staging area are washed/wiped clean.</li> </ul>
<p><b>Spill Containment</b> - Within this scope of work the primary area of concern regarding spills and/or releases are associated with</p> <ul style="list-style-type: none"> <li>Moving/Handling the drums/containers of waste materials. This can be minimized based on the method of picking these drums up and the method of transport. <ul style="list-style-type: none"> <li>Use the proper lifting appliances such as drum grapplers. Often times drillers wish to lift the containers with a choker wrap of their mast cable. This is both improper rigging, damaging to the cable, and significantly increases the risk for dropping the container possibly resulting in a spill or a motor vehicle being struck by the unsecured drum.</li> <li>Care should also be exercised when using a backhoe or similar device to lift the drums. This sometimes results in a bucket tooth into the drum again resulting in a release.</li> <li>Place the drums onto a lift gate and flat bed with removable sides for transport to the staging area.</li> </ul> </li> </ul> <p>This section describes the procedures the Tetra Tech NUS field personnel will employ upon the detection of a spill or leak.</p>		

ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS / CONTROLS	
<ul style="list-style-type: none"> <li>• Notify the SSO or FOL immediately upon detection of a leak or spill. Initiate incidental response measures, including               <ul style="list-style-type: none"> <li>- Employ the personal protective equipment (see below). Take immediate actions to stop the leak or spill by plugging or patching the container or raising the leak to the highest point in the vessel (for containers). Spread the absorbent material in the area of the spill, covering it completely.</li> <li>- Transfer the material to a new vessel; collect and containerize the absorbent material. Label the new container appropriately. Await analyses for treatment and disposal options.</li> </ul> </li> <li>• Re-containerize spills, including 2-inch of top cover (if over soils) impacted by the spill. Await test results for treatment or disposal options.</li> <li>• Personal Protective Equipment               <ul style="list-style-type: none"> <li>- Nitrile outer gloves</li> <li>- Splash Shield</li> <li>- Impermeable over-boots</li> <li>- Rain suits</li> </ul> </li> </ul>			
<p><b>Hazard Monitoring Required:</b>            Visual observation of work practices by the FOL and/or the SSO to minimize potential physical hazards (i.e., improper lifting, unsecured loads, cutting practices, etc.). Monitoring will only be employed if Spill Containment is implemented.</p>	<p><b>Decontamination Procedures:</b>            Not required, unless spill containment protocol is implemented. Then the following will apply</p> <ul style="list-style-type: none"> <li>• Once the spill is secured and all of the spill equipment has been through a soap and water wash and rinse.</li> <li>• Personnel will wash/rinse outer protective garment with soap and water.</li> <li>• Remove outer protective garments.</li> <li>• Wash hands and face.</li> </ul>	<p><b>Permits/Requirements:</b></p> <ul style="list-style-type: none"> <li>• Complete IDW Inventory List</li> </ul>	

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ACTIVITY / PHASE	POTENTIAL HAZARDS	RECOMMENDED ACTIONS / CONTROLS	
<b>PPE Required</b>			
Hard-hat .....	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Hearing Protection (plugs/muffs)....	<input type="checkbox"/> Yes <input type="checkbox"/> No
Safety Glasses .....	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Safety belt/harness.....	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Chemical/splash goggles .....	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Radio/Cellular Phone .....	<input type="checkbox"/> Yes <input type="checkbox"/> No
Splash Shield .....	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Barricades .....	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Splash suits/coveralls.....	<input type="checkbox"/> Yes <input type="checkbox"/> No	Gloves (Type – see note) .....	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Impermeable apron .....	<input type="checkbox"/> Yes <input type="checkbox"/> No	Work/rest regimen.....	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Steel toe Work shoes or boots	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Chemical Resistant Boot Covers....	<input type="checkbox"/> Yes <input type="checkbox"/> No
High Visibility vest .....	<input type="checkbox"/> Yes <input type="checkbox"/> No	Tape up/use insect repellent .....	<input type="checkbox"/> Yes <input type="checkbox"/> No
First Aid Kit.....	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Fire Extinguisher .....	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Eyewash.....	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Other (see below).....	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
Modifications/Exceptions: Other: <u>High Visibility Vests for high traffic areas; Leather or cotton work gloves for handling containers. Fire extinguisher for general activities 2A:B:C.</u>			
<b>Training Required</b> <ul style="list-style-type: none"> <li>• 29 CFR 1910.120 (e) Site Specific Training Figure 2-3.</li> <li>• Tail Gate Meeting Attendance, Figure 2-4</li> </ul> <b>Medical Clearance/Surveillance Required</b> <ul style="list-style-type: none"> <li>• Completed a Medical Data Sheet (See Section 3, Figure 3-6 of the HSGM for Blank forms)</li> </ul>	<b>Emergency Equipment</b> <ul style="list-style-type: none"> <li>- First Aid Kit</li> <li>- Fire Extinguisher</li> <li>- Map to Hospital and Emergency Contact List (Posted and a copy placed in your First-Aid Kit.</li> <li>- Spill Kit (Oil dry, wood shavings, or other absorbent materials, Shovels, brooms, Oil absorbent pads</li> </ul>	<b>H&amp;S Supporting Program Requirements</b>  None required.	

## **DRUM HANDLING SAFE WORK PRACTICES**

The following safe work practices are to be followed when working with 55-gallon drums containing solids (e.g., cuttings) or liquids (e.g. groundwater ).

Check the work area and manage any slip, trip, and/or fall hazards.

Always wear hand protection (e.g. leather or leather palmed gloves) when handling drums.

Where possible use equipment, manual or powered, to move or lift drums.

Always use multiple workers to right a drum on its side, particularly when full. If possible, use equipment, such as a fork lift or equivalent equipment, to right the drum.

When staging, leave open space around each drum to avoid creating pinch points.

Fill drums only 80% to control potential spillage and make handling less hazardous.

