

Safe Work Plan

Lower Passaic River Restoration Project Harrison Reach of the Passaic River

Prepared for:

New Jersey Department of Transportation
Office of Maritime Resources
Contract No.
2001-NJMR02

Prepared by:

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June 2005

Project No: 72013

**Safe Work Plan
For Lower Passaic River Restoration Project
Harrison Reach of the Passaic River**

This Safe Work Plan (SWP) was prepared for employees performing a specific, limited scope of work. It was prepared based on the best available information regarding the physical and chemical hazards known or suspected to be present on the project site. While it is not possible to discover, evaluate, and protect in advance against all possible hazards, which may be encountered during the completion of this project, adherence to the requirements of this SWP will significantly reduce the potential for occupational injury.

By signing below, I acknowledge that I have reviewed and hereby approve the Safe Work Procedure for the Lower Passaic River Restoration Project Harrison Reach of the Passaic River. This procedure has been written for the exclusive use of Earth Tech, its employees, and its subcontractors.

Prepared by:



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6/17/05
Date

Approved by:



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1. INTRODUCTION

This Safe Work Plan (SWP) addresses the requirements for Earth Tech and subcontractor personnel to oversee dredging operations and perform sediment resuspension monitoring during dredging activities in the Harrison Reach of the Lower Passaic River.

The requirements of this SWP apply to Earth Tech-managed operations only. No change to this SWP that could affect the health or safety of personnel, the community, or the environment may be made without prior approval of the Earth Tech Project Manager (PM).

1.1 REGULATORY REQUIREMENTS

This SWP meets the requirements and follows the guidelines established by the Federal Occupational Safety and Health Administration (OSHA):

- Code of Federal Regulation Title 29, Part 1910 (29 CFR Part 1910), *Occupational Safety and Health Standards*
- Code of Federal Regulation Title 29, Part 1926 (29 CFR Part 1926), *Safety and Health Regulations for Construction*
- HASP Core Document (Malcolm Pirnie, Inc., 2005a)

The requirements specified in this SWP also conform to Earth Tech's Corporate EH&S Program requirements as specified in the US Operations SH&E Manual. Individual procedures from this manual, which are applicable to the work activities of this project, may be found in Attachment B.

2. SITE DESCRIPTION AND PLANNED WORK OPERATIONS

2.1 GENERAL DESCRIPTION

The Lower Passaic River Restoration Project site is located at Harrison Reach of Passaic River (see Figure 1 at the end of this section). This document is a task-specific Safe Work Plan for dredging oversight and performing sediment resuspension monitoring activities of the Lower Passaic River Restoration Project (LPRRP). This task-specific Safe Work Plan will be used in conjunction with the HASP Core Document (Malcolm Pirnie, Inc., 2005a), which provides discussion of general health and safety issues regarding field activities for the remedial investigation. This task-specific Safe Work Plan only addresses health and safety issues that are not covered in the HASP Core Document (Malcolm Pirnie, Inc., 2005a).

2.2 PLANNED WORK OPERATIONS

Scope of Work

Earth Tech will conduct environmental services at the site. Work will be performed in accordance with the applicable Statement of Work (SOW) and associated Work Plans developed for Lower Passaic River Restoration Project.

Environmental services being performed at the site include, but are not limited to:

- Dredging operations oversight: The scope of this portion of the study is to observe dredging equipment, workers, and associated vessels used in dredging the upper three feet of sediment in a 1.5 acre area. Field personnel will observe work crews and equipment from boats and/or the land, and will maintain communication with other personnel (e.g., Malcolm Pirnie personnel, subcontractors, dredging personnel) using two-way radios, cellular telephones, and/ or hand signals.
- Sediment resuspension monitoring: The scope of this portion of the study is to use water quality instruments attached to fixed moorings and in sampling boats to monitor resuspension of sediments and associated contamination as a result of dredging activities.

NOTES:

1. BATHYMETRIC DATA SHOWN IS BASED ON SURVEY PERFORMED BY ARJA SURVEY, INC. MARCH 2004. ADDITIONAL INFORMATION ON THIS SURVEY IS AVAILABLE ON THE APPENDICES TO TECHNICAL SPECIFICATIONS CD.
2. AERIAL PHOTOGRAPHY SHOWN IS NEW JERSEY 2002 HIGH RESOLUTION ORTHOPHOTOGRAPHY PUBLISHED BY THE STATE OF NEW JERSEY OFFICE OF INFORMATION TECHNOLOGY, OFFICE OF GEOGRAPHIC INFORMATION SYSTEMS.
3. OWNER HAS PERFORMED A PRELIMINARY SCREENING OF PLUMES AND HAS NOT IDENTIFIED ANY CONTAMINANTS IN THE ENVIRONMENT. AS SUCH, NO CONTAMINANTS WILL BE IDENTIFIED. ALL UTILITIES THAT COULD BE AFFECTED BY THE WORK.
4. ALL DRAWINGS ARE BASED ON THE FOLLOWING DATUMS:
VERTICAL - US ARMY CORPS OF ENGINEERS MLLW
HORIZONTAL - NAD83
5. OTHER DATA AVAILABLE FOR CONTRACTORS:
- GEOTECHNICAL DATA FROM PREVIOUS INVESTIGATIONS, BUT IS NOT LIMITED TO DEERS SURVEY INFORMATION. ENVIRONMENTAL SAMPLING DATA, AND GEOTECHNICAL DATA. THIS INFORMATION IS PRESENTED FOR CONTRACTOR'S INFORMATION ONLY. CONTRACTOR MAY COLLECT ADDITIONAL INFORMATION AS NECESSARY TO EXECUTE WORK.



10'

0'

200'

SCALE: 1" = 200'

REVISIONS

REMARKS

DESIGNED BY: JBM/SET

DRAWN BY: JLF

CHECKED BY: MJB/LJS/RAE

MALCOLM
PIRKIE

TAMS

NEW JERSEY DEPARTMENT OF TRANSPORTATION
OFFICE OF MARITIME RESOURCES
LOWER PASSAIC RIVER DREDGING PILOT STUDY
CONSTRUCTION CONTRACT NO. XXXXXXXX

FIGURE 1
SITE PLAN

DATE: JUNE 2005

SHEET 1 OF 3

CAD REF. NO. 3473003

3. HAZARD ANALYSIS

During operations at the Site, personnel may be exposed to a number of occupational and environmental hazards. In general, the following hazards can be expected:

- **Hazardous Noise:** Produced during dredging operations, material handling and container handling/staging activities that may be ongoing around the work site.
- **Working on or Near Water Surfaces:** Working on and near Passaic River during dredging operations.
- **Vehicle Equipment traffic:** Associated with the operation of boats in the Lower Passaic River.
- **Heat Stress Environments:** Associated with site-specific work activities in the Harrison Reach of the Lower Passaic River.
- **Slips, trips, falls, and protruding objects:** The possibility of falling on slippery surfaces.

3.1 TASK HAZARD ANALYSES

Task hazard analyses (THA) can be found in Attachment A for each planned work task. Each THA specifies the major performance steps involved in the activity, and identifies the related hazards and applicable safety procedures.

3.2 HAZARDS OF SUSPECTED ENVIRONMENTAL CONTAMINANTS

However, to meet hazard communication requirements the following information is provided regarding the hazards of the known contaminants. Should other contaminants be encountered appropriate supplemental information will be provided.

3.2.1 Volatile Organic Compounds (VOCs)

Volatile Organic Compounds are organic chemicals that have a high vapor pressure and easily form vapors at normal temperature and pressure. Many VOCs are human-made chemicals that are used and produced in the manufacture of paints, pharmaceuticals, and refrigerants. The primary VOCs that will pose an exposure concern at this site are benzene, ethylbenzene, toluene, and xylene.

3.2.1.1

Benzene. Benzene is a colorless liquid with a sweet odor. It evaporates into the air very quickly and dissolves slightly in water. It is highly flammable and is formed from both natural processes and human activities. Breathing benzene can cause drowsiness, dizziness, and unconsciousness. Contact with skin may cause irritation with redness and blistering. The OSHA PEL is 1.0 ppm in the workplace during an 8-hour workday, 40-hour workweek.

3.2.1.2

Ethylbenzene. Ethylbenzene is a colorless, flammable liquid that smells like gasoline. It is found in natural products such as coal tar and petroleum. Breathing very high levels can cause dizziness and throat and eye irritation. Points of attack are the eyes, upper respiratory system, skin and central nervous system. The OSHA PEL is 100 ppm in the workplace during an 8-hour workday, 40-hour workweek.

3.2.1.3

Toluene. Toluene is a clear, colorless, noncorrosive liquid with a sweet, pungent, benzene-like odor. Toluene may affect the nervous system, low to moderate levels may cause tiredness, confusion, weakness, memory loss, nausea, loss of appetite, and hearing and color vision loss. Inhaling high levels of toluene in a short time can make you feel light-headed, dizzy, or sleepy. The OSHA PEL is 50 ppm in the workplace during an 8-hour workday, 40-hour workweek.

3.2.1.4

Xylene. Xylene is a colorless, sweet-smelling liquid that catches on fire easily. Xylene affects the brain that can cause headaches, lack of muscle coordination, dizziness, and change in one's sense of balance. Exposure to high levels of xylene in short periods can also cause irritation of the skin, eyes, nose, and throat; difficulty in breathing, delayed reaction time, and stomach discomfort. The OSHA PEL is 100 ppm in the workplace during an 8-hour workday, 40-hour workweek.

3.2.2 Semi Volatile Organic Compounds (SVOCs)

Semi Volatile Organic Compounds are composed primarily of carbon and hydrogen atoms that have boiling points greater than 200°C. Common SVOCs include PAHs (Polynuclear aromatic hydrocarbons).

3.2.2.1 POLYNUCLEAR AROMATIC HYDROCARBONS (PAHs)

Polynuclear aromatic hydrocarbons (PAHs) are produced during combustion events due to inadequate oxidation of fuel. PAHs in the pure state are yellowish crystalline solids. They are found in coal tar and in products of incomplete combustion. These chemicals have varying degrees of potency for causing cancer, with benzo(a)pyrene being among the most potent. PAHs are evaluated collectively as coal tar pitch volatiles. Coal tar pitch volatiles may cause photosensitization and a rash where sunlight strikes the skin. Exposure may also cause cancer of lungs, skin, bladder, or kidneys. Benzo(b)fluoranthene, benzo(j)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, chrysene, and indeno(1,2,3,c,d)pyrene have been identified as carcinogenic.

This information on PAH compounds is presented for site contaminant awareness. While the potential for site personnel sustaining significant inhalation exposures to volatilize PAH compounds during this project's site activities is minimal, there is the potential for inhalation of PAH-contaminated dust, and handling of contaminated soil presents skin exposure hazards. Use of dust-suppression techniques (as appropriate) and the proper use of air-purifying respirators equipped with P100 cartridges and chemically-protective gloves will adequately protect personnel.

3.2.3 Total Petroleum Hydrocarbons (as Diesel)

Like gasoline, diesel fuel is a complex mixture of hydrocarbons. It is manufactured through refining of middle-distillate crude oil components, and thus is somewhat less volatile than gasoline (which comes from light stocks). Exposure to diesel fuels can produce intoxication and other central nervous system (CNS) depression effects in cases of acute exposure, and can lead to defatting of skin and contact dermatitis in case of contact exposure. Like gasoline, diesel fuel contains some small quantities of volatile hydrocarbon additives, including BTEX members. There are no established exposure standards from either OSHA or ACGIH for diesel fuel; however, action levels should be developed that reflect the potential presence of BTEX (particularly benzene) when diesel fuels are present. Control of inhalation exposure to diesel fuel (and its various constituents) can be accomplished by using air-purifying respirators equipped with organic vapor cartridges. The use of

skin protection (e.g., chemically protective gloves) is required when handling potential or confirmed diesel-contaminated materials.

3.2.4 Polychlorinated Biphenyls (PCBs)

Polychlorinated Biphenyls are mixtures of up to 209 individual chlorinated compounds (known as congeners). There are no known natural sources of PCBs. PCBs are either oily liquids or solids that are colorless to light yellow, and some PCBs can exist as a vapor in air. PCBs have no known smell or taste. PCBs have been used as coolants and lubricants in transformers, capacitors, and other electrical equipment, because they don't burn easily and are good insulators.

The most commonly observed health effects in people exposed to large amounts of PCBs are skin conditions such as acne and rashes. PCBs have been demonstrated to cause a variety of adverse health effects. PCBs have been shown to cause cancer in animals. PCBs have also been shown to cause a number of serious non-cancer health effects in animals, including effects on the immune system, reproductive system, nervous system, endocrine system and other health effects. Studies in humans provide supportive evidence for potential carcinogenic and non-carcinogenic effects of PCBs. The different health effects of PCBs may be interrelated, as alterations in one system may have significant implications for the other systems of the body. OSHA regulates that workers not be exposed by inhalation over a period of 8 hours for 5 days per week to more than 1 milligram per cubic meter of air (mg/m^3) for 42% chlorine PCBs, or to $0.5 \text{ mg}/\text{m}^3$ for 54% chlorine PCBs.

3.2.5 Dioxins and Furans

Dioxins and Furans are toxic chlorinated chemicals that are found in very small amounts in the environment, including the air, water, and soil. Large doses of dioxins and furans are known to cause serious health problems, including cancer, in laboratory animals. Health problems include: effects on the skin, liver, thyroid, and on reproduction and the immune system. PCDD and PCDF were present from previous investigation.

3.2.6 Pesticides/Herbicides

As with PAHs, pesticide compounds are solids at room temperature, and most are not readily absorbed through the skin without the aid of a solvent vehicle. The specific pesticides previously investigated at the Harrison Reach of the Lower Passaic River are: 4,4'-DDD, 4,4'-DDE, and 4,4'-DDT. Also, Herbicides 2,4-D and 2,4,5-T were present.

3.2.7 Heavy Metals

As a group, the heavy metals (including lead, arsenic, chromium, nickel, cadmium, and selenium) are toxic to a number of organs and organ systems in the body, including the liver, kidneys, blood-forming organs (primarily located in the bones), and the CNS (especially lead). Acute exposure to metals can produce such symptoms as stomach distress and vomiting, mental confusion and sluggishness, heart palpitations, breathing difficulties, and renal (kidney) failure. Chronic exposures can be characterized by deterioration in function of the liver and kidneys, CNS degradation, and abnormal changes in blood cell counts (especially white blood cells). Exposure to chromium may also lead to formation of lung and gastric cancers.

The primary route of exposure to heavy metals of concern during this project is contact with contaminated soil and water, which can lead to entry through open wounds or contamination and ingestion of food. Preventing this route of exposure necessitates the use of dust control measures,

administrative controls (e.g., no consumption of food/beverages in the work area or smoking/chewing tobacco), chemically-protective gloves, and decontamination procedures.

4. HEALTH AND SAFETY REQUIREMENTS

The following requirements will be observed during performance of this project.

4.1 QUALIFICATIONS OF PERSONNEL

Although this project is not classified as a HAZWOPER activity, it is desired that personnel be qualified as HAZWOPER workers, in order to provide a minimum level of safety competency. Accordingly, all personnel will:

1. Obtain a physician's signed medical clearance through participation in a medical monitoring program meeting the requirements of 29 CFR 1910.120 (f).
2. Complete 40 hours of hazardous waste operations training in accordance with the requirements of 29 CFR 1910.120 (e)(2).

4.2 GENERAL SAFETY REQUIREMENTS

The following Earth Tech Environmental Practice Standards are generally applicable to all work operations to be conducted on site, and must be followed by all personnel present on site:

SH&E 124-Heat Stress Prevention Program

SH&E 113- Personal Protective Equipment

SH&E 201- General Safety Rules

SH&E 203-Accident Prevention Program

SH&E 210- Walking-Working Surfaces Protection

SH&E 309-Marine Operations/Working On or Near Water

Copies of these procedures may be found in Attachment B.

In addition to these procedures, the following supplemental requirements will also be observed at all times while on the site:

4.2.1 Tobacco Use, Eating, and Drinking

Tobacco use, eating and drinking will not be permitted within any controlled work area. Field workers will first wash hands and face immediately after leaving controlled work areas (and always prior to eating, drinking, or tobacco use). Consumption of alcoholic beverages is prohibited at any Earth Tech site.

4.2.2 Housekeeping

During site activities work areas will be continuously policed for identification of excess trash and unnecessary debris. Excess debris and trash will be collected and stored in an appropriate container (e.g., plastic trash bags, garbage can, roll-off bin) prior to disposal. At no time will debris or trash be intermingled with waste PPE or contaminated materials. Anyone observed throwing contaminated material or PPE away with municipal wastes will be removed from the site.

4.2.3 Personal Hygiene

The following requirements will be observed:

Water Supply: A water supply meeting the following requirements will be utilized:

- **Potable Water** - An adequate supply of potable water will be available for field personnel consumption and use in cleaning activities. Potable water used for drinking can be provided in the form of water bottles, canteens, water coolers, or drinking fountains. Where drinking fountains are not available, individual use cups will be provided as well as adequate disposal containers. Potable water containers will be properly identified in order to distinguish them from non-potable water sources
- **Non-Potable Water** - Non-potable water cannot be used for drinking or washing purposes, but may be used for non-hygiene-related activities. All containers of non-potable water will be marked with a label stating:

**Non-Potable Water
Not Intended for Drinking Water Consumption**

Washing Facilities: Employees will be provided washing facilities (e.g., buckets with water and Alconox) at the R/V Robert E. Hayes. Personnel will be required to clean hands and face using water and hand soap (or similar substance) when exiting from the work area, prior to breaks, and at the end of daily work activities.

4.2.4 On-Site Training

In accordance with the requirements of Earth Tech US Operations SH&E Manual SOP 202, *Safety Meetings* (see Attachment B), the following safety training will be conducted as part of field operations:

Initial Orientation Training – As operations are initiated on site personnel will be trained about potential hazards at the work site, and the requirements specified in this SWP for hazard prevention.

Tailgate Safety Briefings – The SSO will conduct a tailgate safety briefing at the start of each work day.

Hazard Communication Training – The requirements for on-site management of hazardous materials is specified in Earth Tech US Operations SH&E Manual SOP 115, *Hazard Communication* (see Attachment B). All personnel shall be briefed on the hazards of any chemical product they use, and shall be aware of and have access to all material safety data sheets (MSDSs).

All site-specific training should be documented on the *Tailgate Safety Briefing Sign-in Log*, a copy that is found in SH&E SOP 202.

4.2.5 Buddy System

All field personnel shall use the buddy system when working within any controlled work area. Personnel belonging to another organization onsite can serve as “buddies” for Earth Tech personnel. Under no circumstances shall an Earth Tech employee be present alone in a controlled work area.

4.2.6 Injury Reporting

Requirements for reporting and documentations of injuries and accidents can be found in Earth Tech Environmental SH&E SOP 203, *Accident Prevention Program*.

4.3 TASK-SPECIFIC SAFETY REQUIREMENTS

The following Earth Tech Environmental Practice Standards are applicable to specific work tasks, as specified in the Task Hazard Analyses in Attachment A, and must be followed at all times while performing the specific tasks:

SH&E SOP 506 – *Manual Hand Tools*

A copy of this procedure may be found in Attachment B.

In addition to these procedures, the following supplemental requirements will also be observed when performing individual work tasks, as specified in the THAs:

4.3.1 Slips, Trips, Falls, and Protruding Objects

Hazards from protruding objects, careless movements, or placement of materials on paths or foot traffic areas present a problem with regard to slips, trips, and falls. Injuries typically resulting from such activities may involve cuts, scrapes, bruises, and/or puncture wounds. Personnel will use a reasonable amount of effort to ensure the prevention of such injuries.

4.4 EXPOSURE MONITORING

Because of the insignificant exposure hazards associated with these operations, air monitoring will not be required during this work.

4.5 PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS

General requirements for the use of personal protective equipment by Earth Tech and subcontractor personnel may be found in Earth Tech Environmental SH&E SOP 113, *Personal Protective Equipment*. This procedure may be found in Attachment B.

In addition, specific personal protective equipment requirements are specified on a task-specific basis in the individual THAs found in Attachment A.

4.6 SITE CONTROL

The site control measures are stated in the HASP Core Document (Malcolm Pirnie, Inc., 2005a).

4.7 DECONTAMINATION PROCEDURES

After completing sediment resuspension monitoring during dredging activities, before breaks or at the end of the shift, personnel will:

1. Decontaminate the sampling equipment using the established quality assurance procedures. Personnel will wear chemically-protective gloves while performing equipment decontamination.

2. Remove their protective gloves and place into a designated waste container for disposal.
3. Use commercially available wet wipes to thoroughly clean face and hands. Disposable wipes will be placed in a designated waste container.

4.8 EMERGENCY RESPONSE

The field personnel will be equipped with a cellular telephone. In the event of emergency (vehicle accident, injury, etc.) personnel should immediately phone **911**. The operator should be informed of the incident location and circumstances so that emergency help can be dispatched. The nearest hospital address and phone number is:

**St. Michael's Medical Center
268 Dr. Martin Luther King Jr. Blvd
Newark, NJ
(973) 268-8000**

Hospital directions: Take McCarter Highway, go left 0.2 miles to Chestnut Street. Make a Right on Board Street. Then make a Left on Orange Street. Take Orange Street for 0.2 miles to Dr. Martin Luther King Jr. Blvd. Take Dr. Martin Luther King Jr. Blvd for 0.2 miles to hospital.

Acknowledgement

By signing below, the undersigned acknowledges that he/she has read and reviewed the Earth Tech Safe Work Plan for the Lower Passaic River Restoration Project site. The undersigned also acknowledges that he/she has been instructed in the contents of this document and understands the information pertaining to the specified work, and will comply with the provisions contained therein.

[illegible]

Attachment A
Task Hazard Analyses

Evaluated by: Ryan Brown

Date: June 2005

TASK NAME

SITE SET-UP

TASK DESCRIPTION

Scope of work include: Dredging productivity oversight and sediment resuspension monitoring during dredging activities. Refer to Section 2 Site Information and Scope of Work.

CHEMICAL EXPOSURE HAZARDS

- VOCs
- SVOCs
- Polynuclear Aromatic Hydrocarbons
- Total Petroleum Hydrocarbons
- PCBs
- Heavy Metals

PPE

Level D (see Table 6-2 for upgrade/downgrade criteria)

- Personal floatation device.
- ANSI approved hardhat.
- ANSI approved steel toe safety shoes/boots.
- Protective chemical gloves, coveralls (tyvek[®]), and rubber boots/booties when potential exists for contact with impacted materials.

OTHER SAFETY EQUIPMENT

- First Aid Kit.
- Leather gloves while handling sharp edges or operating powered tools/machinery.
- Ear plugs/muffs if necessary.

PHYSICAL HAZARDS

- Working on or near water
- Manual lifting
- Slip, trip, and falls
- Heat/cold stress
- Severe weather/sunburn
- Biological
- Noise
- Push/pull
- Vehicle traffic (boats)

APPLICABLE OPERATIONAL SAFETY PROCEDURES

- SH&E 201, General Safety Rules
- SH&E 404, Manual Lifting
- SH&E 506, Manual Hand Tools
- SH&E 604, Decontamination

ADDITIONAL SAFETY CONSIDERATIONS

1. Evaluate surrounding work area for additional hazards that may be present.
2. All loads in excess of 49 pounds require use of mechanical aids or assistance from other personnel.
3. Clear utilities (underground and overhead) in the immediate work area or travel route prior to positioning.

MONITORING PROCEDURES

Refer to Malcolm Pirnie CORE Document Section 8.

Evaluated by: Ryan Brown

Date: June 2005

TASK NAME

SEDIMENT RESUSPENSION MONITORING

TASK DESCRIPTION

The objective of the collection of water column sampling activities during the pilot scale dredging study is to evaluate resuspension of sediments and associated contaminants related to dredging activities. The load of total suspended solids (TSS) will be estimated by monitoring TSS concentrations in the near-field dredge area and comparing it to TSS concentrations upriver of the dredging activity. TSS concentrations will be monitored by LISST probes and turbidity meters stationed on moorings and sampling boats. Water column data collected from the pilot scale dredging study will be used in determining the following: resuspension release rate, resuspension export rate, mass balance for the dredging pilot study area, and turbidity levels of the water within and in the vicinity of the dredging pilot study area.

CHEMICAL EXPOSURE HAZARDS

- VOCs
- SVOCs
- Polynuclear Aromatic Hydrocarbons
- Total Petroleum Hydrocarbons
- PCBs
- Heavy Metals

PPE

Level D (see Table 6-2 for upgrade/downgrade criteria)

- Personal floatation device.
- ANSI approved hardhat.
- ANSI approved steel toe safety shoes/boots.
- Protective chemical gloves, coveralls (tyvek[®]), and rubber boots/booties when potential exists for contact with impacted materials.

OTHER SAFETY EQUIPMENT

- First Aid Kit.
- Leather gloves while handling sharp edges or operating powered tools/machinery.
- Ear plugs/muffs if necessary.

PHYSICAL HAZARDS

- Working on or near water
- Manual lifting
- Slip, trip, and falls
- Heat/cold stress
- Severe weather/sunburn
- Biological
- Noise
- Push/pull
- Vehicle traffic (boats)

APPLICABLE OPERATIONAL SAFETY PROCEDURES

- SH&E 201, General Safety Rules
- SH&E 404, Manual Lifting
- SH&E 506, Manual Hand Tools
- SH&E 604, Decontamination

ADDITIONAL SAFETY CONSIDERATIONS

1. Evaluate surrounding work area for additional hazards that may be present.
2. All loads in excess of 49 pounds require use of mechanical aids or assistance from other personnel.
3. Clear utilities (underground and overhead) in the immediate work area or travel route prior to positioning.

MONITORING PROCEDURES

Refer to Malcolm Pirnie CORE Document Section 8.

Attachment B

Earth Tech Environmental Practice Procedures

ENV 204
HEARING CONSERVATION PROGRAM

Published: January 20, 2003

Revised: N/A

Page: 1 of 2

SUMMARY: Personnel with the potential to be exposed to workplace noise in excess of 85 decibels on the “A-weighted” scale will be enrolled in Earth Tech’s Hearing Conservation Program.

1.0 HEARING CONSERVATION POLICY

All Earth Tech employees whose work activities may exposure them to sound pressure levels at or above 85 A-weighted decibels (85 dBA) will be included the Hearing Conservation Program (HCP) described in this procedure, and will be required to wear hearing protectors in areas where this threshold is exceeded.

2.0 AUDIOMETRIC HEARING TESTS

Audiometric hearing examinations will be included as an element of the employee medical monitoring program for all field workers (see ENV 203), as well as for other categories of workers who’s noise exposure meet the criteria stated above. Audiogram protocols will be determined by Earth Tech’s Corporate Medical Provider (CMP), and will include the following types of examinations:

Baseline Audiogram: An initial (baseline) audiogram performed as part of the initial (pre-employment) medical examination, or as soon as the employee is identified as requiring enrollment in the HCP.

Annual Audiogram: An annual audiogram will be administered for each employee enrolled in the HCP as part of the annual medical examination. Results of annual tests will be compared with the baseline exam by the CMP, who will determine if results indicate the need for more detailed testing.

Termination Audiogram: All employees enrolled in the HCP will be provided an audiogram as part of the termination medical monitoring examination.

3.0 ON-SITE MONITORING OF NOISE LEVELS

Monitoring of on-site noise levels may be conducted at Earth Tech project sites to establish sound pressure levels associated with individual work activities or site activities; this need will be determined by the EH&S Department. Results of this monitoring will be used to determine requirements for engineering controls and use of hearing protection during Earth Tech work activities.

All results of nose monitoring activities will be provided to the EH&S Department for inclusion in employee medical records.

4.0 HEARING PROTECTORS

Project-specific requirements for the use of hearing protection is specified in the project EH&S documentation. The use of hearing protection is mandatory for all employees exposed to sound pressure levels of 85 dBA or greater.

All employees issued hearing protection will be trained in the proper use, care, and maintenance of the protectors. All hearing protection will carry a minimum noise reduction rating (NRR) of at least 26 dBA, and must be approved by the EH&S Department prior to use in the field.

All requirements pertaining to the issuance and use of hearing protection will apply to any subcontractor or visitor personnel working in Earth Tech-controlled areas where the use of hearing protection has been specified.

5.0 TRAINING PROGRAM

All employees exposed to noise at or above a sound pressure level of 85 dBA will participate in an annual training program. The training program will focus on:

ENV 204
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- The effects of noise;
- The purpose of hearing protectors, their advantages and disadvantages, and use and care; and
- The purpose and procedure of audiometric testing.

This training will be provided as part of the employee's annual EH&S training requirements.

6.0 RETENTION OF RECORDS

- Employee noise exposure measurement records will be retained for a minimum of three years after exposure.
- Employee audiometric test records will be retained as part of medical monitoring records (to be maintained on file for the duration of employment plus 40 years).
- Annual employee training session documentation will be retained for the duration of employment.

REFERENCES: ENV 203 – *Medical Monitoring Program*

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PERSONAL PROTECTIVE EQUIPMENT

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SUMMARY: Requirements for use of protective clothing and equipment will be specified by the EH&S Department on a task-by-task basis. The performance characteristics of the protective equipment will meet the following requirements.

1.0 PROTECTIVE EQUIPMENT PERFORMANCE SPECIFICATIONS

Requirements for use of protective equipment are specified by the EH&S Department, on a task-by-task basis, in the project EH&S documentation. All protective equipment used by Earth Tech personnel must meet or exceed the following performance requirements.

1.1 HEAD PROTECTION

Hard hats will meet the requirements of the latest version of ANSI Z89.1 or CSA Z94.1.

1.2 EYE PROTECTION

Eye protection (safety glasses) will meet the requirements of the latest version of ANSI Z87.1 or CSA Z94.3. Sideshields are only required where specified by the client or in the project EH&S documentation, however ALL safety glasses will meet the following minimum requirements:

1. Provide adequate protection against the particular hazards for which they are designed.
2. Be reasonably comfortable when worn under the designated conditions.
3. Fit snugly and not unduly interfere with the wearer's movements.
4. Be easily cleaned and sanitized.

Contact lenses do not provide eye protection; contact lens wearers must use the same additional eye protection as non-lens wearers.

1.3 FACE PROTECTION

Face protection (face shields) will be used when there is a significant splash hazard, or where there is an increased hazard from impact (e.g., use of a bench grinder). Face shields used on site must meet the requirements in the latest version of ANSI Z87.1 or CSA Z94.3.

1.4 HEARING PROTECTION

Hearing protectors can be either ear plugs or ear muffs, but must provide a minimum noise reduction rating (NRR) of 26.

1.5 FOOT PROTECTION

All footwear used on site must provide ankle support (minimum height of 6 inches) with leather uppers, and must provide a safety-toe meeting the specifications in the latest version of ANSI Z41PT91 (M/I 75, C75).

1.6 HAND PROTECTION

Hand protection serves two purposes:

- Control of physical hazards
- Control of skin contact with hazardous materials

1.6.1 Control of Physical Hazards

Where workers are exposed to physical hazards the use of standard leather or cloth work gloves will be employed. These gloves do not need to conform to any ANSI or other standard, however selected gloves should:

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1. Be of sturdy construction
2. Be intended to protect against the particular hazard(s) associated with the job (e.g., insulated gloves for hot work)
3. Properly fit the worker's hands

1.6.2 Control of Skin Contact With Hazardous Materials

Gloves intended to provide chemical protection must be rated by the manufacturer as effective against the substance(s) expected to be encountered. Specific selection will be made on a task-by-task basis and approved by the EH&S Department.

1.7 FALL PROTECTION

Fall protection equipment includes full-body harness, body belts, safety lines and attachment devices used to prevent or arrest falls by employees working unprotected by a rail or net system at heights greater than 6 feet above ground. Fall protection devices will also be used by workers operating from manlifts (at heights greater than 6 feet) if any portion of their body other than hand/arms extends beyond the rail system, or when one or more sides of the lift is unprotected. Earth Tech will implement 100% fall protection in all work areas.

Fall protection equipment must meet the following requirements:

- All fall arrest systems must utilize a full-body harness (body belts are prohibited for fall arrest).
- The attachment point of the body harness shall be located in the center of the wearer's back near shoulder level, or above the wearer's head.
- All lanyards and lifelines must have a minimum breaking strength of 5,000 pounds (attachment points for these lines must also meet this requirement).
- Fall arrest systems must limit the free-fall to 4 feet or less, and subject the worker to no more than 1800 pounds of arrest force.
- Personal fall arrest systems and components subjected to impact loading shall be immediately removed from service and shall not be used again for employee protection until inspected and determined to be undamaged and suitable for reuse.

Fall protection equipment will be used for employee safety only, not for hauling or lifting equipment.

1.8 SPECIALIZED SAFETY EQUIPMENT

Specialized safety equipment includes items such as welding shields or extraction/rescue equipment for use in confined space entry operations. Performance specifications for this equipment are provided in task-specific EH&S documentation for the work operations.

2.0 MINIMUM PROTECTIVE EQUIPMENT REQUIREMENTS

Unless otherwise specified in task-specific guidance in the project EH&S documentation, the following protective equipment/clothing will represent the minimum acceptable for use at any Earth Tech field site:

- Hardhat
- Shirt with sleeves and long pants (shorts are unacceptable for use)
- Safety glasses
- Safety-toed boots

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3.0 PROTECTIVE EQUIPMENT PROCUREMENT AND CARE

3.1 STORAGE AND MAINTENANCE

3.1.1 Personal Items

The following PPE items will be obtained by the individual users, with costs reimbursed based on the condition and safe operating use of PPE. The employee's supervisor will approve new purchases of required PPE by the employee.

- Safety-toed boots (leather)¹
- Safety Glasses²

Employees are expected to maintain this equipment in a clean, ready-to-use condition, and to perform periodic inspections to ensure that equipment is undamaged and fully functional. Any equipment which becomes unserviceable shall be replaced by the employee, subject to reimbursement in accordance with Earth Tech's PPE Allowance criteria.

3.1.2 Individually-Issued Items

The following PPE items will be issued individually to each worker, or will be obtained by each worker at Earth Tech expense for their personal use:

- Hard hat
- Safety-toed boots (rubber)
- Air purifying respirators
- Ear Muffs/ear plugs
- Cold weather gear

Employees are expected to maintain this equipment in a clean, ready-to-use condition, and to perform periodic inspections to ensure that equipment is undamaged and fully functional. Any problems should be identified to the site safety officer immediately so that replacements can be arranged.

3.1.3 Central Issue Items

Except for personal issue items, all other PPE will be stored on site and issued to workers as required for use. This includes:

- Work coveralls
- Chemically-protective outer coveralls
- Leather and chemically-protective gloves
- Face shields
- Fall protection equipment

¹ Earth Tech has established a boot purchase program with RED WING Shoes that provides for a 15% price discount and company-direct billing up to a total cost of \$100. Information about this program can be found on the EH&S website at <http://corp.earthtech.com/healthsafety/hsforms.htm>.

² Earth Tech has established a prescription safety eyewear program with Wal-Mart that provides for a price discount and company-direct billing up of approved eyewear frames and lenses. Information about this program can be found on the EH&S website at <http://corp.earthtech.com/healthsafety/hsforms.htm>.

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- Specialized safety equipment

All central issue equipment will be maintained in a clean, dry condition.

3.2 INSPECTION

Prior to use of any safety equipment (individual issue or centrally stored) personnel should inspect each piece to ensure that it is in good working order. Equipment exhibiting any signs of wear or damage will be immediately placed out of service and repaired/replaced.

REFERENCES: None

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SUMMARY: All manually operated hand tools and equipment shall be used, handled, and stored in accordance with the following requirements.

1.0 GENERAL REQUIREMENTS

1. Select the right tool for the job. Substitutes increase the chance of having an accident.
2. Use tools designed to allow the wrist to stay straight. Avoid using hand tools with your wrist bent.
3. Ensure that employees are properly trained in the safe use of hand tools.
4. Use good quality tools.
5. Keep tools in good condition at all times.
6. Inspect tools for defects before use. Replace or repair defective tools.
7. Keep cutting tools sharp and cover sharp edges with suitable covering to protect the tool and to prevent injuries from unintended contact.
8. Replace cracked, splintered, or broken handles on files, hammers, screwdrivers, or sledges.
9. Ensure that the handles of tools like hammers and axes fit tightly into the head of the tool.
10. Replace worn jaws on wrenches, pipe tools and pliers.
11. Redress burred or mushroomed heads of striking tools.
12. Pull on a wrench or pliers. Never push unless you hold the tool with your palm open.
13. Point sharp tools (e.g., saws, chisels, knives) laying on benches away from aisles and handles should not extend over the edge of the bench top.
14. Maintain tools carefully. Keep them clean and dry, and store them properly after each use.
15. Carry tools in a sturdy tool box to and from the worksite.
16. Wear safety glasses or goggles and well-fitting gloves appropriate for the hazards to which you may be exposed when doing various tasks.
17. Keep the work environment clean and tidy to avoid clutter which may cause accidents.
18. Use a heavy belt or apron and hang tools at your sides, not behind your back.
19. Do not use tools for jobs they are not intended to do. For example, do not use a slot screwdriver as a chisel, pry bar, wedge or punch, or a wrench as a hammer.
20. Do not apply excessive force or pressure on tools.
21. Do not cut toward yourself when using cutting tools.
22. Do not hold the stock in the palm of your hand when using a cutting tool or a screwdriver.
23. Do not wear bulky gloves to operate hand tools.
24. Do not throw tools. Hand them, handle first, directly to other workers.
25. Do not carry tools in a way that interferes with using both hands on a ladder, while climbing on a structure, or when doing any hazardous work. If working on a ladder or scaffold, tools should be raised and lowered using a bucket and hand line.
26. Do not carry a sharp tool in your pocket.

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2.0 TOOL-SPECIFIC REQUIREMENTS

2.1 CUTTING TOOLS

1. Wear safety glasses and protective gloves when using cutters.
2. Choose the proper cutter for the job. Cutters are designed for a specific type, hardness, and size of material.
3. Cut materials straight across - keep the material being cut at right angles to the cutting edges of jaws.
4. Prevent injury from flying metal by wrapping a burlap bag, cloth or rag around the cutting jaws. Metal can fly when cut. The harder the metal, the farther it will fly.
5. Warn those in the area to take precautionary measures to avoid possible injury from flying metal pieces.
6. Keep cutting tools in good repair.
7. Adjust and lubricate cutter and moving parts daily if heavily used.
8. Sharpen jaws according to manufacturers' instructions.
9. Do not use a cutting tool until you are trained in its proper and safe use.
10. Do not use cushion grip handles for jobs requiring electrically-insulated handles. Cushion grips are for comfort primarily and do not protect against electric shock.
11. Do not use cutters which are cracked, broken or loose.
12. Do not exceed the recommended capacity of a tool.
13. Do not cut diagonally.
14. Do not rock cutters from side to side when cutting wire.
15. Do not pry or twist with tool when cutting.
16. Do not hammer on cutting tools or extend the handle length to achieve greater cutting power.
17. Do not expose cutters to excessive heat.

2.2 HAMMERS

1. Hammers are designed according to the intended purpose. Select a hammer that is comfortable for you and that is the proper size and weight for the job. Misuse can cause the striking face to chip, possibly causing a serious injury.
2. Choose a hammer with a striking face diameter approximately ½ inch larger than the face of the tool being struck (e.g., chisels, punches, wedges, etc.).
3. Ensure that the head of the hammer is firmly attached to the handle.
4. Replace loose, cracked or splintered handles.
5. Discard any hammer with mushroomed or chipped face or with cracks in the claw or eye sections.
6. Strike a hammer blow squarely with the striking face parallel to the surface being struck. Always avoid glancing blows and over and under strikes. (Hammers with bevelled faces are less likely to chip or spall).
7. Look behind and above you before swinging the hammer.
8. Watch the object you are hitting.
9. Hold the hammer with your wrist straight and your hand firmly wrapped around the handle.

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10. Do not use a hammer with a loose or damaged handle.
11. Do not use handles that are rough, cracked, broken, splintered, sharp-edged or loosely attached to the head.
12. Do not use any hammer head with dents, cracks, chips, mushrooming, or excessive wear.
13. Do not use a hammer for any purpose for which it was not designed or intended.
14. Do not use one hammer to strike another hammer, other hard metal objects, stones or concrete.
15. Do not redress, grind, weld or reheat-treat a hammer head.
16. Do not strike with the side or cheek of the hammer.

2.3 SAWS

1. Saws are made in various shapes and sizes and for many uses. Use the correct saw for the job.
2. Wear safety glasses.
3. Select a saw of proper shape and size for stock being used.
4. Choose a saw handle that keeps your wrist in a natural position in the horizontal plane.
5. Choose a saw with a handle opening of at least 5 inches long and 2.5 inches wide and slanted at a 15° angle.
6. Check the stock being cut for nails, knots, and other objects that may damage or buckle the saw.
7. Start the cut by placing your hand beside the cut mark with your thumb upright and pressing against blade. Start the cut carefully and slowly to prevent blade from jumping. Pull upward until blade bites. Start with a partial cut, then set the saw at the proper angle.
8. Apply pressure on downstroke only.
9. Hold stock being cut firmly in place.
10. Use a helper, a supporting bench or vise to support long stock if required.
11. Keep teeth and blades properly set.
12. Protect teeth of saw when not in use.
13. Keep saw blades clean.
14. Hacksaws:
 - Select correct blade for material being cut.
 - Secure blade with the teeth pointing forward.
 - Keep blade rigid, and frame properly aligned.
 - Cut using strong, steady strokes, directed away from yourself.
 - Use entire length of blade in each cutting stroke.
 - Use light machine oil on the blade to keep it from overheating and breaking.
 - Cut harder materials more slowly than soft materials.
 - Clamp thin, flat pieces requiring edge cutting.

2.4 PIPE TOOLS (WRENCHES, CUTTERS, REAMERS, AND THREADERS)

1. Pipe tools are made in various shapes and sizes and for many uses. Always use the correct tool for the job.

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2. Select a pipe wrench with sufficient capacity and leverage to do the job.
3. Use a pipe wrench to turn or hold a pipe. Never use a pipe wrench to bend, raise or lift a pipe.
4. Adjust the pipe wrench grip to maintain a gap between the back of the hook jaw and the pipe. This concentrates the pressure at the jaw teeth, producing the maximum gripping force. It also aids the ratcheting action.
5. Inspect pipe wrenches periodically for worn or unsafe parts and replace them (e.g., check for worn threads on the adjustment ring and movable jaw).
6. Keep pipe wrench teeth clean and sharp.
7. Face a pipe wrench forward. Turn wrench so pressure is against heel jaw.
8. Pull, rather than push on the pipe wrench handle. Maintain a proper stance with feet firmly placed to hold your balance.
9. Do not use a pipe wrench as a hammer, or strike a pipe wrench with a hammer.
10. Do not use pipe wrenches on nuts and bolts.
11. Do not use a pipe extender for extra leverage. Get a larger pipe wrench.
12. Replace pipe cutter wheels which are nicked or otherwise damaged.
13. Use a 3- or 4-wheeled cutter, if there is not enough space to swing the single wheel pipe cutter completely around the pipe.
14. Choose a cutting wheel suitable for cutting the type of pipe material required:
 - Thin wheel for cutting ordinary steel pipe.
 - Stout wheel for cutting cast iron.
 - Other wheels for cutting stainless steel, plastic and other materials.
15. Select the proper hole diameter and correct tap size to tap a hole. The hole should be sized so that the thread cut by the tap will be about 75% as deep as the thread on the tap.
16. Use a proper tap wrench (with a "T" handle) for turning a tap.
17. Use lubricant or machine cutting fluid with metals other than cast iron.
18. Do not permit chips to clog flutes (grooves in the tap that allow metal chips to escape from the hole). The chips may prevent the tap from turning - this may result in the tap breaking if you continue to apply pressure.
19. Do not use a conventional adjustable wrench for turning a tap - it will cause uneven pressure on the tap that may cause it to break.
20. Do not attempt to thread hardened steel. This can chip or damage the die.
21. Do not thread any rod or other cylindrical object that is larger in diameter than the major diameter of the die thread.
22. Do not use a spiral reamer on a rotating pipe. The reamer may snag and cause serious injury.

2.5 PLIERS AND WIRE CUTTERS

1. Pliers are made in various shapes and sizes and for many uses. Use the correct pliers or wire cutters for the job.
2. Choose pliers or wire cutters that have a grip span of 2½ - 3½ inches to prevent your palm or fingers from being pinched when the tools are closed.

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3. Use adjustable pliers that allow you to grip the workpiece firmly while maintaining a comfortable handgrip (i.e., hand grasp is not too wide).
4. Use tools only if they are in good condition.
5. Make sure that the cutting edges are sharp. Dull and worn-down cutting edges require many times more force for cutting.
6. Make sure that the toothed jaws are clean and sharp. Greasy or worn-down jaws can result in compromised safety. Such tools also require increased force to hold the workpiece which, in turn, increases the risk of muscular fatigue and repetitive strain injuries.
7. Oil pliers and wire cutters regularly. A drop of oil on the hinge will make the tools easier to use.
8. Pull on the pliers; do not push away from you when applying pressure. If the tool slips unexpectedly, you may lose your balance or injure your hand.
9. Cut at right angles. Never rock the cutting tool from side to side or bend wire back and forth against the cutting edges.
10. Do not cut hardened wire unless the pliers or wire cutters are specifically manufactured for this purpose.
11. Do not expose pliers or wire cutters to excessive heat.
12. Do not bend stiff wire with light pliers. Needle-nose pliers can be damaged by using the tips to bend large wire. Use a sturdier tool.
13. Do not use pliers as a hammer.
14. Do not hammer on pliers or wire cutters to cut wires or bolts.
15. Do not extend the length of handles to gain greater leverage. Use a larger pair of pliers for gripping or a bolt cutter for cutting.
16. Do not use cushion grip handles for jobs requiring tools with electrically insulated handles. Cushion grips are for comfort primarily and do not protect against electric shock.
17. Do not use pliers on nuts and bolts; use a wrench.

2.6 SCREWDRIVERS

1. Screwdrivers are made in various shapes and sizes and for many uses. Use the correct screwdriver for the job.
2. Choose contoured handles that fit the shank tightly, with a flange to keep the hand from slipping off the tool.
3. Use a slot screwdriver with a blade tip width that is the same as the width of the slotted screw head.
4. For cross-head screws, use the correct size and type of screwdriver: a Phillips screwdriver may slip out of a screw head designed for use with the slightly flatter-tipped Pozi-driv screwdriver.
5. Use a vise or clamp to hold the stock if the piece is small or moves easily.
6. Keep the screwdriver handle clean. A greasy handle could cause an injury or damage from unexpected slippage.
7. If work must be carried out on "live" electrical equipment, use screwdrivers that have insulated handles designed for electrical work and a non-conducting shaft. Remember, most plastic handles are designed for grip and comfort.
8. Use non-magnetic tools when working near strong magnets (e.g., in some laboratories).

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9. Use a screw-holding screwdriver (with screw-holding clips or magnetic blades) to get screws started in awkward, hard-to-reach areas. Square-tipped screwdrivers (e.g., Robertson) that hold screws with recessed square holes are also useful in such situations.
10. Use an offset screwdriver in close quarters where a conventional screwdriver cannot be used.
11. Use a screwdriver that incorporates the following features when continuous work is needed:
 - A pistol grip to provide for a straighter wrist and better leverage.
 - A "Yankee drill" mechanism (spiral ratchet screwdriver or push screwdriver) which rotates the blade when the tool is pushed forward.
 - A ratchet device to drive hard-to-move screws efficiently, or use a powered screwdriver.
12. File a rounded tip square making sure the edges are straight. A dull or rounded tip can slip out of the slot and cause hand injury or damage to materials.
13. Store screwdrivers in a rack or partitioned pouch so that the proper screwdriver can be selected quickly.
14. Do not lean or push on a screwdriver with any more force than necessary to keep contact with the screw. A screw properly piloted and fitted will draw itself into the right position when turned. Keep the shank directly over the screw being driven.
15. Do not hold the stock in one hand while using the screwdriver with the other. If the screwdriver slips out of the slot you may cut your hand.
16. Do not hammer screws that cannot be turned.
17. Do not grind the tip to fit another size screw head.
18. Do not try to use screwdrivers on screw heads for which they are not designed (e.g., straight blade screwdrivers on Phillips, clutch head, Torx or multi-fluted spline screw heads).
19. Do not use defective screwdrivers (e.g., ones with rounded or damaged edges or tips; split or broken handles; or bent shafts).
20. Do not use a screwdriver for prying, punching, chiseling, scoring, scraping or stirring paint.
21. Do not use pliers on the handle of a screwdriver for extra turning power. A wrench should be used only on the square screwdriver shank designed for that purpose.
22. Do not expose a screwdriver blade to excessive heat. Heat can affect the temper of the metal and weaken the tool.
23. Do not use a screwdriver to check if an electrical circuit is live. Use a suitable meter or other circuit testing device.
24. Do not carry screwdrivers in your pockets.

2.7 SNIPS

1. Wear safety glasses and protective gloves when working with snips. Small pieces of metal may go flying in the air and cut edges of metal are sharp.
2. Snips are made in various shapes and sizes for various tasks. The handle can be like those on scissors with finger and thumb holes or like plier handles. Models are available for cutting in straight lines and in curves to the left or right.
3. Universal snips can cut in both straight and wide curves.
4. Straight snips and duckbill snips (flat blade, "perpendicular" to the handle, with pointed tips) are generally designed to cut in straight lines; some duckbill snips are designed for cutting curved lines.

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5. Hawk's bill snips (with crescent-shaped jaws) are used for cutting tight circles.
6. Aviation snips have compound leverage that reduces the effort required for cutting.
7. Offset snips have jaws that are set at an angle from the handle.
8. Select the right size and type of snips for the job; check the manufacturer's specifications about the intended use of the snips (e.g., type of cut - straight, wide curve, tight curve, right or left, and maximum thickness and kind of metal or other material that can be cut).
9. Use only snips that are sharp and in good condition.
10. Use snips for cutting soft metal only. Hard or hardened metal should be cut with tools designed for that purpose.
11. Use ordinary hand pressure for cutting. If extra force is needed, use a larger tool.
12. Cut so that the waste is on the right if you are right-handed or on the left if you are left-handed.
13. Avoid springing the blades. This results from trying to cut metal that is too thick or heavy for the snips you are using.
14. Keep the nut and the pivot bolt properly adjusted at all times.
15. Oil the pivot bolt on the snips occasionally.
16. Do not try to cut sharp curves with straight cut snips.
17. Do not cut sheet metal thicker than the manufacturer's recommended upper limit (e.g., cuts up to 16-gauge cold, rolled steel or 18-gauge stainless steel). Do not extend the length of handles to gain greater leverage.
18. Do not hammer or use your foot to exert extra pressure on the cutting edges.
19. Do not use cushion grip handles for tasks requiring insulated handles. They are for comfort primarily and not for protection against electric shocks.
20. Do not attempt to sharpen snips in a sharpening device designed for scissors, garden tools, or cutlery.

2.8 WOOD CHISELS

1. Wear safety glasses.
2. Wood chisels are made in various shapes and sizes and for many uses. Use the correct chisel for the job.
3. Use the right size of chisel for the job.
4. Choose smooth, rectangular handles that have no sharp edges and are attached firmly to the chisel.
5. Ensure that the cutting edge is sharp. Dull chisels can be difficult to control and require more effort to do the job.
6. Check stock thoroughly for knots, staples, nails, screws, or other foreign objects before chiseling.
7. Clamp stock so it cannot move.
8. Adjust your stance so that you do not lose your balance if the tool slips.
9. Chip or cut away from yourself.
10. Keep your hands and body behind the cutting edge.
11. Use a wooden or plastic mallet with a large striking face on all chisels. Only heavy-duty or framing chisels are made of a solid or molded handle that can be struck with a steel hammer.

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12. Make finishing or paring cuts with hand pressure alone.
13. Place chisels safely within the plastic protective caps to cover cutting edges when not in use.
14. Replace any chisel that is bent or shows dents, cracks, chips, or excessive wear.
15. Store chisels in a "storage roll," a cloth or plastic bag with slots for each chisel, and keep them in a drawer or tray.
16. Replace broken or splintered handles.
17. Sharpen cutting edges as often as necessary.
18. Do not use a wood chisel as a pry or a wedge.
19. Do not use a wood chisel on metal.
20. Do not use an all-steel chisel with a mushroomed face or a chipped edge. Redress with a file or whetstone.
21. Do not use a grinder to redress heat-treated tools. Use a whetstone.
22. Do not use a dull chisel.

2.9 WRENCHES

1. Use the correct wrench for the job - pipe wrenches for pipes and plumbing fittings, and general-use wrenches for nuts and bolts.
2. Discard any damaged wrenches (e.g., open-ended wrenches with spread jaws or box wrenches with broken or damaged points).
3. Select the correct jaw size to avoid slippage.
4. Position your body in a way that will prevent you from losing balance and hurting yourself if the wrench slips or something (e.g., a bolt) suddenly breaks.
5. Use a box or socket wrench with a straight handle, rather than an off-set handle, when possible.
6. Ensure that the jaw of an open-ended wrench is in full contact (fully seated, "flat," not tilted) with the nut or bolt before applying pressure.
7. Face an adjustable wrench "forward," adjust tightly, and turn the wrench so pressure is against the permanent or fixed jaw.
8. Ensure that the teeth of a pipe wrench are sharp and free of oil and debris and that the pipe or fitting is clean to prevent unexpected slippage and possible injuries.
9. Apply a small amount of pressure to a ratchet wrench initially to ensure that the ratchet wheel (or gear) is engaged with the pawl (a catch fitting in the gear) for the direction you are applying pressure.
10. Support the head of the ratchet wrench when socket extensions are used.
11. Pull on a wrench using a slow, steady pull; do not use fast, jerky movements.
12. Stand aside when work is done with wrenches overhead.
13. Make sure adjustable wrenches do not "slide" open during use.
14. Keep tools well maintained (cleaned and oiled).
15. Clean and place tools and wrenches in a tool box, rack or tool belt after use.
16. Do not push on a wrench - losing your balance is more likely if the wrench slips.

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17. Do not use a wrench that is bent or damaged.
18. Do not use worn adjustable wrenches. Inspect the knurl, jaw and pin for wear.
19. Do not pull on an adjustable wrench that is loosely adjusted.
20. Do not use pipe wrenches on nuts or bolts.
21. Do not use pipe wrenches for lifting or bending pipes.
22. Do not use a wrench on moving machinery.
23. Do not use the wrong tools for the job. For example, never use pliers instead of a wrench or a wrench as a hammer.
24. Do not use a makeshift wrench.
25. Do not insert a shim in a wrench for better fit.
26. Do not strike a wrench (except a "strike face" wrench) with a hammer or similar object to gain more force.
27. Do not increase the leverage by adding sleeved additions (e.g., a pipe) to increase tool handle length.
28. Do not expose a wrench to excessive heat (like from a blow torch) that could affect the temper of the metal and ruin the tool.

2.10 FILES/RASPS

1. Personnel will not use a file as a pry bar, hammer, screwdriver, or chisel.
2. When using a file or a rasp, grasp the handle in one hand and the toe of the file in the other.
3. Personnel will not hammer on a file.

2.11 CHISELS

1. Personnel will not use a chisel that has a dull cutting edge.
2. Personnel will not use chisels that have "mushroomed" striking heads.
3. Hold a chisel by using a tool holder if possible.
4. Clamp small workpieces in the vise and chip towards the stationary jaw when working with a chisel.

2.12 VISES

1. When clamping a long workpiece in a vise, support the far end of the workpiece by using an adjustable pipe stand, saw horse or box.
2. Position the workpiece in the vise so that the entire face of the jaw supports the workpiece.
3. Personnel will not use a vise that has worn or broken jaw inserts, or has cracks or fractures in the body of the vise.
4. Personnel will not slip a pipe over the handle of a vise to gain extra leverage.

2.13 CLAMPS

1. Personnel will not use the C-clamp for hoisting materials.
2. Personnel will not use the C-clamp as a permanent fastening device.

ENV 505
MANUAL HAND TOOLS**Published: January 20, 2003****Revised: N/A****Page: 10 of 10****2.14 JACKS**

1. Personnel will not exceed the jack's rated lifting capacity as noted on the label of the jack.
2. Clear all tools, equipment and any other obstructions from under the vehicle before lowering the jack.

2.15 TOOL BOXES/CHESTS/CABINETS

1. Use the handle when opening and closing a drawer or door of a tool box, chest, or cabinet.
2. Tape over or file off sharp edges on toolboxes, chests or cabinets.
3. Personnel will not stand on toolboxes, chests or cabinets to gain extra height.
4. Lock the wheels on large toolboxes, chests or cabinets to prevent them from rolling.
5. Push large chests, cabinets and toolboxes rather than pulling them.
6. Personnel will not open more than one drawer of a toolbox at a time.
7. Close and lock all drawers and doors before moving the tool chest to a new location.
8. Personnel will not move a toolbox, chest or cabinet if it has loose tools or parts on the top.

REFERENCES: None

ENV 522
WORKING SURFACES**Published: January 20, 2003****Revised: N/A****Page: 1 of 2**

SUMMARY: Employees are required to maintain a workplace free of hazards (e.g., hazards associated with tripping, falling, or overhead objects as a result of uneven walking surfaces, holes, or debris). This procedure addresses requirements for flooring, work platforms, and stairway safety.

1.0 GENERAL REQUIREMENTS

- A means of access (e.g., ladder, stairway, ramp) shall be provided for all personnel points of access where a break of elevation of 16 inches or more exists.
- Means of access shall be kept clear to allow free passage for employees.
- Unprotected sides of stairway landings shall be provided with guardrail systems.
- Floor or deck holes shall be guarded using a secure cover to prevent accidental passage of materials or tools.
- Floor openings that are 4 feet or more above adjacent floor or ground level shall be guarded either by:
 - A secure cover.
 - A guardrail and toeboards installed on all exposed sides.
 - Perimeter cable installed on all exposed sides. (Note: if the perimeter cable is not 18 inches or more away from the opening, then a mid-height cable shall also be installed.)
- Openings in decks through which personnel or materials may fall shall be guarded as follows:
 - Openings greater than or equal to 18 square feet must be protected using standard railing and toeboards. The railing shall be constructed so rail supports do not exceed 10 feet off center spacing, and rails (both top and midrail) shall be constructed of 2" by 4" lumber, or taut wire rope. Toeboards shall be a minimum of 4 inches in height.
 - Openings less than 18 square feet shall be protected as above, with the exception of tank tops or inner bottoms. Tank tops or inner bottoms shall be protected using a rail system, constructed of iron or steel, where the rail is between 30 to 31 inches in height, with a top rail only. These guards shall be constructed such that they do not require removal for entry.
- When a cover has been removed, the opening shall be protected by barricades installed a minimum of 6 feet from the opening.
- A wall opening or floor opening being used to lower equipment (a chute used for equipment/debris) shall have a barricade or barrier, or a worker assigned to prevent personnel from entering the area where the equipment is descending.
- All platforms in buildings that are 6 feet or more above an adjacent floor or ground level shall be protected with a guardrail or perimeter cable, unless it is not feasible. In such circumstances the use of fall protection is mandatory.
- Where gratings, platforms, or floor plates have been removed, standard railings shall be installed, unless it will interfere with the work.
- On open decks, where the fall from the exposed edge is 5 or more feet, standard guard rails shall be installed.
- All platforms above or adjacent to dangerous equipment, tanks of hazardous substances, or other hazards shall be guarded with perimeter rails or cables.
- When the top of an open tank or vat that contains a hazardous substance is less than 36 inches above the floor or platform, then a barrier (e.g., guard rails) shall be erected to at least 36 inches in height.

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WORKING SURFACES

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- Runways or ramps shall be guarded as follows:
 - Guarded by guardrails on both open sides if the height is 4 or more feet above the floor or ground level.
 - Guarded by guardrails on both sides, regardless of height, if above or adjacent to dangerous equipment, tanks of hazardous substances or other hazards.
- A wall opening that has a bottom that is less than 3 feet above the working surface shall be guarded by a guardrail or wall screen.
- Stairways shall be equipped with a stair railing or handrail as follows:
 - A stairway not more than 44 inches wide and enclosed on both sides, shall have a handrail on the right descending side.
 - A stairway not more than 44 inches wide and open on one side, shall have a stair railing on the open side.
 - A stairway not more than 44 inches wide, which has two open sides, shall have a stair railing on each side.
 - A stairway that is more than 44 inches wide but less than 88 inches shall have 1 handrail on each enclosed side and 1 stair rail on each open side.
 - A stairway that is 88 inches or more in width shall have 1 handrail on each enclosed side, 1 stair rail on each open side, and 1 intermediate stair rail located in the middle of the stairway.
- A guardrail (except for tank tops or inner bottoms) shall consist of a top rail, an intermediate rail, and supporting posts. The top rail shall be not less than 42 inches above the floor, ramp, platform or runway. The intermediate rail shall be halfway between the floor and the top rail. If the intermediate rail will allow for an opening of more than 24 inches, then more than one intermediate rail is required to keep openings less than 24 inches. The guardrail shall be constructed to be able to withstand a 200-pound force in any direction. Supporting posts shall not be more than 8 feet apart (on ships, not more than 10 feet apart off center).
- A toeboard shall be not less than 4 inches in height, and secured in place not more than ¼ inch above the floor, platform, or runway.
- Temporary stairways shall have a minimum width of 22 inches.
- A stairway shall have a minimum vertical clearance of 7 feet, unless the overhead object is padded and caution signs or paint is used to visibly demarcate the hazard.
- A skylight guard shall be constructed to withstand a 200-pound load applied perpendicularly to any one portion of the screen. The guard shall be of grillwork with openings not more than 4 inches long or slatwork with an opening not more than 2 inches wide.

2.0 MAINTENANCE

Floors, platform stair treads and landings shall be maintained free of broken, worn, splintered or loose pieces that would create a tripping or falling hazard. Material used to repair these components shall meet the design strength of the original components.

REFERENCES: ENV 502 - *Ladders*
ENV 503 - *Scaffolding*

<p align="center">ENV 528</p> <p align="center">HEAT STRESS AND HOT WEATHER OPERATIONS</p>	Published: January 20, 2003
	Revised: N/A
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SUMMARY: Field supervisors are responsible for protecting their workers from heat stress conditions by incorporating protective measures into the work routine. The heat stress prevention procedures below will be implemented whenever the temperature exceeds 83 degrees Fahrenheit for workers in normal work clothing, or 65 degrees Fahrenheit for workers in chemically protective clothing.

1.0 GENERAL REQUIREMENTS

Heat stress can be a significant field site hazard, especially for workers wearing chemically protective clothing (CPC). Site personnel must be instructed in the recognition of heat stress symptoms, the first-aid treatment procedures for severe heat stress, and the prevention of heat stress injuries. Workers must be encouraged to immediately report any heat stress that they may experience or observe in fellow workers. Supervisors must use such information to adjust the work-rest schedule to accommodate such problems.

Whenever possible, a designated break area should be established in an air conditioned space, or in shaded areas where air conditioning is impractical. The break area should be equipped to allow workers to loosen or remove protective clothing, and sufficient seating should be available for all personnel. During breaks, workers must be encouraged to drink plenty of water or other liquids, even if not thirsty, to replace lost fluids and to help cool off. Cool water should be available at all times in the break area, and in the work area itself unless hygiene/chemical exposure issues prevent it.

Workers who exhibit ANY signs of significant heat stress (e.g., profuse sweating, confusion and irritability, pale, clammy skin), should be relieved of all duties at once, made to rest in a cool location, and provided with large amounts of cool water. Anyone exhibiting symptoms of heat stroke (red, dry skin, or unconsciousness) must be taken immediately to the nearest medical facility, taking steps to cool the person during transportation (clothing removal, wet the skin, air conditioning, etc.). Severe heat stress (heat stroke) is a life threatening condition that must be treated by competent medical authority.

2.0 WORK-REST SCHEDULE

The prevention of heat stress is best performed through supervisor observation of employees and routine heat stress awareness training activities. However, it is also necessary to implement a work routine that incorporates adequate rest periods to allow workers to remove protective clothing, drink fluids (vital when extreme sweating is occurring), rest and recover. The frequency and length of work breaks must be determined by the work supervisor based upon the ambient temperature, amount of sunshine, the amount of physical labor being performed, the physical condition of the workers, and protective clothing being used.

2.1 ESTABLISHING THE WORK-REST SCHEDULE

Earth Tech permits the use of either of two techniques to initially determine an appropriate daily work-rest schedule. These methods are:

1. Wet Bulb Globe Thermometer (WBGT) Method – this method is preferred, if a WBGT meter is available.
2. Adjusted Temperature Method – this method should be used only if WBGT data is not available.

Either procedure will provide the work supervisor with a recommended routine, however adjustments to this routine may be required to accommodate the specific daily conditions at the work site.

2.1.1 WBGT Method

The WBGT is based on guidance prepared by the American Conference of Governmental Industrial Hygienists (ACGIH) and requires the use of a WBGT monitor to provide readings for use in Tables 1 and 2. Table 1, the WBGT Activities WBT Chart, is intended for use where personnel are not utilizing CPC. Where workers are required to utilize CPC, Table 2, the WBGT Activities WBT Chart, will be used.

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HEAT STRESS AND HOT WEATHER OPERATIONS

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WBGT readings (in degrees Fahrenheit - °F) are compared directly with the values the applicable WBGT Chart for the applicable work rate (where light work corresponds to minimal physical activity besides standing/watching, very heavy work corresponds to significant, continuous physical labor) to determine the work-rest frequency.

Table 1. Non-CPC Activities WBGT Chart

Work-Rest Frequency	°F-WBGT			
	Light Work	Moderate Work	Heavy Work	Very Heavy Work
Continuous Work	85	81	78	
75% Work – 25% Rest	86	83	81	
50% Work – 50% Rest	88	85	83	81
25% Work – 75% Rest	90	87	86	85

Modified from ACGIH's 2002 Threshold Limit Values for Chemical Substances and Physical Agents, for acclimatized workers

Table 2. CPC Activities WBGT Chart

Work-Rest Regimen	°F-WBGT			
	Light Work	Moderate Work	Heavy Work	Very Heavy Work
Continuous Work	74	70	67	
75% Work – 25% Rest	75	72	70	
50% Work – 50% Rest	77	74	72	70
25% Work – 75% Rest	79	76	75	74

Modified from ACGIH's 2002 Threshold Limit Values for Chemical Substances and Physical Agents, for acclimatized workers

2.1.2 Adjusted Temperature Method

This method can be utilized where WBGT data is not available, and requires only that the ambient temperature (in degrees Fahrenheit - °F) be known. Adjustment factors are applied to the ambient temperature to account for departures from ideal conditions (sunny conditions, light winds, moderate humidity and a fully acclimated work force). The adjustments should be made by addition or subtraction to the ambient temperature reading, or changes in table position, as indicated in Table 3. Adjustments are independent and cumulative, all applicable adjustments should be applied. The result is the *Adjusted Temperature*, which can be compared with the values in Table 4 for the applicable work rate (where light work corresponds to minimal physical activity besides standing/watching, very heavy work corresponds to significant, continuous physical labor) to determine the work-rest frequency.

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Table 3. Temperature Adjustment Factors

<u>Time of Day</u>	
Before daily temperature peak ¹	+2 °F
10 am – 2 pm (peak sunshine)	+2 °F
<u>Sunshine</u>	
No clouds	+1 °F
Partly Cloudy (3/8 – 5/8 cloudcover)	-3 °F
Mostly Cloudy (5/8 – 7/8 cloudcover)	-5 °F
Cloudy (>7/8 cloudcover)	-7 °F
Indoor or nighttime work	-7 °F
<u>Wind (ignore if indoors or wearing CPC)</u>	
Gusts greater than 5 miles per hour at least once per minute	-1 °F
Gusts greater than 10 miles per hour at least once per minute	-2 °F
Sustained greater than 5 miles per hour	-3 °F
Sustained greater than 10 miles per hour	-5 °F
<u>Humidity (ignore if wearing CPC)</u>	
Relative Humidity greater than 90%	+5 °F
Relative humidity greater than 80%	+2 °F
Relative Humidity less than 50%	-4 °F
<u>CPC</u>	
Modified Level D (coveralls, no respirator)	+5 °F
Level C (coveralls w/o hood, full-face respirator)	+8 °F
Level C (coveralls w/hood, full-face respirator)	+10 °F
Level B w/airline	+9 °F
Level B w/SCBA	+9 °F and right one column ²
Level A	+14 °F and right one column ²
Other	Specified in the HASP
<u>Miscellaneous</u>	
Unacclimated work force	+5 °F
Partially acclimated work force	+2 °F
Working in shade	-3 °F
Breaks taken in air conditioned space	-3 °F

To read Table 4, determine the *Work Rate* at which the workers will be operating (where light work corresponds to minimal physical activity besides standing/watching, very heavy work corresponds to significant, continuous physical labor), then read down the column to the temperature range which corresponds to the *Adjusted Temperature*. The *Work-Rest Schedule* for that row indicates the appropriate work schedule.

Shaded areas in Table 4 indicate high hazard conditions. When such conditions are anticipated during any work day the field supervisor MUST include a discussion of heat stress as part of the daily tailgate safety meeting topics.

¹ This adjustment accounts for temperature rise during the day. If the temperature has already reached its daytime peak it can be ignored.

² Locate the proper column based on work rate, then move one column to the right (next higher work rate) before locating the corresponding adjusted temperature.

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Table 4. Work-Rest Schedule Based on Adjusted Temperature

Work-Rest Schedule	Adjusted Temperature (°F)			
	Light Work	Moderate Work	Heavy Work	Very Heavy Work
No specified requirements	< 80	< 75	< 70	< 65
15 minute break every 90 minutes of work	80 – 90	75 - 85	70 - 80	65 – 75
15 minute break every 60 minutes of work	>90 – 100	> 85 - 95	>80 - 85	>75 - 80
15 minute break every 45 minutes of work	>100 – 110	>95 - 100	>85 - 90	>80 - 85
15 minute break every 30 minutes of work	>110 - 115	>100 - 105	>90 - 95	>85 - 90
15 minute break every 15 minutes of work	>115 - 120	>105 - 110	>95 - 100	>90 - 95
Stop Work	>120	>110	>100	>95

Note: Time spent performing decontamination or donning/doffing CPC should not be included in calculating work or break time lengths.

2.2 EVALUATING THE WORK-REST SCHEDULE'S EFFECTIVENESS

Once a work-rest schedule is established, the work supervisor must continually evaluate its effectiveness through observation of workers for signs/symptoms of heart stress. Measurement of each worker's pulse can provide additional information in determining if the schedule is adequate, and is accomplished as follows:

At the start of the workday each worker's baseline pulse rate (in beats per minute – bpm) is determined by taking a pulse count for 15 seconds and multiplying the result by four. Worker pulse rates can then be measured at the beginning and end of each break period to determine if the rest period allows adequate cooling by applying the following criteria:

1. Each worker's maximum heart rate at the start of any break should be less than [180 minus workers age] bpm. If this value is exceeded for any worker, the duration of the following work period will be decreased by at least 10 minutes.
2. At the end of each work period all workers' heart rates must have returned to within +10% of the baseline pulse rate. If any worker's pulse rate exceeds this value the break period will be extended for at least 5 minutes, at the end of which pulse rates will be re-measured and the end-of-break criteria again applied.

REFERENCES: None

<p style="text-align: center;">ENV 530</p> <p style="text-align: center;">WORKING ON/NEAR/OVER WATER OR ICE</p>	<p>Published: January 20, 2003</p>
	<p>Revised: N/A</p>
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SUMMARY: The following guidelines shall be implemented during all work activities that require personnel to work on, near or over water and/or ice (e.g., rivers, lakes, ponds, retention basins, unguarded clarifiers, containment systems, etc.). These guidelines must be communicated to all employees performing operations where the potential for drowning exists.

1.0 DEFINITIONS

Personal Floatation Device (PFD)– U.S. Coast Guard-approved life jacket or buoyant work vest. Only types which are designed to keep the user upright when in use will be acceptable.

On/Over Water – Any work location that positions the employee on (in watercraft) or over a body of water where the potential for drowning exists.

Near Water – Adjacent to any body of water where the potential for drowning exists (i.e., top of river bank, unguarded edge of basin, etc.).

2.0 REQUIREMENTS

If work must be performed on, near or over water, the following requirements must be followed:

- Work must be performed in accordance with the “Buddy System.”
- Employees working over or near water, where the danger of drowning exists, shall be provided with U.S. Coast Guard-approved life jacket or buoyant work vests (PFD). Type of PFD should be selected by the water conditions present. Prior to and after each use, the PFDs shall be inspected for defects, which would alter their strength or buoyancy. Defective units shall not be used and replaced.
- Ring buoys with at least 90 feet of line shall be provided and readily available for emergency rescue operations. Distance between ring buoys shall not exceed 200 feet.
- At least one lifesaving skiff/boat shall be immediately available at locations where employees are working over or adjacent to water.
- Whenever possible, minimize the risk to employees avoiding the use of watercraft and instead performing work from the shore/bank. For situations where ice exists reschedule work to periods of warmer temperatures, when ice is not an issue.
- Avoid wearing waders or hip boots, they are cumbersome and may encourage workers to go deeper into water than is safe. Only use this apparel in shallow waters (i.e., creek beds).
- If workers have the potential to get stuck in mud or sediment, air injection equipment designed to free workers feet/legs may need to be available onsite. If a worker does get stuck, do not struggle as this causes deeper sinking. Workers should not be permitted to access areas where this hazard exists, especially in locations containing tidal water flow.
- Use a pole to probe ahead to assess water depths and/or stability of shoreline terrain.
- Take special care on slippery rocks around lakeshores, riverbanks and creeks. Always look ahead at the ground when walking around the water’s edge.
- If sampling near or in flowing water environments, be aware of slippery or steep banks and fast currents. If the current is fast or the water looks deeper than knee height, do not enter the water. If you must enter the water, a restraining system must be worn and secured to the bank for retrieval.

<p align="center">ENV 530</p> <p align="center">WORKING ON/NEAR/OVER WATER OR ICE</p>	<p>Published: January 20, 2003</p>
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If work must be performed on ice, the following requirements must be followed:

- Work must be performed in accordance with the “Buddy System” with rescue communications available.
- Do not walk or work on ice unless there is no other way of performing work.
- Whenever possible, use alternate methods. Have personnel use flat-bottomed boat with ropes (or equivalent) tied to each end and handled by workers on the berm, bank, or shore.
- Only walk on ice that is fully frozen, not cracked or brittle, that will support the necessary weight of workers and associated equipment.
- PFDs shall be inspected and worn in accordance with the requirements listed above.
- Workers must wear a restraining system (a lifeline attached to the front of a full-body harness) and stay close enough to the edge to make it possible for the attendant to pull the individual back on the ice.
- Workers must have available (on their person) equipment that can be used to partially penetrate the ice to help pull them out of the water and back up on the ice (equipment is available with capped ends that can be worn safely until needed).

3.0 WATER AND ICE SAFETY EQUIPMENT

The safety equipment required to support work on, over or near water and/or ice includes:

- Cell phones (or equivalent) capable of contacting emergency services.
- U.S. Coast Guard-approved life jacket or buoyant work vests (PFD).
- Ring buoys with at least 90 feet of line.
- Full-body harness with restraining line.
- Lifesaving skiff/boat (as needed) - contact the EH&S Department for guidance.
- Air injection equipment designed to free workers feet/legs (if necessary).
- Poles to probe for assessment purposes.
- Capped ice picks, spikes, etc.

REFERENCES: None



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DECONTAMINATION

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SUMMARY: Decontamination of contaminated personnel and equipment will comply with the requirements specified below, as well as any additional site-specific procedures that may be required by the Health and Safety Plan (HASP).

1.0 DEFINITIONS

Contamination Reduction Zone CRZ the transition area between the contaminated area and the clean area where decontamination activities occur.

Decontamination – the process of removing or neutralizing contaminants that have accumulated on personnel or equipment.

Exclusion Zone EZ the area where primary activities occur, such as sampling, remediation operations, installation of wells, cleanup work, etc.

LOP – Level of Protection (Personal Protective Equipment or PPE).

Support Zone SZ an uncontaminated zone where administrative and other support functions, such as first aid, equipment supply, emergency information, etc., are located.

2.0 GENERAL REQUIREMENTS

When possible, all necessary steps shall be taken to reduce or minimize contact with chemicals and impacted materials while performing field activities (e.g., avoid sitting or leaning on, walking through, dragging equipment over, tracking, or splashing potential or known impacted materials).

All personal decontamination activities shall be performed with an attendant (buddy) to provide assistance to personnel that are performing decontamination activities. Depending on specific site hazards, attendants may be required to wear a level of protection that is equal to the required level in the exclusion zone.

All persons and equipment entering the EZ shall be considered contaminated, and thus, must be properly decontaminated prior to entering the SZ.

Decontamination procedures may vary based on site conditions and nature of the contaminant. If chemicals or decontamination solutions are used, care should be taken to minimize reactions between the solutions and contaminated materials. In addition, personnel must assess the potential exposures created by the decontamination chemical(s) or solutions. The MSDS must be reviewed, implemented, and filed by personnel contacting the chemicals/solutions.

All contaminated personal protective equipment (PPE) and decontamination materials shall be stored and disposed of in accordance with site-specific requirements determined by site management.

3.0 DECONTAMINATION EQUIPMENT

The equipment required to perform decontamination may vary based on site-specific conditions and nature of the contaminant(s). The following equipment is commonly used for decontamination purposes:

- Soft-bristle scrub brushes or long-handled brushes to remove contaminants;
- Hoses, buckets of water or garden sprayers for rinsing;
- large plastic/galvanized wash tubs or children's wading pools for washing and rinsing solutions;
- large plastic garbage cans or similar containers lined with plastic bags for the storage of contaminated clothing and equipment;
- Metal or plastic cans or drums for the temporary storage of contaminated liquids; and

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- Paper or cloth towels for drying protective clothing and equipment.

4.0 PERSONAL DECONTAMINATION STEPS

Modified Level D

In the Exclusion Zone:

1. Equipment drop on plastic sheet
2. Remove the majority of gross contamination
3. Wash boot covers and outer gloves
4. Rinse boot covers and outer gloves
5. Remove tape
6. Remove boot covers and outer gloves

In the Contamination Reduction Zone (keep the most contaminated equipment near the EZ boundary):

1. Wash protective suits and safety boots
2. Rinse protective suits and safety boots
3. Safety boot removal
4. Remove protective suit
5. Wash inner gloves
6. Rinse inner gloves
7. Remove inner gloves.
8. Remove inner clothing (if necessary)

In the Support Zone:

1. Finish with personal decon/hygiene wash procedures
2. Redress (if necessary).

Level C

In Exclusion Zone (near boundary of CRZ):

1. Equipment drop on plastic sheet
2. Remove the majority of gross contamination
3. Wash boot covers and outer gloves
4. Rinse boot covers and outer gloves
5. Remove tape
6. Remove boot covers and outer gloves

In the Contamination Reduction Zone (keep the most contaminated equipment near the EZ boundary):

1. Wash protective suits and safety boots
2. Rinse protective suits and safety boots
3. Change out (if required): Filter/mask change and redress (boot covers and outer gloves)
4. Safety boot removal
5. Remove protective suit
6. Wash inner gloves

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7. Rinse inner gloves
8. Remove respirator/mask
9. Remove inner gloves
10. Remove inner clothing (if necessary)

In the Support Zone:

1. Finish with personal decon/hygiene wash procedures
2. Redress (if necessary)

Level B

In the Exclusion Zone (near boundary of CRZ):

1. Equipment drop on plastic sheet
2. Remove the majority of gross contamination
3. Wash boot covers and outer gloves
4. Rinse boot covers and outer gloves
5. Remove tape
6. Remove boot covers and outer gloves

In the Contamination Reduction Zone (keep the most contaminated equipment near the EZ boundary):

1. Wash SCBA/airline equipment, protective suits and safety boots
2. Rinse SCBA/airline equipment, protective suits and safety boots
3. Change out (if required): Tank change and redress (boot covers and outer gloves)
4. Safety boot removal
5. SCBA backpack or airline equipment removal
6. Remove protective suit and/or splash suit
7. Wash inner gloves
8. Rinse inner gloves
9. Remove face piece/mask
10. Remove inner gloves
11. Remove inner clothing (if necessary)

In the Support Zone:

1. Finish with personal decon/hygiene wash procedures
2. Redress (if necessary)

Level A

In the Exclusion Zone (near boundary of CRZ):

1. Equipment drop on plastic sheet
2. Remove the majority of gross contamination
3. Wash boot covers and outer gloves (if applicable to ensemble)
4. Rinse boot covers and outer gloves (if applicable to ensemble)
5. Remove tape (if applicable to ensemble)
6. Remove boot covers and outer gloves (if applicable to ensemble)

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In the Contamination Reduction Zone (keep the most contaminated equipment near the EZ boundary):

1. Wash protective suite and safety boots
2. Rinse protective suits and safety boots
3. Change out (if required): Tank change and redress (boot covers and outer gloves)
4. Safety boot removal
5. Remove fully encapsulating suit and hard hat
6. Remove SCBA backpack
7. Wash inner gloves
8. Rinse inner gloves
9. Remove face piece/mask
10. Remove inner gloves
11. Remove inner clothing (if necessary)

In the Support Zone:

1. Finish with personal decon/hygiene wash procedures
2. Redress (if necessary)

5.0 EQUIPMENT DECONTAMINATION

All equipment leaving the EZ shall be considered contaminated and must be properly decontaminated to minimize the potential for exposure and off-site migration of impacted materials. Such equipment may include, but is not limited to: sampling tools, heavy equipment, vehicles, PPE (hoses, cylinders, etc.), and various handheld tools.

All employees performing equipment decontamination shall wear the appropriate PPE to protect against exposure to contaminated materials. The level of PPE may be equivalent to the LOP required in the EZ. Other PPE may include splash protection, such as face-shields and splash suits, and knee protectors. Following equipment decontamination, employees may be required to follow the proper personal decontamination procedures above.

For larger equipment, a high-pressure washer may need to be used. Some contaminants require the use of a detergent or chemical solution and scrub brushes to ensure proper decontamination.

For smaller equipment, use the following steps for decontamination:

1. Remove majority of visible gross contamination in EZ.
2. Wash equipment in decontamination solution with a scrub brush and/or power wash heavy equipment.
3. Rinse equipment.
4. Visually inspect for remaining contamination.
5. Follow appropriate personal decontamination steps outlined above.

All decontaminated equipment shall be visually inspected for contamination prior to leaving the CRZ. Signs of visible contamination may include an oily sheen, residue or contaminated soils left on the equipment. All equipment with visible signs of contamination shall be discarded or re-decontaminated until clean. Depending on the nature of the contaminant, equipment may have to be analyzed using a wipe method or other means.

REFERENCES: None

LOWER PASSAIC RIVER RESTORATION PROJECT
HEALTH AND SAFETY PLAN
CORE DOCUMENT

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APPENDICES

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Appendix B: Documentation of Site-Specific Training; Safety Checklists
Appendix C: Health and Safety Audit Form
Appendix D: Malcolm Pirnie, Inc. Corporate Hearing Conservation Program
Appendix E: Material Safety Data Sheets for Decontamination Chemicals
Appendix F: Boating Safety Documents

Appendix G: TAMS/Malcolm Pirnie, Inc. CPR/First Aid Trained Personnel

Appendix H: Incident/Near Miss Investigation Report

1 INTRODUCTION

1.1 SCOPE

TAMS/Malcolm Pirnie, Inc. (TAMS/Malcolm Pirnie) is under contract to the New Jersey Department of Transportation, Office of Maritime Resources (NJDOT-OMR), to conduct a Feasibility Study (FS) for the Lower Passaic River in New Jersey under the Water Resources Development Act (WRDA). Malcolm Pirnie is under contract to the United States Army Corps of Engineers, Kansas City District (USACE-KC) to conduct a Remedial Investigation/Feasibility Study (RI/FS) for the Lower Passaic River in New Jersey under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This Health and Safety Plan (HASP) addresses health and safety issues as applicable to field investigation tasks associated with both of these efforts.

The Lower Passaic River includes the 17-mile tidal reach below the Dundee Dam, as well as major influences to the system: the Hackensack River up to the Oradell Dam, Saddle River, Second River, Third River, Berry's Creek, Pierson Creek, Newark Bay, Arthur Kill, and Kill van Kull.

Studies conducted to date indicate that sediments in the Lower Passaic River are contaminated with a variety of chemicals, including dioxins/furans, polychlorinated biphenyls (PCBs), pesticides, total extractable petroleum hydrocarbons (TEPH), polycyclic aromatic hydrocarbons (PAHs), and metals. Contaminated sediments underlying the Lower Passaic River are of concern to federal and state regulatory agencies because they may cause a number of negative consequences such as: ecological health effects, human health effects, and economic impacts on navigational dredging disposal costs.

This HASP has been developed to address overall health and safety requirements for TAMS/Malcolm Pirnie employees and subcontractors conducting RI/FS investigations in

compliance with Occupational Safety and Health Administration (OSHA) 29 CFR 1910.120. The HASP is divided into two major sections:

- **A HASP Core Document**, which provides a broad overview of health and safety considerations that apply to all field activities;
- **HASP Addenda**, which provide detailed health and safety considerations specific to each field activity.

Together, the HASP documents describe the requirements and procedures for TAMS/Malcolm Pirnie employee protection for the various investigation activities at the Lower Passaic River Restoration Project (LPRRP) Site. Subcontractors are required to develop task-specific HASPs which will contain a hazard evaluation and hazard control methods specific to their tasks. Subcontractor HASPs will be appended to TAMS/Malcolm Pirnie's HASP and will be consistent with the general provisions and restrictions set out in the HASP Core Document. The HASP Addenda and subcontractor HASPs will be submitted to the USACE prior to the commencement of any field activities.

This HASP outlines safety, health and emergency response procedures for preventing accidents and protecting personnel from injury and occupational illness during investigation activities. Included in this HASP are the assignment of responsibilities, personnel protection minimum requirements, safe work practices and emergency response procedures. This document is based upon available historical information and includes an assessment of potential physical/chemical hazards associated with each activity related to the RI/FS. A copy of the HASP Core Document and the HASP Addenda will be available at the LPRRP Site, in the keeping of the Project Health and Safety Officer (PSO), during site activities. Compliance with this HASP is required of all project personnel and visitors.

1.2 REGULATORY REQUIREMENTS AND GUIDELINES

The procedures outlined in this HASP comply with the OSHA requirements contained in 29 CFR 1910 including the final rule contained in 29 CFR 1910.120. The procedures are also consistent with the guidance contained in the following documents:

- Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities [prepared jointly by the USEPA, National Institute for Occupational Safety and Health (NIOSH), OSHA, and the U.S. Coast Guard (USCG)]; and
- USACE's Safety and Health Requirements Manual, EM 385-1-1, November 2003.

1.3 CORPORATE HEALTH AND SAFETY POLICY

Copies of TAMS's and Malcolm Pirnie's Corporate Health and Safety Policy are included in Appendix A.

1.4 CONTRACTOR/PROJECT BACKGROUND INFORMATION

As stated above, TAMS/Malcolm Pirnie is under contract to NJDOT-OMR to conduct an FS for the LPRRP Site in New Jersey. The project name is "Lower Passaic River Restoration Project". This work is being conducted under New Jersey Department of Transportation agreement number 2001-NJMR02, Task Number OMR 03-6. Background information regarding the project and work to be performed is discussed in Section 2.

Safety statistics for Malcolm Pirnie from 1998-2003 are included in Appendix A; these statistics include the firm's experience modification rate (EMR), number of recordable incidents, number of lost workdays, and related statistics. OSHA Form 300a – Log of Work-Related Injuries and Illnesses is also included in Appendix A for calendar year 2003.

For subcontractors, safety statistics (*e.g.*, EMR, OSHA Form 300a) will be collected and kept on file, but will not be used in evaluating firms' qualifications. Subcontractor safety statistics will be kept in Appendix A of this HASP.

2 SITE BACKGROUND AND SETTING

2.1 SITE LOCATION

The LPRRP Study Area (hereafter referred to as the Study Area) encompasses the 17-mile tidal reach of the Passaic River below the Dundee Dam, including the tidal portion of its tributaries (*e.g.*, Saddle River, Second River, and Third River). Refer to Figure 2-1 for a Site Location Map. The Study Area also includes the major physically connected water bodies, including the Hackensack River up to the Oradell Dam, Berry's Creek, Pierson Creek, Newark Bay, the Arthur Kill, and the Kill van Kull.

2.2 SITE BACKGROUND AND HISTORY

The USEPA, USACE, NJDOT, and the New Jersey Department of Environmental Protection (NJDEP) have partnered to conduct a comprehensive study of the Lower Passaic River and its tributaries. The Lower Passaic is the 17-mile tidal stretch of the river from the Dundee Dam south to Newark Bay. The LPRRP is an integrated, joint effort among state and federal agencies that will take a comprehensive look at the problems within the Lower Passaic River Basin and identify remediation and restoration options to address those problems. This multi-year study will provide opportunities for input from the public at all phases of development.

The project's goals are to provide a plan to:

- Remediate contamination found in the river to reduce human health and ecological risks.
- Improve the water quality of the river.
- Improve and/or create aquatic habitat.
- Reduce the contaminant loading in the Passaic and the Hudson-Raritan Estuary.



Figure 2-1: LPRRP – Site Location Map

2.2.1 A Brief History

The Passaic River derived its name from the Algonquin word meaning “peaceful valley”. The river spans over 80 miles of suburban and urban areas from its headwaters in Morristown, NJ to its confluence with the tidal waters of Newark Bay. The Passaic River Basin drains an area of approximately 935 square miles with 787 square miles in New Jersey and 148 square miles in New York. Seven major tributaries bring water into the river’s main stem, which is used for water supply, recreation, navigation and wastewater assimilation.

During the 1800s, the area surrounding the Lower Passaic River became a focal point for the nation’s industrial revolution. By the 20th century, Newark had established itself as the largest industrial-based city in the country. The urban and industrial development surrounding the Lower Passaic River, combined with associated population growth, have resulted in poor water quality, contaminated sediments, bans on fish and shellfish consumption, lost wetlands, and degraded habitat. Figure 2-2 illustrates Superfund Sites on the National Priorities List (NPL) in the vicinity of the Lower Passaic River. Figure 2-3 indicates facilities in the vicinity of the Study Area regulated pursuant to the Resource Conservation and Recovery Act (RCRA). Figure 2-4 shows locations of New Jersey Known Contaminated Sites in the vicinity of the Study Area. Point and non-point discharges to the Lower Passaic River, including Combined Sewer Overflows (CSOs), have contributed to its contamination. Figure 2-5 illustrates CSOs in the Paterson area, and Figure 2-6 illustrates CSOs in the Newark area.