FIGURE 8-1

INVESTIGATIVE DERIVED WASTE  
DRUM/CONTAINER INVENTORY LOG

*This attachment is to be completed as investigative derived waste is generated. An updated inventory should be provided to your Point of Contact at the end of each 10-day shift.*

Drum/ Container Number #	Drum/ Container Type	Media (Contents)	Location (SWMU and Well #, etc.)	Estimated Volume	Date Filled	Comments
1	5-Gallon Bucket 55-Gallon Drum (UN1A2)	Soil Cutting Purge/Development Water Decontamination Wash Waters		( )- Gallons	/ /	
2	Frac Tank	Purge/Development Water Decontamination Wash Waters		( )- Gallons	/ /	
3				( )- Gallons	/ /	
4				( )- Gallons	/ /	

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Drum/ Container Number #	Drum/ Container Type	Media (Contents)	Location (SWMU and Well #, etc.)	Estimated Volume	Date Filled	Comments

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Field Operations Leader: \_\_\_\_\_

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

NASB Point of Contact: \_\_\_\_\_

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

## 9.0 EMERGENCY ACTION PLAN

### 9.1 INTRODUCTION

This section has been developed as part of a planning effort to direct and guide field personnel in the event of an emergency. In the event of on-site emergencies, TtNUS will expend onsite resources in an initial response measure to control initial stage incidents including:

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

Once initial response measures have been expended site personnel will be evacuated to a safe place of refuge and the appropriate emergency response agencies will be notified and emergency services will be notified.

☛ Life threatening injuries and imminent hazards are considered emergencies and will require an immediate notification of Emergency Services listed within this HASP.

This emergency action plan conforms to the requirements of OSHA 29 CFR 1910.38(a), as allowed in OSHA 29 CFR 1910.120(l)(1)(ii).

### 9.2 EMERGENCY PLANNING

Through the initial hazard/risk assessment effort the following are considered conditions or situations or scenarios associated with this cope that are or could result in an emergency

- Clearing and Grubbing – Chain saw accident/injury
- Drilling – Entanglement (injury, possible fatality); equipment failure caused injury
- Natural hazards –
  - Inclement weather (tornados, electrical storms).
  - Life threatening health occurrence (heart attack, stroke, etc.)
- Spills and releases

To minimize and eliminate these potential emergency situations, emergency planning activities associated with this project include the following. The FOL/SSO are responsible for:

- Coordinating with NAS Brunswick Emergency Services personnel to ensure that TtNUS emergency action activities are compatible with existing facility emergency response procedures. As part of this effort the following measures
  - Evaluate the distance to these locations where work will be conducted to determine how quickly assistance may be provided in an emergency scenario.
    - This will determine the need to have First-Aid/CPR/Bloodborne pathogen trained personnel as part of the field crew. Guidelines are as follows:
      - If provisions for emergency care for life threatening injuries is greater than 4 minutes, then a First-aid/CPR trained person must be on-site.
      - If provisions for medical care for non-life threatening injuries are greater than 15 minutes away, then a First-aid/CPR trained person must be on-site.

**Note:** Based on the projected mileage and travel time first aid trained personnel are not required. However based on the severity of potential hazards conveyed by chainsaw use it is recommended that at least one person be trained and available onsite. Therefore, the PM shall insure that a sufficiently First-Aid/CPR trained person or persons are onsite conducting this activity.

The Base Contact will provide to the TtNUS crew the location of on-Base emergency shelters in the event of a significant storm event during operation hours or an event that has occurred on Base.

Establishing and maintaining information at the project staging area (support zone) for easy access in the event of an emergency. This information will include the following:

- Chemical Inventory (used on-site), with Material Safety Data Sheets (MSDSs).
  - On-site personnel medical records (medical data sheets).
  - A logbook identifying personnel on site each day.
  - Emergency notification phone numbers in site vehicles or an area that is immediately accessible to all personnel.
- 
- Identifying a chain of command for emergency action. For this field effort, the FOL and/or the SSO shall serve as Incident Coordinator in the event of an incident. Incident Command responsibilities will be passed to the responding emergency services agency.
  
  - Educating site workers of the hazards and control measures associated with planned activities at the site, and providing early recognition and prevention, where possible. This will be accomplished through
    - Site-specific training of this emergency action plan and HASP
    - Daily briefings

- Through the use of task-specific Safe Work Packets,
- and through periodic site surveys of the work areas.

It will be the responsibility of the FOL and/or the SSO to enforce the requirements specified in the HASP and those determined based on site-specific conditions and so noted on the safe work permit.

### **9.3 EMERGENCY RECOGNITION AND PREVENTION**

The FOL/SSO will preview site work locations prior to committing personnel or resources. They will:

- Identify, remove (where possible), and/or barricade/demarcate physical hazards within the estimated work area. Ensure that approach paths and access and control points into the work area have been established to ensure the safety of on-site personnel and resources.
- Evaluate the proposed plan to determine if the method selected places personnel at some unnecessary risk based on unforeseen site conditions.
- Provide the necessary equipment to control potential emergencies [i.e., safety cans for flammable liquid storage, spill containment equipment, PPE, and emergency equipment such as portable fire extinguishers and first-aid kits]. Ensure emergency equipment and resources are at the ready, should they be needed for emergency response measures. Ensure personnel are adequately trained in the provisions of this HASP and this Emergency Action Plan.