Figure 2-2: LPRRP – Superfund Sites on the NPL

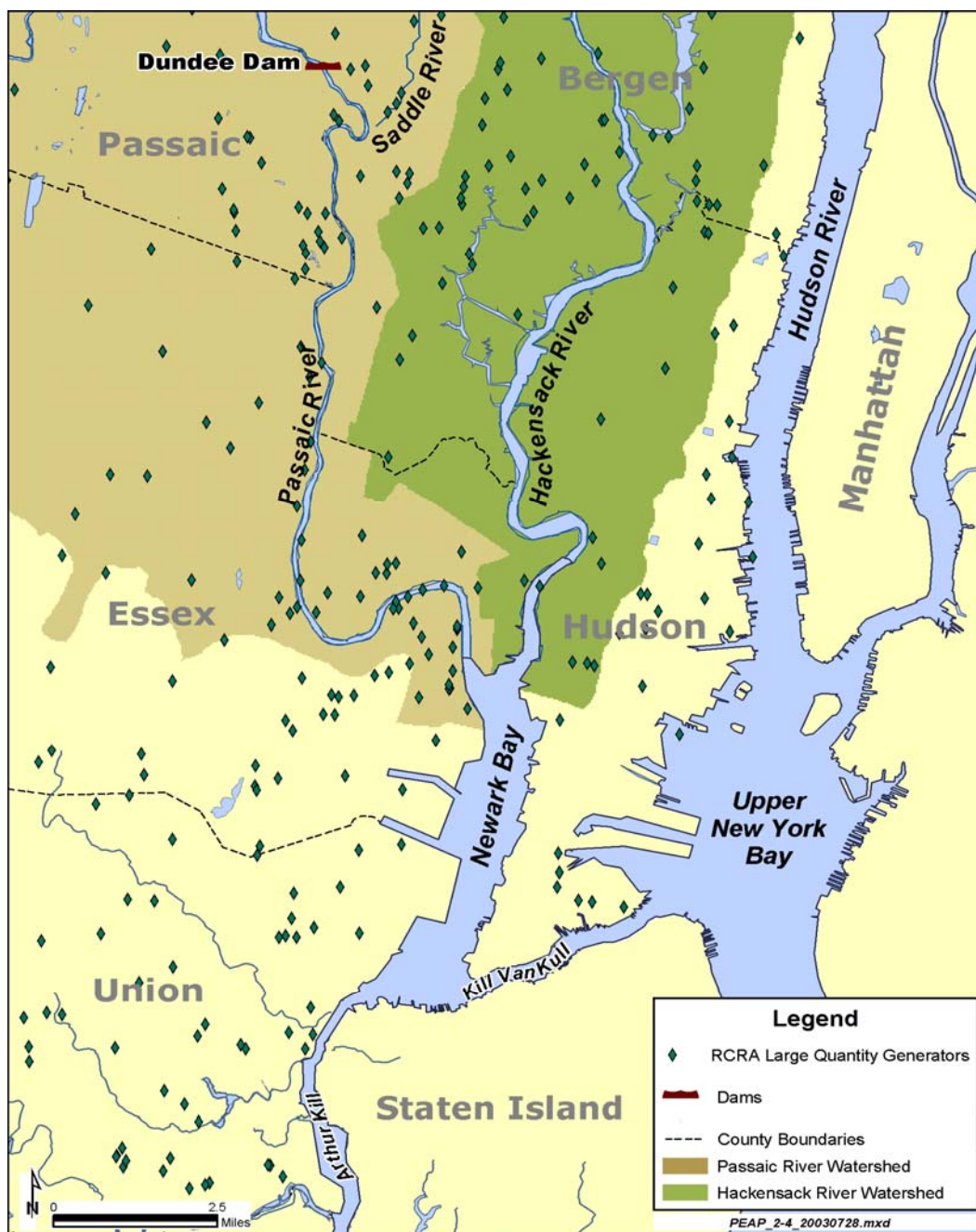


Figure 2-3: LPRRP - Regulated RCRA Facilities

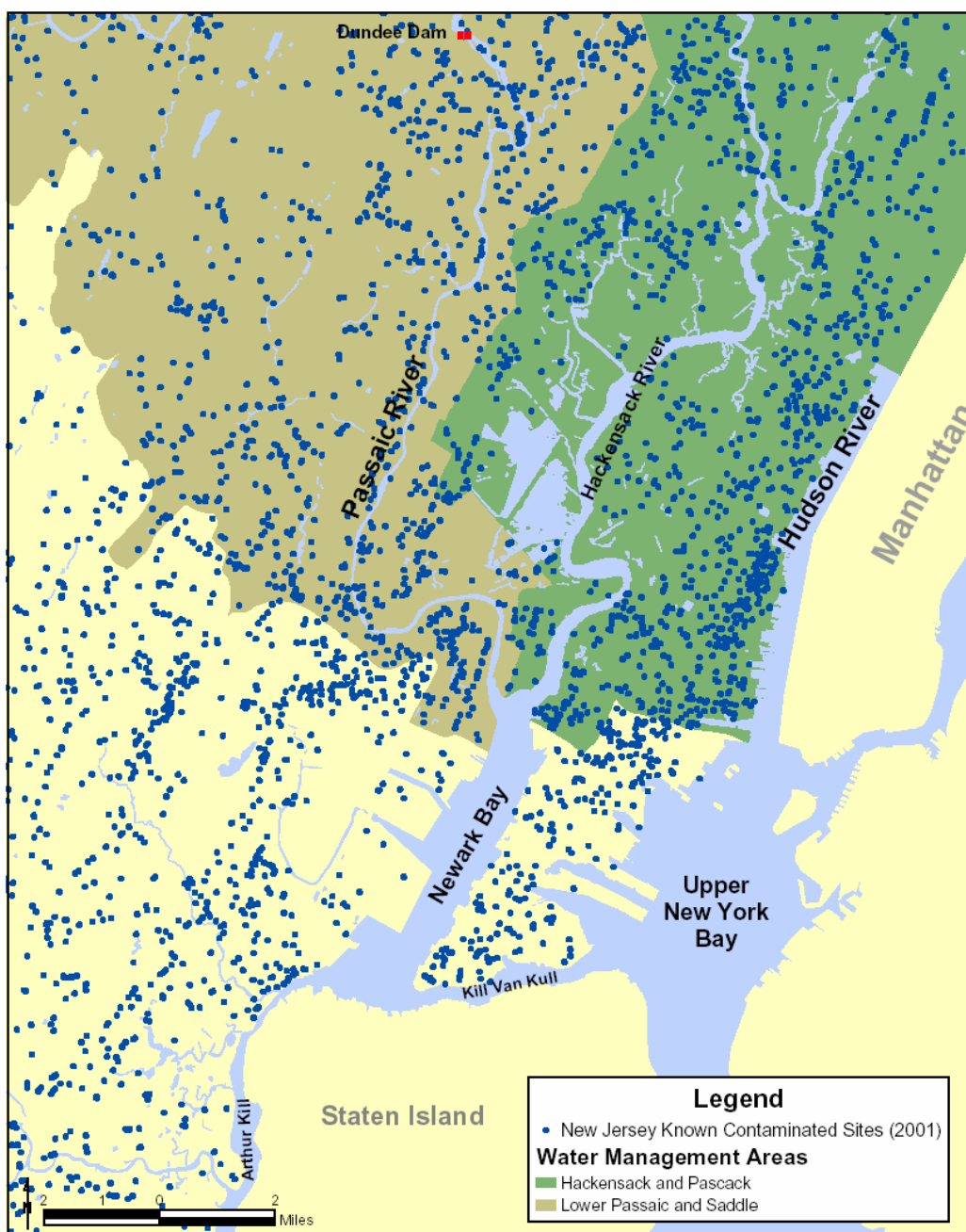


Figure 2-4: LPRRP – New Jersey Known Contaminated Sites

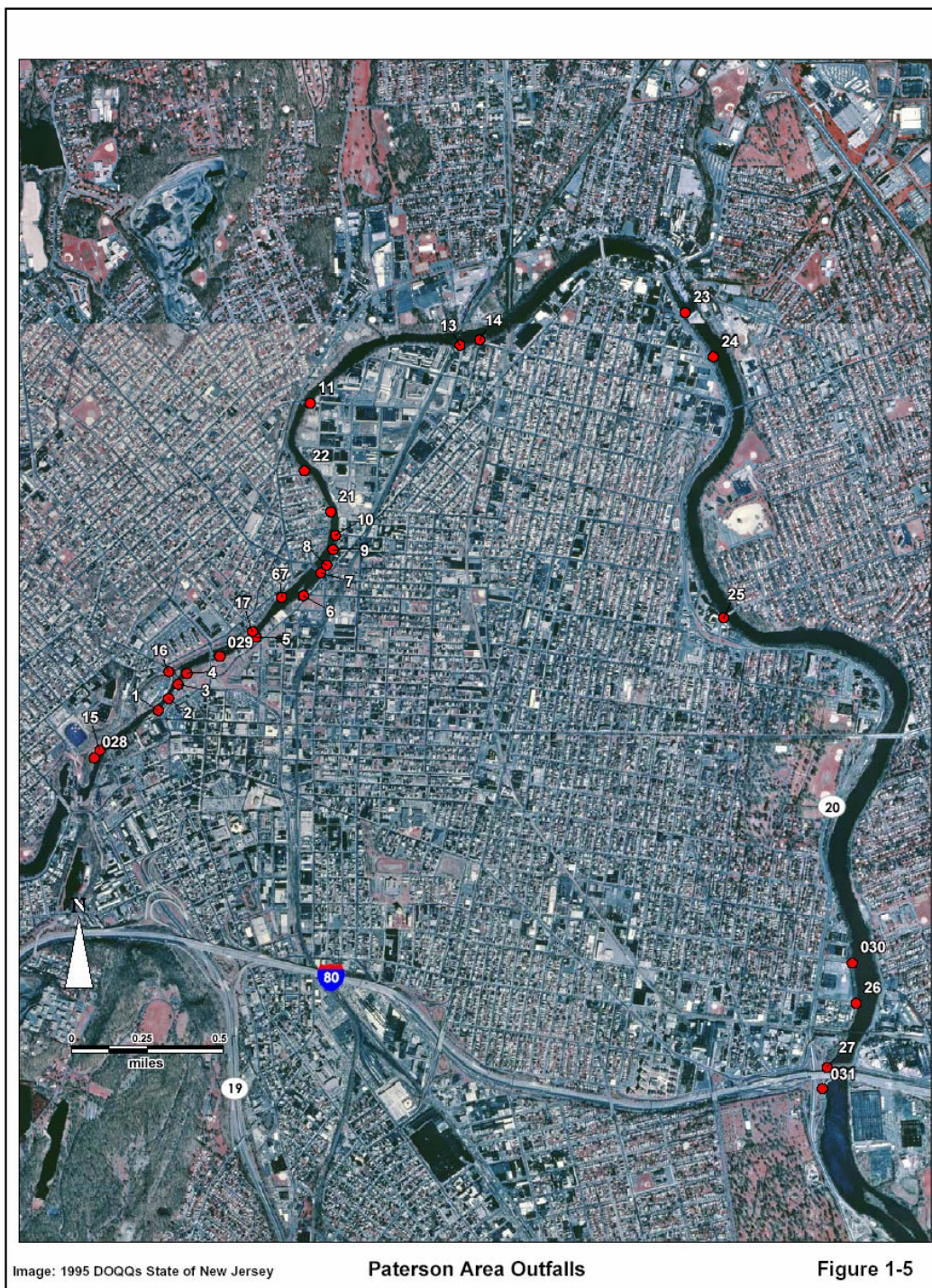


Figure 2-5: LPRRP – Paterson Outfalls

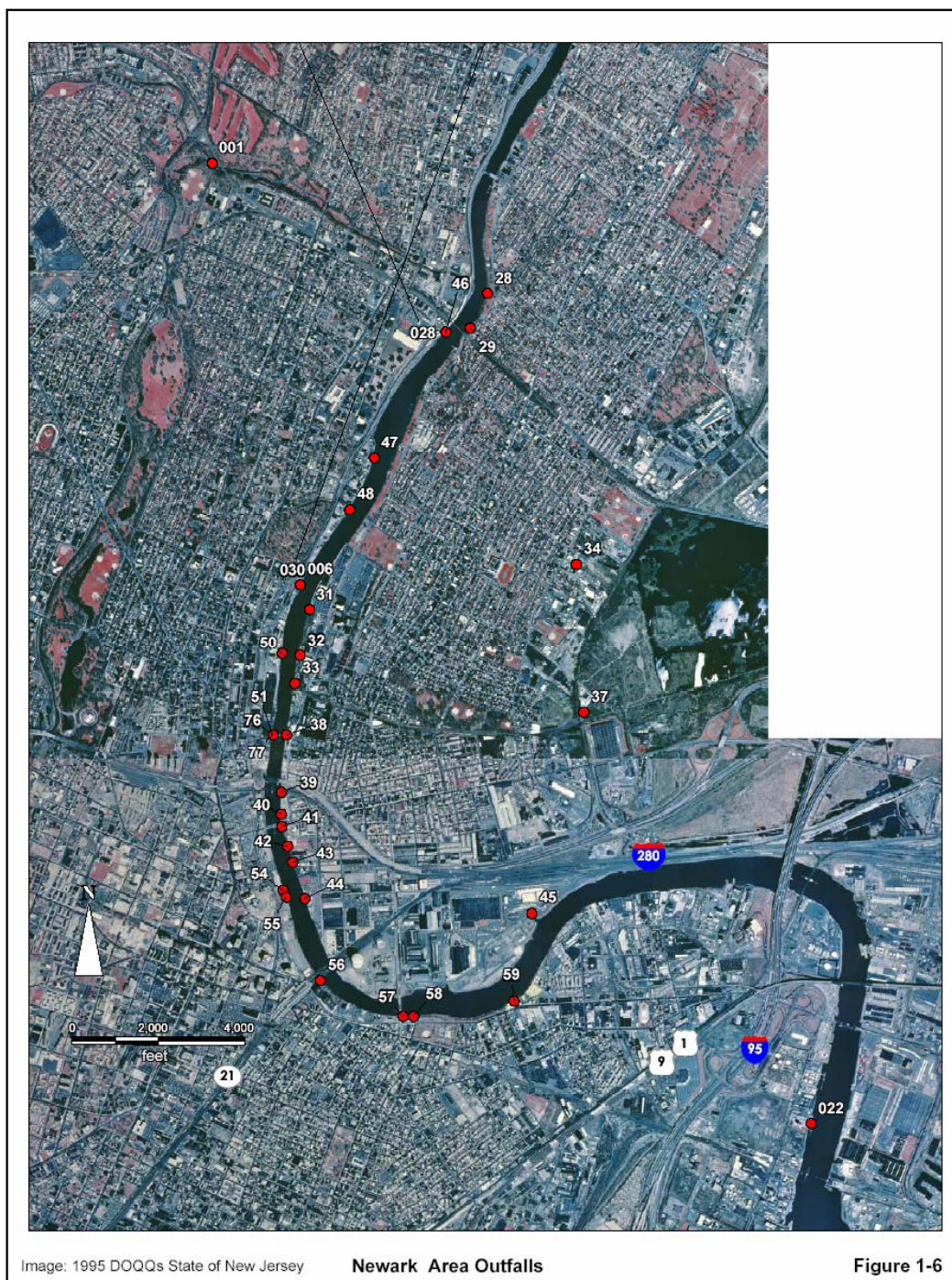


Figure 2-6: LPRRP – Newark Area Outfalls

2.3 PROPOSED WORK/SCHEDULED FIELD ACTIVITIES

The RI/FS field investigation activities proposed at the LPRRP Site are described in the Work Plans written for the CERCLA and WRDA investigations. Fieldwork conducted during these activities will cover the 17-mile tidal portion of the Lower Passaic River, in addition to portions of tributaries (*e.g.*, Second River, Third River, Saddle River) and Newark Bay. The 17-mile tidal portion of the Lower Passaic River is comprised of the following five reaches, beginning from Newark Bay, and ending at the Dundee Dam:

- Point No Point Reach [extends from the down-estuary river boundary, River Mile (RM) 0.0 to RM 2.2],
- Harrison Reach (extends from RM 2.2 to RM 4.4),
- Newark Reach (extends from RM 4.4 to RM 5.8),
- Kearny Reach (extends from RM 5.8 to RM 6.8),
- Upstream Reach (extends from RM 6.8 to the Dundee Dam).

Components of the RI/FS field investigation may include, but are not limited to, the following elements:

- Hydrodynamic Investigations/Modeling: study of sediment radioactive dating and transport, surface water chemistry, flows, tides, and currents for use in model development, calibration, and application; sediment transport studies, including use of sediment and water column sampling results to monitor total suspended solids and turbidity for calibration and validation of model; use of deployed systems to measure bottom current, pressure, temperature, salinity, light, and obtain pumped water samples for suspended matter analysis;
- Geophysical/Bathymetric Surveys: includes acoustic surveys, study/characterization of sub-bottom conditions, and survey of sediment surface elevations for use in mapping, modeling, and identification of the spatial extent of contaminated sediment;
- Contaminant Data – Sediment: collection of low-resolution cores (to determine nature and extent of contamination), high-resolution cores (to compare core patterns with pollutant loading history), and pore water (to evaluate geochemical processes);
- Contaminant Data – Water Column: collection of water column samples to study time of travel, temporal patterns, flow-averaged sampling, event sampling, and near-shore areas for exposure assessment;
- Human Health and Ecological Risk Assessment: includes collection of biological samples, including benthos, fish/shellfish, waterfowl, and reptile/mammals;

- Geotechnical: collection of sediment samples to study grain size and geotechnical properties of sediment in the study area;
- Air Quality Investigations: conduct atmospheric deposition studies to study wet and dry deposition rates, and study air-water interface concentrations to estimate deposition/volatilization rates.
- Dredging and Decontamination Pilot Study: conduct pilot study to evaluate dredging productivity, monitor resuspension of sediments during dredging activities, and decontamination of dredged materials.

Detailed descriptions of the fieldwork and sampling activities are presented in the **HASP Addenda**. The Standard Operating Procedures (SOPs) that are applicable to each field activity are provided in the Field Sampling Plan, Volumes 1 and 3.

3 PROJECT ORGANIZATION AND RESPONSIBILITY

3.1 PROJECT ORGANIZATION OF SAFETY PERSONNEL

An organizational chart identifying the project health and safety personnel is shown in Figure 3-1.

3.2 RESPONSIBILITIES OF SAFETY PERSONNEL

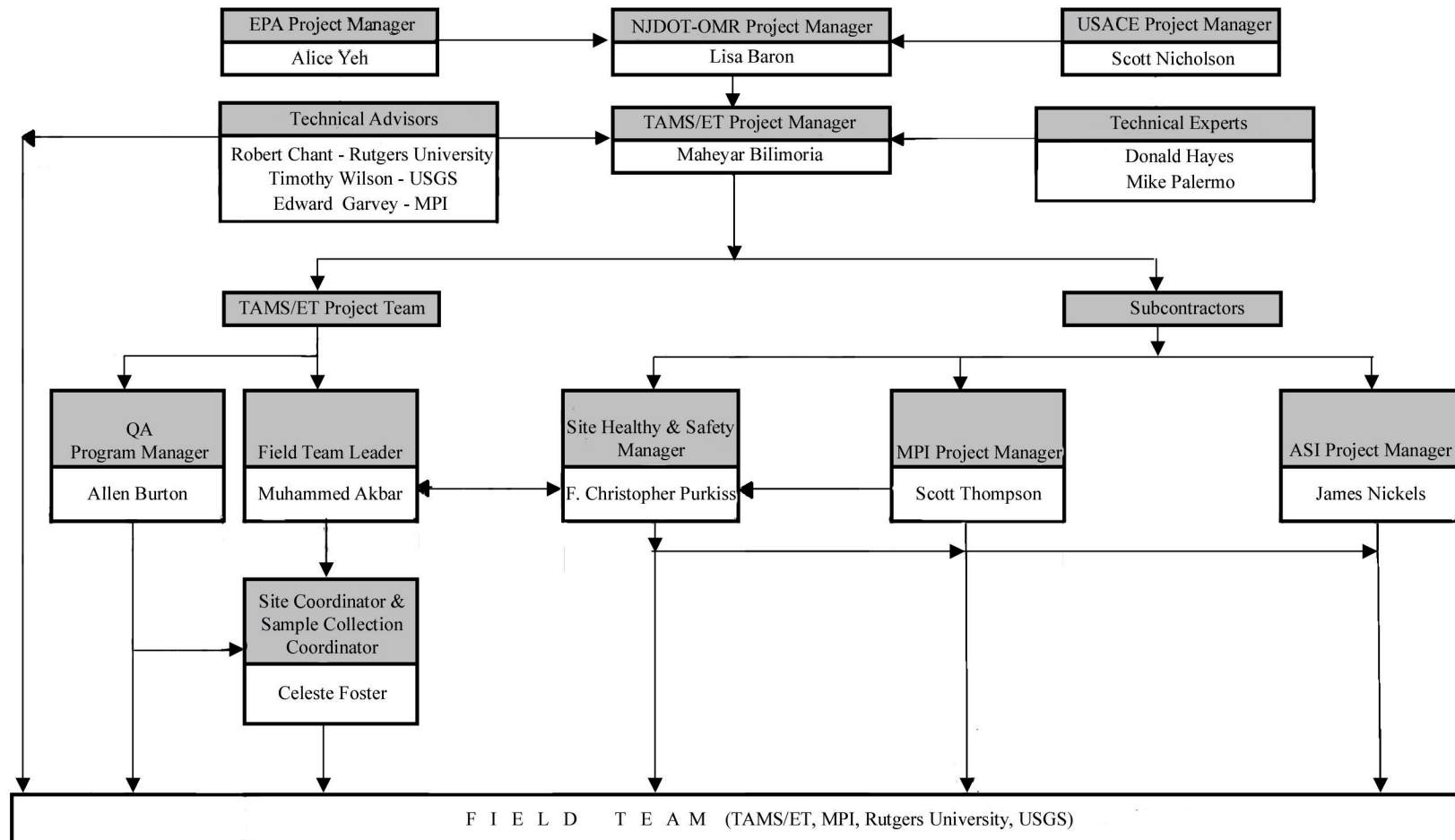
Project Officer – The Project Officer (PO) has the final responsibility for the quality of work performed under the contract.

Project Manager – The Project Manager (PM) is primarily responsible for the development and implementation of the investigation and for the health and safety of TAMS/Malcolm Pirnie personnel assigned to the field investigation. The PM will be the primary point of contact with the USACE – Kansas City District.

Health and Safety Manager – Each company's Health and Safety Manager (HSM) is responsible for development and implementation of its respective health and safety programs. The HSM functions as a liaison with the USACE, OSHA, and other agencies on health and safety issues. The HSM conducts or directs periodic audits for successful implementation of the site safety and health plans.

Project Safety Officer – The Project Safety Officer (PSO) is knowledgeable in safety and worker protection techniques as they relate to the project. Responsibilities include monitoring daily compliance of site work to this HASP, having the ability and authority to make needed changes or additions to the plan and providing technical assistance to the Project Manager on problems relating to work site safety.

**Figure 3-1
Organization Chart**



As site data are obtained and evaluated, the PSO may modify this HASP. The levels of personnel protection outlined in this plan may be upgraded or downgraded based on such information; the levels of personal protection outlined in this plan cannot be downgraded without the approval of the HSM. The PSO or designee will also conduct regular on-site briefings pertaining to health and safety requirements of the project. Each field team will designate one team member to serve as PSO for that team during the field investigations. (The PSO will be present on a full-time basis whenever there are three or more field teams working simultaneously.)

The PSO is responsible for the development and set-up of emergency procedures and personnel decontamination procedures. The PSO or designee will complete a daily diary of activities with health and safety relevance. If unsafe work conditions are encountered, the PSO is authorized to stop work. Resolution of all on-site health and safety problems will be coordinated through the Project Manager with assistance from the HSM.

Deputy Project Manager – The Deputy Project Manager (DPM) reports directly to, and works with, the Project Manager. The Deputy Project Manager is responsible for assisting the Project Manager, as needed, with all health and safety issues.

Field Team Leader – The Field Team Leader (FTL) will be responsible for coordinating the logistics of the field investigation included all required health and safety activities.

TAMS/Malcolm Pirnie Field Personnel – All field personnel are required to become thoroughly familiar with this HASP, follow the health and safety procedures and guidelines outlined in this HASP, and use protective equipment properly to protect themselves and their fellow workers from injury and to prevent damage to material, equipment, and facilities. Field personnel will contribute any appropriate suggestions and assist in discovering or correcting unsafe working conditions. The field investigations will be conducted according to the requirements of USACE's *Safety and Health Requirements Manual, EM 385-1-1* and this HASP.

Subcontractors – Subcontractors will designate one or more safety and health coordinators, one of whom will be assigned to the site during any site activities involving the subcontractor. Each subcontractor's safety and health coordinator will develop a HASP addressing the hazards associated with that subcontractor's project tasks and act as a liaison between the TAMS/Malcolm Pirnie PSO and the subcontractor. Subcontractor HASPs will be appended to and will be consistent with the general provisions and restrictions set out within this HASP Core Document.

Subcontractor Personnel – Subcontractors whose work will be performed on-site, or who otherwise could be exposed to health and safety hazards, will be advised of known hazards through distribution of site information obtained by TAMS/Malcolm Pirnie. As employers, each subcontractor is responsible for the health and safety of their employees. TAMS/Malcolm Pirnie expects that each subcontractor will comply with the requirements of USACE's *Safety and Health Requirements Manual, EM 385-1-1*, this HASP and all applicable federal, state and local regulations. All subcontractors are responsible for:

- Providing personal protective equipment (PPE) for their employees subject to the requirements of this HASP and TAMS/Malcolm Pirnie review.
- Providing documentation to the TAMS/Malcolm Pirnie PSO that their employees have been trained in accordance with the requirements of this HASP.
- Providing documentation to the TAMS/Malcolm Pirnie PSO that their employees have received medical clearances as required by the HASP.
- Providing periodic documentation to the TAMS/Malcolm Pirnie PSO that their employees are in compliance with the provisions of this HASP.

Subcontractors will also provide documentation to the TAMS/Malcolm Pirnie PSO that their employees have received a daily briefing covering their assignment, required PPE, special or unusual conditions and lessons learned. Subcontractor personnel will contribute any appropriate suggestions and assist in discovering or correcting unsafe working conditions. TAMS/Malcolm Pirnie will document their subcontractors' compliance with the requirements of the HASP.

TAMS/Malcolm Pirnie personnel who have health and safety responsibility for this project are summarized in Table 3-1:

Table 3-1: TAMS/Malcolm Pirnie Personnel

PROJECT ROLE	MALCOLM PIRNIE PERSONNEL	CONTACT INFORMATION	TAMS PERSONNEL	CONTACT INFORMATION
Project Manager	Scott Thompson, PE	W: (914) 641-2628	Maheyar Bilimoria	973-338-6680
Deputy Project Manager	Liam Bossi	W: (914) 641-2573	To be determined	
Health and Safety Manager	Mark McGowan, CSP, CIH	W: (914) 641-2484 After hours: (800) 478-6870	To be determined	
Project Safety Officer	To be determined		To be determined	
Alternate Project Safety Officer	To be determined		To be determined	
Alternate Project Safety Officer	To be determined		To be determined	
Field Team Leader	To be determined		To be determined	
Alternate Field Team Leader	To be determined		To be determined	
Alternate Field Team Leader	To be determined		To be determined	

Additional personnel involved with specific field activities are identified in the HASP Addenda.

4 POTENTIAL HEALTH AND SAFETY HAZARDS AND CONTROLS

4.1 ENVIRONMENTAL SAMPLING ACTIVITIES

Field investigation activities include sampling of various media and biota, and various shipboard surveys. The HASP Core Document includes a Task Hazard Analysis for the following:

- Collection of Sediment Core Samples (including hand tools, vibracoring, and collection of geotechnical samples via a barge-based drilling rig).
- Collection of Water Column Samples.

General physical and biological hazards and monitoring/control methods are also addressed in this section. Other field activities will be addressed in the HASP Addenda.

4.1.1 Sediment Sampling

Sediment sampling operations consist of collecting core samples for field and laboratory analysis.

During the course of this project, several different sediment sampling methodologies may be utilized based on equipment accessibility and the types of materials to be sampled. These sampling methods may include use of hand coring tools (*e.g.*, push cores, piston cores), small dredges such as a ponar dredge, and vibracoring equipment operated by a subcontractor. Primary hazards include physical hazards such as lifting retrieved cores over the sides of boats, use of power tools to segment and process cores, and boating safety issues. Chemical hazards are expected to be encountered during handling and processing of sediment samples and will be controlled by use of PPE and monitoring procedures as referenced in Table 4-1.

Table 4-1 presents a Task Hazard Analysis summarizing tasks, hazards, and controls associated with sediment core sample collection. This table presents each task, the

hazards associated with that task, and then recommends various controls, PPE, and operating procedures to control the hazards.

4.1.2 Barge-Based Drilling

Sediment samples may be collected with the use of a barge-mounted drill rig. Such equipment poses hazards in addition to those posed by working on or adjacent to the river.

Tasks, hazards, and controls associated with barge-based drilling operations for sediment core sample collection are included in the Task Hazard Analysis in Table 4-1.

The primary hazards for barge-based drilling are associated with heavy equipment, overhead hazards, and moving parts. Accidents can occur as a result of failing to adequately secure the rig to the barge prior to the start of operations. Heavy equipment and moving parts, such as the hammer, the cathead, and casing/drilling rods/mud tubs hoisted by ropes during drilling, have the potential for striking, pinning, or cutting personnel. Chemical exposure hazards are associated with handling and processing of the recovered sediment samples, and will be controlled by the PPE and monitoring procedures referenced in Table 4-1.

The drill operator is responsible for the safe operation of the drill rig and adherence to the requirements of the HASP. TAMS/Malcolm Pirnie personnel should be aware of site and equipment conditions while conducting field activities (*e.g.*, sample processing) at a work area that is located a safe distance from the drilling crew's work area, know where the "emergency stop switch" is on the back of the drilling rig, and request the crew to demonstrate operation of the switch. The drilling crew must participate in the daily safety meetings and be made aware of all emergency procedures.

Table 4-1: Sediment Sampling – Safety Hazard Evaluation

(see next page)

**TABLE 4-1: SEDIMENT SAMPLING - SAFETY HAZARD EVALUATION
LOWER PASSAIC RIVER RESTORATION PROJECT SITE**

TASK/STEP	HAZARDS	CONTROLS
Collection and processing of sediment core samples	Slips and Falls	Non-skid rubber overboots when aboard vessels; leather safety boots with puncture-resistant inserts to protect against sharp or heavy objects when on land. Observe the buddy system. Use caution when bringing core tubes aboard boats. Practice good work area housekeeping (e.g., keep walkways clear of equipment, water, sediment, and debris).
	Water/Drowning	Use of personal flotation equipment, use of caution/buddy system when boarding vessel and performing field activities. Boating safety is discussed in Section 4.4. River safety is discussed in Section 11.2. If field personnel clothes become wet, he/she will be required to change into dry clothes.
	Chemical Exposure	Use of PPE, including face shields, is required and discussed below. Air monitoring is discussed in Section 8. Observance of control zones is discussed in Section 9. Decontamination of personnel, equipment, and PPE, and waste disposal are discussed in Section 10. Adherence to safety standard operating procedures is discussed in Section 11.
	Power Tools	Use equipment with Ground Fault Circuit Interruptors (GFCIs). Wear proper work gloves, safety glasses, and face shield. Unplug tools when changing blades (for Sawzall) or drill bits (power drills).
	Drill Rig/Heavy Equipment	Awareness of drill rig equipment and conditions. Observe the buddy system. Keep clear of moving parts (e.g., cat head), lines/wire, and rope.
	Lifting Hazards	Use proper lifting techniques (e.g., bend legs, not back). Use an individual limit of 40 pounds. Use more than one person to lift objects that are bulky/awkward, especially on boats. Lifting safety is described in Section 4.3.6.
	Heat Stress	Wear appropriate clothing. Shorter work shifts/frequent breaks during extreme weather conditions. Exposure monitoring and weather-related clothing for heat stress is described in Section 7.2 of the Health and Safety Plan Core Document.
	Cold Stress	Wear appropriate clothing. Shorter work shifts/frequent breaks during extreme weather conditions. Exposure monitoring and weather-related clothing for cold stress is described in Section 7.3 of the Health and Safety Plan Core Document.
	Biological Hazards	Avoidance, insect repellent, personal body inspection.
	Boating Hazards	Use of personal flotation equipment, use of caution/buddy system when boarding vessel and performing field activities. Boating safety is discussed in Section 4.5. River safety is discussed in Section 11.2.
	Weather Conditions	Monitoring of weather conditions and adapting/postponing field activities as appropriate.

EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
Non-skid rubber overboots (aboard vessels); leather safety boots with inserts to protect against sharp or heavy objects (on land); gloves; safety glasses; hard hats with face shield; hearing protection; personal flotation device; coveralls, Tyvek suit, or rain gear; weather-related clothing.	PSO to check teams to ensure that appropriate personal protective equipment is used. PSO to perform periodic visits with field teams; use checklist audit form, and modify PPE as necessary to reflect changing conditions.	40-hour Hazardous Waste Operations Training; CPR/First Aid Training; Marine Safety Training; Review of HASP.
Sediment coring devices (hand tools, including push cores and piston cores).	FTL and field personnel will check equipment during sampling to ensure that integrity of sediment coring equipment has not been compromised.	40-hour Hazardous Waste Operations Training; CPR/First Aid Training; Marine Safety Training; Review of HASP.
Drill rig, Vibracore equipment.	Drill rig operators will be required to inspect and maintain equipment and adhere to HASP. Drill rig operators will participate in daily safety/operations meetings.	40-hour Hazardous Waste Operations Training; CPR/First Aid Training; Marine Safety Training; Review of HASP.

4.1.3 Water Column Sampling

Collection of water column samples and water velocity measurements will be performed at monitoring stations at several locations along the Lower Passaic River and tributaries (*e.g.*, Second River, Third River, Saddle River). Monitoring stations will be accessed by personnel via boats and from bridges. The physical hazards of this operation are primarily associated with boating safety, sample collection methods (*e.g.*, deploying and retrieving heavy sampling devices), and sampling locations (*e.g.*, if sampling is conducted from roadway bridges). Chemical hazards will be associated with the retrieval and handling of contaminated water column samples, and will be controlled via use of PPE.

Table 4-2 presents a Task Hazard Analysis summarizing tasks, hazards, and controls associated with water column sampling. This table presents each task, describes hazards associated with that task, and then recommends various site controls, PPE, and operating procedures to control the hazards.

Table 4-2: Water Column Sampling – Safety Hazard Evaluation

(see next page)

**TABLE 4-2: WATER COLUMN SAMPLING - SAFETY HAZARD EVALUATION
LOWER PASSAIC RIVER RESTORATION PROJECT SITE**

TASK/STEP	HAZARDS	CONTROLS
Collection of water column samples from vessel.	Slips and Falls	Non-skid rubber overboots when aboard vessels; leather safety boots with puncture-resistant inserts to protect against sharp or heavy objects when on land. Observe the buddy system. Use caution when water samples aboard boats. Practice good work area housekeeping (e.g., keep walkways clear of equipment, water, sediment, and debris).
	Water/Drowning	Use of personal flotation equipment, use of caution/buddy system when boarding vessel and performing field activities. Boating safety is discussed in Section 4.5. River safety is discussed in Section 11.2. If field personnel clothes become wet, he/she will be required to change into dry clothes.
	Chemical Exposure	Use of PPE, including face shields, is required and discussed below. Air monitoring is discussed in Section 8. Observance of control zones is discussed in Section 9. Decontamination of personnel, equipment, and PPE, and waste disposal are discussed in Section 10. Adherence to safety standard operating procedures is discussed in Section 11.
	Lifting Hazards	Use proper lifting techniques (e.g., bend legs, not back). Use an individual limit of 40 pounds. Use more than one person to lift objects that are bulky/awkward, especially on boats. Lifting safety is described in Section 4.3.6.
	Heat Stress	Wear appropriate clothing. Shorter work shifts/frequent breaks during extreme weather conditions. Exposure monitoring and weather-related clothing for heat stress is described in Section 7.2 of the Health and Safety Plan Core Document.
	Cold Stress	Wear appropriate clothing. Shorter work shifts/frequent breaks during extreme weather conditions. Exposure monitoring and weather-related clothing for cold stress is described in Section 7.3 of the Health and Safety Plan Core Document.
	Biological Hazards	Avoidance, insect repellent, personal body inspection.
	Boating Hazards	Use of personal flotation equipment, use of caution/buddy system when boarding vessel and performing field activities. Boating safety is discussed in Section 4.5. River safety is discussed in Section 11.2.
	Weather Conditions	Monitoring of weather conditions and adapting field activities as appropriate.

TASK/STEP	HAZARDS	CONTROLS
Collection of water column samples from bridge.	Slips, Falls, Drowning	Leather safety boots with puncture-resistant inserts. Use of personal flotation equipment and personal fall arrest systems, if guard rails are not present. Observe the buddy system.
	Lifting Hazards	Use proper lifting techniques (e.g., bend legs, not back). Use an individual limit of 40 pounds. Use more than one person to lift objects that are bulky/awkward, especially on boats. Lifting safety is described in Section 4.2.6.
	Heat Stress	Wear appropriate clothing. Shorter work shifts/frequent breaks during extreme weather conditions. Exposure monitoring and weather-related clothing for heat stress is described in Section 7.2 of the Health and Safety Plan Core Document.
	Cold Stress	Wear appropriate clothing. Shorter work shifts/frequent breaks during extreme weather conditions. Exposure monitoring and weather-related clothing for cold stress is described in Section 7.3 of the Health and Safety Plan Core Document.
	Biological Hazards	Avoidance, insect repellent, personal body inspection.
	Automobile/Vehicular Traffic	Use of traffic cones and bright/reflective clothing. Use caution/buddy system when collecting samples and performing field activities. Vehicular traffic safety issues are discussed in Section 4.3.10.
	Weather Conditions	Monitoring of weather conditions and adapting field activities as appropriate.

EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
Non-skid rubber overboots (aboard vessels); leather safety boots with inserts to protect against sharp or heavy objects (on land); gloves; safety glasses; hard hats; hearing protection; personal flotation device; coveralls, Tyvek suit, or rain gear; reflective vests; weather-related clothing.	PSO to check teams to ensure that appropriate personal protective equipment is used. PSO to perform periodic visits with field teams; use checklist audit form, and modify as necessary to reflect changing conditions.	40-hour Hazardous Waste Operations Training; CPR/First Aid Training; Marine Safety Training; Review of HASP.

4.2 CHEMICAL HAZARDS

Table 4-3 lists contaminants known to be present at the LPRRP Site and the known peak concentrations in sediment. Table 4-4 lists OSHA Permissible Exposure Limits (PELs), American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs), Immediately Dangerous to Life or Health (IDLH) concentrations, routes of exposure, and physicochemical properties for these chemicals. It is anticipated that airborne concentrations will not exceed OSHA PELs resulting from existing sediment concentrations. Note that Tables 4-3 and 4-4 are taken from the TSI HASP written in January 1995. If deemed appropriate, these tables will be updated to reflect more current conditions in the study area.

Table 4-3: Estimated Chemical Concentrations of Hazardous Chemicals on Site

(see next page)

TABLE 4-3
ESTIMATED MAXIMUM CONCENTRATIONS OF HAZARDOUS
CHEMICALS IN SEDIMENT ON SITE¹

Date	Compound	Max. Conc. (mg/kg)
Jul-93	2,3,3',4,4'-PCB	1.4
Jul-93	2,3,4,4',5-PCB	1.5
Mar-93	3,3',4,4',5,5'-PCB	0.0004
Jul-93	3,3',4,4',5-PCB	0.04
Jul-93	3,3',4,4'-PCB	1.6
1991	PCB 1242	3.8
Jul-93	PCB 1248	47.7
Mar-93	PCB 1254	5.1
Jul-93	PCB 1260	8.7
Jul-93	2,3,7,8-TCDD	0.24
1991	2,3,7,8-TCDF	0.001
1992	Total HPCDD	0.21
1992	Total HPCDF	0.16
1992	Total HXCDD	0.017
1992	Total HXCDF	0.065
Jul-93	Total PECDD	0.0064
Jul-93	Total PECDF	0.041
Jul-93	Total TCDD	0.27
Jul-93	Total TCDF	0.076
1992	2-Butanone	7.2
Jul-93	2-Hexanone	0.038
Jul-93	Acetone	50
Jul-93	Benzene	1.3
Jul-93	Carbon Disulfide	0.022
Jul-93	Chlorobenzene	29
Jul-93	Ethyl Benzene	2.3
1992	Methylene Chloride	0.68
Jul-93	Toluene	0.87
Jul-93	Xylene (total)	150

(1): Source: Passaic River Study Area – RI/FS Work Plans; Investigation Work Plan; Volume 4 of 5 – Safety and Health Contingency Plan, Table 4-1, Page 4-6; TSI, January 1995.

TABLE 4-3 (continued)
ESTIMATED MAXIMUM CONCENTRATIONS OF HAZARDOUS
CHEMICALS IN SEDIMENT ON SITE¹

Date	Compound	Max. Conc. (mg/kg)
Jul-93	4,4 DDD	221
1991	4,4 DDE	2.72
1991	4,4 DDT	7.69
Jul-93	Aldrin	0.0598
Jul-93	Alpha-BHC	0.0346
1992	Alpha-Chlordane	0.129
Jul-93	Beta-BHC	8.44
1991	Delta-BHC	0.0454
Jul-93	Dieldrin	0.270
1992	Endosulfan I	0.151
Jul-93	Endosulfan II	0.123
Jul-93	Endosulfan sulfate	0.107
Jul-93	Endrin	1.25
Jul-93	Endrin aldehyde	0.452
Mar-93	Endrin ketone	0.166
1991	Gamma-BHC (Lindane)	0.0368
1992	gamma-Chlordane	0.128
Mar-93	Heptachlor	0.003
1991	Heptachlor epoxide (exo)	0.108
1991	Methoxychlor	0.083
1991	Nonachlorbiphenyl	0.020
1991	Decachlorbiphenyl	0.001
Jul-93	Dibutyltin	3.18
Jul-93	Monobutyltin	5.07
1992	Tributyltin	584

(1): Source: Passaic River Study Area – RI/FS Work Plans; Investigation Work Plan; Volume 4 of 5 – Safety and Health Contingency Plan, Table 4-1, Page 4-6; TSI, January 1995.

TABLE 4-3 (continued)
ESTIMATED MAXIMUM CONCENTRATIONS OF HAZARDOUS
CHEMICALS IN SEDIMENT ON SITE¹

Date	Compound	Max. Conc. (mg/kg)
1991	As	233
1991	Ba	968
1991	Be	2.7
1991	Cd	45.4
Jul-93	Cr	1,530
1991	Cy	6.02
1991	Hg	29.6
1992	Mg	11,100
Jul-93	Mn	3,190
1990	Ni	230
Jul-93	Pb	2490
Jul-93	Va	199
Jul-93	1,2 Dichlorobenzene	17
Jul-93	1,2,4 Trichlorobenzene	120
Jul-93	1,3 Dichlorobenzene	21
Jul-93	1,4 Dichlorobenzene	35
1991	2-Methylnaphthalene	850
1990	2-Methyphenol	0.29
Jul-93	4-Chloroaniline	1.8
1990	4-Methylphenol	7.5
1990	4-Nitrophenol	0.53

(1): Source: Passaic River Study Area – RI/FS Work Plans; Investigation Work Plan; Volume 4 of 5 – Safety and Health Contingency Plan, Table 4-1, Page 4-6; TSI, January 1995.

TABLE 4-3 (continued)
ESTIMATED MAXIMUM CONCENTRATIONS OF HAZARDOUS
CHEMICALS IN SEDIMENT ON SITE¹

Date	Compound	Max. Conc. (mg/kg)
1991	Acenaphthene	1,000
1991	Anthracene	500
1991	Benzo(a)anthracene	320
1991	Benzo(a)pyrene	210
1991	Benzo(b)fluoranthene	110
1991	Benzo(ghi)perylene	46
1991	Benzo(k)fluoranthene	110
Jul-93	bis(2-Ethylhexyl)phthalate	1,700
1991	Butyl benzyl phthalate	1.8
Jul-93	Carbazole	26
1991	Chrysene	340
Jul-93	Di-n-butyl phthalate	38
Jul-93	Di-n-octyl phthalate	170
1991	Dibenzo(a,h)anthracene	29
Jul-93	Dibenzofuran	74
1991	Fluoranthene	420
1991	Fluorene	530
Jul-93	Hexachlorobenzene	4.7
1991	Indeno(1,2,3-c,d)pyrene	55
1991	Naphthalene	1,300
1991	Phenanthrene	1,200
1990	Phenol	0.35
1991	Pyrene	650
1991	2,4 Dichlorophenol	350
1991	2,4,6 Trichlorophenol	1.2
1991	2-Chlorophenol	40
Jul-93	4-Methylphenol	6.3
Jul-93	TEPH as Diesel	52,000

(1): Source: Passaic River Study Area – RI/FS Work Plans; Investigation Work Plan; Volume 4 of 5 – Safety and Health Contingency Plan, Table 4-1, Page 4-6; TSI, January 1995.

Table 4-4: Physicochemical Characteristics of Chemicals of Concern

(see next page)

TABLE 4-4
PHYSICO-CHEMICAL CHARACTERISTICS OF CHEMICALS OF CONCERN ⁽¹⁾

	CAS #	OSHA PEL	ACGIH TLV/ Recommended Exposure Limits	IDLH	Vapor Pressure mm @ 68 F	Specific Gravity @ 68 F	Skin Hazard	Odor Threshold	Carcinogen Category	OVA % (Methane) Response	MW grams
Acetone	67-64-1	750 ppm 1000 ppm S	750 ppm 1000 ppm S	2000 ppm	180	0.79	NO	mint like 47.5 - 1613.9 mg/m ³	IRIS D	60	58.1
Aldrin	309-00-2	0.25 mg/m ³	0.25 mg/m ³	100 mg/m ³	0.00008	1.6	YES	odorless	IRIS B2	NA	364.9
Alpha-BHC (alpha-hexachlorocyclohexane)	319-84-6	NE	NE	NE	0.02	1.87	YES	0.088 ppm (in water)	IRIS B2	NE	290.83
Auconaphthalene	83-32-9	0.2 mg/m ³ (b)	0.2 mg/m ³ (b)	NE	2.5					NA	154.21
Anthrane	120-12-7	0.2 mg/m ³ (b)	0.2 mg/m ³ (b)	NE	0.23	1.283 @ 25°C	YES	Weak aromatic odor	IRIS A1	NA	178.23
Antimony	7440-36-0	0.5 mg/m ³	0.5 mg/m ³	80 mg/m ³	0.04	6.69	NO		NE	NA	121.75
Aroclor 1248 (Polychlorinated Biphenyl, 48% chlorine)	12672-29-6	NE	NE	NE	0.0004	1.4 @ 15.5°C	YES	"odorless"	IRIS B2	NA	299.5
Aroclor 1254 (Polychlorinated Biphenyl, 54% chlorine)	11097-69-1	0.5 mg/m ³	0.5 mg/m ³	5 mg/m ³	0.00006	1.38 @ 77°F	YES	"odorless"	IRIS B2	NA	328.4
Arsenic (Inorganic)(Metal)	7440-38-2	0.01 mg/m ³ (a) 0.2 mg/m ³	0.2 mg/m ³	100 mg/m ³	0.097	5.73	NO	"odorless"	IRIS A	NA	74.9
Barium	7440-39-3	0.5 mg/m ³	0.5 mg/m ³	1100 mg/m ³	0.35	3.51	NO	"odorless"	NE	NA	137.33
Benzene	71-43-2	1 ppm S 5 ppm S	0.1 ppm (a) 10 ppm	3000 ppm	75	0.88	YES	aromatic 5 - 119 ppm	IRIS A	150	78.11
Benzo(a)anthracene	56-55-3	0.2 mg/m ³ (b)	0.2 mg/m ³ (b)	NE	5.00E-09					NA	228.3
Benzo(a)pyrene	50-32-8	0.2 mg/m ³ (b)	0.2 mg/m ³ (b)	NE	5.00E-09	1.351	YES	faint aroma	IRIS B2	NA	252.3
Benzo(b)fluoranthene	205-99-2	0.2 mg/m ³ (b)	0.2 mg/m ³ (b)	NE	"0"		YES		IRIS B2	NA	252.3
Benzo(g,h,i)perylene, methyl	191-24-2	0.2 mg/m ³ (b)	0.2 mg/m ³ (b)	NE	1.00E-10				IRIS D	NA	276.31
Benzo(k)fluoranthene	207-08-9	0.2 mg/m ³ (b)	0.2 mg/m ³ (b)	NE	9.60E-11		YES		IRIS B2	NA	252.32
Beryllium	7440-41-7	0.002 mg/m ³ 0.005 mg/m ³ C	0.002 mg/m ³	10 mg/m ³	"0"	1.85	NO		IRIS B2	NA	9.01
Beta-BHC (trans-alpha-benzene hexachloride)	319-85-7	NE	NE	NE	0.005	1.89 @ 19 C	YES		IRIS C	NE	290.83
BHC, gamma-	319-86-8	NE	NE	NE	0.02						290.83
bis(2-ethyl hexyl) Phthalate	117-81-7	5 mg/m ³ 10 mg/m ³ S	5 mg/m ³ 10 mg/m ³ S	NE	0.2	0.99	NO		IARC 2B	NA	390.57
Buanoone 2- (Methyl Ethyl Ketone)	78-93-3	200 ppm 300 ppm S	200 ppm 300 ppm S	3000 ppm	71	0.81	NO	mint or acetone like 10 - 20 ppm	IRIS D	80	72.1
Butyl Benzophthalate	85-68-7	NE	NE	NE	0.0000086						312.4
Butyl Phthalate di-n-	84-74-2	5 mg/m ³	5 mg/m ³	9300 mg/m ³	0.03	1.05	NO			NA	278.35
Cadmium (dust)	7440-43-9	.005 mg/m ³	0.01 mg/m ³ T(a) 0.002 mg/m ³ R(a) 0.05 mg/m ³	50 mg/m ³	0.09	8.65 @ 77 F	NO	"odorless"	IRIS B1	NA	112.4
Carbon Disulfide	75-15-0	4 ppm 12 ppm S	10 ppm	500 ppm	297	1.26	YES	ether-like odor	NE	NE	76.1
Chlorobenzene (Monochlorobenzene)	108-90-7	75 ppm	10 ppm (a) 75 ppm	2400 ppm	11	1.11	NO	almond-like 1 mg/m ³ 280 mg/m ³	IRIS D	200	112.56

(1): Source: Passaic River Study Area – RI/FS Work Plans; Investigation Work Plan; Volume 4 of 5 – Safety and Health Contingency Plan, Table 6-1, Page 6-17; TSI, January 1995.

TABLE 4-4 (continued)
PHYSICO-CHEMICAL CHARACTERISTICS OF CHEMICALS OF CONCERN ⁽¹⁾

	CAS #	OSHA PEL	ACGIH TLV/ Recommended Exposure Limits	IDLH	Vapor Pressure		Skin Hazard	Odor Threshold	Carcinogen Category	OVA % (Methane) Response	MW	
					mm @ 68 F	@ 68 F					grams	
Chlorophenol 2-	95-57-8	NE	NE	NE	2.2	1.26	YES	Unpleasant, penetrating 0.00018	IARC 2B	NE	128.56	
Chromium (metal)	7440-47-3	1 mg/m ³	0.5 mg/m ³	NE	0.02	7.14	NO	odorless	NE	NA	520	
Chromium III	16065-83-1	0.5 mg/m ³	0.5 mg/m ³	NE	0.02	varies	YES	odorless	NA	NA	520	
Chromium VI	7440-47-3	0.1 mg/m ³ C (for chromic acids and chromates)	0.05 mg/m ³	NE	0.02		NO	odorless	IRIS A	NA	520	
Chrysene (1,2-Benzophenanthrene)	218-01-9	0.2 mg/m ³ (b)	0.2 mg/m ³ (b)	NE	0.00000006	1.274	YES		IRIS B2	NA	228.29	
Coal Tar Pitch Volatiles	65996-93-2	0.2 mg/m ³		700 mg/m ³	varies		YES		IARC 1	NA		
Cyanide, potassium salt	151-50-8	5 mg/m ³	5 mg/m ³	50 mg/m ³	~0	1.55	YES	faint, bitter, almond	NE	NA	65.12	
Cyanide, sodium salt	14-33-9	5 mg/m ³	5 mg/m ³	50 mg/m ³	~0	1.6	YES	faint, bitter, almond	NE	NA	49	
DDE (p,p' Dichlorophenylchloroethylene)	72-55-9	NE	0.00029 (D)	NE	0.0000065				IRIS B2	NA	318.03	
DDT	50-29-3	1 mg/m ³	1 mg/m ³	NE	0.00000015	0.99	YES	fruit-like, aromatic 0.35 ppm in water	IRIS B2	NA	354.49	
Dibenzofuran	132-64-9	NE	NE								168.2	
Dichlorobenzene 1,2-	95-50-1	50 ppm C	25 ppm 50 ppm C	1000 ppm	1	1.3	YES	Aromatic 50 ppm	IRIS D	50	147	
Dichlorobenzene 1,3-	541-73-1	NE	NE	NE	2	1.2884	YES		IRIS D	NE	147	
Dichlorobenzene 1,4-	106-46-7	75 ppm 110 ppm S	75 ppm 110 ppm S	1000 ppm	0.18	1.25	NO	Mothball-like Aromatic (strong at 30-60 ppm)	IARC 2B	113	147	
Dichlorophenol 2,4-	120-83-2	NE	NE		0.33						163	
Dieldrin	60-57-1	0.25 mg/m ³	0.25 mg/m ³	450 mg/m ³	0.00000016	1.75	YES	odorless to mild, chemical 0.041 ppm	IRIS B2	NA	380.93	
Endrin	72-20-8	0.1 mg/m ³	0.1 mg/m ³	2000 mg/m ³	0.00000017	1.7	YES	odorless to faint chemical 0.018 ppm	IRIS D	NA	380.93	
Ethyl Benzene	100-41-4	100 ppm 125 ppm S	100 ppm 125 ppm S	2000 ppm	8.6	0.87	NO	aromatic	IRIS D	100	106.2	
Fluoranthene	206-44-0	0.2 mg/m ³ (b)	0.2 mg/m ³ (b)	NE	0.01	1.25 @ 0C	YES		IRIS D	NE	202.26	
Fluorene	867-37-1	0.2 mg/m ³ (b)	0.2 mg/m ³ (b)	NE	1.7	1.203 @ 0C	Yes		IARC 3	NE	166.22	
Hexachlorobenzene	118-74-1	NE	0.025 mg/m ³ (a)	NE	0.28	1.569 @ 23.6C	YES		IRIS B2	NE	284.78	
Hexanone 2-	591-78-6	5 ppm	5 ppm	5000 ppm	3.5	0.81	YES	acetone-like odor		NE	100.16	
Indenol (1,2,3-c,d)pyrene	193-39-5	0.2 mg/m ³ (b)	0.2 mg/m ³ (b)	NE	~0		YES		IRIS B2	NA	276.34	

(1): Source: Passaic River Study Area – RI/FS Work Plans; Investigation Work Plan; Volume 4 of 5 – Safety and Health Contingency Plan, Table 6-1, Page 6-17; TSI, January 1995.

TABLE 4-4 (continued)
PHYSICOCHEMICAL CHARACTERISTICS OF CHEMICALS OF CONCERN ⁽¹⁾

	CAS #	OSHA PEL	ACGIH TLV/ Recommended Exposure Limits	IDLH	Vapor Pressure mm @ 68 F	Specific Gravity @ 68 F	Skin Hazard	Odor Threshold	Carcinogen Category	OVA % (Methane) Response	MW grams
Lead (inorganic)	7439-92-1	0.05 mg/m ³ 10 mg/m ³ T 5 mg/m ³ R	0.15 mg/m ³ 10 mg/m ³	700 mg/m ³	0.04	11.34	NO	odorless	IRIS B2	NA	207
Magnesium (dust)	1309-48-4	5 mg/m ³ R	10 mg/m ³	NE	0	3.58	NO		NE	NA	40.3
Manganese	7439-96-5	5 mg/m ³ C	0.2 mg/m ³ (a) 5 mg/m ³	NE	0.029	7.2	NO		IRIS D	NA	54.9
Mercury (organo) alkyl compounds (as Hg)	7439-97-6	0.01 mg/m ³ 0.03 mg/m ³ S	0.01 mg/m ³ 0.03 mg/m ³ S	10 mg/m ³	varies	varies	YES		IRIS D	NA	
Methyl Naphthalene 2-	91-57-6	0.2 mg/m ³ (b) 25 ppm	0.2 mg/m ³ (b) 50 ppm	NE	3.1	1.01 @ 20C	NO	0.01 - 0.05 ppm sweet, pleasant 160 - 307 ppm	NE		142.2
Methylene Chloride	75-09-2	125 ppm S	50 ppm	5000 ppm	350	1.33	NO		IRIS B2	90	84.9
Methylphenol 2-	95-48-7	NE	NE		0.21						108.14
Methylphenol 4-	106-44-5	NE	NE		0.097						108.14
Naphthalene	91-20-3	10 ppm 15 ppm S	10 ppm 15 ppm S	500 ppm	0.08	1.15	NO	Odor to mothballs		NA	128.2
Nickel (soluble salts)	7440-02-0	1 mg/m ³	1 mg/m ³ 0.05 mg/m ³ (a)		0.02	8.9	NO		IRIS A1 (refinery dust)	NA	58.69
Nitrophenol 4-	100-02-7	NE	NE		0.5	1.27	YES	odorless	NE	NA	139.11
Octyl Phthalate di-n- Phenanthrene	117-84-0	NE	NE	NE	0.05	0.973 @ 25 C	NE		NE	NA	390.56
Phenol	85-01-8	0.2 mg/m ³ (b) 5 ppm	0.2 mg/m ³ (b) 5 ppm	NE	0.28	0.98 @ 4C	YES	faint, aromatic sweet aromatic 0.05 - 16.4 ppm	IRIS D	NA	178.22
Potassium (dust)	108-95-2	5 ppm	5 ppm	250 ppm	0.4	1.06	YES		IRIS D	54	94.1
Pyrene (Benz(a,c)phenanthrene)	7440-09-7	10 mg/m ³ T 5 mg/m ³ R	10 mg/m ³	NE	0.11	0.86				NA	39.1
Tetrachlorodibenzo-p-dioxin 2,3,7,8-	129-00-0	0.2 mg/m ³ (b)	0.2 mg/m ³ (b)	NE	0.43	1.271 @ 23 C	YES		IRIS D	NA	202.26
Tin (soluble)	1746-01-6	NE	NE	NE	6.40E-10		YES		IARC B2	NA	321.96
Toluene	7440-31-5	2 mg/m ³ 100 ppm	2 mg/m ³ 50 ppm	400 mg/m ³ 2000 ppm	0.03	7.28	YES			NA	118.69
Trichlorobenzene 1,2,4-	108-88-3	150 ppm S	50 ppm	NE	21	0.87	YES	sweet pungent 2.14 ppm	IRIS D	110	92
Trichlorophenol 2,4,6-	120-82-1	5 ppm C	5 ppm C	NE	0.26	1.45	YES	Aromatic 3 ppm	IRIS D	100	181.46
Vanadium	88-06-6	NE	NE		0.4						197.45
Xylene, all isomers	1314-82-1	0.05 mg/m ³ 100 ppm	0.05 mg/m ³ 100 ppm	70 mg/m ³	0	3.36	NO		NE	NA	181.88
Xylene, m-	1330-20-7	150 ppm S	150 ppm S	1000 ppm	9	NA	NO	aromatic	IRIS D	NE	106.2
Xylene, o-	106-42-3	100 ppm 150 ppm S	100 ppm 150 ppm S	1000 ppm	9	0.86	NO	aromatic	IRIS D	111	106.2
Xylene, p-	108-38-3	100 ppm 150 ppm S	100 ppm 150 ppm S	1000 ppm	9	0.86	NO	aromatic	IRIS D	116	106.2
Zinc Oxide Dust	1314-13-2	10 mg/m ³ T 5 mg/m ³ R	10 mg/m ³	NE	0		NO		IRIS D	NA	81.4

(1): Source: Passaic River Study Area – RI/FS Work Plans; Investigation Work Plan; Volume 4 of 5 – Safety and Health Contingency Plan, Table 6-1, Page 6-17; TSI, January 1995.

TABLE 4-4 (continued)
PHYSICO-CHEMICAL CHARACTERISTICS OF CHEMICALS OF CONCERN ⁽¹⁾

	CAS #	OSHA PEL	ACGIH TLV/ Recommended Exposure Limits	IDLH	Vapor Pressure mm @ 68 F	Specific Gravity @ 68 F	Skin Hazard	Odor Threshold	Carcinogen Category	OVA % (Methane) Response	MW grams
Zinc Oxide Fume	1314-13-2	5 mg/m ³ 10 mg/m ³ S	5 mg/m ³ 10 mg/m ³ S	NE	"0	5.61	NO		IRIS D	NA	81.4

NOTES:

- a These TLVs have not yet been adopted. ACGIH has placed them under notice of intended changes.
 ACGIH American Conference of Governmental Industrial Hygienists
 b This PEL/TLV is for all Coal Tar Pitch Volatiles combined. Separate PEL/TLVs have not been established to date.
 c Ceiling Limit, shall not be exceeded at any time during the work day.
 CAS # Chemical Abstracts Service Registry Number
 D Contaminant intake that should not induce adverse effects to human health or should not pose a risk of cancer occurrence greater than a predetermined risk level.
 Developed by U.S. Army Medical Bioengineering R&D Laboratory. Expressed in mg/kg/day.
 IARC International Agency for Research on Cancer
 IDLH Immediately Dangerous to Life or Health
 IRIS Integrated Risk Information System
 MW Molecular weight
 mg/m³ milligrams of contaminant per cubic meter of air
 NA Not Applicable
 NE Not Established
 OSHA Occupational Safety and Health Administration
 PEL Permissible Exposure Limit, unless noted is the TWA, Time Weighted Average (usually for 8 hours a day, 5 days a week), mandated by law (1989 standards)
 ppm parts of contaminant per million parts of air
 R Respirable Dust
 S Short Term Exposure Limit (STEL) usually 15 minutes, four times in one day
 S/5/2 STEL for 5 minutes, twice per day
 Skin Hazard Contaminant can be absorbed through intact skin.
 T Total Dust
 TLV Threshold Limit Value, unless noted is the TWA, Time Weighted Average (usually for 8 hours a day, 5 days a week), recommended
 Carcinogenic Category
 IRIS Human Carcinogen
 IARC Probable Human Carcinogen (limited human data)
 A 1 Probable Human Carcinogen (sufficient in animals, inadequate evidence in humans).
 B1 Possible Human Carcinogen
 2A Not Classifiable
 B2 Evidence of Non-Carcinogen
 2B
 C 3
 D 4
 E

(1): Source: Passaic River Study Area – RI/FS Work Plans; Investigation Work Plan; Volume 4 of 5 – Safety and Health Contingency Plan, Table 6-1, Page 6-17; TSI, January 1995.

4.3 PHYSICAL HAZARDS

Most of the field activities at the Site will occur on or near the Lower Passaic River. The following subsections discuss physical hazards that may be encountered during field activities, and control measures with which to minimize the potential for an incident.

4.3.1 Heat Stress

Exposure monitoring and required actions for heat stress are described in Section 7.2.

4.3.2 Cold Stress

Exposure monitoring and required actions for cold stress are described in Section 7.3.

4.3.3 Noise

TAMS/Malcolm Pirnie requires the use of hearing protection by all employees when noise levels exceed 85 decibels.

Hazards

The OSHA limit of 90 decibels may be exceeded on or near heavy equipment, such as drilling rigs or vibracoring equipment. A sound level meter (SLM), operating in the dBA mode, will be used to assess employee exposures when personnel are working.

Control Measures

Site workers will wear hearing protection when the noise levels exceed 85 decibels. In addition, all TAMS/Malcolm Pirnie personnel must undergo an initial employment, annual, and employment termination examination, during which a hearing test is conducted.

4.3.4 Slip, Trip, and Fall Hazards

Hazards

Transferring field personnel and equipment onto boats and subsequently back ashore presents slip, trip, and fall hazards, as the dock and/or boat may be in motion. While working on boats, surfaces are likely to be wet and slippery due to water, sediment, and other debris associated with field sampling activities. Trip hazards include equipment, lines, and tools. During field activities involving boats (*e.g.*, sediment sample collection, deploying and retrieving samplers and instruments in the water), falling into the water and overturning of boats are potential hazards. Waves and wind will cause the boats to sway and items on the surfaces to slide around on the deck.

Ground irregularities due to topography (*e.g.*, steep slopes/shore areas) or protruding materials (*e.g.*, nails in boards, broken glass) may pose a slip, trip, fall, or puncture hazards to workers. There are potential hazards from the presence of wet areas (*e.g.*, deck or bottom of boat), puddles, oil and grease, debris, loose or sandy soils/shorelines, or other obstructions that may be within passageways or walkways.

On bridges, irregular, slippery, and/or narrow walkways may pose potential slip, trip, and fall hazards to workers. Absence of guard rails may present fall hazards. Vehicle traffic may pose health and safety concerns.

Control Measures

Slip, trip, and fall hazards on boats and docks must be controlled by exercising care and caution when boarding and unloading boats, following safe boating practices, wearing PFDs at all times when working on the water, and maintaining good housekeeping practices for work areas onboard sampling vessels.

Rubber overboots will be worn by field personnel on vessels to protect slip, trip, and fall hazards. Field personnel will be briefed by the PSO each morning on the location and type of obvious hazards in the work areas. Site workers are to take care in areas where ground irregularities or protruding objects exist and may not be observed due to vegetation. Field personnel working on land will wear leather boots with puncture-resistant inserts to protect against sharp or heavy objects.

Field personnel will use handrails and guardrails (where available) on boats so as to minimize the potential of falling. Also, field personnel will be provided with PFDs in case of a man-overboard situation. Field personnel will exercise care and caution when:

- Boarding/leaving boats;
- Accessing instruments on the water or in the sediment;
- Releasing equipment out of, or bringing equipment into boats;
- Moving about a boat.

Field activities will not be conducted on the Lower Passaic River under dark conditions. Tasks will be completed in work areas on the Lower Passaic River before sunset. It is possible that samples and equipment will be unloaded to the field office after sunset. Only lit dock areas will be selected for use.

On bridges, leather safety work boots with puncture-resistant inserts will be worn. In the absence of guard rails, workers will use PFDs and personal fall arrest systems. Safety with regards to automobile traffic is addressed in Section 4.3.10.

4.3.5 Sanitation

Field activities will be conducted in accordance with the OSHA sanitation standard (29 CFR 1910.141). The field office will be equipped with a sanitary trailer; this trailer will be segregated by gender and will be equipped with toilet facilities and potable water for washing, and may be equipped with shower facilities and a clothes changing area. Boats of various sizes will be used during field activities; some boats may provide toilet facilities and potable water for hand washing, while others may not. During sediment coring activities, a shuttle boat will be used to transport sediment cores from sampling locations to the field office for processing. For boats without sanitation facilities, this shuttle boat may be used to transport workers to the field office to provide access to sanitation facilities. Portable radios and/or cellular telephones may be used as a means of

communication for coordinating such trips. Portable toilet facilities, hand sanitizers, and potable water will be provided on boats to the extent practicable.

Additional public restroom facilities along the river (*e.g.*, in public parks) will be located during field activities and communicated to field team personnel.

4.3.6 Lifting Safety

Hazards

Lifting and moving of heavy or awkwardly-balanced objects may result in injury.

Control Measures

Using proper lifting techniques may prevent back strain or injury. The fundamentals of proper lifting include:

- Consider the size, shape, and weight of the object to be lifted. A mechanical lifting device (such as a winch to deploy and retrieve water sampling equipment) or additional persons must be used to lift an object if it cannot be lifted safely alone.
- The hands and the object should be free of dirt or grease that could prevent a firm grip.
- Gloves must be used, and the object inspected for metal slivers, jagged edges, burrs, or rough or slippery surfaces.
- Fingers must be kept away from points that could crush or pinch them, especially when putting an object down.
- Feet must be placed far enough apart for balance. The footing should be solid and the intended pathway should be clear.
- The load should be kept as low as possible, close to the body with the knees bent.
- To lift the load, grip firmly and lift with the legs, keeping the back as straight as possible.
- A worker should not carry a load that he or she cannot see around or over.
- When putting an object down, the stance and position are identical to that for lifting; the legs are bent at the knees, and the back is straight as the object is lowered.

4.3.7 Equipment Operation

Hazards

Use of hand-operated tools or heavy machinery presents potential dangers to the health and safety of field personnel. Potential injuries include laceration, crushing, puncture, and being struck by machines/tools, as well as electrical hazards.

Control Measures

Hand tools (*e.g.*, power drill, Sawzall), which will be used to process and segment retrieved sediment cores, shall be equipped with ground fault circuit interruptors (GFCIs) in order to reduce the risk of electrical shock. When using power tools, field personnel will follow these guidelines:

- Read the owner's/operator's manual prior to use;
- Never use a tool unless trained to do so; hold the power tool and consider its weight, shape, size, and use, as well as what kinds of problems and accidents may arise from using it;
- Inspect the tool before use for worn or damaged parts; if the tool is not in usable condition, inform the FTL and obtain an operable tool;
- Avoid loose-fitting clothes; remove jewelry (*e.g.*, necklaces, rings),
- Wear appropriate work gloves, unless wearing of gloves under wet conditions cause a more slippery grip;
- Wear safety glasses, face shield, and face mask, as appropriate;
- Wear appropriate ear protection;
- Turn off and unplug tools before:
 - Adjusting, oiling, cleaning, or repairing,
 - Attaching an accessory,
 - Changing blades or drill bits.
- Unplug tools by pulling directly on the plug;
- Turn off and rest power tools on a flat surface when not in use.
- Stop working and turn off the power tool if distracted by something or someone.
- When using power drills:
 - Use double-insulated or properly grounded drills;
 - Use only good-quality (*i.e.*, sharp and not damaged) bits, and select the proper size and type of bit for the job;
 - Do not over-force the drill into hard material as the bit might break.

- When using saws:
 - Use the proper blade for the job;
 - Make sure that the blade is sharp, undamaged, and securely tightened in place;
 - Do not turn on the saw when the blade is in contact with the object to be cut; hold the saw firmly with one hand, and steady the object with the other hand before turning the saw on;
 - Keep your hand and other objects clear of the blade.

To prevent entrainment in moving machinery (*e.g.*, drilling rigs advancing casing), TAMS/Malcolm Pirnie employees will maintain a safe distance from heavy machinery. TAMS/Malcolm Pirnie employees will remain outside the swing radius of heavy equipment. The PSO or designee will remind all site workers each morning about the hazards of moving equipment. Subcontractors will place a worker near moving heavy equipment to guide the operator and warn others.

4.3.8 Electrical

Hazards

Electrical storms (thunderstorms) may pose an electrocution hazard. Use of power tools presents electrical hazards.

Control Measures

During thunderstorms, all heavy equipment will be shut down, activities on water will be terminated, and all personnel on-site will take refuge in buildings or automobiles.

All electrical equipment, power tools, and extension lighting used on this site will be protected by ground fault circuit interrupters (GFCIs); low-voltage equipment will be used wherever possible.

4.3.9 Falling Objects

Hazards

Falling objects from equipment, bridges, or other sources may present a potential source of danger for field personnel.

Control Measures

If there is a danger of falling objects on a property, the entire area inside the exclusion zone will be designated as a hard hat area. Hard hats will also be worn within 50 feet of drilling operations or other activities posing an overhead hazard.

4.3.10 Automobile Traffic

Hazards

During collection of water column samples from bridges, vehicular traffic may pose a hazard to field personnel.

Control Measures

When selecting bridges for collection of water column samples, bridges will be chosen based on their proximity to desired sampling locations, as well as the availability for a safe point from which to collect a sample. Bridges may have one or more lanes of traffic traveling in either direction; shoulders and/or sidewalks may or may not be available on the bridge. If a bridge is determined to be appropriate for collecting water column samples, the following considerations will be taken:

- Ownership of road/bridge: appropriate state, county, and/or local authorities will be contacted to determine:
 - Lead time for notification of when and how often samples will be collected.
 - Whether a Department of Transportation permit is required during sampling events.
 - Where a field vehicle may be parked (*e.g.*, on a shoulder, off the bridge in a secure location).
 - Whether a police officer is required to be present during sampling events.
- Whether or not traffic will need to be diverted (*e.g.*, if the bridge has two lanes traveling in each direction, has no shoulder or sidewalk, and one lane of traffic needs to remain closed during sampling activities).

- Whether or not flag persons will be required to divert traffic (*e.g.*, if the bridge has one lane traveling in each direction, has no shoulder or sidewalk, and one lane of traffic needs to remain closed during sampling activities), and whether or not such persons would need training by a local or state governing authority.
- Traffic cones and signs required by applicable NJDOT regulations.
- Clothing requirements (*e.g.*, bright, reflective clothing).

Field personnel will work in pairs when collecting water column samples from bridges; one of the sample team members will be responsible for collecting samples while the other team member will be responsible for watching for traffic. Samples will be collected during daylight hours, and not during nighttime.

4.4 Biological Hazards

A significant portion of fieldwork will be conducted in grassy and wooded areas along the river. Numerous biological hazards may be present, including poison ivy, snakes, thorny bushes and trees, ticks, mosquitoes, and other pests.

4.4.1 Ticks

Working in tall grass, especially in or at the edge of wooded areas, increases the potential for ticks to bite workers. Ticks can be particularly numerous in the spring and fall. Ticks are vectors of many different diseases including Rocky Mountain Spotted Fever (RMSF), Q fever, tularemia, Colorado tick fever and lyme disease. Ticks attach to the skin and intravenously feed on blood, creating an opportunity for disease transmission.

Hazards

The following tick-borne diseases may present hazards when conducting fieldwork. These diseases are transmitted primarily by the deer tick, which is smaller and redder than the common wood tick. The disease may be transmitted by immature ticks, which are small and hard to see. The tick may be as small as a period on this page.

- *Lyme Disease* – This disease commonly occurs in the tri-state area (Connecticut, New York, New Jersey) in the spring and summer and is transmitted by the bite of infected

ticks. Symptoms of Lyme disease include a rash or a peculiar red spot, like a bull's eye, which expands outward in a circular manner. The victim may have headache, weakness, fever, a stiff neck, swelling and pain in the joints, and eventually, arthritis.

- *Erlichiosis* – The disease also commonly occurs in the summer and is transmitted by the bite of infected ticks. Symptoms of erlichiosis include muscle aches, joint aches, and flu-like symptoms, but there is typically no skin rash.
- *Rocky Mountain Spotted Fever (RMSF)* – This disease is transmitted via the bite of an infected tick. The tick must be attached for 4 to 6 hours before the disease-causing organism (*Rickettsia rickettsii*) becomes reactivated and can infect humans. The primary symptom of RMSF is the sudden appearance of a moderate-to-high fever. The fever may persist for 2 to 3 weeks. The victim may also have a headache, deep muscle pain, and chills. A rash appears on the hands and feet on about the third day and eventually spreads to all parts of the body. For this reason, RMSF may be confused with measles or meningitis. The disease may cause death, if untreated, but if identified and treated promptly, death is uncommon.

Control Measures

Covering exposed areas of the body and the use of insect repellent containing N,N-Diethyl-m-toluamide (DEET) help prevent tick bites. Periodically during the workday, employees should inspect themselves for the presence of ticks. If a tick is discovered, the following procedures should be used to remove it:

- Do not try to detach a tick with your bare fingers; bacteria from a crushed tick may be able to penetrate even unbroken skin. Fine-tipped tweezers should be used.
- Grip the tick as close to your skin as possible and gently pull it straight away from you until it releases its hold.
- Do not twist the tick as you pull and do not squeeze its body – this may actually inject bacteria into your skin.
- Thoroughly wash your hands and the bite areas with soap and water. Apply an antiseptic to the bite area.
- Save the tick in a small container with the date, the body location of the bite and where you think the tick came from.
- Notify the PSO of any tick bites as soon as possible.

Recently, Lyme disease has been the most prevalent type of disease transmitted by ticks in the United States. Ticks transmit other diseases similar to Lyme disease, which present similar symptoms and long-term consequences. All personnel sustaining a tick bite should consult a physician.

4.4.2 Mosquitoes

Personnel may be exposed to mosquitoes during work activities along the river.

Hazards

Typical exposure to mosquitoes does not present a significant hazard. However, if West Nile virus is prevalent in the area, mosquitoes can present a hazard and exposure to this virus is increased. West Nile virus results in flu-like symptoms and can be serious if not treated or in immune-compromised individuals. West Nile cases have been confirmed in New Jersey.

Control Measures

To minimize the threat of mosquito bites, all personnel working outside must be aware of the potential for encountering mosquitoes and implement the basic precautions listed below:

- Avoid working at dawn or dusk when mosquitoes are most active.
- Prevent accumulation of standing water at the work site.
- Apply an insect repellent that contains DEET to exposed skin and clothing.
- Wear light colored clothes, preferably with long-sleeves and full-length pants.
- Do not touch any dead birds or animals.

If dead birds are detected near a particular work area, report to the local County Health Department. If flu-like symptoms are present, contact the Site HSC for more information.

4.4.3 Spiders

Field personnel may encounter spiders during work activities along the Lower Passaic River. This subsection addresses identifying several poisonous species which may be present at the site, and appropriate response.

Hazards

Two spiders are of concern, the black widow and the brown recluse. Both prefer dark sheltered areas such as basements, equipment sheds and enclosures, and around woodpiles or other scattered debris.

The black widow is shiny black, approximately 1 inch long, and found throughout the United States. There is a distinctive red hourglass marking on the underside of the black widow's body. The bite of a black widow is seldom fatal to healthy adults, but effects include respiratory distress, nausea, vomiting, and muscle spasms.

The brown recluse is smaller than the black widow and gets its name from its brown coloring and behavior. The brown recluse is more prevalent in the southern United States but may be found in New Jersey. The brown recluse has a distinctive violin shape on the top of its body. The bite of the brown recluse is painful; the bite site ulcerates and takes many weeks to heal completely.

Control Measures

To minimize the threat of spider bites, all personnel walking through vegetated areas must be aware of the potential for encountering these arachnids. Personnel need to avoid actions that may result in encounters, such as turning over logs and placing hands in dark places such as behind equipment or in corners of equipment sheds or enclosures. If a spider bite occurs, the victim must be transported to the nearest hospital as soon as possible; first aid consists of applying ice packs and washing the area around the wound to remove any unabsorbed venom.

4.4.4 Snakes

Field personnel may encounter snakes while conducting fieldwork. This subsection addresses identifying several species of snakes which may be present at the site, and appropriate response.

Hazards

Non-poisonous snakes may be present at the Lower Passaic River Site, but it is highly unlikely that poisonous snakes will be present. There are only two poisonous snakes, the Timber Rattlesnake and the Copperhead, found in New Jersey. The Timber Rattlesnake is an Endangered Species and can only be found in a few remote, “rugged” areas of the state. It is highly unlikely to find this species in urbanized areas of the Lower Passaic River. Similarly, the habitat of the Copperhead is generally wooded hills with rock outcrops.

Control Measures

With the exception of some rare species of poisonous snakes, snakes will not attack unless provoked. All snakes encountered should be avoided. If a snake is discovered, the PSO should be immediately informed of the snake’s location, size and type, if known. In most cases, only a brief interruption of work will be necessary to allow the snake to vacate the work area on its own.

4.4.5 Poisonous Plants

Field personnel may encounter poisonous plants while conducting fieldwork. This subsection addresses identifying and controlling exposure to common species.

Hazards

Poisonous plants may be present along the Lower Passaic River. Personnel should be alerted to their presence, and instructed on methods to prevent exposure. For example, poison ivy is a climbing plant with ternate leaves (arranged in threes), with white berries. Poison oak is similar to poison ivy, but its leaves appear oak-like in form. The leaves of these poisonous plants produce irritating oil causing an intensely itching skin rash and characteristic bullous lesions.

Control Measures

The main control is to avoid contact with the plant, cover arms and hands, and frequently wash potentially exposed skin. Particular attention must be given to avoiding skin

contact with objects or protective clothing that have touched the plants. Treat every surface that may have touched the plant as contaminated, and practice contamination avoidance. If skin contact is made, the area should be washed immediately with soap and water, and observed for signs of reddening.

4.5 Boating Safety

Fieldwork that requires using vessels in the Lower Passaic River and tributaries and which requires the raising of drawbridges and/or turning of swing bridges will be coordinated with the Point of Contact at Caven Point, and will be overseen by the USEPA or its designee. All vessels associated with the field activities will monitor the USCG on Marine Band Radio, Channel 16. Operators of local bridges will be notified on a daily basis of the likely location of field activities on the river. No work is anticipated to be performed on the river after dusk or before dawn. While performing fieldwork within the designated navigational channel proper, the boats will station buoys to clearly denote the area in which other boats may freely navigate. The navigational channel will not be completely blocked during fieldwork and vessels associated with the field activities will yield to other vessels that may need to pass. Additionally, fieldwork on the river will not occur if visibility is less than 200 feet at that given location.

Contractor personnel working over, adjacent, or near water, or where the danger of drowning exists, must wear a USCG-approved life jacket or buoyant work vests. Prior to and after each use, the buoyant work vests or life preservers must be inspected for defects, which would alter their strength and buoyancy. Defective units must be removed from service. Ring buoys with at least 90 feet of line must be provided and readily available for emergency rescue operations. Distance from ring buoys may not exceed 200 feet. Some means of rescue (*e.g.*, a ring buoy or boat) must be immediately available at locations where personnel are working over or adjacent to water.

Hazards

Working from a boat presents obvious hazards, including drowning, but several other hazards exist. Powered boats carry a fuel supply, with the potential for fire or explosion if vapors accumulate and reach an ignition source. Weather, currents, and other watercraft may also pose significant hazards to the crew.

Control Measures

In land-based field operations, proper training and equipment are essential to completing field tasks efficiently and safely. This also holds true for operations conducted on or adjacent to bodies of water. The type of boats to be utilized may include Boston Whalers, “Zodiac” boats, “Jon” boats, pontoon boats, and small powerboats (less than 20 feet long).

The operator/skipper of each boat must complete a USCG-certified boating safety training course prior to conducting work on the river. Each employee working from a boat is required to participate in a boating safety training session conducted during the daily safety meeting. The training session must provide instruction on the following topics:

- Proper boat and safety equipment inspections.
- Content and frequency of equipment safety inspections.
- Proper use of on-board safety equipment, including fire extinguisher, radio or cellular phone, flares, horn, etc.
- Proper procedures on the completion and filing of a float plan.
- Appropriate boating “rules-of-the-river”.
- Emergency procedures in the event of capsizing or being thrown overboard.
- Personal flotation devices (PFDs) and their proper inspection and use.

Prior to each day or shift of operations, a boat inspection must be conducted by the boat operator/skipper. This inspection must be conducted in accordance with accepted USCG and any applicable state boating safety inspection procedures. The inspection must verify that necessary safety equipment is aboard, functioning properly, and all members of the crew are aware of proper procedures that are to be followed upon the water. In addition,

this information must be reviewed during the daily tailgate safety meeting to confirm that the procedures have been followed and all crew members are satisfied as to its completion.

It will be the responsibility of the FTL to verify that daily boat/equipment inspections are completed and documented, and daily tailgate safety meetings are conducted. The following safety procedures must be followed at all times:

- Boat(s) must not be overloaded with equipment or personnel.
- Loads must be distributed evenly throughout the boat.
- A Type III PFD (*e.g.*, life jacket or life vest) must be worn at all times when working on or adjacent to the water.
- Prior to each use, the PFD or work vest must be inspected for defects that may alter its strength or buoyancy. PFDs must also be properly inspected to confirm that appropriate USCG approvals and ratings information is available. Defective units must be tagged “DO NOT USE” and removed from service.
- At least one throwable PFD (*e.g.*, seat cushion or ring buoy) must be available on board each boat.
- In addition to PFDs, personnel who are working in boats over water when the sum of the air temperature and water temperature is less than 90 degrees Fahrenheit (°F), must be equipped with thermal protective clothing/equipment (wet suits, dry suits, or survival suits). The thermal protective clothing must be adequate to protect personnel from hypothermic effects of immersion in water at the temperatures encountered.
- Sampling activities may be done using hip waders and the required level of PPE. Waders must be inspected prior to donning for holes, punctures, tears, or any other defect (*i.e.*, missing straps) that would allow water to enter. In addition to drowning and other hazards associated with working on or near the water, there exists the possibility for slips, trips, or falls caused by slippery, unstable, and irregular walking surfaces. Waders used for sampling activities must be properly sized and provide the wearer with adequate traction.
- An audible signal/alarm (audible at up to ½ mile away) must be maintained in each boat.
- Each boat must be equipped with a ship-to-shore radio, cellular phone, and/or “walkie-talkie” capable of contacting the USCG, marine police, or other on-shore station to call for help in an emergency.
- Each boat must be equipped with some type of visual display signal/device (*e.g.*, flares or appropriate distress flag).

- All powerboats must have a valid state registration. This registration must be maintained on the boat, and as necessary be made available for USCG or marine police inspection.
- At a minimum, each powerboat must be equipped with a Type 4-A, 10-B, C-rated fire extinguisher.
- Boats may not be operated at night without proper lighting and the capability for making visual distress signals.
- The “buddy system” will be strictly adhered to during any water-related activities. At no time will anyone enter the water or conduct boating activities without another individual readily available to contact emergency services.

5 PERSONAL PROTECTIVE EQUIPMENT

5.1 GENERAL PROTECTION LEVELS

Personnel must wear protective equipment when work activities involve known or suspected radiological or chemical atmospheric contamination; when vapors, gases, or particulates may be generated; or when direct contact with dermally active substances may occur. Respirators can protect the lungs, the gastrointestinal tract and the eyes against air toxicants. Chemical-resistant clothing can protect the skin from contact with skin-destructive and skin-absorbable chemicals. Good personal hygiene limits or prevents the ingestion of materials.

Equipment designed to protect the body against contact with known or anticipated chemical hazards has been divided into four categories according to the degree of protection afforded.

- Level A: Level A should be selected when the highest level of respiratory, skin and eye protection is needed. It is not anticipated that use of Level A protection will be required at the LPRRP Site.
- Level B: Level B should be selected when the highest level of respiratory protection is needed, but a level of skin protection lower than Level A is required. Level B protection is the minimum level recommended on initial site entries until the hazards have been further defined by on-site studies. It is not anticipated that use of Level B protection will be required at the LPRRP Site.
- Level C: Level C should be selected when the types of airborne contaminants are known, the concentrations have been measured and the criteria for using air-purifying respirators are met. Level C requires the use of a full-face air-purifying respirator equipped with an organic vapor, dust, fumes and mists combination cartridge. It is not anticipated that use of Level C protection will be required at the LPRRP Site.
- Level D/Modified Level D: Level D should be selected only when there are no respiratory or skin hazards suspected or known to exist at the site. Modified Level D PPE is selected when no respiratory hazards are suspected or known to exist, yet the potential for dermal hazards including contact with contaminated soils/sediments, splashes or immersion exists. If the potential for splashes or immersion exists (*e.g.*, during water column sampling or sediment core segmentation), coated-type chemical resistant coveralls (*e.g.*, Saranex or full rain gear) and hard hats with face shields could be selected. Face shields are mandatory for sediment core segmentation. If the only dermal hazards which existed were related to sediment sampling, a non-coated

semi-permeable-type coverall (such as Tyvek) could be selected, thereby avoiding the heat stress hazards associated with an impermeable coverall. It is anticipated that use of Level D/Modified Level D protection will be required at the LPRRP Site.

The level of protection selected is based primarily on:

- Types and measured concentrations of the contaminants in the ambient atmosphere and their associated toxicity; and
- Potential or measured exposure to substances in air and water, splashes of liquids, or other indirect contact with material due to the task being performed.

In situations where the types of contaminants, concentrations, and possibilities of contact are not known, the appropriate level of protection must be selected based on professional experience and judgment until the hazards may be further characterized. The individual components of clothing and equipment must be assembled into a full protective ensemble to protect the worker from site-specific hazards, while at the same time minimizing hazards and drawbacks of the personal protective gear itself. Ensemble components outlined in the following subsection are based on the widely-used USEPA Levels of Protection.

In general, the following guidelines apply:

- All protective headgear shall meet the requirements of the American National Standards Institute (ANSI) Z89.1, Class A or ANSI Z89.2, Class B.
- Personnel will be provided with eye and face protective equipment when machines or operations present potential eye or face injury from physical, chemical or radiological agents. Eye and face protective equipment shall meet the requirements in ANSI Z87.1, Practice for Occupational and Educational Eye and Face Protection.
- Persons requiring corrective lenses in eyeglasses, when required by this regulation to wear eye protection, will be protected by one of the following:
 - Eyeglasses whose protective lenses provide optical correction; or
 - Goggles that can be worn over corrective lenses without disturbing the adjustment of the spectacles; or goggles that incorporate corrective lenses mounted behind the protective lenses.
- If excessive noise levels are encountered, particularly around heavy equipment operation, noise protection shall be provided as appropriate.

- Persons handling rough, sharp-edged, abrasive materials or whose work subjects the hand to lacerations, punctures, burns, or bruises will use general-purpose outer hand protection in addition to the chemical resistant inner and outer gloves, as required.
- Employees will wear clothing suitable for the weather and work conditions. The minimum will be a shirt, long trousers, and protective work shoes or boots. Canvas tennis or deck shoes are not acceptable.
- Protective footwear (*e.g.*, steel-toed) will be worn by all persons who are engaged in the work. Steel-toed rubber boots will be worn aboard boats and in work areas where immersion or splash hazards exist.
- PPE will be inspected regularly and maintained in serviceable and sanitary condition and before being reissued to another person or returned to storage, will be cleaned, disinfected, inspected, and repaired.