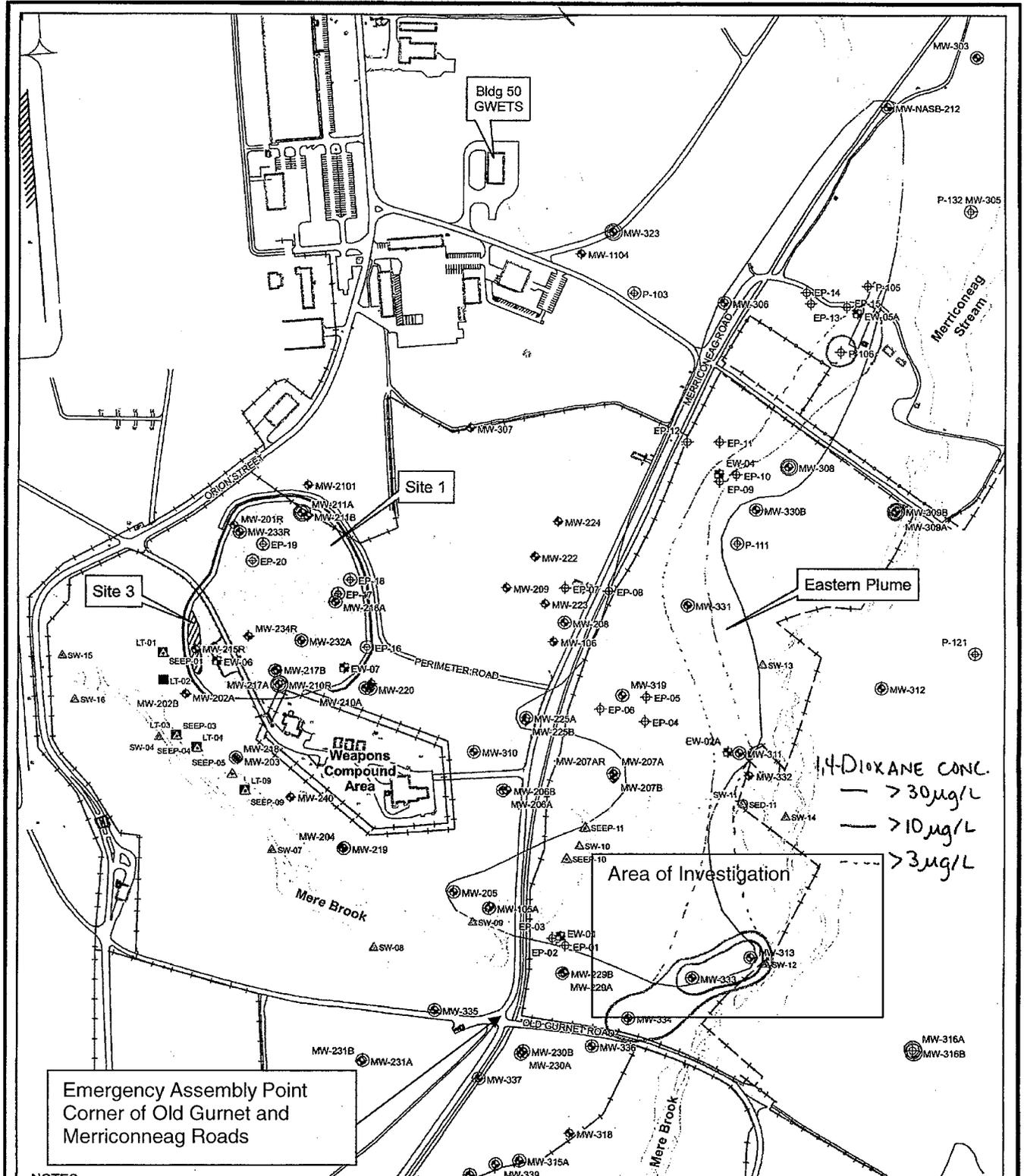
### **9.4 SAFE DISTANCES AND PLACES OF REFUGE**

The FOL/SSO shall identify a safe place of refuge (in the event of an emergency). This location will be selected and conveyed to the Field Crew as part of conducting the daily safety briefing. Selection will be based on the following considerations:

- A location adjacent to the site from which providing telephone communications and/or shelter.
- A location from which the field crews can provide site security restricting access to the emergency area, however, a point from which the field crew may direct emergency response personnel (i.e., intersection or gate, etc.).

This location should be positioned a sufficient (safe) distance from the operation that will not be impacted by the emergency.

Figure 9-1  
Proposed Emergency Assembly Point



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

The primary site contaminants in this case are low levels of VOCs. Decontamination would consist

- Removal of PPE (gloves, hard hats, etc.) and evacuate the injured.

### **9.5.1 Emergency Medical Treatment**

TtNUS and subcontractor personnel are only permitted to provide treatment to the level of their training. It should also be noted that first-aid shall be administered voluntarily with the exception of those persons trained and designated to provide this service.

Emergency medical treatment will be initiated under the following guarded restrictions:

- The FOL and/or the SSO have been notified of the incident if they are not present.
- 911 has been called and are enroute.

Those providing emergency medical treatment will:

- Take the necessary precautions to prevent direct contact with the injured person's body fluids. This may be accomplished through the employment of the following measures:
  - Use sterile gloves when handling cuts, abrasions, bites, punctures, etc. or any part of the injured person. The use of safety glasses and surgeons masks maybe necessary if there is the potential for uncontrolled spread of body fluids. The PHSO will be immediately notified in event that personnel providing emergency first-aid come into contact with body fluids or other potentially infectious tissues. Measures described here are Universal precautions and Body Substance Isolation.

In order to engage these protective measures, the FOL shall ensure that these items are part of their first-aid kit. General first aid instructions are provided in Attachment I.

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

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

- Initiate incident alerting procedures - Verbal
- Evacuate injured/non-essential personnel
- Initiate initial response procedures

- Describe to the FOL (who will serve as the Incident Coordinator) what has occurred in as much detail as possible

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

- On base call **9-1-1** or (207) 921-1717 or other emergency contacts (Table 8-1) and report the emergency. Give the emergency operator the location of the emergency, the type of emergency, the number of injured, and a brief description of what occurred. Stay on the phone and follow the instructions given by the operator. The operator will then notify and dispatch the proper emergency response agencies.

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

- Initiate an evacuation
- Direct field personnel to proceed to the appropriate assembly points (as directed by NAS Brunswick Emergency Services or by our NAS Brunswick Point of Contact) Designated Emergency Shelter.

## **9.7 EMERGENCY CONTACTS**

Prior to performing work at the site, personnel will be thoroughly briefed on the emergency procedures to be followed in the event of an incident. A cellular phone or designated land-line phone shall be identified and made available during on-site operations for the purpose of emergency notification. Table 8-1 provides a list of emergency contacts and their corresponding telephone numbers. This table must be posted on-site, where it is readily available to site personnel. If field personnel are operating at a number of isolated locations, additional copies should be made available to the field crew.

## **9.8 EMERGENCY EQUIPMENT**

A first aid kit, eye wash unit, and a 2:A:B:C Fire extinguisher will be placed in all site vehicles, and will be maintained and shall be immediately available for use in the event of an emergency.

## **9.9 EMERGENCY CONTACTS**

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

on site where it is readily available to all site personnel. Telephone numbers for the Base Fire Department and EMS are listed in Table 8-1.