5.2 REQUIRED LEVEL OF PROTECTION

Based upon current information regarding the contaminants present at the Lower Passaic River Site and a hazard evaluation of the various PI tasks to be completed (see Section 4.0), the required level of personal protection is provided by task in Table 5-1. The Malcolm Pirnie Corporate Health and Safety Program Guide (June 1988) contains the protocol for PPE and Respiratory Protection, as required by OSHA (29 CFR 1910.120).

Table 5-1: Required Level of Protection

STUDY	ANTICIPATED LEVEL OF PPE
Sediment Sampling	Modified Level D
Barge-Based Sampling	Modified Level D
Water Column Sampling	Level D

The HASP Addenda specify the PPE for specific tasks associated with each study.

The levels of protection identified in Table 5-1 require the following equipment:

Modified Level D

Equipment Requirements for Modified Level D are as follows:

- Semi-permeable disposable coveralls, such as Tyvek®, when body contact with contaminated solid media is anticipated;
- Polyethylene-coated Tyvek® suit or full rain gear when body contact with liquid contaminants is anticipated;
- USCG-approved survival suit when working on a boat, barge, shore, bridge (unless adequate railings exist), or dock during winter months;
- Long cotton underwear (optional);
- PFD when working on a boat, barge, shoreline, bridge (unless adequate railings exist), dock, or in the water;
- Outer gloves (Nitrile), chemical-resistant;
- Inner gloves (Latex), chemical-resistant (optional);
- When working on land: Chemical-resistant, steel toed safety boots which meet American National Standards Institute (ANSI) Z41;
- When working on vessels: non-skid rubber overboots;
- Safety glasses or chemical splash goggles which meet ANSI Z87;
- Hard hat (face shield required for core segmentation, optional for liquid sampling or decontamination activities) which meets ANSI Z89;
- Hearing protection in accordance with Malcolm Pirnie's Corporate Hearing Conservation Program (included as Appendix D). If noise levels exceed 85 dBA (as measured with a noise dosimeter) then PPE with a Noise Reduction Ratio (NRR) shall be utilized as described in the Corporate Hearing Conservation Program.

Level D

Equipment Requirements for Level D are as follows:

- Coveralls or suitable work clothing, in accordance with weather conditions (*e.g.*, blue jeans and t-shirt);
- PFD when working on a boat, barge, shoreline, bridge (unless adequate railings exist), dock, or in the water;
- Gloves (optional);
- When working on land: Chemical-resistant, steel toed safety boots which meet American National Standards Institute (ANSI) Z41;
- When working on vessels: non-skid rubber overboots;
- Safety glasses or chemical splash goggles which meet ANSI Z87;
- Hard hat (face shield optional for liquid sampling or decontamination activities) which meets ANSI Z89;

- Hearing protection in accordance with Malcolm Pirnie's Corporate Hearing Conservation Program (included as Appendix D). If noise levels exceed 85 dBA (as measured with a noise dosimeter) then PPE with a Noise Reduction Ratio (NRR) shall be utilized as described in the Corporate Hearing Conservation Program.

5.3 INSPECTION AND USE OF PPE

5.3.1 Inspection of PPE

Before use of protective clothing, all personnel shall determine that the clothing material is correct for the specified task at hand. The clothing is to be visually inspected for imperfect seams, non-uniform coatings, tears, and malfunctioning closures. It is to be held up to the light to check for pinholes. It is to be flexed to observe for cracks or other signs of shelf deterioration. If the product has been used previously, it should be inspected inside and out for signs of chemical deterioration, such as discoloration, swelling and stiffness. During work, the clothing should be periodically inspected for evidence of chemical deterioration, closure failure, tears, punctures and seam discontinuities.

Before using gloves, check for pinhole leaks. Face shields and lenses should be checked for cracks, crazing and fogginess. Equipment that is found to be defective must be replaced immediately.

5.3.2 PPE Donning Procedures

The following procedures shall be used when donning PPE:

- Remove bulky outerwear, remove street clothes, and store in clean location;
- Put on work clothes or coveralls;
- Put on the required chemical protective coveralls;
- Put on the required chemical protective boots or boot covers;
- Tape the legs of the coveralls to the boots with duct tape;
- Put on the required chemical protective gloves;
- Tape the wrists of the protective coveralls to the gloves;

- Don remaining PPE, such as safety glasses or goggles and hard hat.

5.3.3 PPE Doffing Procedures

Whenever a field crew member leaves the exclusion zone of a work area, the following decontamination sequence must be followed:

- Rinse contaminated materials from the boots or remove contaminated boot covers;
- Clean reusable protective equipment;
- Remove protective garments and equipment (remove inner gloves last to protect against dermal contact during doffing of outer garments); all disposable clothing should be placed in plastic bags, which must be labeled with contaminated waste labels;
- Wash hands, arms, face, and neck as appropriate;
- Proceed to clean area and dress in clean clothing;

All disposable equipment, garments, and PPE must be bagged in plastic bags, which must be labeled for disposal. Discussion of decontamination procedures for PPE and other equipment is provided in Section 10 – Decontamination Procedures.

6 HEALTH AND SAFETY ORIENTATION TRAINING

6.1 INTRODUCTION

TAMS/Malcolm Pirnie and subcontractor personnel involved with the investigation activities are required to have completed the 40-hour hazardous materials health and safety training as specified in 29 CFR 1910.120. This training, designed to orient personnel potentially exposed to hazardous substances, health hazards, or safety hazards, includes the following:

- Safety and health risk analysis.
- Use of PPE.
- Work practices by which the employee can minimize risks from hazards.
- Safe use of engineering controls and equipment.
- Medical surveillance requirements including recognition of symptoms and signs which might indicate overexposure to hazards.
- Procedures for environmental monitoring, site control, and decontamination.
- Emergency response plans.

All personnel will also have proof of attendance at an annual 8-hour Health and Safety refresher course if their 40-hour course was completed more than a year prior to the start of field activities. In addition, a minimum of two field personnel with current CPR/First Aid Training will be present on-site during all field activities. During field activities involving boats, at least two CPR/First Aid trained individuals will be assigned to each boat crew; one of these individuals may be a subcontractor (*e.g.*, driller). A copy of all current training certificates will be kept in the field office.

All field teams will be provided with a daily work order that will include a checklist and known conditions in the work area.

6.2 SPECIALIZED TRAINING

TAMS/Malcolm Pirnie employees, subcontractors, and other field personnel are to be knowledgeable in the particular hazards that may be encountered during this project and be familiar with safe operating procedures. This will be accomplished through the review of this HASP, specialized training prior to the commencement of the fieldwork, an audit of field activities and safety meetings during the program, as discussed below. Forms for the documentation of site-specific training are contained in Appendix B.

Field personnel should have a minimum of three days of actual field experience under a skilled supervisor and be familiar with emergency response procedures outlined in this HASP. CPR and First Aid training is encouraged for all field personnel. The PSO and all supervisory personnel will have attended additional training, including CPR, First Aid, and 8-hour hazardous materials supervisory training. Subcontractors will be responsible for ensuring that their employees receive specialized training for their job functions and responsibilities.

6.2.1 Captain's Qualifications

Each captain must have proof of attendance at a Safe Boating Course offered by either the U.S. Coast Guard or U.S. Power Squadrons and be certified in CPR and First Aid. All U.S. Coast Guard captain requirements must be met for task-specific objectives (*e.g.*, sediment coring operations, shuttling, hydrodynamic surveys). These requirements will be required for any TAMS/Malcolm Pirnie and subcontractor personnel who operate a boat.

6.2.2 Pre-Investigation Health and Safety Briefing

TAMS/Malcolm Pirnie and subcontractor personnel involved with the project will attend a site-specific health and safety briefing prior to initiation of the field activities. The topics to be discussed will include:

- Characteristics and potential hazards of contaminants known to be present at the site.

- Personal protective clothing: function, donning/doffing.
- Respirators: selection, use, care.
- Personal hygiene.
- Environmental monitoring.
- Decontamination procedures.
- Site control and work zone designations.
- General safety concepts.
- Emergency recognition and prevention.
- Heat stress.
- Signs and symptoms of over exposure to site specific chemical hazards.
- Hazard communication.
- Emergency response plan.
- Site contingency plans.

6.2.3 Health and Safety Field Audit

The PSO shall observe field investigation activities and prepare a Health and Safety Field Audit Report (HSFAR), which addresses hazardous waste operations from a safety perspective. The audit will evaluate the health and safety activities implemented by the field sampling team in accordance with the HASP. Any minor deficiencies that are noted during the audit will be corrected in the field as they occur. If major deficiencies are noted during the audit (those that cannot be immediately corrected in the field), a Stop-Work Order will be issued until appropriate measures can be taken to correct the problem. A written report of the Health and Safety audit will be prepared by the PSO and submitted to both the HSM and the Project Manager. This report will identify any deficiencies found and will outline the corrective actions that were recommended/implemented to address any minor deficiencies observed. The audit report will also recommend appropriate corrective actions for any major deficiency noted. The Project Manager will assist with corrective action and maintain an on-going log of the audit activities in the monthly progress report. The Project Manager will submit follow-up reports to the USACE PM, describing completed corrective actions that addressed major deficiencies. A minimum of one Health and Safety audit will be conducted by the

PSO during the investigations per year. In addition, the USACE may conduct a Health and Safety audit of investigation activities conducted by TAMS/Malcolm Pirnie as part of their health and safety effort. A copy of the HSFAR form is presented in Appendix C.

6.2.4 Morning Safety Meetings

The PSO or designee shall conduct morning safety and health briefings on an as-needed basis. Problems relative to respiratory protection, inclement weather, heat stress, or the interpretation of newly available environmental monitoring data are examples of topics that might be covered during these briefings. An outline report of meetings giving the date, time, attendees, subjects discussed, and instructor shall be maintained (refer to Appendix B). Visitors will be properly oriented to existing site conditions, planned activities, levels of personal protection, and other procedures outlined in this HASP.

6.2.5 Safety Checklists

Safety checklists developed by the USACE will be used for the following fieldwork aspects of the project:

- Earth Drilling Equipment (to be filled out by the appropriate subcontractor);
- Rigging (to be filled out by the appropriate subcontractor);
- Launches, Motorboats, and Skiffs (to be filled out by TAMS/Malcolm Pirnie and subcontractors).

These forms are to be filled out each day when the referenced equipment is to be used. Copies of these forms are included in Appendix B. Forms will be collected by TAMS/Malcolm Pirnie upon their completion and kept in the project file.

6.3 HAZARD COMMUNICATION

TAMS and Malcolm Pirnie each have a written hazard communication program which was established to meet the requirements of 29 CFR 1910.1200, and field activities shall be implemented in accordance with that program, as described below.

Material Safety Data Sheets (MSDSs) for hazardous chemicals introduced to the site by TAMS/Malcolm Pirnie and their subcontractors will be kept at an established MSDS Station in an accessible, common area of the field office for review by all on-site personnel. Labels on containers used by TAMS/Malcolm Pirnie are as originally received (not to be defaced) and are to contain the following information: (1) the identity of the hazardous chemical(s); (2) the appropriate hazard warnings; and (3) the name and address of the chemical manufacturer. If an employee transfers chemicals from a labeled container to a portable container, a label that contains those three items must be affixed to it. If the portable container is intended only for that employee's immediate use (*i.e.*, during the same work shift), then the container may be clearly marked with only the product name. The employee will be responsible to properly empty, clean, or dispose of the portable container immediately after use.

As part of the site-specific health and safety orientation conducted by the PSO, a review of TAMS and Malcolm Pirnie's hazard communication programs will be included to inform employees of hazardous chemicals to which they may be exposed during field activities. Subcontractors will also attend the hazard communication training session. If the chemical hazard changes or a new chemical hazard is introduced into the area after work begins, additional training will be provided by the PSO.

Site-specific hazard communication training for hazardous chemicals introduced to the site by TAMS/Malcolm Pirnie will include:

- Properties and hazard (chemical, physical, toxicological) of each hazardous chemical;
- Health hazards, including signs and symptoms of exposure and any medical condition known to be aggravated by exposure;
- Measures employees can take to protect themselves, including: appropriate work practices or methods for proper use and handling, procedures for emergency response, and the proper use and maintenance of PPE, as required;
- Work procedures for employees to follow to protect themselves when cleaning hazardous chemical spills and leaks;

- Use of the container labeling system and the MSDSs including: where MSDSs are located, how to read and interpret the information on both labels and MSDSs, and how employees may obtain additional hazard communication information.

Site-specific hazard communications training will also cover hazardous chemicals introduced by other employers and shall emphasize:

- Information about the hazardous chemicals to which TAMS/Malcolm Pirnie's employees may be exposed;
- An explanation of the labeling system other employers are using;
- Information about the precautionary measures TAMS/Malcolm Pirnie employees need to take to protect themselves during normal operating conditions and in emergencies;
- Location of MSDSs for hazardous chemicals brought to the site by other employers.

The PSO shall document the training, including the agenda and list of attendees. This subsection of the HASP, and the hazard communication training conducted as described above, shall be the mechanism for informing other employers planning to be on-site of hazardous chemicals introduced to the site by TAMS/Malcolm Pirnie.

A copy of this HASP and of TAMS and Malcolm Pirnie's Hazard Communication policies will be kept at an accessible, common area of the field office. In addition, MSDSs and portions of the HASP will be compiled into a single binder and kept on-board vessels during field activities.

7 MEDICAL SURVEILLANCE AND EXPOSURE MONITORING

7.1 MEDICAL SURVEILLANCE

TAMS/Malcolm Pirnie personnel who may have potential exposure to hazardous materials will have an initial employment, an annual, and a termination examination. Medical evaluations will be performed by an approved occupational physician in accordance with their respective company's Medical Monitoring Programs. All TAMS/Malcolm Pirnie field personnel shall be enrolled in their respective company's Medical Monitoring Program, be medically approved to wear respirators, and fit-tested in accordance with OSHA requirements. Subcontractors are also required to meet medical surveillance requirements for this project.

Purpose – The purposes of the medical evaluation are to: 1) determine fitness for duty on hazardous waste sites; and 2) establish baseline data for future reference. Such an evaluation is based upon the employee's occupational and medical history, a comprehensive physical examination, and an evaluation of the ability to work while wearing protective equipment. The medical examination must include an OSHA-type evaluation of the worker's ability to use respiratory protective equipment.

Supplemental Examinations – Supplemental examinations may be performed whenever there is an actual or suspected excessive exposure to chemical contaminants or upon experience of exposure symptoms, or following injuries or temperature stress.

7.2 HEAT STRESS MONITORING

Heat stress is caused by a number of interacting factors, including but not limited to: environmental conditions, clothing, workload, and the physical condition of the individual. Since heat stress is one of the most common illnesses associated with heavy outdoor work conducted with direct solar load and, in particular, because wearing PPE can increase the risk of developing heat stress, workers must be capable of recognizing

the signs and symptoms of heat-related illnesses. Personnel must be aware of the types and causes of heat-related illnesses and be able to recognize the signs and symptoms of these illnesses in both themselves and their co-workers.

Hazards

The four major harmful effects of overexposure to heat are outlined and discussed below.

Heat Rashes

- Heat rashes are one of the most common problems in hot work environments. Commonly known as prickly heat, a heat rash is manifested as red papules and usually appears in areas where the clothing is restrictive. As sweating increases, these papules give rise to a prickling sensation. Prickly heat occurs in skin that is persistently wetted by unevaporated sweat, and heat rash papules may become infected if they are not treated. In most cases, heat rashes will disappear when the affected individual returns to a cool environment.

Heat Cramps

- Heat cramps are usually caused by performing hard physical labor in a hot environment. These cramps have been attributed to an electrolyte imbalance caused by sweating. It is important to understand that cramps can be caused both by too much or too little salt. Cramps appear to be caused by the lack of water replenishment. Because sweat is a hypotonic solution (+/- 0.3% NaCl), excess salt can build up in the body if the water lost through sweating is not replaced.
- Thirst cannot be relied on as a guide to the need for water; instead, water must be taken every 15 to 20 minutes in hot environments. Under extreme conditions, such as working for 6 to 8 hours in heavy protective gear, a loss of sodium may occur. Drinking commercially available carbohydrate electrolyte replacement liquids is effective in minimizing physiological disturbances during recovery.

Heat Exhaustion

- Heat exhaustion occurs from increased stress on various body organs due to inadequate blood circulation, cardiovascular insufficiency, or dehydration. Signs and symptoms include pale, cool, and moist skin; heavy sweating; dizziness; nausea; headache; vertigo; weakness; thirst; and giddiness. Fortunately, this condition responds readily to prompt treatment.
- Heat exhaustion should not be dismissed lightly, however, for several reasons. One is that the fainting associated with heat exhaustion can be dangerous because the victim

may be operating machinery or controlling an operation that should not be left unattended; moreover, the victim may be injured when he or she faints. Also, the signs and symptoms seen in heat exhaustion are similar to those of heat stroke, which is a medical emergency. Workers suffering from heat exhaustion should be removed from the hot environment, be given fluid replacement, and be encouraged to get adequate rest.

Heat Stroke

- Heat stroke is the most serious form of heat stress. Heat stroke occurs when the body's system of temperature regulation fails and the body's temperature rises to critical levels. This condition is caused by a combination of highly variable factors, and its occurrence is difficult to predict. Heat stroke is a medical emergency.
- The primary signs and symptoms of heat stroke are confusion; irrational behavior; loss of consciousness; convulsions; a lack of sweating (usually); hot, dry skin; and an abnormally high body temperature [*e.g.*, a rectal temperature of 41 degrees Celsius (°C) (equivalent to 105.8°F)]. If body temperature is too high, death can occur. The elevated metabolic temperatures caused by a combination of workload and environmental heat load, both of which contribute to heat stroke, are also highly variable and difficult to predict. If a worker shows signs of possible heat stroke, professional medical treatment should be obtained immediately.
- The worker should be placed in a shady area and the outer clothing should be removed. The worker's skin should be wetted and air movement around the worker should be increased to improve evaporative cooling until professional methods of cooling are initiated and the seriousness of the condition can be assessed. Fluids should be replaced as soon as possible. The medical outcome of an episode of heat stroke depends on the victim's physical fitness and the timing and effectiveness of first-aid treatment.
- Regardless of the worker's protestations, no employee suspected of being ill from heat stroke should be sent home or left unattended unless a physician has specifically approved such an order.

Proper training and preventive measures will help avert serious illness and loss of work productivity. Preventing heat stress is particularly important because once someone suffers from heat stroke or exhaustion, that person may be predisposed to additional heat injuries.

Control Measures

Measures to prevent heat stress include regular work breaks during field activity, regular fluid replenishment, the availability of shelter (*i.e.*, shaded area), and wearing of

appropriate clothing (e.g., lightweight clothes, light-colored clothes, breathable fabrics, hats to protect from the sun). All personnel will be made aware of the symptoms of heat stress. If one or more symptoms are detected, the affected worker will be assisted to seek shade, drink plenty of fluids, and seek medical attention, if required.

Several screening techniques can be used to detect early warning signs of heat stress. The PSO may choose to monitor heat stress by measuring either body temperature or heart rate. Each method is described below.

Body Temperature Measurement

Body temperature may be measured with a digital-readout clinical ear thermometer with disposable tips. The following method, based on body temperature measurements, is simple to perform, straightforward, and may be conducted by the PSO.

Body temperature may be measured for three minutes with an ear thermometer at the end of each work period and before drinking fluids. Temperature at the end of the work period should not exceed 99.6°F. If the temperature exceeds 99.6°F, then the next work period should be shortened by 10 minutes (or by 33%), while the length of the rest period is kept the same. If the temperature exceeds 99.6°F at the beginning of the next rest period, however, the following work cycle should be further shortened by 33%. Temperature should be measured again at the end of the rest period to make sure that it has dropped below 99.6°F. No worker may be permitted to continue wearing semi-permeable or impermeable garments when his/her temperature exceeds 100.6°F.

Heart Rate Measurement

When measuring heart rate, the field team member should be escorted to an area of the site where no imminent danger exists. The field team member may remain standing during the measurement. The PSO may measure heart rate by using his or her forefinger to find in the wrist of a field team member, or at the carotid artery in the neck. The PSO will not use his or her thumb to measure heart rate, as the thumb has its own pulse. After

finding the pulse of the affected field team member, the PSO will count the beats for 10 seconds (using a wristwatch) and multiply the number of beats by 6 to find the field team member's heart rate.

If any site worker has a heart rate exceeding 115 beats per minute (measured immediately prior to a rest period), one or more of the following control measures must be used to help control heat stress:

- Site workers will be encouraged to drink plenty of water and electrolyte replacement fluids throughout the day
- On-site drinking water will be kept cool (50 to 60°F).
- A work regimen that will provide adequate rest periods for cooling down will be established, as required.
- All personnel will be advised of the dangers and symptoms of heat stroke, heat exhaustion, and heat cramps.
- Cooling devices, such as vortex tubes or cooling vests, should be used when personnel must wear impermeable clothing in conditions of extreme heat.
- Site personnel should be instructed to monitor themselves and co-workers for signs of heat stress and to take additional breaks as necessary.
- A shaded rest area must be provided. All breaks should take place in the shaded rest area.
- Site personnel must not be assigned to other tasks during breaks.
- Site personnel must remove impermeable garments during rest periods. This includes white Tyvek-type garments.

All project personnel must be informed of the importance of adequate rest, acclimation, and proper diet in the prevention of heat stress disorders.

7.3 COLD STRESS MONITORING

Cold stress normally occurs in temperatures at or below freezing, or under certain circumstances, in temperatures of 40°F.

Hazards

Extreme cold for a short time may cause severe injury to exposed body surfaces or result in profound generalized cooling, causing death. Areas of the body that have high surface area-to-volume ratio, such as fingers, toes, and ears, are the most susceptible. Two factors influence the development of a cold weather injury: ambient temperature and the velocity of the wind. For instance, 10°F with a wind of 15 miles per hour (mph) is equivalent in chilling effect to still air at 18°F. An equivalent chill temperature chart relating the actual dry bulb temperature and wind velocity is presented in Table 7-1, below.

Table 7-1: Wind Chill Temperature Chart

Estimated Wind Speed (mph)	Actual Temperature Reading (°F)											
	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
	Equivalent Chill Temperature (°F)											
Calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
(Wind speeds >40 mph have little additional effect.)	Little Danger: Maximum danger of false sense of security.				Increasing Danger: Danger from freezing of exposed flesh within one minute.			Great Danger: Flesh may freeze within 30 seconds.				
	Trench foot and immersion foot may occur at any point on this chart.											

Note: This chart was developed by the U.S. Army Research Institute of Environmental Medicine, Natick, MA (Source: ACGIH Threshold Limit Values for Chemical Substances and Physical Agents).

Frostbite is the generic term for a local injury resulting from cold. Several degrees of tissue damage are associated with frostbite. Frostbite of the extremities can be categorized into:

- *Frost Nip or Incipient Frostbite* - characterized by sudden blanching or whitening of skin.

- *Superficial Frostbite* - skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient.
- *Deep Frostbite* - tissues are cold, pale, and solid; extremely serious injury.
- *Systemic hypothermia* is caused by exposure to freezing or rapidly dropping temperature. It can be fatal. Its symptoms are usually exhibited in five stages:
 1. Shivering;
 2. Apathy, listlessness, sleepiness, and (sometimes) rapid cooling of the body to less than 95°F;
 3. Unconsciousness, glassy stare, slow pulse, and slow respiratory rate;
 4. Freezing of the extremities; and
 5. Death.

Trauma sustained in freezing or sub-zero conditions requires special attention because an injured worker is predisposed to secondary cold injury. Special provisions must be made to prevent hypothermia and secondary freezing of damaged tissues in addition to providing for first-aid treatment. To avoid cold stress, site personnel must wear protective clothing appropriate for the level of cold and physical activity. In addition to protective clothing, preventive safe work practices, additional training, and warming regimens may be utilized to prevent cold stress.

Control Measures

To prevent cold stress illnesses, follow the safety precautions listed below.

- Protective gloves are typically worn during field activities. These gloves offer some thermal protection.
- For air temperature of 0°F or less, mittens should be used to protect the hands. For exposed skin, continuous exposure should not be permitted when air speed and temperature results in a wind chill temperature of -25°F.
- At air temperatures of 36°F or less, field personnel who become immersed in water or whose clothing becomes wet must be immediately provided with a change of clothing and be treated for hypothermia.
- If work is done at normal temperature or in a hot environment before entering the cold, the field personnel must verify that their clothing is not wet due to perspiration. If wet, field personnel must change into dry clothes prior to entering the cold area.

- If the available clothing does not give adequate protection to prevent hypothermia or frostbite, work must be modified or suspended until adequate clothing is made available or until weather conditions improve.
- Appropriate clothing shall be worn by field personnel (*e.g.*, hats, layered clothing, thermal underwear); field personnel will check that clothing does not interfere with ability to perform field tasks.
- Field personnel handling evaporative liquid (*e.g.*, gasoline, alcohol, or cleaning fluids) at air temperatures below 40°F must take special precaution to avoid soaking of clothing or gloves with the liquids because of the added danger of cold injury due to evaporative cooling.

In addition, the following safe work practices should be employed to prevent cold stress.

- All field personnel will be provided with adequate cold weather gear including insulated coveralls, gloves or mittens, and cold weather boots. Warming facilities or equipment will be provided (*e.g.*, heated car) and utilized by field personnel as needed. Personnel working on the river will wear a USCG-approved survival suit. If extremely cold or severe weather conditions are forecast, work activities should be postponed.
- When the water temperature is below 50°F, all personnel working on boats must wear United States Coast Guard (USCG) Anti-Exposure Survival work suits.
- Direct contact between bare skin and cold surfaces (less than 20°F) should be avoided. Metal tool handles and/or equipment controls should be covered by thermal insulating material.
- For work performed in a wind chill temperature at or below 10°F, workers should be under constant protective observation (buddy system). The work rate should be established to prevent heavy sweating that will result in wet clothing. For heavy work, rest periods must be taken in heated shelters and workers should be provided with an opportunity to change into dry clothing if needed.
- Field personnel should be provided the opportunity to become accustomed to cold-weather working conditions and required protective clothing.
- Work should be arranged in such a way that sitting or standing still for long periods is minimized.
- During the warming regimen (rest period), field personnel should be encouraged to remove outer clothing to permit sweat evaporation or to change into dry work clothing. Dehydration, or loss of body fluids, occurs insidiously in the cold environment and may increase susceptibility to cold injury due to a significant change in blood flow to the extremities. Fluid replacement with warm, sweet drinks and soups is recommended. The intake of coffee should be limited because of diuretic and circulatory effects.

The PSO shall be vigilant in order to identify **hypothermia** in its earliest stage, thus preventing a potential hazard to the worker. The most important sign of hypothermia is a change in behavior; this is often subtle and typically best recognized by a co-worker or the PSO. Physical and behavioral symptoms of hypothermia include:

- Pain in the extremities;
- Decrease in usual work efficiency;
- Forgetfulness and a decreased level of communication;
- Decline in manual dexterity;
- Poor motor skills or repetitive behavior;
- Poor judgment;
- Lack of concern for physical needs;
- Cold, pale skin appearance, shivering, and goosebumps;
- Maximum severe shivering develops when the body temperature drops to 95° F. This must be taken as a sign of danger to workers and exposure to cold should be immediately terminated.

Mild hypothermia is treated by re-warming the affected person by:

- Moving to a protected area;
- Removing wet or damp clothing and changing into dry clothing;
- Drinking warm fluids;
- Wrapping in dry blankets;

More **severe cases of hypothermia** require prompt intervention by medical personnel in addition to the above activities. Refer to Section 12.4 for directions to the nearest hospital.

Mild cases of **frostbite** (*i.e.*, the affected area can still be sensed as painful) may be treated in the field by re-warming. More serious cases of frostbite should be treated at a medical facility since attempting to thaw the frozen are may cause severe damage. A victim of serious frostbite will be protected from the environment and protected from

further heat loss, but the skin should not be rubbed or thawed with warm water or dry heat.

7.4 NOISE EXPOSURE MONITORING

As part of the required baseline annual or bi-annual medical evaluation all employees undergo an audiometric evaluation. The annual or bi-annual audiogram is compared to the baseline to determine if the employee has had a Standard Threshold Shift (STS). While working on various tasks during this project, employees may be exposed to noise levels in excess of the OSHA PEL of 90 decibels on the A-weighted scale (dBA) for a short period of time. As part of the hazard evaluation, noise levels will be evaluated during the early stages of this project to identify activities that subject employees to elevated noise levels. If possible, to control these elevated noise levels, engineering or administrative controls will be implemented. If these controls are not feasible, then hearing protection with an adequate NRR will be issued to these employees in accordance with MPI's Corporate Hearing Conservation Program (provided as Appendix D).

7.5 CHEMICAL EXPOSURE MONITORING

During field activities, samples collected will be sealed upon collection and during transport and storage. As a result of the atmospheric hazard assessment on the tasks currently described in Section 4, no atmospheric sampling is anticipated, and no airborne chemical exposure action levels have been prescribed for outdoor field activities. Therefore, TAMS/Malcolm Pirnie field personnel are unlikely to be exposed to atmospheric hazards during field activities. During the course of field activities, if strong odors are detected, or if other signs indicate that a respiratory hazard occurs, then this HASP will be revised accordingly. If at a later date, atmospheric hazards are found to exist, action levels will be developed and appended to this HASP.

During sample processing (*i.e.*, core segmentation), which may occur aboard boats or in a field office/sample processing facility, air monitoring will be conducted. A MiniRAE photoionization detector (PID) or equivalent will be used to monitor for elevated levels of volatile organic compounds. A Jerome 431-X Mercury Vapor Analyzer (or equivalent) will be used for the detection and accurate measurement of toxic mercury vapor in the breathing zone of the employees processing core samples. Use of these instruments is described further in Section 8 – Hazardous Material Monitoring. If contaminant levels in the breathing zone exceed those as specified in Section 8, then prescribed PPE will be used or the area will be evacuated in accordance with the Emergency Response Procedures.

8 HAZARDOUS MATERIAL MONITORING

8.1 INTRODUCTION

Emergency response actions and PPE selection will be based on monitoring results. A MiniRAE PID or equivalent will be used, if necessary, during performance of the investigation activities at the LPRRP Site to make quantitative determinations of contaminant concentrations in the breathing zone of personnel, especially those with the likelihood of greatest exposure. A discussion of potential air contaminants is presented in the following sections.

8.2 AIR MONITORING

During field activities, samples collected will be sealed upon collection and during transport and storage. As a result of the atmospheric hazard assessment on the tasks currently described in Section 4, no atmospheric sampling is anticipated, and no airborne chemical exposure action levels have been prescribed for outdoor field activities. Therefore, TAMS/Malcolm Pirnie field personnel are unlikely to be exposed to atmospheric hazards during field activities. If during the course of field activities, if strong odors are detected, or if other signs indicate that a respiratory hazard occurs, then this HASP will be revised accordingly. If at a later date, atmospheric hazards are found to exist, action levels will be developed and appended to this HASP.

Most sediment samples will be processed in the field office by TAMS/Malcolm Pirnie personnel. The following subsections provide a description of monitoring activities to be performed during sediment processing procedures; action levels are summarized in Section 8.6.

8.2.1 MiniRAE Photoionization Detector

A MiniRAE PID will be used to monitor the breathing zone of field personnel in the sediment processing facility to assess the presence of volatile organic vapors. Testing

will be conducted continuously. Upon beginning fieldwork, the PID will be used to determine background levels of volatile organic vapors. During fieldwork, if PID readings are observed for at least 15 minutes where volatile organic vapors are present at 5 ppm greater than background levels, then field personnel will inform the PSO and temporarily stop work. The PSO will then consult with the HSM to design, implement, and upgrade the level of PPE used.

Contaminant concentrations detected, instrument type and calibration data will be recorded on the field laptop computers. All instrumentation will be calibrated before use; periodic calibration checks will be made by the PSO or designee and documented in the field laptop over the duration of the work activities.

All instrumentation will be maintained in accordance with the manufacturer's specifications. All monitoring instruments will be protected from surface contamination during use to minimize the need for decontamination.

8.3 JEROME MERCURY VAPOR ANALYZER

A Jerome 431-X Mercury Vapor Analyzer (or equivalent) will be used for the detection and accurate measurement of toxic mercury vapor in the breathing zone of the employees processing core samples. Testing will be conducted each time a new core tube is opened. An action level of 0.01 mg/m^3 will be used to determine what types of engineering controls will be put into place and whether Level C PPE should be implemented with the appropriate mercury filter cartridges. If readings from the Jerome meter indicate that the action level has been exceeded, then the FTL will inform the PSO and temporarily stop work. The PSO will then consult with the HSM to design, implement, and upgrade the level of PPE used.

8.4 PCBs

PCBs have very high boiling points and exhibit low volatility. Site work will take place outdoors with adequate ventilation. Samples and sediment cores will be capped and refrigerated during storage and transport. There is very little potential for PCB vapor generation, and very little potential for airborne particulate generation during project activities, as PCBs have a strong affinity for sediment, which will be wet.

8.5 GASOLINE AND SOLVENTS

Standard safety procedures will be followed when handling gasoline and solvents to minimize vapor generation and inhalation exposure. Safety containers will be capped and stored outside in a manner that provides adequate ventilation and minimizes the risks of release, fire, or explosion. Potential exposures are expected to be of very short duration.

8.6 ACTION LEVELS

Action levels for air monitoring results are listed in Table 8-1. The PID action levels apply to persistent readings (*i.e.*, greater than 15 minutes). The PID action levels are based on USEPA's rationale for relating total atmospheric vapor/gas concentrations to the selection of the level of personal protection as provided in the USEPA Standard Operating Guides.

Table 8-1: Action Levels for Work Area Monitoring

MONITORING INSTRUMENT	CONTAMINANT CONCENTRATION	LEVEL OF PPE OR PRESCRIBED ACTION
MiniRAE PID (volatile organic chemicals)	0 ppm to background	Use Level D/Modified Level D PPE. Continue monitoring.
	Background to 5 ppm above background, sustained for at least 15 minutes.	Contact PSO and await further instruction.
	Greater than 5 ppm above background, sustained for at	Cease all activities and withdraw from work area. See Emergency

	least 15 minutes.	Response Procedures.
Jerome Mercury Vapor Analyzer	Less than 0.01 ppm	Use Level D/Modified Level D PPE. Continue monitoring.
	0.01 ppm or greater	Contact FTL/PSO. Stop work and await further direction.

9 SITE CONTROL MEASURES

9.1 GENERAL

A daily log containing the names of personnel, site entry and exit times, and their levels of PPE shall be maintained. Site security may involve the use of security guards to protect equipment and field personnel during field activities, if deemed necessary.

9.2 CONTAMINATION CONTROL ZONES

To control the potential spread of contamination at the Site, and to keep visitors from entering potentially hazardous areas, the three (3) work zone approach, outlined below, will be utilized:

Access of non-essential personnel to the Exclusion and Contamination Reduction Zones will be controlled. Only personnel who are essential to the completion of the task and wearing the prescribed level of protection will be allowed access to these areas. Entrance of non-contractor or subcontractor personnel must be approved by the PSO based on that person's documentation of training described in Section 6.

In order to prevent the spread of contamination and to prevent unauthorized people from entering potentially hazardous areas, contamination control zones shall be defined and maintained in each potentially contaminated work area as described below.

9.2.1 Exclusion Zone

An Exclusion Zone (EZ) may consist of a specific work area, or may be an entire area of potential contamination. All personnel entering an EZ must use the required PPE (as discussed in Section 5, or as determined by the PSO), and must have the appropriate training and medical clearance. The EZ is the defined area where there is a possible respiratory and/or contact health hazard. Cones, caution tape, or a site diagram may be

used to identify the location of each EZ. No eating, drinking or smoking will be allowed in this zone.

9.2.2 Contamination Reduction Zone

The Contamination Reduction Zone or station will be established for the general entry and exit area to and from the Exclusion Zone. This area will be the area designated for the decontamination of personnel, clothing, and equipment prior to entering the Support Zone, and for the physical segregation of the Support and Exclusion Zones. All personnel entering or leaving the EZ will pass through this area to prevent any cross-contamination.

Tools, equipment, and machinery will be decontaminated in a specific location. The decontamination of all personnel will be performed on-site adjacent to the EZ. Personal protective outer garments and respiratory protection will be removed in the CRZ and prepared for cleaning or disposal. This zone is the only appropriate corridor between the EZ and the Support Zone (SZ).

The level of personal protective equipment required in this area shall be in accordance with the specified requirements as a minimum or as determined by the PSO after monitoring the Site. Eating, drinking or smoking is strictly prohibited in this area. The contamination reduction station will also contain appropriate safety and emergency equipment, such as a first aid kit and eyewash station.

9.2.3 Support Zone

The SZ is a clean area outside the CRZ located to prevent employee exposure to hazardous substances. Eating and drinking will be permitted in the SZ only after proper decontamination. Smoking may be permitted in the SZ, subject to site requirements. This Zone will be established on the Site and is defined as the area outside the zone of significant contamination. The Support Zone shall be protected from work Site contamination. The function of the Support Zone is to provide:

- An entry area for personnel, material and equipment to the Exclusion Zone.
- An exit area for decontaminated personnel, materials and equipment from the CRZ.
- An area for location of Support Area facilities; and
- A storage area for clean safety and work equipment.

9.3 ASSIGNMENT OF WORK ZONES ON BOATS

On smaller boats (*e.g.*, a pontoon boat with moonpool for collection of vibracore samples, or boats less than 25 feet in length) which do not contain any sanitation facilities, the entire boat may be classified as an EZ. For such boats, a dockside CRZ will be established for controlling the spread of contamination as the crew comes ashore at the end of each work day or for breaks. For a worker boarding a shuttle boat (*e.g.*, for transport to the field office for use of sanitary facilities), the worker will decontaminate him/herself at a CRZ on a shuttle boat or dock before entering an SZ.

On larger boats, separate work zones will be established to contain/minimize the spread of contamination from sampling efforts. Such vessels will be divided into an EZ, CRZ, and SZ to responsibly manage on-water sampling activities and minimize exposure risks. In addition, cabins will be designated as SZs (necessitating establishment of an EZ and CRZ) since they often contain galleys and sanitary facilities, which must be maintained free of contamination.

10 DECONTAMINATION PROCEDURES

10.1 INTRODUCTION

The degree of decontamination required is a function of both a particular activity and the physical environment within which it takes place. Decontamination procedures for personnel, equipment, and PPE are described below. As discussed in Section 9.2.2, decontamination shall be performed in the CRZ. The PSO will monitor these procedures. Further, all on-site activities will be carried out in such a manner as to avoid excessive contamination of personnel, protective equipment, tools, and machinery.

10.2 PERSONNEL DECONTAMINATION

Decontamination will take place in the area designated as the contamination reduction zone (CRZ). Personnel egress to and from these zones will be limited. This will minimize the potential spread of contaminated materials to clean areas. Under no circumstances is a potentially contaminated person to exit the site by means other than through the CRZ. Upon leaving the site for lunch break or at the end of each work shift, personnel will be required to remove all contaminated clothing or equipment. Upon completion of tasks that require the use of safety equipment, at each time of break, or at the end of each work shift, the work crew will proceed toward the designated decontamination area.

For Level D PPE, disposable gloves (if used) will be disposed of in a glove drop container. All personnel wearing Modified Level D PPE in a work area must undergo decontamination prior to entering a SZ. In the CRZ, the personnel decontamination area will consist of the following stations at a minimum:

- *Station 1:* Personnel entering the CRZ will remove the gross contamination from their outer clothing and boots.
- *Station 2:* Personnel will remove their outer garment and outer gloves and dispose of them in properly labeled containers. Personnel will then decontaminate their hard hats and boots with an aqueous solution of detergent or other appropriate cleaning

solution. These items will then be hand carried to the next station. Inner gloves may then be discarded.

- *Station 3:* Personnel will thoroughly wash their hands and face before leaving the CRZ. Respirators, if used, will be sanitized and then placed in a clean plastic bag.

10.3 EQUIPMENT DECONTAMINATION

All potentially contaminated equipment will remain in the EZ until the end of the activity. In order to contain/control contamination in the CRZ, a large plastic sheet will be placed on the ground (or dock or boat surface as appropriate) and disposable towels will be used to contain spilled and splashed water. A bristle brush and a soap and water solution (Alconox) will be used to remove gross sediment contamination from all equipment and decontaminated accordingly before being removed from the CRZ. A pump sprayer may be utilized for each rinse station.

Boot covers or boots, aprons and outer gloves, prior to their removal from the CRZ, will be washed in large tubs with a soap and water solution and rinsed with fresh water. When a Tyvek or other disposable type of PPE is required, it will be removed in such a way so as not to contaminate the CRZ. Disposable PPE will be placed in a trash bag and, if necessary, labeled accordingly.

In the event that field decontamination of equipment is necessary, the following reagents may be used: Alconox; analyte free water; nitric acid, isopropyl alcohol, or acetone. MSDSs for these chemicals can be found in Appendix E.

10.4 PPE DECONTAMINATION

Where and whenever possible, single-use, external protective clothing must be used for work within the EZ or CRZ. This protective clothing must be disposed of in properly labeled containers. Reusable protective clothing will be rinsed at the site with detergent and water. The rinsate will be collected for disposal.

10.5 DECONTAMINATION FOR MEDICAL EMERGENCIES

In the event of a minor, non-life-threatening injury, personnel should follow the decontamination procedures as outlined above, and then administer first aid.

In the event of a major injury or other serious medical concern, immediate first-aid is to be administered in lieu of further decontamination efforts unless the environmental conditions would be considered “Immediately Dangerous to Life or Health,” in which case all personnel shall evacuate the site.

10.6 WASTE DISPOSAL PROCEDURES

All discarded materials, waste materials, or other objects will be handled in such a way as to preclude the potential for spreading contamination, creating a sanitary hazard, or causing litter to be left on-site. All potentially contaminated materials will be bagged or containerized as necessary and segregated for proper disposal. All contaminated waste materials will be disposed of in a manner consistent with regulatory requirements. All non-contaminated materials will be collected and bagged for appropriate disposal as normal domestic waste.

11 STANDARD OPERATING PROCEDURES FOR SAFETY

11.1 GENERAL REQUIREMENTS

The Lower Passaic River Site contains a range of physical hazards that must be understood by all field personnel assigned to work on this site. At a minimum, the safe work practices to be followed at the site shall include:

- The number of personnel and equipment on the site shall be minimized, consistent with effective site operations.
- On-site personnel shall use the “buddy” system. No one may work alone (*i.e.*, out of earshot or visual contact with other workers). In addition, each field team will be required to carry a two-way radio and have access to a cellular phone.
- Site activities will be performed to minimize dust production and sediment disturbance.
- Contact with materials either suspected or known to be contaminated will be avoided to minimize the potential for transfer to personnel, as well as cross contamination and the need for decontamination.
- Because most field activities will be conducted outdoors, portable lighting may be required to support work in the dawn or dusk hours.
- Eating, drinking, chewing gum or tobacco, smoking, or any practice, which increases the probability of hand-to-mouth transfer of contaminated material, is strictly prohibited in the work area outside the designated clean zone.
- Medicine and alcohol can potentiate the effects of exposure to toxic chemicals. Due to possible interactions, use of prescribed drugs should be reviewed with the contractor or subcontractor occupational physician. Alcoholic beverage and illegal drug intake are strictly forbidden during site work activities.
- When it is necessary for a visitor to observe the fieldwork, that person will be issued appropriate PPE, briefed on potential hazards, safety practices, decontamination procedures and site communications. All site visitors must supply respiratory equipment and proof of training/fit testing to the PSO or designee.
- If weather conditions cause field activities on the Lower Passaic River to be unsafe, then work shall be suspended until weather conditions have subsided so as to be appropriate and safe for work as determined by the FTL, PSO, HSM, and PM. Refer to Section 4.3 for physical conditions (*e.g.*, electrical storms) which may warrant halting of field activities.
- All employees have the obligation to correct or report unsafe work conditions.

11.2 RIVER SAFETY

All personnel operating a vessel or performing any fieldwork from shore or from a vessel will follow the following SOPs:

- Follow all applicable USCG and New Jersey/New York State Navigational rules.
- All work conducted from a bridge, boat, or shore will be done during daylight hours only.
- Work on the river during adverse weather will be suspended when conditions pose an immediate or significant health risk to employees.
- While on a boat or working from bridges all personnel will wear a USCG approved PFD.
- At least one Type IV throwable flotation device with a minimum of 90 feet of rope will be on board each vessel.
- For all boats greater than 18 feet in length, at least 3 handheld type flares and a 1 square foot fluorescent orange flag will be kept on board.
- If a boat with an outboard engine is used, a USCG Class B-1 fire extinguisher will be kept on board in an immediately accessible area.
- If gasoline is carried on board it will be kept in an Underwriters Laboratory (UL) approved container. Sufficient absorbent will be kept on the boat at all times while gasoline is stored to clean up any spills.
- When the water temperature is below 50°F, all personnel working on boats must wear USCG Anti-Exposure Survival work suits.

Appendix F provides boating safety documents developed by the Maryland Department of Natural Resources, as well as by the USCG, in association with the MetLife insurance company, on the following topics:

- Clean Boating;
- Man-Overboard Emergency Instructions;
- Boating Accidents;
- Fueling Safety;
- Use of Marine Radio;
- Visual Distress Signals for Recreational Boaters;
- Powerline Hazards.

12 EMERGENCY RESPONSE PLAN

12.1 GENERAL

This section presents emergency response procedures, including medical emergencies and injury, first aid treatment, illness, near-miss reporting requirements, and fire and spill response protocols.

Each work area will be evaluated for the potential for fire, explosion, chemical release, or other emergency. An evacuation route from each specific work area must be identified prior to beginning work in the area.

Unusual events, activities, chemicals, and conditions must be reported to the FTL/PSO immediately. The FTL/PSO will discuss and resolve these issues with the HSM and/or PM as appropriate.

12.2 EMERGENCY EQUIPMENT

Emergency equipment will be readily accessible and distinctly marked. TAMS/Malcolm Pirnie and/or subcontractor personnel shall be familiar with the location of, and trained in the use of, emergency equipment. The following emergency equipment items will be available on-site (all items will be available in the field office/sediment processing facility, as well as on water vessels):

Fire Extinguishers

TAMS/Malcolm Pirnie and subcontractors will provide fire extinguishers. Class A, B dry chemical fire extinguishers shall be located on-site. Immediately after each use, fire extinguishers are to be either recharged or replaced. Fire extinguishers are to be suitably placed, distinctly marked, and readily accessible.

First Aid Kits

First Aid Kits shall conform to Red Cross and other applicable good health standards, and shall consist of a weatherproof container with individually-sealed packages for each type of item. First Aid Kits will be fully equipped before being sent out on each job and will be checked by the PSO to ensure that any expended items are replaced. First Aid Kits shall be suitably placed, distinctly marked, and readily accessible.

Eye Wash

In the event of contamination by dust particles during any remedial activity, an emergency eye wash will be available on-site during all field activities. Eye washes will be checked by the PSO to ensure that eye washes are replaced. Eye wash stations shall be suitably placed, distinctly marked, and readily accessible.

12.3 EMERGENCY RESPONSE

If an incident (*e.g.*, injury, fire, spill, boat accident) occurs, the FTL must take the following steps:

- Evaluate the incident and assess the need for assistance and/or evacuation;
- Call for outside assistance as needed;
- Notify the PSO and HSM of the incident;
- Notify USACE and its representatives of the incident; and
- Take appropriate measures to stabilize the incident scene.

In the event of an accident (*e.g.*, traffic or boat accident involving personal or property damage), the personnel involved will immediately notify the USCG at (718) 354-4119 so that the proper emergency personnel can respond. Following this call, the same personnel will notify the appropriate PSO and HSM. In addition, appropriate emergency measures will immediately be taken by site personnel to assist those who have been injured and to protect others from hazards. These measures may include contacting the relevant authorities (depending on the nature of the emergency) and/or health care facilities and moving those involved to a secure location, as appropriate. If necessary, the

HSM will call the New Jersey State Spill Response at (877) 927-6337 to report any spills that occurred as a result of the accident.

Upon the occurrence of any event during the performance of the work which requires reporting to the National Response Center under Section 103 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), such reporting will be made, as well as any required notifications and reports to the USEPA and the New Jersey Department of Environmental Protection (NJDEP).

In the event of any action or occurrence during the performance of the work which causes or threatens to cause a release of a hazardous substance that may present an immediate threat to public health or welfare or the environment, the USACE and the NJDEP will be notified by the appropriate HSM immediately upon obtaining knowledge of such action or occurrence. Such notifications will be made to the USACE Project Manager (or to alternate contacts, in the case of unavailability).

In the event of emergency, the FTL must take all reasonable measures to confirm that the fire, explosion, or discharge does not occur, recur, or spread to other materials or waste at the site. These measures include stopping operations, collecting and containing released materials or wastes, and removing or isolating containers.

The following sub-sections present emergency contacts, and procedures for medical emergency, fire response and spill prevention/response.

12.3.1 Emergency Contacts

The means to summon local public response agencies such as the police, fire, and ambulance shall be reviewed during each daily safety meeting. Due to the size of the study area, Table 12-1 provides a list of municipalities on each side of the river, organized by River Mile.

Table 12-1: Municipalities along Lower Passaic River

LEFT SIDE OF RIVER, TRAVELING UPSTREAM (TOWARD DUNDEE DAM)		RIGHT SIDE OF RIVER, TRAVELING UPSTREAM (TOWARD DUNDEE DAM)	
River Mile	Municipality	River Mile	Municipality
0.0 – 8.0	City of Newark	0.0 – 3.2	Town of Kearny
8.0 – 10.0	Township of Belleville	3.2 – 5.6	Town of Harrison
10.0 – 11.25	Township of Nutley	5.6 – 6.1	Boro of East Newark
11.25 – 12.5	City of Clifton	6.1 – 8.55	Town of Kearny
12.5 – 16.75	City of Passaic	8.55 – 10.0	Boro of North Arlington
16.75 – 17.7	City of Clifton	10.0 – 11.6	Township of Arlington
		11.6 – 13.4	Boro of Rutherford
		13.4 – 15.6	Boro of Wallington
		15.6 – 17.7	City of Garfield

These municipalities are located in the following counties of New Jersey:

- Bergen County: City of Garfield, Township of Lyndhurst, Borough of North Arlington, Borough of Rutherford, Borough of Wallington.
- Essex County: Township of Belleville, City of Newark, Township of Nutley.
- Hudson County: Township of Harrison, Township of Kearny.
- Passaic County: City of Clifton, City of Passaic.

When traveling from Caven Point through Newark Bay and into the Passaic River, pass Jersey City, Bayonne City (from Newark Bay to the New Jersey Turnpike Extension Bridge), and Jersey City appear on the right side of the river before reaching the Passaic River.

In the event of an emergency, field personnel may use Table 12-1 to describe their location in the Passaic River with respect to the municipality they are located in.

In Table 12-2, emergency contact information is provided for municipalities identified in Table 12-1. General/federal/state contact is provided first; contact information for municipalities is presented by county, alphabetically.

Table 12-2: Emergency Contacts

CONTACT	TELEPHONE NUMBER
GENERAL/FEDERAL/STATE	
Emergency Response (Fire, Police, Medical, etc.)	911
Poison Control Center	(800) 336-6997
United States Coast Guard	(718) 354-4119
National Response Center and Terrorist Hotline	(800) 424-8802
NJDOT-OMR Project Manager: Lisa Baron	(609) 530-4779
USACE Project Manager: Beth Buckrucker	(816) 983-3581
USEPA Project Manager: Alice Yeh	(212) 637-4427
New Jersey State Police	(609) 882-2000 (Headquarters, West Trenton) (973) 344-1704 (Newark)
New Jersey Department of Environmental Protection	(877) 927-6337 (24-hour Emergency Control Center) (609) 292-3131 (General Information)
Port Authority of NY & NJ - Police, Central Police Desk	(973) 963-7111
BERGEN COUNTY	
Bergen County Police Department	(201) 646-2700 (Headquarters) (201) 634-3100 (Emergency Management)
City of Garfield	
Garfield Police Department	911 (Emergency) (973) 478-8500
Garfield Fire Department	911 (Emergency) (973) 478-8815 (Non-Emergency)
Township of Lyndhurst	
Lyndhurst Police Department	911 (Emergency) (201) 939-2900 (Non-Emergency)
Lyndhurst Fire Department	911 (Emergency) (201) 804-2441 (Non-Emergency)
Borough of North Arlington	
North Arlington Police Department	911 (Emergency) (201) 991-4400 (Non-Emergency)
North Arlington Fire Department	911 (Emergency) (201) 955-5633 (Non-Emergency)
North Arlington Emergency Squad	911 (Emergency) (201) 955-5647 (Non-Emergency)
Borough of Rutherford	
Rutherford Police Department	911 (Emergency) (201) 939-6000 (Non-Emergency)
Rutherford Fire Department	911 (Emergency) (201) 939-6000 (Non-Emergency)
Ambulance Corp	911 (Emergency) (201) 939-8241 (Non-Emergency)
Borough of Wallington	

Wallington Police Department	911 (Emergency)
Wallington Fire Department	911 (Emergency) (973) 473-1715 (Non-Emergency)
ESSEX COUNTY	
Essex County Sheriff's Office	(973) 621-4105
Essex County Police (County Police)	(973) 268-4200
Essex County Emergency Special Services	(973) 733-4645
Township of Belleville	
Belleville Police Department	(973) 450-3333
Belleville Fire Department	(973) 450-3366
City of Newark	
Newark Police Department	(973) 733-6000
Newark Fire Department (Main)	(973) 733-7424
Newark Fire Department (Emergency Management)	(973) 733-3660
Newark Fire Department, (Hazardous Materials Response)	(973) 733-7423
Township of Nutley	
Nutley Police Department	911 (Emergency)
Nutley Fire Department	911 (Emergency)
HUDSON COUNTY	
Hudson County Sheriff's Office	(201) 915-1300 (Patrol Bureau)
Township of Harrison	
Harrison Police Department	911 (Emergency) (973) 589-0911 (Emergency) (973) 478-6839 (Non-Emergency)
Harrison Fire, Ambulance	911 (Emergency) or (973) 589-0911 (Emergency)
Ewan Volunteer Fire Company	911 (Emergency) (856) 478-2261 (Non-Emergency)
Harrison Emergency Management	(973) 478-4105
Township of Kearny	
Kearny Police Department	911 (Emergency) (201) 998-1313 (Non-Emergency)
Kearny Fire Department	911 (Emergency) (201) 991-1402 (Non-Emergency)
PASSAIC COUNTY	
Passaic County Sheriff's Office	(973) 881-7500
City of Clifton	
Clifton Police Department	911 (Emergency) (973) 470-5900 (Non-Emergency)
Clifton Fire Department	911 (Emergency) (973) 470-5801/5900 (Non-Emergency)
City of Passaic	
Passaic Police Department	911 (Emergency)
Passaic Fire Department	911 (Emergency)

12.3.2 Medical Emergency

All employee injuries must be promptly reported to the FTL, who will:

- Verify that the injured employee receives prompt first aid and medical attention; and
- In emergency situations, the individual is to be transported by appropriate means to the nearest urgent care facility (normally a hospital emergency room).

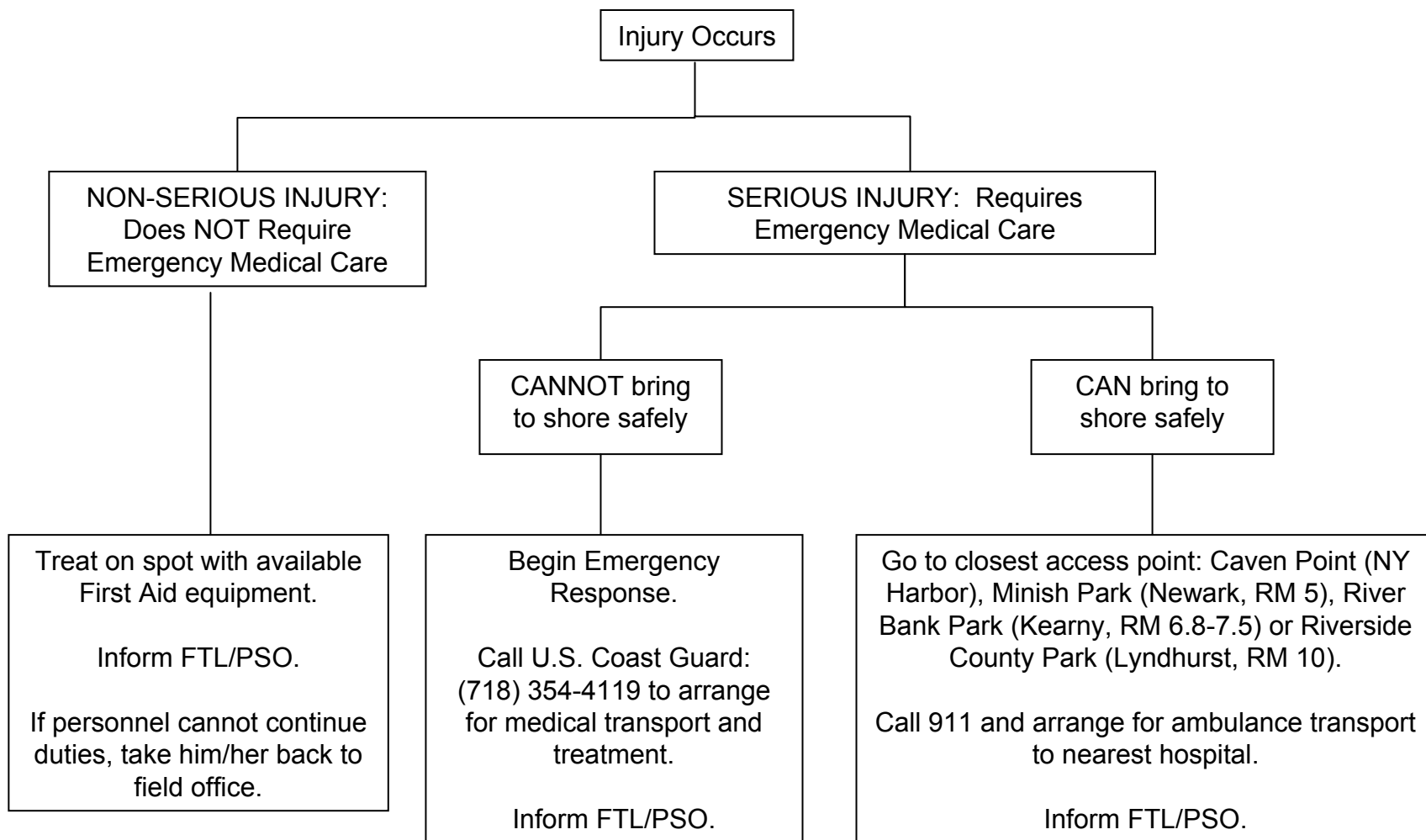
Figure 12-1 provides flowcharts of actions to take in the event of an injury or medical emergency; the first flowchart indicates protocols to follow for injuries which occur while on the Passaic River; the second flowchart indicates protocols to follow for injuries which occur while in the field office at Minish Park or at the USACE Caven Point facility.

Appendix G provides a summary of field team personnel who are trained in CPR/First Aid. Rescue and medical duties for project team members (*e.g.*, PSO, FTL) are discussed throughout the remainder of this section.

Figure 12-1: Emergency Response Flowcharts

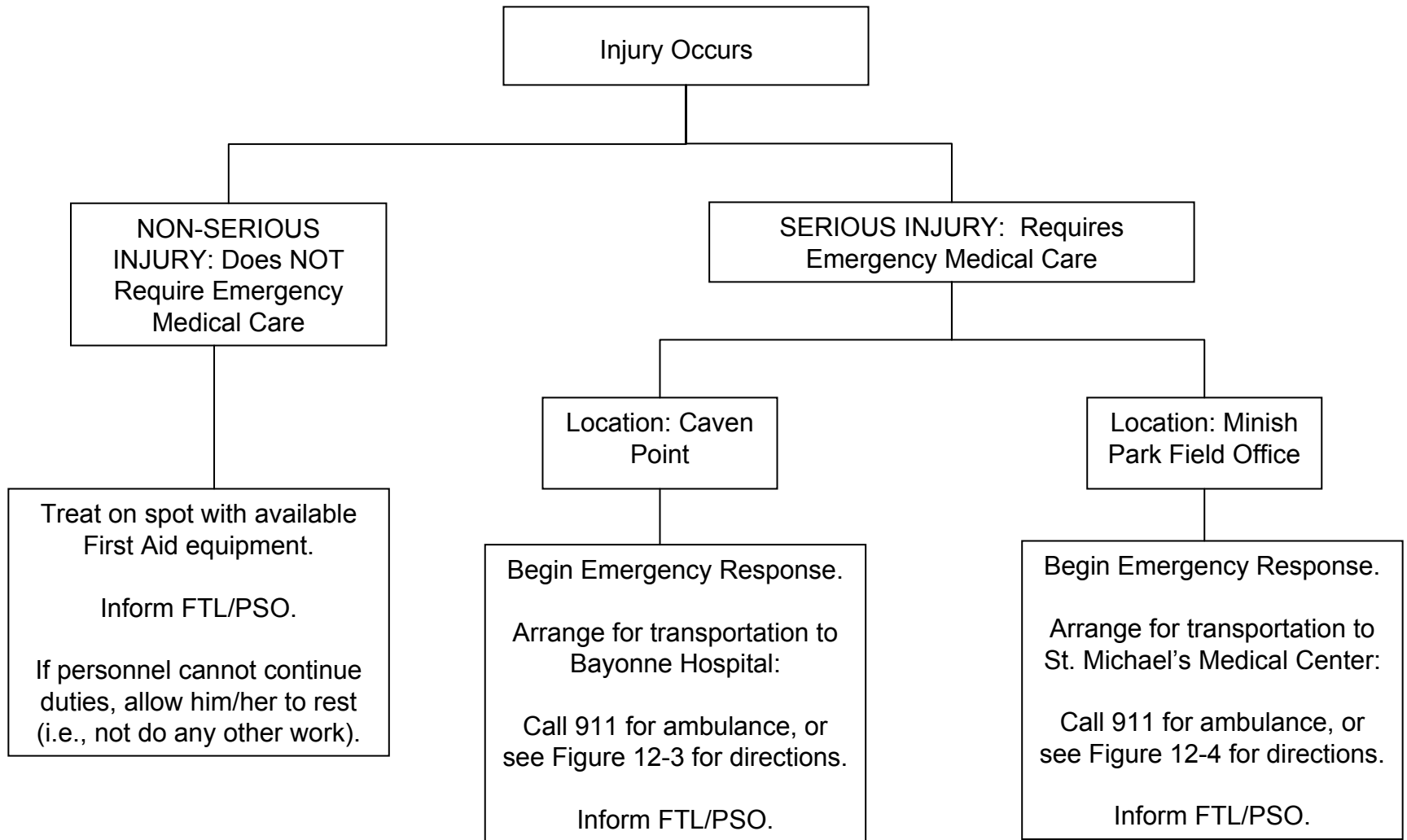
(see next page)

Figure 12-1: Emergency Response:
Location: On the Passaic River



Please refer to Section 12.3 for discussion of spill, fire, other emergency response.

Figure 12-1: Emergency Response
Location: At Caven Point or Field Office



Please refer to Section 12.3 for discussion of spill, fire, other emergency response.

12.3.3 First Aid

All persons must report any near-miss incident, accident, injury, or illness to their immediate supervisor or the FTL. First aid will be provided by trained personnel. Injuries and illnesses requiring medical treatment must be documented. The FTL must conduct an accident investigation as soon as emergency conditions no longer exist and first-aid and/or medical treatment has been administered. The report must be completed and submitted to the PSO and HSM within 24 hours after the incident.

If first-aid treatment is required, first-aid kits kept at the field office and on boats will be used. If treatment beyond first aid is required, the injured should be transported to the nearest medical facility. If the injured person is not ambulatory, or shows any sign of not being in a comfortable and stable condition for transport, then the USCG or an ambulance/paramedic should be summoned. If there is any doubt as to the injured worker's condition, it is best to let the USCG, local paramedic, or ambulance service examine and transport the worker.

12.3.3.1 Emergency Care Steps

The steps listed below must be followed in the event of an emergency at the site.

- ***Survey the scene.*** Determine if it is safe to proceed. Try to determine if the conditions that caused the incident are still a threat. Protect yourself from exposure before attempting to rescue the victim.
- ***Do a primary survey of the victim.*** Check for **airway** obstruction, **breathing**, and **pulse**. Assess likely routes of chemical exposure by examining the eyes, mouth, nose, and skin of the victim for symptoms.
- ***Phone Emergency Medical Services (EMS).*** Give the location, telephone number used, caller's name, what happened, number of victims, victims' condition, and help being given.
- Maintain airway and perform rescue breathing as necessary.
- ***Perform CPR*** as necessary.
- ***Do a secondary survey of the victim.*** Check vital signs and do a head-to-toe exam.

- ***Treat other conditions as necessary.*** If the victim can be moved, take him/her to a location away from the work area where EMS can gain access.

12.3.3.2 Inhalation

Any employee complaining of symptoms of chemical overexposure shall be removed from the work area and transported to the designated medical facility for examination and treatment.

12.3.3.3 Ingestion

Call EMS and consult a Poison Control Center for advice. If available, refer to the MSDS for treatment information, if recommended. If unconscious, keep the victim on his/her side and clear the airway if vomiting occurs.

12.3.3.4 Skin Contact

Personnel who have had skin contact with site chemicals of concern (COCs) will, unless the contact is severe, proceed through the decontamination zone to the wash-up area. Personnel must remove any contaminated clothing, and then flush the affected area with water for at least 15 minutes. The individual should be transported to the medical facility if he/she shows any sign of skin reddening or irritation, or if he/she requests a medical examination.

12.3.3.5 Eye Contact

Field personnel who have had site COCs splashed in their eyes or who have experienced eye irritation while in the contaminated zone must immediately proceed to the eyewash station, set up in the decontamination zone.

Do not decontaminate prior to using the eyewash. Remove whatever protective clothing is necessary to use the eyewash. Flush the eye with clean running water for at least 15 minutes. Arrange prompt transport to the designated medical facility (see Section 12.4).

12.3.4 Fire/Explosion Response

In the case of a fire or explosion, the FTL shall notify local fire and police department (See Table 12-1), and other appropriate emergency response groups as necessary. Project personnel will attempt to extinguish the fire with available extinguishers, if safe to do so. In the event of a fire that project personnel are unable to safely extinguish, the local fire department shall be summoned. The FTL shall assess the situation and assist the local fire department if requested.

12.3.5 Spill Prevention/Response

This sub-section details requirements for activities to be performed to prevent, or if occurred, minimize the impacts from an accidental spill or other release of fuels, oils, or other hazardous materials brought on site during project activities.

In the event of an accidental release of a toxic or hazardous material, the employee observing the incident must immediately notify the FTL, and if possible, proceed to control the emergency situation. The FTL and the PSO will be notified if a spill occurs. The PSO will notify other appropriate emergency response groups and management as necessary. In the event of a significant release, the PSO (or designate) will contact the National Response Center. If required, the National Response Center will alert National or Regional Response Teams of the significant release. The PSO (or designate) will also determine whether an evacuation of the immediate areas is necessary and will announce that decision. If possible, personnel should leave the area via the CRZ. If this is not possible, personnel should leave via the shortest route possible in a direction away from any potential danger.

The FTL or PSO must then immediately assess the hazard and identify the character and specific source of the spill. Most releases are expected to be minor and require only cleanup and disposal of small quantities of materials. If an IDLH atmosphere does not exist and adequate personal protective equipment is being used, the spread of any contamination is to be controlled whenever possible.

However, if there is an immediate threat to human health and the environment, evacuation and notification of additional authorities may be necessary (see Table 12-2 for emergency contact numbers). Additional appropriate authorities may include local police and fire departments, hospitals, and state and local emergency response teams.

Good judgment must be used in evacuation procedures to avoid placing people in greater danger. If no immediate threat exists, the FTL or PSO must continue to direct emergency response activities and document the following information:

- Name of the person reporting the incident;
- Location of the incident;
- Phone number where the person reporting the spill can be reached;
- Date, time, and location of the incident;
- A brief description of the incident;
- The estimated quantities of materials or wastes spilled;
- The extent of contamination of land, water, or air, if known;
- Action taken, or to be taken.

When determining the possible hazards to human health and/or the environment that may result from the incident, the FTL and PSO must consider both the direct and indirect effects of the release, assess the possible effects of any toxic, irritating, or asphyxiating gases that are generated, and determine the effects of any hazardous run-off from water or chemical agents used to control fire and heat-induced explosions.

12.3.5.1 Spill Response Procedures

In the event of a release, the following steps will be taken by the person or persons noting the release:

- Notify the FTL immediately;
- Evacuate immediate area of release.

12.3.5.2 Spill Reporting Requirements

At a minimum, personnel reporting a spill or release must provide the following information to the FTL (using the Incident/Near-Miss Investigation Report provided as Appendix H):

- Location of the release or threatened release;
- The material released or threatened to be released;
- The approximate quantity and concentration of the release or threatened;
- Any other information as required for compliance with National Response Center (NRC) or NJDEP reporting requirements.

The FTL will then contact the appropriate PM and HSM and notify them of the incident. The project manager or the HSM will notify USACE and its representatives of the incident and determine if reports to the NRC or NJDEP are required.

12.3.5.3 Emergency Information

The means to summon local public response agencies such as police, fire, and ambulance will be reviewed in the daily safety meeting. Emergency contacts are listed in Table 12-2. The following sub-sections provide information on medical emergencies and first aid while working at the site.

12.3.6 Spill Containment

The goal of spill control is to avoid spilling potentially hazardous liquids or solids at anytime, especially during transfer, transport or disposal of these materials. In the unlikely event that a spill occurs, the spill will be contained and cleaned up in accordance with applicable federal and state requirements including 29 CFR 1910.120(j).

The following specific steps are to be taken to avoid spill control/containment if needed:

- Drums and containers will be labeled indicating their contents and origin.
- Drums will be inspected prior to moving to ensure their integrity.
- The amount of drum movement will be minimized to the extent practical.
- Appropriate personal protective equipment will be used when cleaning up spills.

If liquids are spilled, they will be contained with contents and placed in drums. Spilled soils or liquids spilled on soils will be placed in drums for future disposal.

12.4 HOSPITAL LOCATIONS AND DIRECTIONS

Directions are provided to hospitals in the following three sections of the study area, as summarized in Table 12-3:

Table 12-3: Hospitals in Vicinity of LPRRP Site

Portion of Study Area	Hospital
Caven Point – Jersey City, NJ (If emergency is in area of Caven Point)	Bayonne Hospital 29 East 29 th Street Bayonne, NJ Tel: (201) 858-5000
Minish Park – Newark, NJ (If emergency is in area of field trailer, RM 5)	St. Michael's Medical Center 268 Dr. Martin Luther King Jr. Blvd. Newark, NJ Tel: (973) 268-8000
Lower Passaic River (If emergency is on water, proceed to Riverside County Park in Lyndhurst (RM 10), or Riverbank Park in Kearny (RM 7), if possible, and arrange for transportation)	Claara Maass Medical Center, West Hudson Division 206 Bergen Avenue Kearny, NJ Tel: (201) 955-7000

Each of the above hospitals has emergency room and parking facilities. Directions are provided to each hospital on the following pages. Figure 12-2 provides a figure of the LPRRP site area, with hospital locations marked.

Figure 12-2: Hospital, Field Office, and Access Locations

(see next page)



PASSAIC

BERGEN

Field Office
(RM 13)

Park Ave./
Kingsland
Ave. bridge
(RM 10.8),
Lyndhurst –
Access Pt.

Riverside
County Park
(RM 10),
Lyndhurst –
Access Pt.

Riverbank
Park (RM
6.8-7.5),
Kearny –
Access Pt.

Claara Maass
Medical Center –
206 Bergen Ave.,
Kearny

ESSEX

HUDSON

St. Michael's
Medical Center –
268 Dr. Martin
Luther King Blvd.,
Newark

Bayonne Hospital –
29 East 29th St.,
Bayonne (4.5 miles
south)

Caven Point –
USACE Marine
Facility (2000
ft to SE)

Bayonne Hospital: 29 East 29th Street; Bayonne, NJ; (201) 858-5000

From Caven Point Army Terminal (see attached map):

- Chapel Avenue to Garfield Avenue.
- Left onto Garfield Avenue.
- Garfield Ave. becomes Broadway/Broadway St.; go 1.2 miles (total) to East 53rd St.
- Left onto East 53rd Street.
- 1 block to Avenue E.
- Right onto Avenue E.
- 1.3 miles to East 29th Street.
- Right on East 29th Street. Will see hospital, emergency entrance, and garage.

From Jersey City and local area:

- JFK Boulevard to 30th Street
- Left onto 30th Street.
- 3 blocks to Avenue E.
- Right onto Avenue E. Will see hospital, emergency entrance, and garage.

From NJ Turnpike:

- NJ Turnpike to Exit 14A.
- After toll booth, go straight, and go under the overpass (do not go over!); you will be on Avenue E.
- Go 7-8 blocks to 29th and 30th Streets. The hospital, emergency entrance, and garage will be visible where Avenue E intersects 29th and 30th Streets.

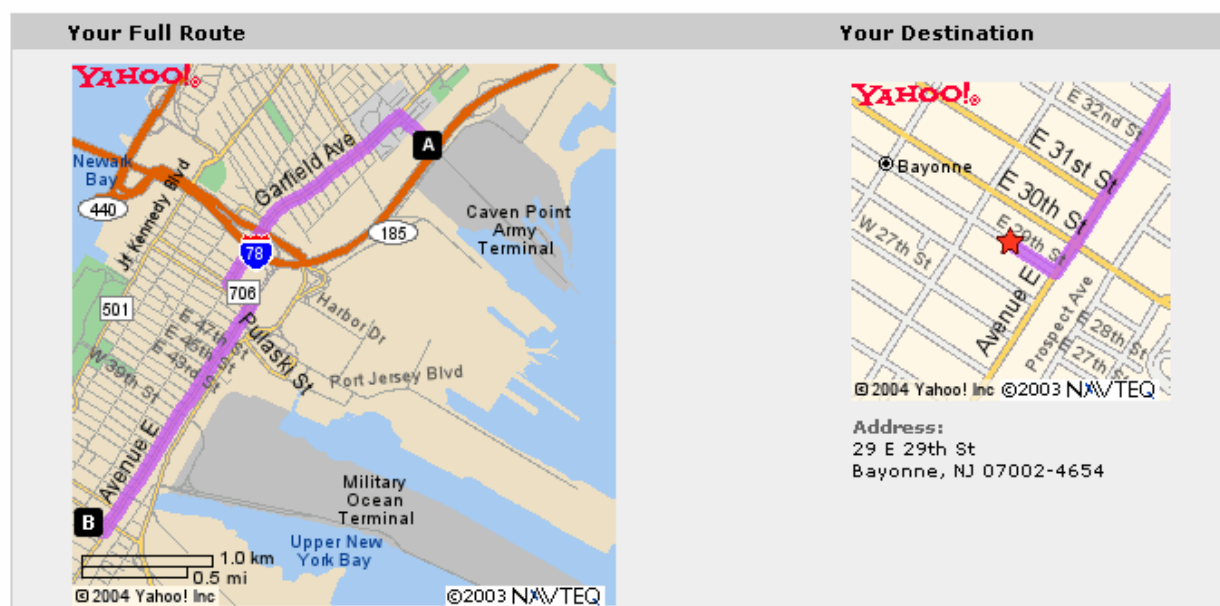
Figure 12-3: Directions to Bayonne Hospital – Bayonne, NJ

Starting from:	A 3 Chapel Ave, Jersey City, NJ 07305-4027		
Arriving at:	B 29 E 29th St, Bayonne, NJ 07002-4654		
Distance:	2.9 miles	Approximate Travel Time:	8 mins

Your Directions

1. Start at **3 CHAPEL AVE, JERSEY CITY** - go **0.2** mi
2. Turn **L** on **GARFIELD AVE** - go **1.1** mi
3. Continue on **BROADWAY/BROADWAY ST** - go **0.1** mi
4. Turn **L** on **E 53RD ST** - go **0.1** mi
5. Turn **R** on **AVENUE E** - go **1.3** mi
6. Turn **R** on **E 29TH ST** - go **0.1** mi
7. Arrive at **29 E 29TH ST, BAYONNE**

When using any driving directions or map, it's a good idea to do a reality check and make sure the road still exists, watch out for construction, and follow all traffic safety precautions. This is only to be used as an aid in planning.



St. Michael's Medical Center; 268 Dr. Martin Luther King Jr. Blvd.; Newark NJ

(973) 877-5000; <http://www.cathedralhealth.org/stmichaels/>

Directions from Minish Park (see attached map):

- From McCarter Highway, go left 0.2 miles to Chestnut Street.
- Chestnut Street for 0.2 miles to Broad Street.
- Right on Broad Street.
- Broad Street for 1.3 miles to Orange Street.
- Left on Orange Street.
- Orange Street for 0.2 miles to Dr. Martin Luther King Jr. Blvd.
- Dr. Martin Luther King Jr. Blvd. for 0.2 miles to hospital.

The visitors' parking lot is located on Central Avenue, between University Avenue and Dr. Martin Luther King, Jr., Blvd.

Figure 12-4: Directions to St. Michael's Medical Center – Newark, NJ

Starting from:	A McCarter, Newark, NJ 07102		
Arriving at:	B 268 Martin Luther King Jr Blvd, Newark, NJ 07102-2011		
Distance:	2.0 miles	Approximate Travel Time:	4 mins

Your Directions

1. Start at **[517-560] MCCARTER HWY, NEWARK** on **RT-21** - go **0.1 mi**
2. Turn **L** on **CHESTNUT ST** - go **0.2 mi**
3. Turn **R** on **BROAD ST** - go **1.3 mi**
4. Turn **L** on **ORANGE ST** - go **0.2 mi**
5. Turn **L** on **DR MARTIN LUTHER KING JR BLVD/MARTIN LUTHER KING JR BLVD** - go **0.2 mi**
6. Arrive at **268 MARTIN LUTHER KING JR BLVD, NEWARK**

When using any driving directions or map, it's a good idea to do a reality check and make sure the road still exists, watch out for construction, and follow all traffic safety precautions. This is only to be used as an aid in planning.

Your Full Route



Your Destination



Address:
268 Martin Luther King Jr Blvd
Newark, NJ 07102-2011

Claara Maass Medical Center, West Hudson Division: 206 Bergen Avenue; Kearny, NJ;
(201) 955-7000; http://www.sbhcs.com/hospitals/west_hudson/

From Riverside County Park, Lyndhurst (see attached map):

- Start at Riverside Avenue, going south.
- Riverside Avenue becomes River Road – continue for 1.3 miles.
- River Road becomes Passaic Avenue – continue for 0.5 miles to Magnolia Avenue.
- Left on Magnolia Avenue.
- Magnolia Avenue for 0.3 miles to Kearny Avenue.
- Right on Kearny Avenue.
- Kearny Avenue for 1.2 miles to Bergen Avenue.
- Left on Bergen Avenue and you will see the hospital and emergency room entrance.
(The hospital is in a residential neighborhood.)

From River Bank Park, Kearny (see attached map)

- Start at River Road, going south. Go 0.2 miles.
- River Road becomes Passaic Avenue/River Road – continue for 0.6 miles.
- Passaic Avenue/River Road becomes Passaic Avenue – continue for 1.2 miles to Bergen Avenue.
- Left on Bergen Avenue.
- Bergen Avenue for ~0.5 miles to hospital (you'll go up and down the crest of a hill the hospital is in a residential neighborhood, between Elm Street and Forest Street).

**Figure 12-5: Directions to Claara Maass Medical Center, West Hudson Division –
Kearny, NJ (from Riverbank Park, Kearny)**

Starting from:	A River Rd, Kearny, NJ 07031		
Arriving at:	B 206 Bergen Ave, Kearny, NJ 07032-3324		
Distance:	2.5 miles	Approximate Travel Time:	5 mins

Your Directions

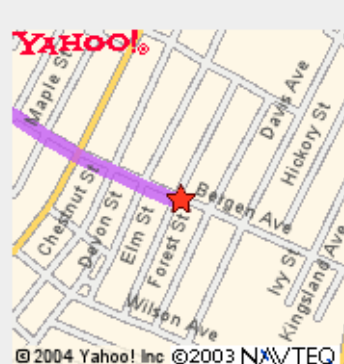
1. Start at **RIVER RD, KEARNY** on **RIVER RD** going towards **STEVENS PL** - go **0.2 mi**
2. Continue on **PASSAIC AVE/RIVER RD** - go **0.6 mi**
3. Continue on **PASSAIC AVE** - go **1.2 mi**
4. Turn **L** on **BERGEN AVE** - go **0.6 mi**
5. Turn **L** on **ELM ST** - go **< 0.1 mi**
6. Arrive at **206 BERGEN AVE, KEARNY**

When using any driving directions or map, it's a good idea to do a reality check and make sure the road still exists, watch out for construction, and follow all traffic safety precautions. This is only to be used as an aid in planning.

Your Full Route



Your Destination



Address:
206 Bergen Ave
Kearny, NJ 07032-3324

**Figure 12-6: Directions to Claara Maass Medical Center, West Hudson Division –
Kearny, NJ (from Riverside County Park, Lyndhurst)**

Starting from:	A Riverside Ave, Lyndhurst, NJ 07071		
Arriving at:	B 206 Bergen Ave, Kearny, NJ 07032-3324		
Distance:	3.6 miles	Approximate Travel Time:	8 mins

Your Directions	
1.	Start at RIVERSIDE AVE, LYNDHURST on RIVERSIDE AVE going towards STUYVESANT AVE - go 0.1 mi
2.	Continue on RIVER RD - go 1.3 mi
3.	Continue on PASSAIC AVE - go 0.5 mi
4.	Turn L on MAGNOLIA AVE - go 0.3 mi
5.	Turn R on KEARNY AVE - go 1.2 mi
6.	Turn L on BERGEN AVE - go 0.2 mi
7.	Arrive at 206 BERGEN AVE, KEARNY

When using any driving directions or map, it's a good idea to do a reality check and make sure the road still exists, watch out for construction, and follow all traffic safety precautions. This is only to be used as an aid in planning.

Your Full Route	Your Destination
<p>© 2004 Yahoo! Inc. © 2003 NAVTEQ</p>	<p>© 2004 Yahoo! Inc. © 2003 NAVTEQ</p> <p>Address: 206 Bergen Ave Kearny, NJ 07032-3324</p>

12.5 PERSONNEL ROLES, LINES OF AUTHORITY, COMMUNICATION

The PSO is the primary authority for directing operations at the Site under emergency conditions. Section 3, Project Organization and Responsibility, outlines the roles and responsibilities of safety personnel for the project.

Telephones, portable radios, and hand signals will be used at the Site for communication.

Telephones/Radios

Cellular phones will be provided for each team working in the field. Personnel captaining the sample transfer boats will have access to one of these phones at all times. At least one member of each team is required to have one of these phones with them at all times.

Hand Signals

Hand signals will be employed by downrange field teams along with utilizing the buddy system. These signals (Table 12-4) are also very important when working with heavy equipment. The entire field team shall know them before operations commence and covered during site-specific training prior to fieldwork.

Table 12-4: Hand Signals and Meanings

HAND SIGNAL	MEANING
Hand gripping throat	"CAN'T BREATHE"
Grip wrist or both hands around waist	"LEAVE AREA IMMEDIATELY"
Hands on top of head	"NEED ASSISTANCE"
Thumbs up	"OK, I AM ALL RIGHT, I UNDERSTAND"
Thumbs down	"NO, NEGATIVE"

12.6 REPORTING INJURIES, ILLNESSES, AND NEAR-MISS INCIDENTS

All injuries and illnesses, however minor, shall be reported to the FTL immediately. The FTL shall complete an Incident/Near-Miss Investigation Report (Appendix H) and submit it to the PSO, the HSM, and the USACE within 24 hours.

Near-miss incidents are situations in which no injury or property damage occurred, but under slightly different circumstances an injury or property damage could have occurred. Near misses are caused by the same factors as injuries; therefore, they must be reported on the Incident/Near-Miss Investigation Report (Appendix H) and investigated in the same manner.

12.7 EVACUATION PROCEDURES AND SAFE DISTANCES

Evacuation procedures will occur at three levels: (1) withdrawal from immediate work area (100 feet or more upwind), (2) Site evacuation, and (3) evacuation of surrounding area. If site evacuation is required, all field team members will be notified by cellular phone. Anticipated conditions that require these responses are described in the following subsections.

Withdrawal Upwind

Withdrawing upwind (100 feet or more) will be required when:

- During periodic monitoring the ambient air conditions contain greater contaminant concentrations than guidelines allow for the type of respiratory protection being worn (the work crew may return after obtaining greater respiratory protection and/or assessing the situation as stabilized);
- A breach in protective clothing or a minor accident occurs (the work crew may return when the tear or other malfunction is repaired and first aid or decontamination has been administered as appropriate);
- The respirator malfunctions requiring replacement.

Site Evacuation

Evacuation of the Site will be required when:

- Ambient air conditions contain explosive and persistent levels of combustible gas or excessive levels of toxic gases;
- A fire or major accident occurs; or
- An explosion is imminent or has occurred.

After determining that Site evacuation is warranted, the work crew will proceed upwind of the work site and notify the PSO of site conditions. If the decontamination area is upwind and more than 500 feet from the work site, the crew will pass quickly through the decontamination area to remove contaminated outer suits. However, if the hazard is toxic gas, respirators will be retained. The crew will proceed to the field office to assess the situation, where the respirators may be removed (if instrumentation indicates an acceptable condition). As more facts are determined from the field crew, they will be relayed to the appropriate agencies. The advisability and type of further response action will be coordinated and implemented by the PSO.

Surrounding Area Evacuation

The area surrounding the Site will be evacuated when persistent, insuppressible toxic or explosive vapors are detected, or air quality monitored at several points downwind assess danger to the surrounding area.

When the PSO determines that conditions warrant evacuation of downwind residences and commercial operations, the local agencies will be notified and assistance requested. Designated on-site personnel will initiate evacuation of the immediate off-site area without delay.

12.8 SITE SECURITY AND CONTROL

A daily log containing the names of personnel, Site entry and exit times, and their levels of personnel protection shall be maintained by the PSO.

In order to control the potential spread of contaminants, and to keep visitors from entering potentially hazardous areas, caution tape will mark the work zones.

12.9 EMERGENCY RESPONSE EVALUATION

In the aftermath of an emergency, before normal Site activities are resumed, personnel will be prepared and fully equipped to handle another emergency. The PSO will be responsible for restocking emergency supplies, replacing or repairing damaged equipment, and determining that the Exclusion, Contaminant Reduction and Support Zones have been redefined. The Project Manager will notify appropriate government agencies as required. This includes OSHA if there has been a fatality or if five or more workers have been hospitalized.

The Project Manager and Health and Safety Manager are responsible for initiating an investigation and documenting the incident. This investigation will be designed to develop information about the institutional, organizational, technical, and operational root causes of the accident or injury. Documentation will include:

- A chronological history of the incident.
- Facts about the incident and when they became available.
- Title and names of involved personnel.
- Decisions made, orders given – to whom, by whom and when.
- Actions taken: who did what, when, where, and how.
- Environmental measurements.
- Potential exposures of Site personnel.
- History of all injuries or illnesses during or as a result of the incident.

Documentation will include the completion of the TAMS/Malcolm Pirnie Supervisor's Incident Investigation Report.

Before Site work resumes, a meeting will be held to review and revise all aspects of the HASP according to new Site conditions, cleanup and/or other additional tasks required as

a result of the incident, and lessons learned from the emergency response. This meeting will be attended by the PM, the Corporate HSM, the Field Team Leader, the PSO, representatives of partner firms whose operations or tasks were or could be impacted by the incident, and by representatives of any and all contractors whose operations or tasks were or could be impacted by the incident.

The purpose of the meeting will be to:

- Review the incident and unsafe conditions and/or act that resulted in the incident.
- Determine if and how these conditions or acts were preventable.
- Replace, or correct procedures that failed to result in desirable responses or activities.
- Determine if the incident has changed the Site profile and where and what that impact might be.

The result of the meeting will be:

- The generation of a series of action items which must be satisfactorily completed prior to the re-initiation of the Site activities.
- Developing, if required, appropriate changes to this HASP.
- Retraining Site personnel in the changes to this HASP.

Appendix A: TAMS Corporate Health and Safety Policy
Malcolm Pirnie, Inc. Corporate Health and Safety Policy
TAMS Safety Statistics
Malcolm Pirnie, Inc. Safety Statistics
Subcontractor Safety Statistics

MALCOLM PIRNIE, INC. CORPORATE HEALTH AND SAFETY POLICY

Malcolm Pirnie's Health and Safety Policy is as follows:

- Malcolm Pirnie is committed to providing a safe and healthful work place, free of recognized hazards, and to conduct its operations in accordance with applicable federal, state, and local environmental, health and safety standards, regulations and laws including those of the U.S. Department of Labor, Occupational Health and Safety Administration (OSHA), the U.S. Environmental Protection Agency (EPA), and U.S. Department of Transportation (DOT).
- Malcolm Pirnie expects that all employees will plan and conduct their work activities in a responsible and safe manner that reflects this commitment to their personal well-being, that of our clients, and of the general public.
- Malcolm Pirnie will provide appropriate safety equipment and training to employees to eliminate or reduce exposure to safety and health hazards.
- Malcolm Pirnie staff will promptly report to the Manager, Health & Safety (914 641-2484), and the General Counsel (914 614-2950) all serious incidents, accidents, injuries and property damage that involve Malcolm Pirnie, the client, or contractor employees, which occur during the execution of their projects.
- Failure to comply with Malcolm Pirnie's Health & Safety Policies, Procedures or Programs may result in disciplinary action, up to and including termination of employment.

With unequivocal support of these concepts, we will be able to cultivate and maintain a safe and healthful work environment for all employees. If you have any questions, please contact Mark McGowan at (914) 641-2484.



Safety Statistics
February 2004

MALCOLM PIRNIE EXPERIENCE MODIFICATION RATE PERFORMANCE CEILING IS 1.0			
BLS total Recordable Cases for 2002 ¹ For SIC 87 ²	MPI Total Incident Rate for 2003	BLS Total Lost Workday Cases for 2002 ¹ for SIC 87 ²	MPI Total Lost Workday Cases for 2003
1.5	0.42	0.5	.27
¹ Last Available date ² MPI Industry Class			

Malcolm Pirnie, Inc.