In addition, Tetra Tech NUS personnel who are injured or become ill on the job must notify appropriate company representatives. Figure 8-2 presents the procedure for reporting an injury/illness, and the form to use for this purpose. **If the emergency involves personnel exposures to chemicals, follow the steps in Figure 8-2.**

**TABLE 9-1**  
**EMERGENCY CONTACT NUMBERS**  
**NAS BRUNSWICK, BRUNSWICK, MAINE**

AGENCY	TELEPHONE
NAS Brunswick Emergency Number for On-Base Fire and Police and Ambulance	(207) 921-3333
Fire/Police Department (non-emergency)	(207) 921-2587
Mid Coast Hospital	(207) 373-3635
BRAC PMO NE Remedial Project Manager (RPM): Todd Bober	(215) 897-4911
NASB Point of Contact (POC) Mike Fagan	(207) 921-1717
NASB Alternate Point of Contact (POC) Lisa Joy, Environmental Director	(207) 921-1720
Public Works Trouble Call	(207) 921-2214
NASB General Information	(207) 921-2214
NASB Medical Clinic	(207) 921-2991
<b>NORTHERN NEW ENGLAND POISON CENTER</b>	(800) 222-1222
WorkCare	1(800)455-6155 (714) 456-2154 Fax
CLEAN Health and Safety Manager, Matthew M. Soltis, CIH, CSP	(412) 921-8912
Project Health and Safety Officer Jennifer Choich, Ph.D.	(412) 921-8083

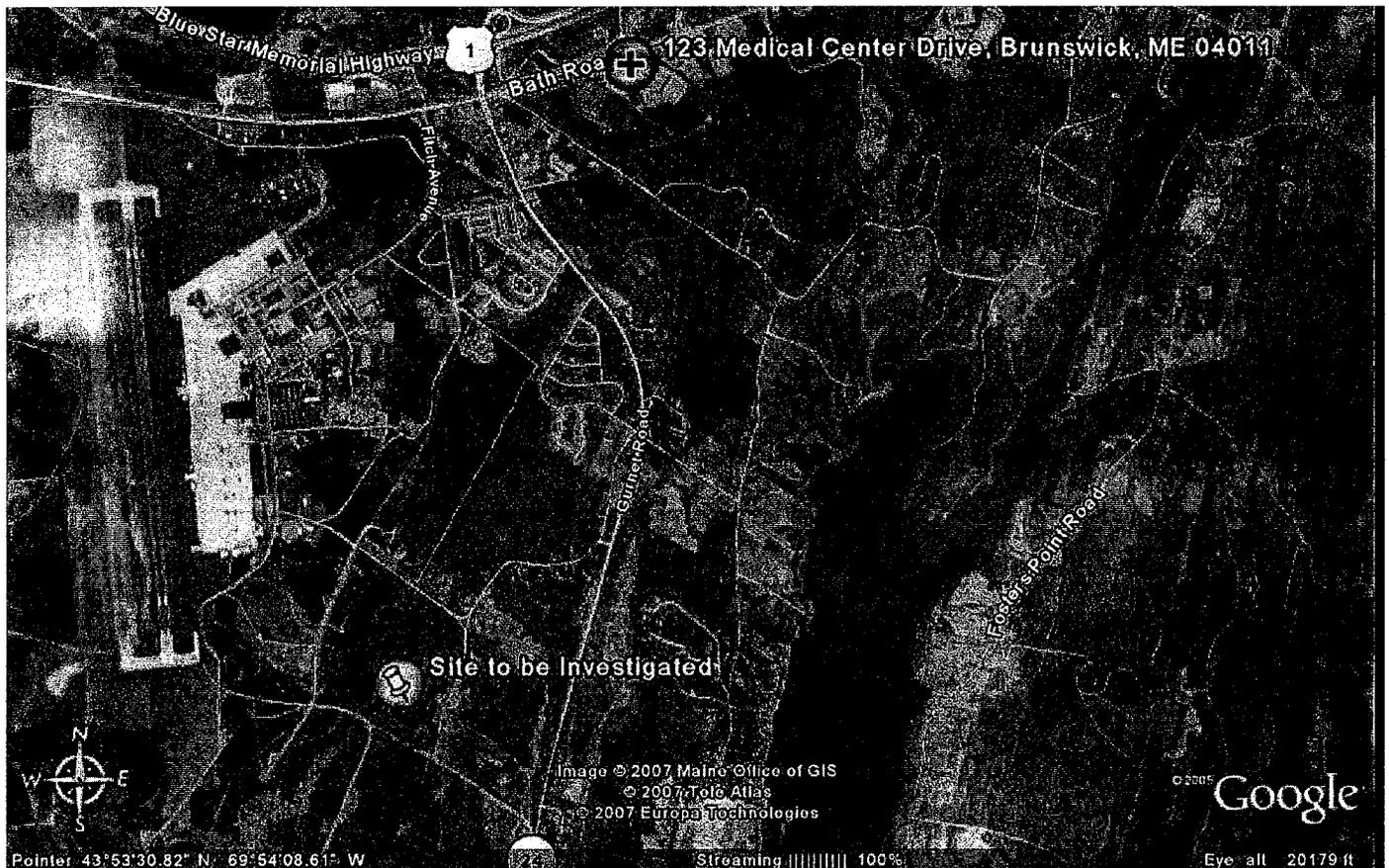
## 9.10 EMERGENCY ROUTE TO HOSPITAL

### DIRECTIONS TO HOSPITAL

Hospital Name: Mid Coast Hospital  
Hospital Address: 123 Medical Center Drive,  
Brunswick, ME 04011  
Hospital Telephone: Emergency Department (207)373-3635  
General (207) 729-0181

FIGURE 9-2

MAP TO THE EMERGENCY FACILITY (MID COAST HOSPITAL) Emergency Room (207)373-3635



1. Exit the site, turn left (east) towards Gurnet Road (RT.24)
2. Turn left on Gurnet, proceed north until Bath Road, Turn Right.
3. Proceed on Bath Road, hospital is on the right.

As in all cases drive the route as part of mobilization and confirm the route. Any changes due to site specific conditions should be provided to the PHSO for incorporation into the NASB file.