Five Previous Calendar Years	1999	2000	2001	2002	2003
Total Hours Worked (Less benefit hours)	2,445,232	2,661,810	2,802,443	2,852,872	2,906,716
Number of Employees	1198	1300	1370	1366	1398
Experience Modifier	0.82	0.89	0.88	0.81	0.79
Number of Total Recordable Incidents	25 (8 Injuries) (17 Illnesses *)	10	8	6	10
Number of Fatalities	0	0	0	0	0

Recordable Lost Day Incidents	15	7	3	0	4
Recordable Lost Days	137	32	36.5	0	7.5
Recordable Restricted Day Incidents	5	1	1	1	1
Recordable Restricted Days	69	2	23	2	2
Recordable No Lost Day Incidents	8	3	4	0	6
Total Incident Rate	2.04	0.75	0.57	0.42	0.69
Lost Day Incident Rate	1.23	0.52	0.21	0	0.27

*Majority of lost days/restricted duty based on one claim.

Incident Rate (Total # Incidents) = # Recordable Incidents x 200,000/Total Hours Worked

Incident Rate (# Lost Day Incidents) = # Recordable Lost Day Incidents x 200,000/Total Hours Worked

OSHA's Form 300A

Summary of Work-Related Injuries and Illnesses

All establishments covered by Part 1904 must complete this Summary page, even if no injuries or illnesses occurred during the year. Remember to review the Log to verify that the entries are complete

Using the Log, count the individual entries you made for each category. Then write the totals below, making sure you've added the entries from every page of the log. If you had no cases write "0."

Employees former employees, and their representatives have the right to review the OSHA Form 300 in its entirety. They also have limited access to the OSHA Form 301 or its equivalent. See 29 CFR 1904.35, in OSHA's Recordkeeping rule, for further details on the access provisions for these forms.

Number of Cases

Total number of deaths	Total number of cases with days away from work	Total number of cases with job transfer or restriction	Total number of other recordable cases
0	3	1	5
(G)	(H)	(I)	(J)

Number of Days

Total number of days of job transfer or restriction	Total number of days away from work
6.5	3
(K)	(L)

Injury and Illness Types

Total number of...			
(M)			
(1) Injury	5	(4) Poisoning	0
(2) Skin Disorder	0	(5) Hearing Loss	0
(3) Respiratory Condition	0	(6) All Other Illnesses	4

Post this Summary page from February 1 to April 30 of the year following the year covered by the form

Public reporting burden for this collection of information is estimated to average 50 minutes per response, including time to review the instruction, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistics, Room N-3644, 200 Constitution Ave, NW, Washington, DC 20210. Do not send the completed forms to this office

Establishment information

Your establishment name Malcolm Pirnie, Inc.

Street 104 Corporate Park Dr.

City White Plains State NY Zip 10602

Industry description (e.g., Manufacture of motor truck trailers)
Consulting Engineering

Standard Industrial Classification (SIC), if known (e.g., SIC 3715)
8 7 1 1

Employment information

Annual average number of employees 1398

Total hours worked by all employees last year 2,906,71

Sign here

Knowingly falsifying this document may result in a fine.

I certify that I have examined this document and that to the best of my knowledge the entries are true, accurate, and complete.

<u>Mark A. McGowan</u>	<u>Manager, Health & S</u>
Company executive	Title
<u>914-641-2484</u>	<u>1/14/2004</u>
Phone	Date

Appendix B: Documentation of Site-Specific Training; Safety Checklists

B-1: Daily Health and Safety Briefing Sheets

B-2: Pre-Entry Health and Safety Briefing Sheets

B-3: Daily Morning Health and Safety Briefing Records

Safety Checklist for Earth Drilling Equipment

Safety Checklist for Rigging

Safety Checklist for Launches, Motorboats, and Skiffs

APPENDIX B-1
HEALTH AND SAFETY BRIEFING
LOWER PASSAIC RIVER RESTORATION PROJECT SITE

Date: __

To all Malcolm Pirnie employees and subcontractor employees prior to their work on-site:

The purposes of regularly scheduled health and safety briefings are to ensure that employees are apprised of the written, Malcolm Pirnie, Site Health and Safety Plan (HASP) and that the HASP is being followed.

I acknowledge that I have today received a verbal, site-specific, health and safety briefing concerning at least one of the major components of the HASP.

Today's Discussion: __

NAME	SIGNATURE	FIRM/COMPANY
1.	1.	1.
2.	2.	2.
3.	3.	3.
4.	4.	4.
5.	5.	5.
6.	6.	6.
7.	7.	7.
8.	8.	8.
9.	9.	9.
10.	10.	10.
11.	11.	11.
12.	12.	12.
13.	13.	13.
14.	14.	14.
15.	15.	15.

APPENDIX B-2
PRE-ENTRY HEALTH AND SAFETY BRIEFING
LOWER PASSAIC RIVER RESTORATION PROJECT SITE

To all individuals entering the site who will not be involved in any site investigations or site remediation on this site today:

I acknowledge that I have received a verbal, site-specific, pre-entry, health and safety briefing concerning site emergency response procedures and radiological, chemical, and physical hazards that are known to exist on the Lower Passaic River Restoration Project Site. I agree that I will stay with a designated Malcolm Pirnie representative while on the site. I agree that I shall not enter any areas without the permission and the escort of a Malcolm Pirnie representative.

NAME & SIGNATURE	DATE	FIRM/COMPANY
1.	1.	1.
2.	2.	2.
3.	3.	3.
4.	4.	4.
5.	5.	5.
6.	6.	6.
7.	7.	7.
8.	8.	8.
9.	9.	9.
10.	10.	10.

APPENDIX B-3 DAILY MORNING HEALTH AND SAFETY BRIEFING RECORD
LOWER PASSAIC RIVER RESTORATION PROJECT SITE

DATE:		TIME:
MEETING INSTRUCTOR		
NAME:	TITLE:	SIGNATURE:
LIST OF ATTENDEES		
NAME:	TITLE:	SIGNATURE:
SUBJECTS DISCUSSED		
SUBJECT:		
RECORD OF DISCUSSION:		
RESOLUTION(S):		

**APPENDIX B-3: DAILY MORNING HEALTH AND SAFETY BRIEFING RECORD
LOWER PASSAIC RIVER RESTORATION PROJECT SITE**

DATE:	TIME:
SUBJECTS DISCUSSED (CONTINUED)	
SUBJECT:	
RECORD OF DISCUSSION:	
RESOLUTION(S):	
SUBJECT:	
RECORD OF DISCUSSION:	
RESOLUTION(S):	
SUBJECT:	
RECORD OF DISCUSSION:	
RESOLUTION(S):	
SUBJECT:	
RECORD OF DISCUSSION:	
RESOLUTION(S):	

SAFETY CHECKLIST FOR EARTH DRILLING EQUIPMENT			
Contract # and title:			
Equipment name & number:			
Contractor:		Subcontractor:	
Contractor inspector:		Date inspected:	
This checklist references EM 385 1-1, revised 3 November 2003	Yes	No	N/A
1. Is a copy of the manual for all drilling equipment available? (16.M.02)			
2. Have all overhead electrical hazards and potential ground hazards been identified in a site layout plan and addressed in an activity hazard analysis? (16.M.02)			
3. Are MSDSs for all drilling fluids available? (16.M.05)			
4. Does the drilling equipment have 2 easily accessible emergency shut down devices (one for the operator and one for the helper)? (16.M.06)			
5. Is the equipment posted with a warning of electrical hazards? (16.M.07)			
6. Is there a spotter or an electrical proximity-warning device available to ensure safe distances from power lines are maintained? (16.M.07)			
7. Remarks: (Enter actions taken for “no” answers)			
Contractor inspector signature			
Contractor QC/safety officer/project manager			

SAD Form 1666h-R Previous editions may be used for contract submittals prior to Nov 03.
Reference: EM 385-1-1, 3 November 2003 edition.

SAFETY CHECKLIST FOR RIGGING			
Contract # and title:			
Equipment name & number: Owned or leased?			
Contractor		Subcontractor:	
Contractor inspector:		Date inspected:	
This checklist references EM 385 1-1, revised 3 November 2003		Yes	No
1. Is rigging equipment inspected in accordance with manufacturer specifications, by a competent person prior to use on each shift? (15.A.01)			
2. Has all defective rigging been removed? (15.A.01)			
3. Is rigging stored properly? (15.A.01)			
4. Are running lines within 6.5' of the ground or working level guarded by a physical barriers? (15.A.03)			
5. Are all eye splices made in an approved manner with rope thimbles? (Sling eyes excepted) (15.A.04)			
6. Are positive latching devices used to secure loads? (15.A.05)			
7. Are all custom lifting accessories marked to indicate their safe working loads? (15.A.07)			
8. Are all custom designed lifting accessories proof-tested to 125% of their rated load? (15.A.07)			
9. Are the following conditions met for wire rope: (15.B.01-09) a. Are they free of rust or broken wires? b. Are defective ropes cut up or marked as unusable? c. Do rope clips attached with bolts have the bolts on the dead end or short end of the rope? d. Are protruding ends of strands in splices on slings and bridles covered or blunted?			

SAD Form 1666e-R Previous editions may be used for contract submittals prior to Nov 03. Reference: EM 385-1-1, 3 November 2003 edition.

<p>e. Except for eye splices in the end of wires and for all endless wire rope slings, are all wire ropes used in hoisting, lowering, or pulling loads one continuous piece, free of knots or splices?</p> <p>f. Do all eye splices have at least 5 full tucks?</p> <p>g. If used, are wedge sockets fastening attached without attached the dead end of the wire rope to the live rope?</p> <p>h. Are they free of eyes or splices formed by wire rope clips or knots?</p>	Yes	No	N/A
<p>9. Are the following conditions met for chain? (15.C.01-04)</p> <p>a. Are chains inspected prior to use and weekly thereafter?</p> <p>b. Do all coupling links or other attachments have rated capacities at least equal to that of the chain.</p> <p>c. Are makeshift fasteners restricted from use?</p>			
<p>10. Are the following conditions met for fiber rope:(15.D.01-07)</p> <p>a. Are all ropes protected from freezing, excessive heat or corrosive materials?</p> <p>b. Are all ropes protected from abrasion?</p> <p>c. Are splices made IAW manufacture's recommendations?</p> <p>d. Do all eye splices in manila rope contain at least 3 full tucks and do all short splices contain at least 6 full tucks(3 on each side of the centerline of the splice)?</p> <p>e. Do all splices in layed synthetic fiber rope contain at least 4 full tucks and do short splices contain at least 8 full tucks (4 on each side of the centerline of the splice)?</p> <p>f. Do the tails of fiber rope splices extend at least 6 rope diameters (for rope 1" diameter or greater) past the last full tuck?</p> <p>g. Are all eye splices large enough to provide an included angle of not greater than 60° at the splice when the eye is placed over the load or support?</p>			
<p>11. Are the following conditions met for all slings:(15.E.01-06)</p> <p>a. Is protection provided between the sling and sharp surfaces?</p> <p>b. Do all rope slings have minimum clear length of 40 times the diameter of component ropes between each end fitting or eye splice?</p> <p>c. Do all braided slings have a minimum clear length of 40 times the diameter of component ropes between each end fitting or eye splice?</p> <p>d. Do all welded alloy steel chain slings have affixed permanent identification stating diameter, rated load, lift capacity in vertical, choker, basket configuration, and date placed in service?</p> <p>e. Is each synthetic web sling marked or coded to identify its manufacturer, rated capacities for each type hitch and the type material?</p>			

SAD Form 1666e-R Previous editions may be used for contract submittals prior to Nov 03.

Reference: EM 385-1-1, 3 November 2003 edition.

	Yes	No	N/A
12. Are drums, sheaves, and pulley smooth and free of surface defects that may damage rigging? (15.F.01)			
13. Is the ratio of the diameter of the rigging and the drum, block sheave or pulley thread diameter such that the rigging will adjust without excessive wear, deformation, or damage? (15F.02)			
14. Have all damaged drums, sheaves and pulleys been removed from service? (15.F.04)			
15. Are all connections, fittings, fastenings, and attachments of good quality, proper size and strength, and installed IAW manufacturer's recommendations? (15.F.05)			
16. Are all shackles and hooks sized properly? (15.F.06 & .07)			
17. Are hoisting hooks rated at 10 tons or greater provided with safe handling means? (15.F.07)			
18. Do all drums have sufficient rope capacity? (15.F.08)			
19. Is the drum end of the rope anchored by a clamp securely attached to the drum in a manner approved by the manufacturer? (15.F.08)			
20. Do grooved drums have the correct groove pitch for the diameter of the rope and is the groove depth correct? (15.F.08)			
21. Do the flanges on grooved drums project beyond the last layer of rope at a distance of either 2" or twice the diameter of the rope, whichever is greater? (15.F.08)			
22. Do the flanges on ungrooved drums project beyond the last layer of rope a distance of either 2.5" or twice the diameter of the rope, which ever is greater.			
23. Are the sheaves compatible with the size of rope used and as specified by the manufacture? (15F.09)			

SAD Form 1666e-R Previous editions may be used for contract submittals prior to Nov 03.
Reference: EM 385-1-1, 3 November 2003 edition.

	Yes	No	N/A
--	-----	----	-----

24. Are sheaves properly aligned, lubricated, and in good condition? (15.F.09)			
25. When rope is subject to riding or jumping off a sheave, are sheaves equipped with cablekeepers? 915.F.09)			
26. Are eyebolts loaded in the plane of the eye and at angles less than 45* to the horizontal? (15.F.10)			
27. Remarks: (Enter actions taken for “no” answers.)			
Contractor inspector signature			
Contractor QC/safety/project manager signature			

SAD Form 1666e-R Previous editions may be used for contract submittals prior to Nov 03.
Reference: EM 385-1-1, 3 November 2003 edition.

SAFETY CHECKLIST FOR LAUNCHES, MOTORBOATS AND SKIFFS			
Contract # and title:			
Contractor:		Subcontractor:	
Name of equipment:		Superintendent:	
This checklist references EM 385 1-1, revised 3 November 2003		Yes	No
1. Is a qualified crew person assigned to assist with deck duties under the following circumstances: (19C.01)			
a. Yes extended trips (more than 2 hours) are made from the work site?			
b. Yes conditions of navigation make it hazardous for an operator to leave the wheel while underway?			
c. Yes operations other than tying-in require the handling of lines?			
d. Yes operating at night or in inclement weather?			
e. Yes towing?			
2. Are all motorboats, launches and skiffs posted with the number of passengers and weight they can carry? (19C.02)			
3. Is there a PFD available for each passenger and crewmember? (19C.02)			
4. Do all launches and motorboats that are less than 26 feet in length have at least one 1A-10 B fire extinguisher on board? (19C.03)			
5. Do all launches and motorboats that are 26 feet or more in length have at least 2 1A-10 B fire extinguishers on board? (19C.03)			
6. Do all launches and motorboats that have gasoline or liquid petroleum gas power plants or equipment in cabins, compartments, or confined spaces have built-in automatic C D or other equally effective type of fire extinguishing system? (19C.03)			
7. Are all cabins launches and motorboats equipped with "kill (dead man) switches"? (19C.02(d))			

SAD Form 1437b-R Previous editions may be used for contract submittals prior to Nov 03.
Reference: EM 385-1-1, 3 November 2003 edition.

	Yes	No	N/A
<p>8. Have all motorboat operators completed the following training?</p> <ul style="list-style-type: none"> a. A boating safety course meeting the USCG Auxiliary, National Associate of Safety Boating Law Administrators (NASBLA), or equivalent; and b. Motorboat handling training, based on the type of boats they will operate, provided by qualified instructors (in-house or other). c. Operators must pass a written and operational test d. Current USCG licensed personnel are exempt from the boating safety training, but they shall complete the written exam and operational test. (19.C.05) 			
<p>7. Remarks: (Enter actions taken for “no” answers.)</p>			
<p>Contractor inspector signature</p>			
<p>Contractor QC/safety officer/project manager signature</p>			

SAD Form 1437b-R Previous editions may be used for contract submittals prior to Nov 03.
Reference: EM 385-1-1, 3 November 2003 edition.

Appendix C: Health and Safety Audit Form

Health and Safety Field Audit – Hazardous Waste Operations

HEALTH & SAFETY FIELD AUDIT
HAZARDOUS WASTE OPERATIONS
AMS/Malcolm Pirnie, Inc.

Site _ Project No.: _

Date: _

Description of
Field Operation: Auditor: _

Project Manager: _

Project Safety Officer: _

YES NO/A

☐ ☐ ☐ Approved H&S Plan on Site with signatures of field personnel and visitors entering work zones.

☐ ☐ ☐ MSDSs available for all chemicals brought to the site.

☐ ☐ ☐ Hazardous material containers properly labeled.

☐ ☐ ☐ MPI's Hazard Communication Program on site (common OSHA citation).

☐ ☐ ☐ All field personnel are current with respect to:

☐ HAZWOPER training

☐ Medical monitoring examinations (within 1 year)

☐ ☐ ☐ First Aid/CPR-trained individuals on-site

☐ ☐ ☐ Health and safety kickoff and morning meetings documented in field log book.

☐ ☐ ☐ Field personnel are aware of emergency procedures, evacuation routes, etc.

☐ ☐ ☐ Personnel decontamination facility established, equipped and being utilized as specified by HASP.

☐ ☐ ☐ PPE is available and being utilized as specified by HASP.

**HEALTH & SAFETY FIELD AUDIT
HAZARDOUS WASTE OPERATIONS**
TAMS/Malcolm Pirnie, Inc.

Site _____ Project No.: _____
Date: _____

Description of Field _____ Operation: _____
Auditor: _____

Project Manager: _____

Project Safety Officer: _____

YES NO N/A

- | | |
|--|---|
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Site control zones (exclusion zone, etc.), established as specified by the HASP. |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Field log complete including: PPE levels, individuals on-site, visitors on-site, work and rest periods, instrument calibration, air monitoring results, and decontamination procedures |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Monitoring results obtained in a timely manner (if applicable). |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Monitoring results within action levels or exceedances resolved. |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Multi-function DOL information poster is displayed in field trailer (if applicable) |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Communication aids (radios, cellular phones) are appropriate to site conditions. |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | “Buddy” system being implemented as appropriate. |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Site security measures are appropriate for site conditions. |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Emergency information posted on-site (phone numbers, route to hospital) |
| <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> | Emergency equipment on-site: |
| | <input type="checkbox"/> Wind Sock
<input type="checkbox"/> Fire Extinguishers (charged)
<input type="checkbox"/> First Aid Kits
<input type="checkbox"/> Eye Wash
<input type="checkbox"/> Spill Control Materials |

HEALTH & SAFETY FIELD AUDIT
HAZARDOUS WASTE OPERATIONS
TAMS/Malcolm Pirnie, Inc.

Site _____ Project No.: _____ Date: _____

Description of Field Operation: _____

Auditor: _____

Project Manager: _____

Project Safety Officer: _____

Comments _____

Action Items: _____

**HEALTH & SAFETY FIELD AUDIT
HAZARDOUS WASTE OPERATIONS**
TAMS/Malcolm Pirnie, Inc.

LIST OF OUTSTANDING DEFICIENCIES

DATE: _____

PAGE _____ of _____

SITE: _____

CONTRACTOR: _____ LOCATION: _____

CQC REPORT# _____ CONTRACT #: _____

Description of Deficiency	Date Identified	Projected Resolution Date	Person Responsible for Correcting the Deficiency	Date Resolved	Remarks

NOTE: THIS FORM SHALL BE USED TO TRACK OUTSTANDING DEFICENCIES

Appendix D:
TAMS Corporate Hearing Conservation Program
Malcolm Pirnie, Inc. Corporate Hearing Conservation Program

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INTRODUCTION

Noise is the perception of pressure waves in the air caused by a vibrating source. The ears transduce this mechanical energy to electrochemical impulses that are transmitted to the brain, resulting in the perception of sound. Noise is unwanted sound. This Hearing Conservation Program sets forth requirements for reducing noise and protecting employees who may be exposed to excessive noise levels.

These requirements are based on the Occupational Safety and Health Administration Hearing Conservation Program described in [29 CFR 1910.95](#). The standards for noise that disrupts speech communication and applicable for the safe performance of work are derived from the speech interference levels described in the reference, Handbook of Noise Measurement.

The primary goal of the hearing conservation program is to reduce and eventually eliminate hearing loss due to occupational exposures.

Malcolm Pirnie's Hearing Conservation Program involves:

- Identification of exposed personnel (task and assignment identification, workplace and personal monitoring).
- Implementation of noise-reducing engineering and administrative controls.
- Audiometric testing (baseline and annual).
- Training.
- Use of hearing protective devices (plugs, ear muffs).

1. REFERENCES

The program was developed using the following references as guides:

[29 CFR 1910.95](#), "Occupational Noise Exposure"

[29 CFR 1926.52](#), "Occupational Exposure to Noise in Construction"

NIOSH "National Institute for Occupational Safety and Health"

ANSI "American National Standards Institute"

American Conference of Governmental Industrial Hygienists, Threshold Limit Values for Physical Agents in the Work Environment. ACGIH, Cincinnati, OH.

Peterson, A., Handbook of Noise Measurement, Chapter 4.18, "Masking-I Can't Hear You When the Water's Running," GenRad, Inc., 9th edition (1980).

2. POLICY

Malcolm Pirnie employees will control their exposures to hazardous noise, to the extent feasible, by minimizing workplace exposure whenever possible. This will be accomplished by the design and implementation of accepted engineering control methods e.g.: altering the noise-producing equipment or changing the environment to reduce noise levels; or by limiting the time of exposure. When effective engineering or administrative control of hazardous noise is not available, or while being instituted, potentially exposed employees will be issued and be required to use appropriate hearing protection devices at no cost.

Selected Malcolm Pirnie employees, who have the potential to have significant noise exposures, will complete a baseline audiometric medical examination and receive medical clearance prior to wearing any hearing protective device. These Malcolm Pirnie employees will complete annual audiometric testing for as long as they continue to have potential significant noise exposures to ensure that the employee has not suffered a significant threshold shift. In addition, each selected employee will receive annual training in the selection, use, limitations, and care of hearing protection equipment.

This document applies to all Malcolm Pirnie employees who may be exposed to excessive noise levels in both construction and non-construction work.

3. RESPONSIBILITIES

3.1. Corporate Health & Safety Manager

The Corporate Health & Safety Manager (CHSM) will develop, administer, and maintain the Malcolm Pirnie Hearing Conservation Program including:

- Reviewing field operations to determine if there is a potential for exposure to hazardous levels of noise.
- Reviewing and evaluating the results of the audiometric tests.
- Providing training to employees who may be or have been exposed to noise that exceeds the applicable standards.
- Selecting the most appropriate type of hearing protectors for employees exposed to noise at levels above 85 dBA (50% dose).
- Fitting and training the employee in the use of hearing protectors

3.2. Project Managers

Project Managers are responsible for:

- Anticipating and identifying areas where Malcolm Pirnie employees may be assigned on their projects that may expose them to potentially hazardous levels of noise.
- Accepting employees' concerns regarding noise levels in the workplace.
- Notifying the CHSM of employees who are suspected or confirmed to be exposed routinely or intermittently at levels equaling or exceeding the 8-hour action level of 85 dBA (50% dose) or the time-weighted average of 90 dBA, regardless of the use of hearing protectors.
- Directing the Project Safety Officer (PSO) to conduct noise surveys to establish the noise levels at a suspected work site; and, directing the PSO to post the appropriate signs in specific areas and operations or on equipment under Malcolm Pirnie's control that may expose employees to noise equaling or exceeding 85 dBA (50% dose).
- Where feasible, directing the PSO to conduct personal dosimetry noise surveys on employees who may be exposed to noise levels that exceed the permissible limits.
- Assisting with the design of feasible engineering controls to reduce employee exposure to noise.
- Notifying project personnel of areas with hazardous noise.
- Notifying the CHSM when there is concern about noise levels.
- Enforcing the use of hearing protectors where required.
-

3.3. Equipment Facility Manager

The Malcolm Pirnie Equipment Facility Manager is responsible for:

- Maintaining or procuring an adequate collection of noise-monitoring equipment, including sound-level meters, octave-band analyzers, personal dosimeters, and calibrators to assess employee exposures.

3.4. Project Staff

Project staff are responsible for:

Contacting the Project Manager or the PSO if noise levels in the workplace are of concern.

- Use hearing protectors where required and adhere to requirements listed on signs identifying noisy areas.
- Participate in required medical exams, required training and demonstrations on how to properly fit protectors offered by Malcolm Pirnie.

4. DEFINITIONS

4.1. Action Level

The sound level which when reached or exceeded necessitates implementation of activities to reduce the risk of noise-induced hearing loss. OSHA currently uses an 8-hour time weighted average of 85 dBA and a 12-hour time weighted average of 82 dBA as the criterion for implementing an effective hearing conservation.

4.2. Baseline Audiogram

A valid audiogram against which subsequent audiograms are compared to determine if hearing thresholds have changed. The baseline audiogram is preceded by a quiet period so as to obtain the best estimate of the person's hearing at that time.

4.3. dB (Decibel)

The unit used to express the intensity of sound. The decibel was named after Alexander Graham Bell. The decibel scale is a logarithmic scale in which 0 dB approximated the threshold of hearing in the mid frequencies for young adults and in which the threshold discomfort is between 85 and 95 dB and the threshold for pain is between 120 and 140 dB.

4.4. Hazardous Noise

A hazardous noise is any sound for which any combination of frequency, intensity, or duration is capable of causing permanent hearing loss in a specified person.

4.5. Noise Dose

The noise exposure expressed as a percentage of the allowable daily exposure. For OSHA, a 100% dose would equal an 8-hour exposure to a continuous 90-dBA noise; a 50% dose would equal an 8-hour exposure to an 85-dBA noise or a 4-hour exposure to a 90-dBA noise.

4.6. NRR (Noise Reduction Rating)

The NRR is a single-number rating method which attempts to describe hearing protection based on how much the overall noise level is reduced by the hearing protection itself. When estimating A-weighted noise exposures, first subtract 7 dB from the NRR and then subtract the remainder from the A-weighted noise level. The NRR theoretically provides an estimate of the protection that should be met or exceeded by 98% of the wearers of a given device.

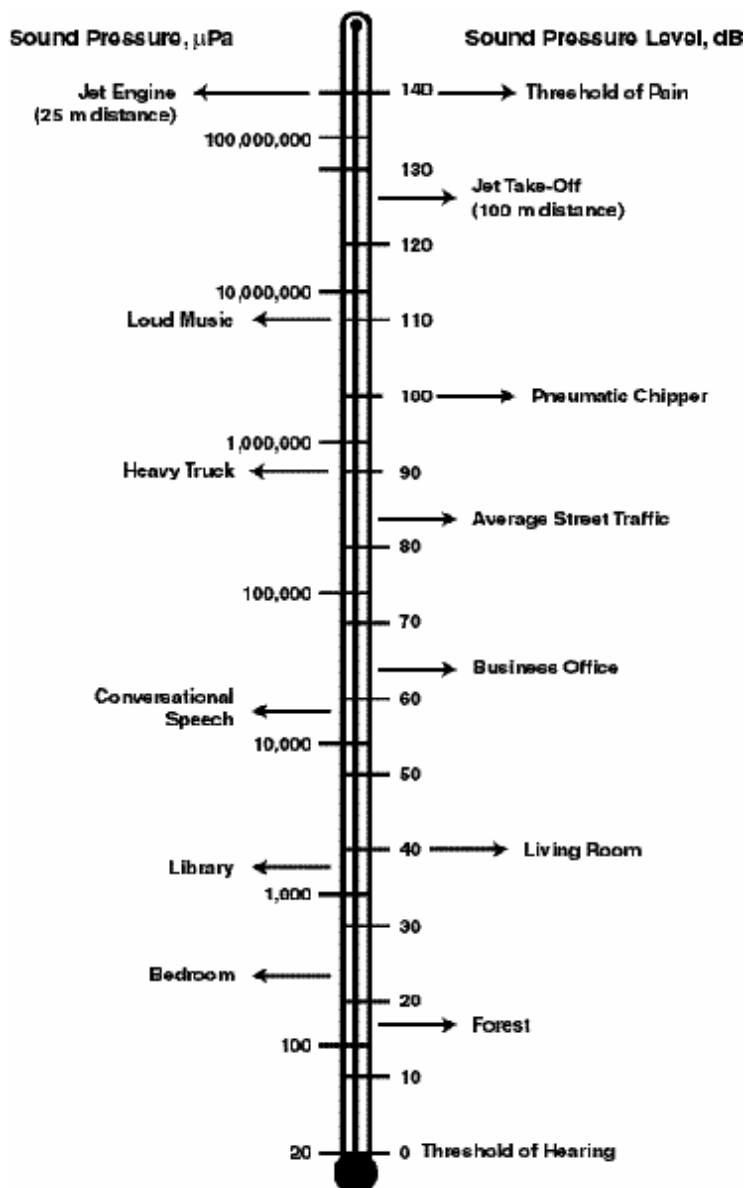
4.7. Permissible Exposure Limit

The OSHA Permissible Exposure Limits (PEL) is presently a 90dBA 8-hour time-weighted average exposure that can not be exceeded during any 8-hour work shift of a 40-hour workweek.

5. NOISE HAZARDS

Exposure to excessive levels of noise can result in permanent hearing loss, acuity, development of tinnitus (i.e., ringing of the ears), a possible increase in blood pressure, and stress-related problems. Noise may also cause annoyance or difficulty in communicating or working effectively and safely. A general guideline is that if you need to raise your voice to communicate with a co-worker at a normal conversation distance, then you may be in a noise hazard area.

The figure below shows the sound pressure levels on the decibel and log scales for various types of equipment and areas where such noise levels may be encountered.



6. NOISE EVALUATION

The Project Manager will identify work areas on his or her project where noise levels have the potential of equaling or exceeding 85 dBA (50% dose, see Definitions). These areas will be evaluated by the PSO and potentially exposed employees will be identified. Those areas where the noise levels can be shown to be below 85 dBA (50% dose, see Definitions) will not be routinely monitored. Identification of hazardous noise areas and equipment is the responsibility of the Project Manager but may be delegated to the PSO. (Item 2 and Item 3)

Signs will be posted at the entrance to any work area under Malcolm Pirnie control where noise levels exceed 85 dBA, requiring anyone entering the area to wear proper hearing protection. Personnel who work in these areas shall have hearing protection supplied to them, shall be instructed in its proper use, and be required to wear this equipment when in these areas. It is the responsibility of the Project Manager to ensure that these precautions are enforced.

6.1. Noise Measurements and Exposure Assessments

In order to effectively control noise it is necessary that the noise be accurately measured according to standard procedures and that the measurements are properly evaluated against accepted criteria. All noise monitoring will be conducted in accordance with established regulatory standards.

The monitoring of employees for noise exposure is made up of two parts, area and personal monitoring. This monitoring will include an evaluation of the specific noise environment in which hearing protection devices may be used. Area measurements are generally obtained first. If noise levels are at or above 85 dBA, then the PSO, in consultation with the Project Manager and the CHSM may be directed to conduct personal monitoring using dosimeters. All noise exposure monitoring data will be recorded and maintained. (Item 3)

6.2. Area Measurements

In an area survey, measurements of environmental noise levels are recorded using a sound-level meter to identify work areas where employees' exposures may be above hazardous levels. Area monitoring is conducted using a calibrated sound level meter set to the "A" scale, slow response. Within the area of interest, several different locations will be measured. Typical measurement locations would include:

- In the hearing zone at the employee's work location;
- Adjacent to the noise source(s);
- At the entrance(s) to the work area;
- At other locations within the area where the employee might spend time.

A rough sketch of the area will be included with the results showing the locations where the noise readings were obtained. If the noise levels are below 85 dBA in the area, no further routine monitoring will be required for that area. Should any of the noise measurements equal or exceed 85 dBA, records shall be maintained as to the noise levels recorded, where they were taken, and the source(s) of the noise. These records shall be updated regularly to determine if any changes have occurred that would warrant re-monitoring of exposed personnel.

6.3. Personal Monitoring

In some cases an employee's Time-Weighted Average (TWA) noise exposure cannot be determined by the results of area sampling. Determination of the noise exposure level will be accomplished using calibrated noise dosimeters. The PSO will place a noise dosimeter on each employee to be monitored at the beginning of their normal work shift with the microphone placed in the "hearing zone". The dosimeter will be worn for the full duration of the work shift.

At the end of the work shift, the PSO will remove the dosimeter and exposure data downloaded and printed, if capable. Background information will be collected during the testing for each employee detailing job description, unusual job activities, etc., for the time period sampled. Those employees whose noise exposure are equal to or exceed 85 dBA (50% dose) on an 8-hour TWA will be referred for inclusion in the Hearing Conservation Medical Surveillance Program.

6.4. Re-monitoring of Hazardous Noise Areas

Any area with noise levels that equal or exceed 85 dBA shall be re-monitored whenever a change in production process, equipment, or controls increase the noise exposure such that additional employees are exposed to noise levels at or above 85 dBA on a time-weighted average basis. Areas where the noise levels have dropped below 85 dBA shall be eliminated from the monitoring program.

7. NOISE EXPOSURE LIMITS

7.1. Eight-hour, Time-weighted Average (8-Hour TWA) Exposure Limits

The ACGIH has established a standard of 85 dBA (50% dose) (sound pressure in dB related to 20 μ Pa measured on the A-weighted scale) over an 8-hour day. Exposure to transient noise louder than 85 dBA is permitted, as long as the average exposure for the entire day is less than 85 dBA (50% dose).

OSHA's permissible exposure limits for specified exposure durations are summarized below. Table 1 shows the relationship between noise levels and permitted exposure periods.

Table 1. Threshold limit values for noise.^a

	Duration/day	Sound level, dBA ^b
Hours	8	90
	6	92
	4	95
	3	97
	2	100
	1	105
Minutes	30	110
	15	115
	7.50 ^c	120
	3.75 ^c	125
	1.88 ^c	130
	0.94 ^c	135
<p>a No exposure to continuous, intermittent, or impact noise in excess of a peak C-weighted level of 140 dB.</p> <p>b Sound level in decibels are measured on a sound level meter, conforming as a minimum to the requirements of the American Standards Institute Specifications for Sound Level Meters, S1.4 (1983), Type S2A, and set to use the A-weighted network with slow meter response.</p> <p>c Limited by the noise source, not by administrative controls.</p>		

7.2. Ultrasound Exposure Limits

The ACGIH has established standards for exposure to very high audible frequencies and frequencies above the range of human hearing (ultrasonic) (10 kHz to 100 kHz, as measured at the mid-frequency of the third octave band). Table 2 shows the TLV for ultrasound.

Table 2. Threshold limit values for ultrasound.

Mid-frequency octave band (kHz)	One-third octave band level in dB (re 20 mPa)	
	Ceiling Values	8-hour TWA
10	105 ^a	88 ^a
12.5	105 ^a	89 ^a
16	105 ^a	92 ^a
20	105 ^a	94 ^a
25	110	--
31.5	115	--
40	115	--
50	115	--
63	115	--
80	115	--
100	115	--
a Subjective annoyance and discomfort may occur in some individuals at levels between 75 and 105 dB for frequencies ranging from 10 kHz to 20 kHz, especially if they are tonal in nature. Hearing protection or engineering controls may be needed to prevent subjective effects. Tonal sounds in frequencies below 10 kHz might also need to be reduced to 80 dB.		

7.3. Permissible Speech Interference Level

In some cases, noise may not exceed standards established to protect hearing, but may interfere with the safe conduct of work. For example, nuisance noise can prevent effective communication between two or more people working together. It also can prevent employees from hearing or understanding safety instructions or other critical communications.

Most of the information conveyed through speech is in the mid-frequencies, from about 500 to 2000 Hz, which are used to determine how noise will interfere with speech. Noise levels above 60 dB can make telephone conversation difficult.

7.4. Nuisance Noise

Noise may be annoying because of its level, frequency, or aspects of its modulation. A noise may not be very loud, but its frequency may be high enough to cause headaches in susceptible individuals. Alternatively, a noise may not be that loud but may start and stop suddenly. This can disturb concentration or startle exposed personnel. Because there are no guidelines for annoying noise, each case will be examined independently to attempt to alleviate the irritation.

8. ENGINEERING AND ADMINISTRATIVE CONTROLS**8.1. Engineering Controls**

The best way to limit noise exposure is to alter the noise-producing equipment or change the environment to reduce noise levels. Examples include replacing old, noisy equipment; increasing sound dampening around noisy equipment; and improving muffler design. Engineering controls shall be formally considered before other types of controls are implemented. Contact the CHSM for assistance in reviewing the options for engineering controls.

8.2. Administrative Controls**8.2.1. Measuring Noise**

Project Managers who have project that may expose Malcolm Pirnie employees to loud noise will notify the CHSM. The CHSM will consult with the Project Manager and PSO to determine the advisability and the feasibility of conducting noise measurements to identify areas or specific operations that may produce excessive noise or to evaluate a employee's exposure to noise throughout an 8-hour day. The results of the measurements are used to determine which, if any, controls are appropriate to reduce employee exposure to noise.

8.2.2. Modifying Work Schedules

Noise exposure can be limited by altering work schedules. For example, a worker scheduled to work in the area of noisy equipment should perform these tasks over several days so that the average exposure each day does not exceed the permissible limit.

8.2.3. Posting Signs / Labels

Caution labels or signs should be posted on equipment or in areas under Malcolm Pirnie's control where it has been determined that noise levels may exceed 85 dBA. These signs should notify the employee of a potential noise hazard and specify the conditions under which hearing protectors are recommended or required. Caution labels and signs are particularly important where employees' duties require them to move among different locations or to use a variety of tools. The purpose and meaning of the signs shall be included in the training aspect of Malcolm Pirnie's Hearing Conservation Program.



9. HEARING PROTECTION DEVICES

Hearing protective devices (e.g., ear plugs, canal caps, and ear muffs) shall only be used after engineering and administrative measures have been implemented, when feasible, and further protection is still needed. They also may be used during the design and fabrication of suitable enclosures, sound damping materials, and isolation.

Whenever employees are subjected to noise exceeding 85 dBA over an 8-hour day, the Project Manager and the CHSM will assist in the design of feasible administrative and engineering controls and will re-evaluate the employee and his/her work area after implementation of the controls. If these controls fail to reduce the noise levels below the established limits, then hearing protection may be used to protect employees.

The CHSM or Project Manager shall provide employees affected by noise with earplugs or earmuffs as needed. The Project Manager may select hearing protectors for employees affected by noise at levels up to 85 dBA but should contact the CHSM to select the appropriate type of hearing protector for areas where exposure above 85 dBA is possible. In all cases, hearing protectors will provide adequate attenuation to prevent exposure to excessive noise levels and will be provided to employees at no cost. The Project Manager or the PSO will conduct surveillance of all work areas where hearing protection devices are used to ensure that they are being used in accordance with manufacturer specifications. (Item 9)

Hearing protectors have a "noise reduction rating" (NRR) number provided by the manufacturer. The NRR is a general guide to the level of noise reduction (in decibels) the protector provides in laboratory test situations if it is fitted and worn properly.

To determine the noise reduction of a hearing protector used in the workplace, subtract 7 dB from the NRR and apply a 50 percent safety factor. For example, hearing protectors with a NRR = 23 dB would provide a noise reduction of 8 dB when used in the workplace $[(23 \text{ dB} - 7 \text{ dB}) \times 0.5 = 8 \text{ dB}]$.

Hearing protectors may also have a "noise reduction rating (subject fit)" or NRR (SF) number, which may be used without any correction. (Item 10)

9.1. Maintenance of Hearing Protective Devices

Reusable earplugs, such as the triple flange or formable devices, should be washed in lukewarm water using hand soap, rinsed in clean water, and dried thoroughly before use. Wet or damp earplugs should not be placed in their respective containers. Cleaning should be performed as needed.

Earmuff cushions should be kept clean. The plastic or foam cushions may be cleaned in the same way as earplugs, but do not allow the inside of the muff to get wet. Allow cushions to completely dry before storing.

9.2. Hearing Protection Performance Information

The maximum sound attenuation one gets when wearing hearing protection devices is limited by human body and bone conduction mechanisms. Even though a particular device may provide outstanding values of noise attenuation the actual noise reductions may be less because the noise surrounding the head and body bypasses the hearing-protective device and is transmitted through tissue and bone pathways to the inner ear.

The term "double hearing protection" is misleading. The attenuation provided from any combination earplug and earmuff is not equal to the sum of their individual attenuation values.

10. TRAINING (Item 1)

For each employee who is enrolled in the Hearing Conservation Program, employees will be trained in the use of various hearing protectors at the initial medical surveillance appointment or at the most convenient opportunity thereafter. Project Managers shall provide hearing protectors to all employees in the program and require them to use these devices while noise levels remain excessive.

Employees who are exposed to noise levels equaling or exceeding the 8-hour time-weighted average of 85 dBA (50% dose) will be trained in the use of hearing protective devices. This training covers the following:

- The effects of overexposure to noise on hearing.
- When and/or where hearing protection is required.
- The purpose of hearing protectors.
- The advantages, disadvantages, and attenuation of various types of protectors.
- Instructions on how to select, use, fit, and care for hearing protectors. (Item 9)
- The purpose of audiometric testing, including an explanation of the test procedures.
- Noise Induced Hearing Loss (NIHL)
- Explanation of noise measurement procedures

Additional training and follow-up annual retraining shall be provided based on the results of annual audiometric testing and the work activity involvement.

Training materials shall be updated as necessary when changes occur in hearing protection equipment and work practices. The noise exposure procedures will be posted in the workplace and made available to affected employees.

11. MEDICAL SURVEILLANCE (Item 4)

Medical surveillance examinations are conducted to monitor the hearing acuity of employees exposed to noise levels exceeding 85 dBA, at no cost to the employee. Medical surveillance is not routinely required for employees who are exposed to nuisance noise. Non-Malcolm Pirnie employees/subcontractors should receive medical surveillance through their employer. Equipment and training provided to Malcolm Pirnie employees may be available to some non- Malcolm Pirnie employees.

The CHSM will enroll Malcolm Pirnie employees exposed to noise above the established limits in the Hearing Conservation Program. This program shall meet all the requirements of [29 CFR 1910.95](#) and include:

- Annual training on the health effects of noise exposure and instructions on how to fit and wear hearing protectors.
- A baseline exam and annual follow-up audiometric testing.

11.1. Baseline Audiograms

A baseline audiogram will be conducted for each exposed employee within 6 months of initial exposure to noise levels at or exceeding 85 dBA. The CHSM will advise the employee of the need to schedule audiometric testing and advise employees to wear hearing protectors or avoid noisy environments for 14 hours prior to the test. (Item 5 and Item 6)

11.2. Follow-Up Audiograms

Subsequent annual follow-up audiometric testing will be conducted for each affected employee. The follow-up audiograms will be compared to the employee's baseline audiogram to ensure that the employee has not suffered a significant threshold shift.

When compared to the baseline audiogram, if the follow-up test shows that a worker may have suffered a significant threshold shift, the Occupational Physician may schedule a retest within 30 days and consider the results of this test as the annual audiogram. The Occupational Physician will determine if the threshold shift is occupational or non-occupational and notify the employee in writing within 21 days of the determination. If the threshold shift is occupational, the Occupational Physician will: (Item 7)

Inform the CHSM of the possible need to re-evaluate the employee's work activities.

Assess the employee's level of knowledge in the types and use of hearing protection to augment knowledge deficits, that is, if the employee is already using hearing protectors. The CHSM can re-fit the employee with the current hearing protection used or modify the type of hearing protection provided. The CHSM will notify the Project Manager of the situation and provide such hearing protectors to the Project Manager for distribution or directly to the employees for use.

The Occupational Physician may also require the employee to undergo further clinical audiological evaluation or otological examination if it is determined that such an evaluation or examination is necessary, or if they suspect that a medical pathology of the ear is caused or aggravated by the wearing of hearing protectors. (Item 8)

12. RECORDKEEPING

12.1. Exposure Monitoring Records

In accordance with the requirements of 1910.1020(d), Access to Employee Exposure and Medical Records, Malcolm Pirnie shall retain the records for at least the following periods:

- 30 years for noise exposure monitoring records; or
- Duration of employment plus 30 years for medical monitoring records. (Item 11)

12.2. Training Records

Training for the use and maintenance of various hearing protectors should be documented in the site health and safety logbook. The CHSM will maintain a copy of all corporate training records. The training records maintained in the local office file will include the following information:

- The dates of the training sessions.
- The contents or a summary of the training sessions.
- The names and qualifications of persons conducting the training.
- The names and job titles of persons attending the training sessions.

Training records shall be maintained for three years from the date on which the training occurred. Upon request, employees will have access to any of his/her training records maintained by the local office and the CHSM.

All records kept under this Section are subject to OSHA employee record keeping requirements under 29 CFR 1910.1020.

12.3. Availability of Records

In accordance with 29 CFR 1910.1020(e), Access to Employee Exposure and Medical Records, Malcolm Pirnie will provide copies of the requested material to an employee, a former employee, or anyone having appropriate authorization for record access.

12.4. Transfer of Records

Malcolm Pirnie will comply with the requirements for the transfer of records as set forth in 29 CFR 1910.1020 (h).