**Estimated Time:** 4-5 minutes

**Estimated Distance:** 2.08 miles

## **9.11 INJURY/ILLNESS REPORTING**

If any Tetra Tech NUS personnel are injured or develop an illness as a result of working on site, the Tetra Tech NUS "Incident Report Form" (Attachment II) must be followed. Following this procedure is necessary for documenting all of the information obtained at the time of the incident.

Any pertinent information regarding allergies to medications or other special conditions will be provided to medical services personnel. This information is listed on Medical Data Sheets (Attachment II) filed onsite. If an exposure to hazardous materials has occurred, provide information on the chemical, physical, and toxicological properties of the subject chemical(s) to medical service personnel.

### FIGURE 9-3 POTENTIAL EXPOSURE PROTOCOL

The purpose of this protocol is to provide guidance for the medical management of injury situations.

In the event of a personnel injury or accident:

- Rescue, when necessary, employing proper equipment and methods.
- Give attention to emergency health problems -- breathing, cardiac function, bleeding, and shock.
- Transfer the victim to the medical facility designated in this HASP by suitable and appropriate conveyance (i.e. ambulance for serious events)
- Obtain as much exposure history as possible
- If the injured person is a Tetra Tech NUS employee, call the medical facility and advise them that the patient(s) is/are being sent and that they can anticipate a call from the WorkCare physician. WorkCare will contact the medical facility and request specific testing which may be appropriate. WorkCare physicians will monitor the care of the victim. Site officers and personnel should not attempt to get this information, as this activity leads to confusion and misunderstanding.
- Call WorkCare at 1-800-455-6155 and enter Extension 109, or follow the voice prompt for after hours and weekend notification and be prepared to provide:
  - Any known information about the nature of the injury.
  - As much of the exposure history as was feasible to determine in the time allowed.
  - Name and phone number of the medical facility to which the victim(s) has/have been taken.
  - Name(s) of the involved Tetra Tech NUS, Inc. employee(s).
  - Name and phone number of an informed site officer who will be responsible for further investigations.
  - Fax appropriate information to WorkCare at (714) 456-2154.
- Contact Corporate Health and Safety Department (Matt Soltis) and Corporate Human Resources Manager Marilyn Duffy at (412) 921-7090.
- As data is gathered and the scenario becomes more clearly defined, this information should be forwarded to WorkCare.

WorkCare will compile the results of all data and provide a summary report of the incident. A copy of this report will be placed in each victim's medical file in addition to being distributed to appropriately designated company officials.

Each involved worker will receive a letter describing the incident but deleting any personal or individual comments. A personalized letter describing the individual findings/results will accompany this generalized summary. A copy of the personal letter will be filed in the continuing medical file maintained by WorkCare.

**FIGURE 9-3 (continued)**  
**WORKCARE**  
**POTENTIAL EXPOSURE PROTOCOL**

Name: \_\_\_\_\_ Date of Exposure: \_\_\_\_\_  
Social Security No.: \_\_\_\_\_ Age: \_\_\_\_\_ Sex: \_\_\_\_\_  
Client Contact: \_\_\_\_\_ Phone No.: \_\_\_\_\_  
Company Name: \_\_\_\_\_

**I. Exposing Agent**

Name of Product or Chemicals (if known): \_\_\_\_\_

Characteristics (if the name is not known)

Solid      Liquid      Gas      Fume      Mist      Vapor

**II. Dose Determinants**

What was individual doing? \_\_\_\_\_  
How long did individual work in area before signs/symptoms developed? \_\_\_\_\_  
Was protective gear being used? If yes, what was the PPE? \_\_\_\_\_  
Was their skin contact? \_\_\_\_\_  
Was the exposing agent inhaled? \_\_\_\_\_  
Were other persons exposed? If yes, did they experience symptoms? \_\_\_\_\_

**III. Signs and Symptoms** (check off appropriate symptoms)

**Immediately With Exposure:**

Burning of eyes, nose, or throat	Chest Tightness / Pressure
Tearing	Nausea / Vomiting
Headache	Dizziness
Cough	Weakness
Shortness of Breath	

**Delayed Symptoms:**

Weakness	Loss of Appetite
Nausea / Vomiting	Abdominal Pain
Shortness of Breath	Headache
Cough	Numbness / Tingling

**IV. Present Status of Symptoms** (check off appropriate symptoms)

Burning of eyes, nose, or throat	Nausea / Vomiting
Tearing	Dizziness
Headache	Weakness
Cough	Loss of Appetite
Shortness of Breath	Abdominal Pain
Chest Tightness / Pressure	Numbness / Tingling
Cyanosis	

Have symptoms: (please check off appropriate response and give duration of symptoms)  
Improved: \_\_\_\_\_ Worsened: \_\_\_\_\_ Remained Unchanged: \_\_\_\_\_

**V. Treatment of Symptoms** (check off appropriate response)

None: \_\_\_\_\_ Self-Medicating: \_\_\_\_\_ Physician Treated: \_\_\_\_\_

**ATTACHMENT I**  
**GENERAL FIRST AID GUIDELINES**

## EMERGENCY FIRST AID

There are several instances associated with this scope of work where significant injuries and fatalities could occur. These include

- Chainsaw operation
- Drilling

### **Before Giving Care**

Insure the scene is safe to enter to provide care.

Body Substance Isolation (BSI) - Employ PPE including surgeons gloves, safety glasses, and if necessary surgeons mask.

### **Emergency Medical**

#### **Cardiopulmonary Resuscitation (CPR)**

- Step 1: Determine if the surrounding scene is safe.
- Step 2: Tell someone nearby to call 9-1-1.
- Step 3: Determine if the injured person is breathing or responsive. Speak to them ask if they can hear you (Listen, watch for the chest to rise).

#### **If they are not Breathing and a Pulse is not detectable**

- Step 4: Position the injured person on his or her back, being extremely careful not to move or twist in the event of a head, neck or spine injury. If several rescuers are present, use their assistance to minimize this danger using the logroll technique.
- Step 5: Check to see if the airway is unobstructed. Use the head tilt/chin lift method to establish and maintain an open airway while you pinch the injured person's nose shut.
- Step 6: Give two long, slow breaths (1 second in duration), being sure to maintain a seal between your mouth and his or hers. The FOL shall insure the first aid kit is equipped with a MicroShield CPR Mask to permit CPR without contacting the injured persons bodily fluid.
- Step 7: Position the hands: Place your hands approximately - find the lower tip of the breastbone. Measure two finger widths towards the head, and place the heel of one hand in this location (Approximately between the nipples). Place your other hand on top of the first hand, interlacing your fingers of both hands.
- Step 8: Lean forward so that your shoulders are over your hands. Push downward on the chest (1 to 1 1/2 inches), using the weight of your upper body for strength. Compress 30 times in 20 seconds.
- Step 9: Give two more slow breaths after the 30 compressions.

Step 10: Repeat cycle 5 times over two minutes, check for breathing and pulse.

Step 11: Continue this 5-set cycle until pulse and breathing are regained or emergency services arrive.

### **Tips & Warnings:**

Use surgeon's gloves and a breathing mask to prevent or transmission of body fluids during CPR.

If breaths do not go in, re-tilt the head and try again. If breaths still do not go in, the airway may be obstructed.

If you suspect a spinal injury do not tilt the chin to open the airway. Instead, with one hand on each side of the head and facing the injured person's toes, put your index and third fingers in front of the earlobes and push the jaw forward and up.

If this method doesn't open the airway, revert to the chin-tilt method: the injured person's most drastic need is for oxygen.

If the person has a severe injury to the mouth, then give breaths through the nose while keeping the injured person's mouth sealed shut.

**Bleeding** - If someone's bleeding, you must stop the bleeding and cover and bandage the wound, where possible:

### **Protect Yourself Against Bloodborne Pathogens**

The concept of Universal Precautions and Body Substance Isolation must be practiced. ***(All bodily substances are infectious)***

1. If possible, wash your hands with soap and then wear rubber gloves.
2. Wear a surgical mask and safety glasses to protect yourself against contacting the injured persons bodily fluids as well as to protect them from you.
3. Prepare a clean place to administer first aid.
4. Keep hands and first aid materials as clean as possible.

These precautions will reduce the chance of infection. If there is a large amount of blood loss, and/or it is a serious wound, get emergency medical help.

Apply direct pressure by placing gauze pads or multiple dressings over the wound and applying pressure.

If the dressing becomes saturated, do not remove it; apply additional dressings.

If it is an extremity (Arm, hand, leg elevate above the heart)

If bleeding stops secure the dressing, seek medical attention.

When applying pressure dressings to extremities, check the pulse of the extremity to insure adequate circulation is still occurring. Capillary response may also be used to insure adequate circulation still exists.

**Tip:** The dressing shouldn't be too tight because you don't want to cut circulation. Check the closest distal pulse (heart – injury – pulse point) to insure circulation is still occurring.

If bleeding does not stop, pressure may need to be applied on a pressure point between the wound and the heart. Locate the pulse, press against the bone and press. Transport NOW!

**Hands:** There is a pressure point on the inner side of wrist.

**Arms:** There is a pressure point located inside each upper arm, between the elbow and the shoulder. What you will be doing is pressing the artery (brachial) against the bone.

**Legs:** Another pressure point is located in the groin area, where each leg meets the torso. The idea is to press the artery against the bone until the bleeding stops. When you release pressure, release it very slowly and observe the dressing. If it fills with blood, repeat.

**Surface Bruises** - Signs/Symptoms include: discoloration caused by bleeding in the tissue near the skin's surface, swelling and pain. Apply ice packs or cold moist towels. Internal bleeding: Signs/Symptoms are large bruises; severe, intense pain; pale cold, clammy skin; dilated pupils; weak, rapid irregular pulse rate; swelling and distension. Treatment: Keep the person comfortable, warm and treat for shock if necessary - Transport.

**Broken Bones** - The signs & symptoms of fractures, sprains, and strains are: swelling, deformity, discoloration, pain, or possibly (but not always) inability to use affected part. If you cannot tell if the person has a fracture, sprain, or strain, treat it as a fracture.

#### Two types of fractures: Open and Closed.

With an Open fracture the bone has broken through the skin, and bleeding is present. Do not clean the wound or attempt to push the bone ends back into the skin. Apply splint wrap in the shape it is in.

Treatment for Open and Closed Fractures: Don't move the person. Keep them warm and still, treat for shock if necessary. Immobilize the injured area by using a splint (makeshift if available).

To splint a fracture:

1. Place the splint above and below the fracture.
2. Tie the splint to the fracture, leaving a knot tied on the splint. If the fracture is an arm, place it in a sling. If there is a deformity in the fracture, pad the splint to fit the deformity.

**Shock** - Signs & Symptoms compensated and uncompensated shock can be pale skin color, breathing difficulty, clammy skin, higher pulse rate, or mental confusion. Restlessness and anxiety may be the first signs and symptoms you observe. No food or drink is to be given. Anaphylactic shock may also include trouble or difficult breathing, hives and/or rashes.

Treatment for shock is to maintain body temperature and calm the victim. Place a blanket over the person, monitor airway, breathing, signs of circulation, and check for bleeding. You may raise the legs 8 to 12 inches to help the body's blood flow if you don't suspect a head, neck, back, or leg injury.

**Reminder:**

Report all incidents to the PHSO. If there is suspected contact with the injured persons bodily fluids notify the PHSO so Bloodborne Pathogen program elements may be instituted.

# **ATTACHMENT II**

## **INCIDENT REPORT FORM**



Report Date	Report Prepared By	Incident Report Number
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**INSTRUCTIONS:**

**All incidents (including those involving subcontractors under direct supervision of Tetra Tech personnel) must be documented on the IR Form.**

**Complete any additional parts to this form as indicated below for the type of incident selected.**

TYPE OF INCIDENT (Check all that apply)	Additional Form(s) Required for this type of incident
Near Miss (No losses, but could have resulted in injury, illness, or damage)	<input type="checkbox"/> Complete IR Form Only
Injury or Illness	<input type="checkbox"/> Complete Form IR-A; Injury or Illness
Property or Equipment Damage, Fire, Spill or Release	<input type="checkbox"/> Complete Form IR-B; Damage, Fire, Spill or Release
Motor Vehicle	<input type="checkbox"/> Complete Form IR-C; Motor Vehicle

**INFORMATION ABOUT THE INCIDENT**

**Description of Incident**

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**Date of Incident** \_\_\_\_\_ **Time of Incident** \_\_\_\_\_ AM  PM  OR Cannot be determined

**Weather conditions at the time of the incident** \_\_\_\_\_ **Was there adequate lighting?** Yes  No

**Location of Incident** \_\_\_\_\_ **Was location of incident within the employer's work environment?** Yes  No

**Street Address** \_\_\_\_\_ **City, State, Zip Code and Country** \_\_\_\_\_

**Project Name** \_\_\_\_\_ **Client:** \_\_\_\_\_

**Tt Supervisor or Project Manager** \_\_\_\_\_ **Was supervisor on the scene?** Yes  No

**WITNESS INFORMATION (attach additional sheets if necessary)**

**Name** \_\_\_\_\_ **Company** \_\_\_\_\_

**Street Address** \_\_\_\_\_ **City, State and Zip Code** \_\_\_\_\_

**Telephone Number(s)** \_\_\_\_\_

**CORRECTIVE ACTIONS**

**Corrective action(s) immediately taken by unit reporting the incident:**

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**Corrective action(s) still to be taken (by whom and when):**

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**ROOT CAUSE ANALYSIS LEVEL REQUIRED**

Root Cause Analysis Level Required: Level - 1  Level - 2  None

**Root Cause Analysis Level Definitions**

<b>Level - 1</b>	<p><b>Definition:</b> A Level 1 RCA is conducted by an individual(s) with experience or training in root cause analysis techniques and will conduct or direct documentation reviews, site investigation, witness and affected employee interviews, and identify corrective actions. Activating a Level 1 RCA and identifying RCA team members will be at the discretion of the Corporate Administration office.</p> <p>The following events may trigger a Level 1 RCA:</p> <ul style="list-style-type: none"> <li>▪ Work related fatality</li> <li>▪ Hospitalization of one or more employee where injuries result in total or partial permanent disability</li> <li>▪ Property damage in excess of \$75,000</li> <li>▪ When requested by senior management</li> </ul>
<b>Level - 2</b>	<p><b>Definition:</b> A Level 2 RCA is self performed within the operating unit by supervisory personnel with assistance of the operating unit HSR. Level 2 RCA will utilize the 5 Why RCA methodology and document the findings on the tools provided.</p> <p>The following events will require a Level 2 RCA:</p> <ul style="list-style-type: none"> <li>▪ OSHA recordable lost time incident</li> <li>▪ Near miss incident that could have triggered a Level 1 RCA</li> <li>▪ When requested by senior management</li> </ul>

**Complete the Root Cause Analysis Worksheet and Corrective Action form. Identify a corrective action(s) for each root cause identified within each area of inquiry.**

**NOTIFICATIONS**

Title	Printed Name	Signature	Telephone Number	Date
Project Manager or Supervisor				
Site Safety Coordinator or Office H&S Representative				
Operating Unit H&S Representative				
Other: _____				

The signatures provided above indicate that appropriate personnel have been notified of the incident.

**INSTRUCTIONS:**

Complete all sections below for incidents involving injury or illness.  
Do NOT leave any blanks.  
Attach this form to the IR FORM completed for this incident.

Incident Report Number: (From the IR Form) \_\_\_\_\_

**EMPLOYEE INFORMATION**

**Company Affiliation**

Tetra Tech Employee?  TetraTech subcontractor employee (directly supervised by Tt personnel)?

**Full Name**

**Company (if not Tt employee)**

**Street Address, City, State and Zip Code**

**Address Type**

\_\_\_\_\_

Home address (for Tt employees)

\_\_\_\_\_

Business address (for subcontractors)

**Telephone Numbers**

Work: \_\_\_\_\_

Home: \_\_\_\_\_

Cell: \_\_\_\_\_

**Occupation (regular job title)**

**Department**

**Was the individual performing regular job duties?**

**Time individual began work**

Yes  No

\_\_\_\_\_ AM  PM  OR Cannot be determined

**Safety equipment**

Provided? Yes  No

Type(s) provided:  Hard hat  Protective clothing

Used? Yes  No  If no, explain why

Gloves  High visibility vest

Eye protection  Fall protection

Safety shoes  Machine guarding

Respirator  Other (list)

**NOTIFICATIONS**

**Name of Tt employee to whom the injury or illness was first reported**

**Was H&S notified within one hour of injury or illness?**

Yes  No

**Date of report**

**H&S Personnel Notified**

**Time of report**

**Time of Report**

**If subcontractor injury, did subcontractor's firm perform their own incident investigation?**

Yes  No  If yes, request a copy of their completed investigation form/report and attach it to this report.

### INJURY / ILLNESS DETAILS

**What was the individual doing just before the incident occurred?** Describe the activity as well as the tools, equipment, or material the individual was using. Be specific. Examples: "Climbing a ladder while carrying roofing materials"; "Spraying chlorine from a hand sprayer"; "Daily computer key-entry"

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**What Happened?** Describe how the injury occurred. Examples: "When ladder slipped on wet floor and worker fell 20 feet"; "Worker was sprayed with chlorine when gasket broke during replacement"; "Worker developed soreness in wrist over time"

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**Describe the object or substance that directly harmed the individual:** Examples: "Concrete floor"; "Chlorine"; "Radial Arm Saw". If this question does not apply to the incident, write "Not Applicable".

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### MEDICAL CARE PROVIDED

Was first aid provided at the site: Yes  No  If yes, describe the type of first aid administered and by whom?

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Was treatment provided away from the site: Yes  No  If yes, provide the information below.

Name of physician or health care professional	Facility Name
Street Address, City State and Zip Code	Type of Care?
	Was individual treated in emergency room? Yes <input type="checkbox"/> No <input type="checkbox"/>
	Was individual hospitalized overnight as an in-patient? Yes <input type="checkbox"/> No <input type="checkbox"/>
Telephone Number	Did the individual die? Yes <input type="checkbox"/> No <input type="checkbox"/> If yes, date: _____
	Will a worker's compensation claim be filed? Yes <input type="checkbox"/> No <input type="checkbox"/>

**NOTE:** Attach any police reports or related diagrams to this report.

### SIGNATURES

I have reviewed this report and agree that all the supplied information is accurate

Affected individual (print)	Affected individual (signature)	Telephone Number	Date

This form contains information relating to employee health and must be used in a manner that protects the confidentiality of the employee to the extent possible while the information is being used for occupational safety and health purposes.

**INSTRUCTIONS:**

Complete all sections below for incidents involving property/equipment damage, fire, spill or release.

Do NOT leave any blanks.

Attach this form to the IR FORM completed for this incident.

Incident Report Number: (From the IR Form) \_\_\_\_\_

**TYPE OF INCIDENT (Check all that apply)**

Property Damage

Equipment Damage

Fire or Explosion

Spill or Release

**INCIDENT DETAILS**

Results of Incident: Fully describe damages, losses, etc.

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

Response Actions Taken:

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

Responding Agency(s) (i.e. police, fire department, etc.)

Agency(s) Contact Name(s)

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

**DAMAGED ITEMS (List all damaged items, extent of damage and estimated repair cost)**

Item:	Extent of damage:	Estimated repair cost

**SPILLS / RELEASES (Provide information for spilled/released materials)**

Substance	Estimated quantity and duration	Specify Reportable Quantity (RQ)
		_____ Exceeded? Yes <input type="checkbox"/> No <input type="checkbox"/> NA <input type="checkbox"/>

**FIRES / EXPLOSIONS (Provide information related to fires/explosions)**

Fire fighting equipment used? Yes  No  If yes, type of equipment: \_\_\_\_\_

**NOTIFICATIONS**

Required notifications	Name of person notified	By whom	Date / Time
Client: _____ Yes <input type="checkbox"/> No <input type="checkbox"/>			
Agency: _____ Yes <input type="checkbox"/> No <input type="checkbox"/>			
Other: _____ Yes <input type="checkbox"/> No <input type="checkbox"/>			

Who is responsible for reporting incident to outside agency(s)? To  Client  Other  Name: \_\_\_\_\_

Was an additional written report on this incident generated? Yes  No  If yes, place in project file.

**INSTRUCTIONS:**

Complete all sections below for incidents involving motor vehicle accidents. Do NOT leave any blanks.  
Attach this form to the IR FORM completed for this incident.

Incident Report Number: (From the IR Form)

**INCIDENT DETAILS**

Name of road, street, highway or location where accident occurred      Name of intersecting road, street or highway if applicable

County	City	State

Did police respond to the accident?      Did ambulance respond to the accident?  
Yes  No       Yes  No

Name and location of responding police department      Ambulance company name and location

Officer's name/badge #

Did police complete an incident report? Yes  No  If yes, police report number: \_\_\_\_\_  
Request a copy of completed investigation report and attach to this form.

**VEHICLE INFORMATION**

How many vehicles were involved in the accident? \_\_\_\_\_ (Attach additional sheets as applicable for accidents involving more than 2 vehicles.)

Vehicle Number 1 – Tetra Tech Vehicle		Vehicle Number 2 – Other Vehicle	
Vehicle Owner / Contact Information		Vehicle Owner / Contact Information	
Color		Color	
Make		Make	
Model		Model	
Year		Year	
License Plate #		License Plate #	
Identification #		Identification #	

Describe damage to vehicle number 1      Describe damage to vehicle number 2

Insurance Company Name and Address      Insurance Company Name and Address

Agent Name		Agent Name	
Agent Phone No.		Agent Phone No.	
Policy Number		Policy Number	

### DRIVER INFORMATION

Vehicle Number 1 – Tetra Tech Vehicle		Vehicle Number 2 – Other Vehicle	
Driver's Name		Driver's Name	
Driver's Address		Driver's Address	
Phone Number		Phone Number	
Date of Birth		Date of Birth	
Driver's License #		Driver's License #	
Licensing State		Licensing State	
Gender	Male <input type="checkbox"/> Female <input type="checkbox"/>	Gender	Male <input type="checkbox"/> Female <input type="checkbox"/>
Was traffic citation issued to Tetra Tech driver? Yes <input type="checkbox"/> No <input type="checkbox"/>		Was traffic citation issued to driver of other vehicle? Yes <input type="checkbox"/> No <input type="checkbox"/>	
Citation #		Citation #	
Citation Description		Citation Description	

### PASSENGERS IN VEHICLES (NON-INJURED)

List all non-injured passengers (excluding driver) in each vehicle.  
 Driver information is captured in the preceding section.  
 Information related to persons injured in the accident (non-Tt employees) is captured in the section below on this form.  
 Injured Tt employee information is captured on FORM IR-A

Vehicle Number 1 – Tetra Tech Vehicle		Vehicle Number 2 – Other Vehicle	
How many passengers (excluding driver) in the vehicle? ____		How many passengers (excluding driver) in the vehicle? ____	
Non-Injured Passenger Name and Address		Non-Injured Passenger Name and Address	
Non-Injured Passenger Name and Address		Non-Injured Passenger Name and Address	
Non-Injured Passenger Name and Address		Non-Injured Passenger Name and Address	

### INJURIES TO NON-TETRATECH EMPLOYEES

Name of injured person 1				Address of injured person 1		
Age	Gender	Car No.	Location in Car	Seat Belt Used?	Ejected from car?	Injury or Fatality?
	Male <input type="checkbox"/> Female <input type="checkbox"/>			Yes <input type="checkbox"/> No <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>	Injured <input type="checkbox"/> Died <input type="checkbox"/>
Name of injured person 2				Address of injured person 2		
Age	Gender	Car No.	Location in Car	Seat Belt Used?	Ejected from car?	Injury or Fatality?
	Male <input type="checkbox"/> Female <input type="checkbox"/>			Yes <input type="checkbox"/> No <input type="checkbox"/>	Yes <input type="checkbox"/> No <input type="checkbox"/>	Injured <input type="checkbox"/> Died <input type="checkbox"/>

### OTHER PROPERTY DAMAGE

Describe damage to property other than motor vehicles	
Property Owner's Name	Property Owner's Address

**COMPLETE AND SUBMIT DIAGRAM DEPICTING WHAT HAPPENED**