Appendix E: Material Safety Data Sheets for Decontamination Chemicals

Acetone
Alconox
Isopropyl Alcohol (2-Isopropanol)
Nitric Acid

MSDS Number: **A0446** * * * * * *Effective Date: 05/20/04* * * * * * *Supersedes: 02/12/04*

MSDS **Material Safety Data Sheet**

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

M Mallinckrodt
CHEMICALS JTBaker

24-hour Emergency Response: 800.841.2147
800.447.4343 or 609.442.4443

Responsible Person in Canada:
T. Allen, T. Allen, 609.442.4443

Material Description:
Chemical: TCI 527 3147

NOTE: This MSDS is for the product as
supplied by the manufacturer. It does not
represent the product as received by the
customer. The customer is responsible for
the proper use of the product.

ACETONE

1. Product Identification

Synonyms: Dimethylketone; 2-propanone; dimethylketal

CAS No.: 67-64-1

Molecular Weight: 58.08

Chemical Formula: (CH₃)₂CO

Product Codes:

J.T. Baker: 5008, 5018, 5356, 5580, 9001, 9002, 9003, 9004, 9005, 9006, 9007, 9008, 9009,
9010, 9015, 9036, 9125, 9254, 9271, A134, V655

Mallinckrodt: 0018, 2432, 2435, 2437, 2438, 2440, 2443, 2445, 2850, H451, H580, H981

2. Composition/Information on Ingredients

Ingredient	CAS No.	Percent	Hazardous
Acetone	67-64-1	99 100%	Yes

3. Hazards Identification

Emergency Overview

DANGER! EXTREMELY FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH FIRE. HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM.

SAF-T-DATA^(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate

Flammability Rating: 3 - Severe (Flammable)

Reactivity Rating: 0 - None

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. May cause coughing, dizziness, dullness, and headache. Higher concentrations can produce central nervous system depression, narcosis, and unconsciousness.

Ingestion:

Swallowing small amounts is not likely to produce harmful effects. Ingestion of larger amounts may produce abdominal pain, nausea and vomiting. Aspiration into lungs can produce severe lung damage and is a medical emergency. Other symptoms are expected to parallel inhalation.

Skin Contact:

Irritating due to defatting action on skin. Causes redness, pain, drying and cracking of the skin

Eye Contact:

Vapors are irritating to the eyes. Splashes may cause severe irritation, with stinging, tearing, redness and pain.

Chronic Exposure:

Prolonged or repeated skin contact may produce severe irritation or dermatitis.

Aggravation of Pre-existing Conditions:

Use of alcoholic beverages enhances toxic effects. Exposure may increase the toxic potential of chlorinated hydrocarbons, such as chloroform, trichloroethane.

4. First Aid Measures

Inhalation:

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

Ingestion:

Aspiration hazard. If swallowed, vomiting may occur spontaneously, but DO NOT

INDUCE. If vomiting occurs, keep head below hips to prevent aspiration into lungs. Never give anything by mouth to an unconscious person. Call a physician immediately.

Skin Contact:

Immediately flush skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.

Eye Contact:

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

5. Fire Fighting Measures

Fire:

Flash point: -20C (-4F) CC

Autoignition temperature: 465C (869F)

Flammable limits in air % by volume:

lcl: 2.5; ucl: 12.8

Extremely Flammable Liquid and Vapor! Vapor may cause flash fire.

Explosion:

Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Vapors can flow along surfaces to distant ignition source and flash back. Contact with strong oxidizers may cause fire. Sealed containers may rupture when heated. This material may produce a floating fire hazard. Sensitive to static discharge.

Fire Extinguishing Media:

Dry chemical, alcohol foam or carbon dioxide. Water may be ineffective. 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. 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 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.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

Acetone:

-OSHA Permissible Exposure Limit (PEL)

1000 ppm (TWA)

-ACGIH Threshold Limit Value (TLV):

500 ppm (TWA), 750 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 and engineering controls are not feasible, a half-face organic vapor respirator may be worn for up to ten times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece organic vapor respirator 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-face piece 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

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, volatile liquid.

Odor:

Fragrant, mint-like

Solubility:

Miscible in all proportions in water.

Specific Gravity:

0.79 @ 20C/4C

pH:

No information found.

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

100

Boiling Point:

56.5C (133F) @ 760 mm Hg

Melting Point:

-95C (-139F)

Vapor Density (Air=1):

2.0

Vapor Pressure (mm Hg):

400 @ 39.5C (104F)

Evaporation Rate (BuAc=1):

ca. 7.7

10. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:

Carbon dioxide and carbon monoxide may form when heated to decomposition

Hazardous Polymerization:

Will not occur.

Incompatibilities:

Concentrated nitric and sulfuric acid mixtures, oxidizing materials, chloroform, alkalis, chlorine compounds, acids, potassium t-butoxide

Conditions to Avoid:

Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Oral rat LD50: 5800 mg/kg; Inhalation rat LC50: 50,100mg/m3; Irritation eye rabbit, Standard Draize, 20 mg severe; investigated as a tumorigen, mutagen, reproductive effector.

-----\Cancer Lists\-----			
---NTP Carcinogen---			
Ingredient	Known	Anticipated	IARC Category
Acetone (67-64-1)	No	No	None

12. Ecological Information

Environmental Fate:

When released into the soil, this material is expected to readily biodegrade. When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released into water, this material is expected to readily biodegrade. When released to water, this material is expected to quickly evaporate. This material has a log octanol-water partition coefficient of less than 3.0. This material is not expected to significantly bioaccumulate. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material may be moderately degraded by photolysis. When released into the air, this material is expected to be readily removed from the atmosphere by wet deposition.

Environmental Toxicity:

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

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: ACETONE

Hazard Class: 3

UN/NA: UN1090

Packing Group: II

Information reported for product/size: 215L

International (Water, I.M.O.)

Proper Shipping Name: ACETONE**Hazard Class:** 3**UN/NA:** UN1090**Packing Group:** II**Information reported for product/size:** 215L

15. Regulatory Information

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-----\Chemical Inventory Status - Part 1\-----
Ingredient                                     TSCA  EC   Japan  Australia
-----
Acetone (67-64-1)                             Yes  Yes   Yes    Yes

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-----\Chemical Inventory Status - Part 2\-----
Ingredient                                     Korea  DSL  DSL  Phil
-----
Acetone (67-64-1)                             Yes   Yes  No   Yes

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-----\Federal, State & International Regulations - Part 1\-----
Ingredient                                     -SARA 302-   -SARA 313-
RQ      TPQ      List  Chemical Catg.
-----
Acetone (67-64-1)                             No    No    Yes    No

```

```

-----\Federal, State & International Regulations - Part 2\-----
Ingredient                                     -RCRA-      -TSCA-
CEPCLA      261.33      8(d)
-----
Acetone (67-64-1)                             5000      U002      No

```

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

Australian Hazchem Code: 2[Y]E**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:**

DANGER! EXTREMELY FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH FIRE. HARMFUL IF SWALLOWED OR INHALED. CAUSES

IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT AFFECTS CENTRAL NERVOUS SYSTEM.

Label Precautions:

Keep away from heat, sparks and flame

Keep container closed.

Use only with adequate ventilation.

Wash thoroughly after handling.

Avoid breathing vapor.

Avoid contact with eyes, skin and clothing.

Label First Aid:

Aspiration hazard. If swallowed, vomiting may occur spontaneously, but DO NOT INDUCE. If vomiting occurs, keep head below hips to prevent aspiration into lungs. Never give anything by mouth to an unconscious person. Call a physician immediately. 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:

No Changes.

Disclaimer:

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Prepared by: Environmental Health & Safety

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

MSDS Number: **A2052** * * * * * *Effective Date: 05/14/03* * * * * * *Supersedes: 02/18/03*

MSDS **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: 613-996-6566

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

A non-emergency question should be directed to Customer Service: 1-800-859-2151, for assistance

ALCONOX®

1. Product Identification

Synonyms: Proprietary blend of sodium linear alkylaryl sulfonate, alcohol sulfate, phosphates, and carbonates.

CAS No.: Not applicable.

Molecular Weight: Not applicable to mixtures.

Chemical Formula: Not applicable to mixtures.

Product Codes: A461

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Alconox® proprietary detergent mixture	N/A	90 - 100%	Yes

3. Hazards Identification

Emergency Overview

CAUTION! MAY BE HARMFUL IF SWALLOWED OR INHALED. MAY CAUSE IRRITATION TO EYES AND RESPIRATORY TRACT.

J.T. Baker SAF-T-DATA^(tm) Ratings (Provided here for your convenience)

Health Rating: 1 - Slight

Flammability Rating: 0 - None

Reactivity Rating: 1 - Slight

Contact Rating: 2 - Moderate

Lab Protective Equip: GOGGLES: LAB COAT

Storage Color Code: Orange (General Storage)

Potential Health Effects

Inhalation:

May cause irritation to the respiratory tract. Symptoms may include coughing and shortness of breath.

Ingestion:

May cause irritation to the gastrointestinal tract. Symptoms may include nausea, vomiting and diarrhea.

Skin Contact:

No adverse effects expected.

Eye Contact:

May cause irritation, redness and pain.

Chronic Exposure:

No information found.

Aggravation of Pre-existing Conditions.

No information found.

4. First Aid Measures

Inhalation:

Remove to fresh air. Get medical attention for any breathing difficulty.

Ingestion:

If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention.

Skin Contact:

Wash exposed area with soap and water. Get medical advice 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:

Not expected to be a fire hazard.

Explosion:

No information found.

Fire Extinguishing Media:

Dry chemical, foam, water or carbon dioxide.

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. Wear appropriate personal protective equipment as specified in Section 8. Spills: Pick up and place in a suitable container for reclamation or disposal, using a method that does not generate dust. When mixed with water, material foams profusely. Small amounts of residue may be flushed to sewer with plenty of water.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Moisture may cause material to cake. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

None established

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures as low as possible. 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):

For conditions of use where exposure to dust or mist is apparent and engineering controls are not feasible, a particulate respirator (NIOSH type N95 or better filters) may be worn. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P filter. For emergencies or instances where the exposure levels are not known, use a full-face positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:

Wear protective gloves and clean body-covering clothing.

Eye Protection:

Use chemical safety goggles. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:

White powder interspersed with cream colored flakes.

Odor:

No information found.

Solubility:

Moderate (1-10%)

Specific Gravity:

No information found.

pH:

No information found.

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

0

Boiling Point:

No information found.

Melting Point:

No information found.

Vapor Density (Air=1):

No information found.

Vapor Pressure (mm Hg):

No information found.

Evaporation Rate (BuAc=1):

No information found.

10. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:

Carbon dioxide and carbon monoxide may form when heated to decomposition.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

No information found

Conditions to Avoid:

No information found.

11. Toxicological Information

No LD50/LC50 information found relating to normal routes of occupational exposure.

-----\Cancer Lists-----			
Ingredient	---NTP Carcinogen---		IARC Category
	Known	Anticipated	
Alconox® proprietary detergent mixture	No	No	None

12. Ecological Information

Environmental Fate:

This product is biodegradable.

Environmental Toxicity:

No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal 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

Not regulated.

15. Regulatory Information

-----\Chemical Inventory Status - Part 1-----				
Ingredient	TSCA	EC	Japan	Australia
Alconox® proprietary detergent mixture	Yes	No	No	No

-----\Chemical Inventory Status - Part 2-----				
Ingredient	-----\Canada-----			
	Korea	DSL	NDSL	Phil

Alconox® proprietary detergent mixture	No	No	Yes	No
----- Federal, State & International Regulations - Part 1 -----				
	-SAHA 302-		-----SARA 313-----	
Ingredient	RQ	TPQ	List	Chemical Catg.
Alconox® proprietary detergent mixture	No	No	No	No

----- Federal, State & International Regulations - Part 2 -----			
	-PCRA-		-TSCA-
Ingredient	CEPCLA	261.33	8(d)
Alconox® proprietary detergent mixture	No	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
 SAHA 311/312: Acute: Yes Chronic: No Fire: No Pressure: No
 Reactivity: No (Pure / Solid)

Australian Hazchem Code: None allocated.

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: 0 Flammability: 0 Reactivity: 0

Label Hazard Warning:

CAUTION! MAY BE HARMFUL IF SWALLOWED OR INHALED. MAY CAUSE IRRITATION TO EYES AND RESPIRATORY TRACT.

Label Precautions:

Avoid contact with eyes.
 Keep container closed.
 Use with adequate ventilation.
 Avoid breathing dust.
 Wash thoroughly after handling.

Label First Aid:

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 case of eye contact, immediately flush eyes with plenty of water for at least 15 minutes. In all cases, get medical attention.

Product Use:

Laboratory Reagent.

Revision Information:

MSDS Section(s) changed since last revision of document include: 8

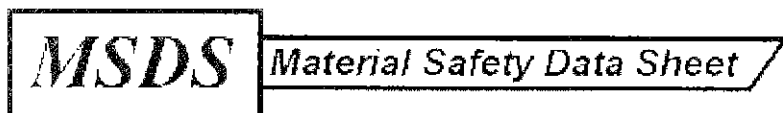
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Prepared by: Environmental Health & Safety

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

MSDS Number: **P6401** * * * * * *Effective Date: 05/07/03* * * * * * *Supersedes: 01/24/02*



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

For non-emergency questions, please call Baker Chemical Services at 908-859-2151 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: (CH₃)₂CHOH

Product Codes: 5373, 5582, 5863, 5870, 5873, 5890, 5986, 5996, 9016, 9025, 9026, 9045, 9055, 9059, 9062, 9078, 9079, 9081, 9082, 9083, 9084, 9088, 9089, 9095, 9334, 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^(tm) 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.

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: 12°C (54°F) C/C

Autoignition temperature: 399°C (750°F)

Flammable limits in air % by volume:

lcl: 2.0; ucl: 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\-----			
Ingredient	-- NTP Carcinogen--		IARC Category
	Known	Anticipated	
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**

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-----\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

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-----\Chemical Inventory Status - Part 2:-----
Ingredient                                     Korea  --Canada--
                                     DSL    NDSL   Phil.
-----
Isopropyl Alcohol (67-63-0)                 Yes   Yes    No     Yes
Water (7732-18-5)                           Yes   Yes    No     Yes

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-----\Federal, State & International Regulations - Part 1:-----
Ingredient                                     -SARA 302-   -SARA 313-
                                     RQ    TPQ    List  Chemical Catg.
-----
Isopropyl Alcohol (67-63-0)                 No     No     Yes    No
Water (7732-18-5)                           No     No     No     No

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-----\Federal, State & International Regulations - Part 2:-----
Ingredient                                     -ECRA-       -TSCA-
                                     361.33      3(d)
-----
Isopropyl Alcohol (67-63-0)                 No          No       No
Water (7732-18-5)                           No          No       No

```

Chemical Weapons Convention: No TSCA 11(b): No CDTA: No
 SAFA 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: 2 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: 8.

Disclaimer:

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Prepared by: Environmental Health & Safety

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

MSDS Number: **N3660** * * * * * *Effective Date: 07/02/02* * * * * * *Supersedes: 07/13/00*

MSDS**Material Safety Data Sheet**

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



Mallinckrodt
CHEMICALS

J.T. Baker

Mallinckrodt Baker (Canada) Inc.
4610 Steeles Ave. E. Unit 142A-142B

Mallinckrodt Baker (Canada)
4610 Steeles Ave. E. Unit 142A-142B

Canada Safety Data Sheet
01/01/02, T 1027-0407

MSDS No. N3660 - Nitric Acid, 50-70%
This MSDS is for informational purposes only.
It is not intended to be used as a substitute for
the actual product label or for the actual
product itself.

Information on this document is for informational purposes only. It is not intended to be used as a substitute for the actual product label or for the actual product itself.

NITRIC ACID, 50-70%

1. Product Identification

Synonyms: Aqua Fortis, Azotic Acid; Nitric Acid 50%; Nitric Acid 65%; nitric acid 60-70%

CAS No.: 7697-37-2

Molecular Weight: 63.01

Chemical Formula: HNO₃

Product Codes:

J.T. Baker: 411D, 412D, 5371, 5796, 5801, 5826, 5856, 5876, 5896, 9597, 9598, 9600, 9601, 9602, 9603, 9604, 9606, 9607, 9608, 9610, 9616, 9617, 9670

Mallinckrodt: 1409, 2704, 2716, 6623, H862, H993, H998, V077, V633, V650

2. Composition/Information on Ingredients

Ingredient	CAS No.	Percent	Hazardous
Nitric Acid	7697-37-2	50 - 70%	Yes
Water	7732-18-5	30 - 50%	No

3. Hazards Identification

Emergency Overview

POISON! DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. INHALATION MAY CAUSE LUNG AND TOOTH DAMAGE.

SAF-T-DATA^(tm) Ratings (Provided here for your convenience)

Health Rating: 4 - Extreme (Poison)

Flammability Rating: 0 - None

Reactivity Rating: 3 - Severe (Oxidizer)

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

Nitric acid is extremely hazardous: it is corrosive, reactive, an oxidizer, and a poison.

Inhalation:

Corrosive! Inhalation of vapors can cause breathing difficulties and lead to pneumonia and pulmonary edema, which may be fatal. Other symptoms may include coughing, choking, and irritation of the nose, throat, and respiratory tract.

Ingestion:

Corrosive! Swallowing nitric acid can cause immediate pain and burns of the mouth, throat, esophagus and gastrointestinal tract.

Skin Contact:

Corrosive! Can cause redness, pain, and severe skin burns. Concentrated solutions cause deep ulcers and stain skin a yellow or yellow-brown color.

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 and lung damage. Long-term exposures seldom occur due to the corrosive properties of the acid.

Aggravation of Pre-existing Conditions:

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

4. First Aid Measures

Immediate first aid treatment reduces the health effects of this substance.

Inhalation:

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give

oxygen. Call a physician.

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:

Not combustible, but substance is a strong oxidizer and its heat of reaction with reducing agents or combustibles may cause ignition. Can react with metals to release flammable hydrogen gas.

Explosion:

Reacts explosively with combustible organic or readily oxidizable materials such as, alcohols, turpentine, charcoal, organic refuse, metal powder, hydrogen sulfide, etc. Reacts with most metals to release hydrogen gas which can form explosive mixtures with air.

Fire Extinguishing Media:

Water spray may be used to keep fire exposed containers cool. Do not get water inside container.

Special Information:

Increases the flammability of combustible, organic and readily oxidizable materials. 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. 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. 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:

-OSHA Permissible Exposure Limit (PEL):

2 ppm (TWA), 4 ppm (STEL)

-ACGIH Threshold Limit Value (TLV):

2 ppm (TWA); 4 ppm (STEL)

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, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. Nitric acid is an oxidizer and should not come in contact with cartridges and canisters that contain oxidizable materials, such as activated charcoal. Canister-type respirators using sorbents are ineffective.

Skin Protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, 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 to yellowish liquid

Odor:

Suffocating, acrid.

Solubility:

Infinitely soluble.

Specific Gravity:

1.41

pH:

1.0 (0.1M solution)

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

100 (as water and acid)

Boiling Point:

122C (252F)

Melting Point:

-42C (-44F)

Vapor Density (Air=1):

2-3

Vapor Pressure (mm Hg):

48 (@ 20C (68F)

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 nitrogen oxides fumes and hydrogen nitrate.

Will react with water or steam to produce heat and toxic and corrosive fumes.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

A dangerously powerful oxidizing agent, concentrated nitric acid is incompatible with most substances, especially strong bases, metallic powders, carbides, hydrogen sulfide, turpentine, and combustible organics.

Conditions to Avoid:

Light and heat.

11. Toxicological Information

Nitric acid: Inhalation rat LC50: 243 ppm (NO2)/30M; Investigated as a mutagen, reproductive effector. Oral (human) LDLo: 430 mg/kg.

-----Cancer Lists-----			
Ingredient	---NTP Carcinogen---		IARC Category
	Known	Anticipated	
Nitric Acid (7697-37-2)	No	No	None
Water (7732-18-5)	No	No	None

12. Ecological Information

Environmental Fate:

No information found.

Environmental Toxicity:

No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste facility. Although not a listed RCRA hazardous waste, this material may exhibit one or more characteristics of a hazardous waste and require appropriate analysis to determine specific disposal requirements. 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: NITRIC ACID (WITH NOT MORE THAN 70% NITRIC ACID)

Hazard Class: 8

UN/NA: UN2031

Packing Group: II

Information reported for product/size: 150LB

International (Water, I.M.O.)

Proper Shipping Name: NITRIC ACID (WITH NOT MORE THAN 70% NITRIC ACID)

Hazard Class: 8

UN/NA: UN2031

Packing Group: II

Information reported for product/size: 150LB

International (Air, I.C.A.O.)

Proper Shipping Name: NITRIC ACID (WITH NOT MORE THAN 70% NITRIC ACID)

Hazard Class: 8

UN/NA: UN2031

Packing Group: II

Information reported for product/size: 150LB

15. Regulatory Information

-----\Chemical Inventory Status - Part 1 -----				
Ingredient	TSCA	EC	Japan	Australia
Nitric Acid (7697-37-2)	Yes	Yes	Yes	Yes
Water (7732-18-5)	Yes	Yes	Yes	Yes

-----\Chemical Inventory Status - Part 2 -----				
--Canada--				
Ingredient	Korea	DSL	NDSL	Phil.
Nitric Acid (7697-37-2)	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.
Nitric Acid (7697-37-2)	1000	1000	Yes	No
Water (7732-18-5)	No	No	No	No

-----\Federal, State & International Regulations - Part 2 -----			
-RCRA- -TSCA-			
Ingredient	CERCLA	361.23	8(d)
Nitric Acid (7697-37-2)	1000	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: 2PF

Poison Schedule: So

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: 0 Other: Oxidizer

Label Hazard Warning:

POISON! DANGER! STRONG OXIDIZER CONTACT WITH OTHER MATERIAL

MAY CAUSE FIRE. CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. INHALATION MAY CAUSE LUNG AND TOOTH 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.
Keep from contact with clothing and other combustible materials.
Do not store near combustible materials.
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: 3.

Disclaimer:

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

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

Appendix F: Boating Safety Documents

Clean Boating: How to do your Part
Man-Overboard Emergency Instructions
Boating Accidents
Fueling Safety
Use of Marine Radio
Visual Distress Signals for Recreational Boaters
Powerline Hazards

Clean Boating – How to do Your Part
From the Maryland Clean Marina Initiative
Maryland Department of Natural Resources
http://www.boatsafe.com/nauticalknowhow/clean_boating.htm

Environmental Concerns:

Petroleum in or on the water is harmful and, in some cases, fatal to aquatic life. Benzene, a carcinogen, is in gasoline. Oil contains zinc, sulfur, and phosphorous.

Once petroleum is introduced into the water, it may float at the surface, evaporate into the air, become suspended in the water column or settle to the sea floor. Floating petroleum is particularly noxious because it reduces light penetration and the exchange of oxygen at the water's surface. Floating oil also contaminates the microlayer. The microlayer refers to the uppermost portion of the water column. It is home to thousands of species of plants, animals, and microbes. The abundance of life in the microlayer attracts predators: seabirds from above and fish from below. Pollution in the microlayer, thus, has the potential to poison much of the aquatic food web.

Also worth noting, a single pint of oil released onto the water can cover one acre of water surface area.

The Law

Because of the harm associated with petroleum, the discharge of oil is absolutely prohibited. The Federal Water Pollution Control Act prohibits the discharge of oil or oily waste into or upon the navigable waters of the United States or the waters of the contiguous zone if such discharge causes a film or sheen upon, or discoloration of, the surface of the water, or causes a sludge or emulsion beneath the surface of the water. Violators are subject to a penalty of \$5,000.

The United States Coast Guard must be notified anytime a spill produces a sheen on the water. Call the National Response Center at 1-800-424-8802. Report the location, source, size, color, substance, and time of the spill. Failure to report a spill may result in fines.

The Clean Water Act (33 CFR 153.305) also prohibits the use of soaps or other dispersing agents to dissipate oil on the water or in the bilge without the permission of the Coast Guard. Soaps, emulsifiers and dispersants cause the petroleum to sink in the water column and mix with sediments where they will remain for years. Also, the soaps themselves are pollutants. You may be fined up to \$5,000 per incident for the unauthorized use of soap or other dispersing agents on the water or in the bilge.

Fueling Practices

Gas or diesel may be spilled during the act of fueling: as backslash out the fuel intake or as overflow out the vent fitting. Spills of this sort harm aquatic life, waste money, and can result in stains on the hull and damage to the gel coat and striping. Follow these tips to avoid problems:

- Fill tanks to no more than 90 percent capacity--gas that is drawn from cool storage tanks will expand as it warms up onboard your vessel.
- To determine when the tank is 90 percent full, listen to the filler pipe, use a sounding stick (if possible), and be aware of your tank's volume.
- Rather than filling your tank upon your return to port, wait and fill it just before leaving on your next trip. This practice will reduce spills due to thermal expansion because the fuel will be used before it has a chance to warm up.
- Fill portable tanks ashore where spills are less likely to occur and easier to clean up.
- Use oil absorbent pads to catch all drips.
- Slow down at the beginning and end of fueling.

Bilge Maintenance and Oil Changes

Engine oil tends to accumulate in bilges. If no precautions are taken, the oil is pumped overboard along with the bilge water. Discharging oily water is illegal. To avoid fines and to protect water quality, follow these tips:

- Keep your engine well tuned to minimize the amount of oil that is released. Be sure there are no leaking seals, gaskets or hoses.
- If you change your own oil, purchase a non-spill pump to draw crankcase oils out through the dipstick tube and slip a plastic bag over used oil filters prior to their removal to capture any drips. Hot drain the filter by punching a hole in the dome end and draining for 24 hours. Recycle the collected oil. Recycle the metal canister if practical. If not, dispose in your regular trash.
- Place oil absorbent materials or a bioremediating bilge boom in the bilge.
- Place an oil absorbent pad under the engine.
- Replace oil absorbent materials regularly.
- Look for contractors or marinas that offer a bilge pumpout service.
- Do not treat oily water with detergents. Soaps pollute and make clean up impossible. You may be fined up to \$25,000 for using soaps to dissipate oil.

Disposal of Oil Absorbent Materials

The disposal of used oil absorbent material depends on what type of product it is and how it was used:

- Standard absorbents that are saturated with gasoline may be air dried and reused.
- Standard absorbents saturated with oil or diesel may be wrung out over oil recycling bins (if they are saturated with oil or diesel only!) and reused. Alternatively, they should be double bagged with one plastic bag sealed inside of another and tossed in your regular trash.

- Bioremediating bilge booms may be disposed in your regular trash as long as they are not dripping any liquid. Because the microbes need oxygen to function, do not seal them in plastic bags.

Emissions Control

Marine engines--especially 2-stroke outboard motors--produce the highest average level of hydrocarbon exhaust emissions after lawn and garden equipment. Hydrocarbon emissions contribute to ground level ozone, a known health risk. Follow these tips to help your engine operate as efficiently as possible:

- Use the gas to oil ratio recommended by the engine manufacturer. Too much oil can foul spark plugs and too little can lead to increased engine wear or even failure.
- Use premium two-cycle engine oil (TC-W3 or TC-W4). Premium oils improve engine performance and reduce pollution because they burn cleaner, contain more detergents, and prevent formation of carbon deposits.
- Use gasoline with the octane level recommended by the engine manufacturer.

Preventative Equipment

Products are available commercially which can help you prevent spills and reduce emissions:

- Install a fuel/air separator along your vent line. These devices allow air, but not fuel to escape through a vent opening.
- Attach a safety nozzle to portable gas cans used to fill outboard engines. These nozzles automatically stop the flow of fuel when the receiving tank is full.
- To prevent oily bilge water from being discharged, install a bilge pump switch that leaves an inch or two of water in the bilge. Alternatively, connect a bilge water filter to your vessel's bilge pump. Filters will remove oil, fuel and other petroleum hydrocarbons from the water.
- When it is time to buy a new engine, select a fuel efficient, low emission model.
- Attach a container to the external vent fitting to collect overflow. There are products on the market that may be attached to the hull with suction cups. A rubber seal on the container fits over the fuel vent allowing the overflow to enter the container. Fuel captured in this manner can be added to the next boat to fuel.

In Case of a Spill:

- Stop the flow.
- Contain the spill.
- Call the U.S. Coast Guard National Response Center at (800) 424-8802.

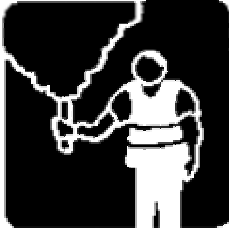
Man-Overboard Emergency Instructions.
MetLife Boat Safety Tips
<http://www.uscgboating.org/safety/metlife/help.htm>

Getting Help on the Water

On the water, a minor problem can rapidly develop into a situation beyond your control. For this reason, let someone know even when you are experiencing relatively minor difficulties, **before** your situation turns into an emergency.

The Coast Guard serves as Search and Rescue (SAR) coordinator for all maritime emergencies and is the appropriate point of contact whenever you are concerned for your safety. If you are in distress (distress is defined as a situation where you or your boat are threatened by grave or imminent danger requiring assistance), the Coast Guard will take immediate steps to help you. Normally, Coast Guard or Coast Guard Auxiliary rescue boats and/or aircraft will be sent, but assistance from any available source will be arranged to expedite your rescue.

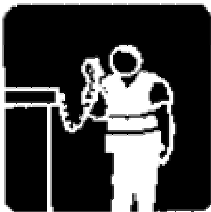
How To Signal For Help



If you are in distress use "MAYDAY, MAYDAY, MAYDAY" on the radio. If your situation is not a distress, simply call "Coast Guard." Channel 16 VHF/FM and 2182khz HF/SSB are dedicated distress and calling frequencies we monitor at all times. Citizen's Band (CB) is not dependable and is not monitored at most Coast Guard stations. If you do not have a radio, attempt to signal a fellow boater who can assist or call the Coast Guard for you. In a distress situation, use flares or any other distress signalling device to catch the attention of another boater.

What To Tell The Coast Guard

While arranging help, we will ask for the following:



- Your location or position.
- Exact nature of the problem (special problems).
- Number of people on board.
- Your boat's name, registration and description.
- Safety equipment on board.



When It's Not A Distress

The Coast Guard's primary search and rescue role is to assist boaters in distress. If you are not in distress and alternate sources of assistance are available, we will normally coordinate the effort to assist you. If you have a friend, marina, or commercial firm that you want contacted, we will attempt to do so. You may also contact them directly on Channel 16 VHF/FM or through the marine operator.

If this effort is unsuccessful, we will make a Marine Assistance Request Broadcast

(MARB) on your behalf. This announces that you need help, gives your location, and invites others to come to your aid.

If you do not accept services offered in response to the first MARB, we will:

- Provide information on other commercial firms, if available, so you may contact them directly, or
- If you request, make a second MARB to see if any other help is available.



Who Will Answer Your Call When You're Not In Distress

A commercial firm may offer help. In order to not interfere with commercial enterprise (you will have to pay for these services), we normally do not provide direct on-scene assistance if a commercial firm is available to help you safely in a reasonable time. If you agree to the assistance of a commercial firm and then refuse this service when it arrives, you still may be legally obligated to pay a fee.

If the Coast Guard or Coast Guard Auxiliary arrives to assist you and you require a tow, they normally will tow you to the nearest location where you can either arrange for repairs or a tow back to your home port.

In addition to Coast Guard, Coast Guard Auxiliary and commercial firms, others that may be available to assist you include a fellow boater, a local fire or police department, or another public agency. Keep in mind that a Good Samaritan, although well-meaning, may not have the equipment or skills needed to help you safely and effectively.



When To Call Back

Keep in contact with the Coast Guard at regular intervals. Call us when help arrives. If someone offers help but cannot get to you within a reasonable time, usually not to exceed one hour, contact the Coast Guard to arrange other assistance. We also need to know if conditions change sufficiently to cause alarm - for example:

- A medical emergency develops.
- A storm approaches.
- You begin to take on water.
- Your last reported position changes.

Tips On Non-Distress Assistance

Unless you are familiar with the person(s) offering you help, clearly understand the type and quality of the assistance offered before accepting help or entering into a contract. Consider the following before accepting any assistance: Large physical stresses can occur in towing and salvage operations, risking damage to one or both boats, and personal injury.

- Does the provider have the proper equipment to handle your problem safely?
- Does the provider have the proper insurance to protect you and your vessel if he/she should cause damage or injury.
- Can the crew handle the situation safely given the conditions and the nature of the problem?
- If a fee is being asked, does the operator have a Coast Guard license? All operators must have a license if they charge for towing services.

Remember The Signals!

Channel 16 VHF/FM * 2182 khz HF/SSB

Visual Distress Signalling Devices: (for example flares, signal mirror)

How To Avoid Trouble

For the safety of you and your passengers:

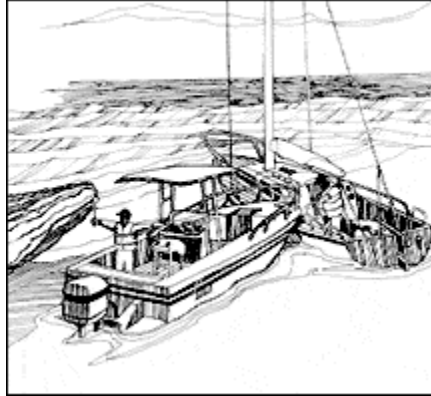
- Take a nationally recognized boating course.
 - Get a free Courtesy Marine Exam from the Coast Guard Auxiliary.
 - Fill your fuel tanks.
 - File a float plan.
 - Ensure your engine is properly tuned.
 - Check your engine compartment for fumes.
 - Instruct your passengers on basic safety procedures.
 - Always have everyone wear life jackets (PFDs).
 - Check your safety equipment.
- | | |
|-------------------------------|-----------------------------------|
| • Radio | • Flares and sound signal devices |
| • Life Jackets (PFDs) | • Compass and chart |
| • Fire extinguishers | • First aid kit |
| • Anchor and line | • Paddle and bailer |
| • Basic tools and spare parts | • Lights and flashlight |

Boating Accidents MetLife Boat Safety Tips

<http://www.uscgboating.org/safety/metlife/accidents.htm>

You Are Responsible

As the operator of a vessel you are required by law to file a formal, written report of an accident. There are four conditions that require you to fill out and send in a boating accident report.



A boating accident report must be filed when...

- A life is lost due to the accident.
- Someone is injured and requires medical attention beyond first aid.
- There is damage by or to the vessel and other property.
- Any person on board a vessel disappears (under circumstances indicating possible death or injury).

Boating Accidents Include:

Capsizing
Sinking/Flooding
Fire

Falls Overboard
Explosions

Collisions
Disappearance

* Damage is determined by federal regulation to be reportable when it exceeds \$500 or there is complete loss of the vessel (Note: many states have set a limit less than \$500 - contact the local boating authority to determine the amount).

- You just ran your beautiful boat into a submerged rock and put a hole in your hull. No one is hurt, but you estimate boat repairs will cost about \$800.
- Your boat took on water and flooded overnight. Repairs for the damage cost \$350.

Must you file an accident report in these scenarios? If you do, do you know how? Would you know where?

Reports Must Be Filed Within...

- 48 hours of the occurrence if a person dies within one day (24 hours of the accident).
- 48 hours if a person is injured and medical treatment beyond first aid is required.
- 10 days if there is only damage to the vessel and/or property.

All serious injuries and loss of life must be reported to local authorities immediately!

Who Must Fill Out The Form?

The form is usually filled out by the operator of the boat unless the operator is physically unable to complete the form. If that is the case, then the owner of the vessel must submit the form.

To obtain the forms and report the accident, call the State Boating Law Administrator where the vessel number was issued, or the state where the casualty or accident occurred if different.

If you need assistance in locating where to call within each state or territory, or reporting an accident, call the [Coast Guard Infoline](#).

Why Must A Report Be Filed?

The information you supply is used to develop safety regulations and manufacturing standards for the benefit of the boating public. The information is also used in boating safety education programs and other boating safety initiatives. Without good data, a boating safety hazard might be completely overlooked and other boaters could be hurt or killed.

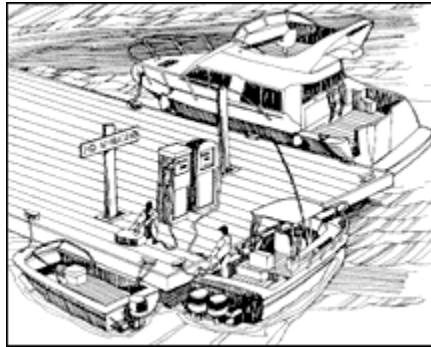
Fueling Safety MetLife Boat Safety Tips

<http://www.uscgboating.org/safety/metlife/distress.htm>

Shipshape is Firesafe

Fire safety is something that everyone who owns or operates a boat should practice. Each year, boating fires and explosions injure hundreds of individuals and cause millions of dollars in property damage. While there is a greater chance for a fire or explosion on a boat than on land, many of these accidents can be prevented.

Fuel and fuel vapors are two of the leading ingredients in all boating accidents involving fires and explosions. Keep fuel and vapors in their proper places and make all of your boating trips firesafe.



In General or Seasonal

Be alert for damage to your boat's fuel system. Over time, fuel fittings and fuel hoses wear out. Inspect these fittings and hoses regularly, especially near the engine where engine heat and vibration can accelerate deterioration.

- Inspect fuel tanks annually. Pay particular attention to bottom surfaces which may have been in contact with bilge water. Also check to see if any part of the tank could have rusted or been damaged due to rubbing and abrasion. Permanently installed fuel tanks and closed compartments that contain engine or fuel tanks must be vented to the outside.
- Be sure the fuel fill pipe is securely mounted, grounded, and located where spilled fuel would be directed overboard. Fuel fill hoses that are dry and cracked or soft and mushy should be replaced immediately.
- If a hose or fuel tank is leaking, replace it before using your boat.
- Use only marine-rated parts for repairs.
- On a boat with portable fuel tanks, make sure the vents can be closed and the tanks have a vapor-tight, leak-proof cap. The vent on a portable tank should be open when the motor is running, but when the tank is not in use, the vent and the cap should be tightly closed.
- Make sure any powered ventilation (a bilge blower) is operating properly.
- Be sure heating and cooking appliances on board are secured and operate properly. Refer to the appliance owner's manual for guidance on inspecting for leaks in valves and connections; NEVER USE A MATCH.

- Make sure flammable items are stowed safely and cannot come into contact with cooking or heating appliances or hot engine parts.
- Make sure fire extinguishers are Coast Guard approved and in working order - that gauges register and nozzles are clear.
- Take a boating safety course and learn the correct use of a fire extinguisher aboard a boat.
- Repair all bare wires and loose electrical connections; they might cause a short in your boat's electrical system, which could start a fire.
- Do not store disposable propane cylinders or charcoal lighting fluid on board.
- Conduct a bow to stern inspection checking for fuel leaks.

Before Casting Off

Get in the habit of performing these brief steps:



- "Sniff" your bilges. Usually your nose is the best fuel/vapor detector. It will mean getting down on your hands and knees, but it's the best way to do it.

- Operate the bilge blower for AT LEAST FOUR MINUTES before starting an inboard engine. If you still smell fumes, try to locate the source and make repairs before starting the engine.
- Make sure the location of your fire extinguishers is known to all passengers and they know how to operate them.
- When refueling, close all hatches, ports and other openings; shut off all engines and motors; and refrain from smoking. Fill all portable tanks on the dock.
- After refueling, wipe up or wash off any excess or spilled fuel; open all hatches and ports; and let the boat air out. "Sniff" your bilges. Operate the bilge blower for at least four minutes before starting an inboard engine.

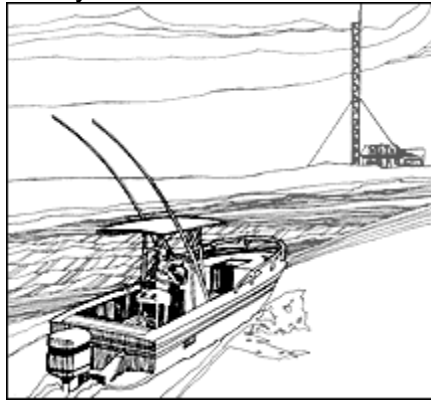
Use of Marine Radio
MetLife Boat Safety Tips
<http://www.uscgboating.org/safety/metlife/radio.htm>

Marine Radio Could be a Lifesaver

Why Should You Have A Marine Radio On Your Boat?

You are sailing to the farthest reaches of an isolated bay when you strike an uncharted, submerged object. You begin taking on water. No one is around. If you had a radio, you could call for help.

Motoring along the river, one of your passengers begins convulsions. You know you must contact medical authorities immediately, but you are without a radio. With a radio, medical help might be only a radio call away. Without one, it may be hours before you are able to get to a medical facility.



What Type Of Radio Should I Buy?

Investing in a good Very High Frequency FM (VHF FM) radio is the smartest purchase. A VHF radio has certain advantages such as:

- Good quality transmission.
- Strong signal.
- Channels reserved for distress calls.
- Continuously monitored frequencies.

Citizen Band (CB) radios are not recommended due to weak signals and overcrowded frequencies. In addition, the Coast Guard does not routinely monitor CB Channels.

Can I Use the Radio as a Telephone?

There is a marine operator in many areas, located on a specified channel, that will "patch" you into the local telephone system. A radio is not to be used for gossip or idle conversation. The use of profanity and obscene language is illegal. One difference between a telephone and a radio is that anything said over the radio will be heard by hundreds of other people. Another difference is that there are only a limited number of channels so conversation, should be kept to passing only required information. Conversation is not permitted to extend past three minutes.

What Are the Different Channels Used For?

There are 104 VHF channels designated for marine service. Of this number, 54 are designated exclusively for use in the waters of the United States. The most common channels and their purpose are listed below:

Channel 16 (156.8 MHz) This is the most important channel on the VHF band. THIS IS THE DISTRESS, SAFETY, AND CALLING FREQUENCY WHICH THE COAST GUARD MONITORS CONTINUOUSLY. All vessels equipped with VHF radios must keep their radios tuned to channel 16 so they can assist if an emergency is near. Vessels may initiate contact with each other but must shift to a working frequency to carry on a conversation (e.g., Motor vessel Albatross, this is sailing vessel Mother Goose, AB-1234, on Channel 16, switch and answer Channel 68). Use Channel 16 for only bona fide emergencies.

Channel 22A (157.1 MHz) This channel is the primary working channel of the Coast Guard. It is used for communications between the Coast Guard and the maritime public, both recreational and commercial. Severe weather warnings, hazards to navigation, and other maritime safety warnings are broadcast on Channel 22A.

Channel 13 (156.65 MHz) This channel is the bridge to bridge or "piloting" channel, used for communicating navigation information between ships. Strictly used for navigational purposes by commercial, military, and recreational vessels at locks, bridges and harbors.

Channel 6 (156.3 MHz) This channel is the ship to ship frequency used for safety related communications. This channel is not used for ordinary operational navigation or personal communications.



What Do Certain Words I Hear on the Radio Mean?

MAYDAY is a request for immediate assistance. LISTEN! DO NOT TRANSMIT!! Determine if you're in a position to help. If not, maintain radio silence. "MAYDAY" identifies an imminent, life-threatening emergency.

PAN-PAN (pronounced pahn-pahn) is used when the safety of a boat or person is in jeopardy. Man-overboard messages are sent with the PAN-PAN signal.

SECURITE (pronounced say-cure-e-tay) is used to pass navigation information or weather warnings.

What if I Hear Someone Saying MAYDAY on Channel 16?

If you have a radio and you are under way, you are required to monitor Channel 16. MAYDAY takes precedence over all other transmissions. If you hear a MAYDAY, remain silent and listen. Take down the information being passed. If the Coast Guard or other rescue authority responds, maintain silence and listen, but do not respond.

However, if there is no response, take action. Try raising the distressed vessel over the radio. Gather more information, especially the position. Attempt to raise the Coast Guard while traveling toward the vessel. Sometimes the Coast Guard may not hear the distressed vessels transmissions, but can hear another vessel near the scene; therefore,

call the Coast Guard again, just in case. If you raise them, give them the information you have and follow their instructions. If you cannot contact the Coast Guard, attempt to assist the other vessel to the best of your ability without placing yourself in danger.

What If I Need Help?

If you have an imminent life threatening emergency, transmit on Channel 16:

1. MAYDAY, MAYDAY, MAYDAY!
2. This is (name of boat three times, call letters once).
3. Repeat once more, "MAYDAY", (your boat's name).
4. Now report your position (give as accurate a position as possible).
5. Report nature of emergency.
6. Report the kind of assistance desired.
7. Report number of people on board and condition of any injured.
8. Description of the boat and seaworthiness.

Then wait for a response. If there is none, repeat the message.

Do I Need A Radio License or Operator's Permit?

You must have a SHIP STATION LICENSE for your radio before operation. An OPERATOR'S PERMIT is only required if you dock in a foreign port. To obtain forms and additional information contact the FCC at (202) 418-3676(FORM).

Transmission of a false (hoax) distress or emergency message or using obscene or profane language is illegal. If search and rescue units are sent out, the perpetrator is responsible for their costs in addition to the fine.

Visual Distress Signals for Recreational Boaters

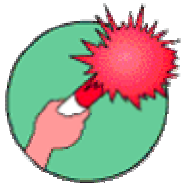
MetLife Boat Safety Tips

<http://www.uscgboating.org/safety/metlife/distress.htm>

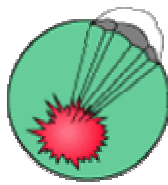
All vessels used on coastal waters, the Great Lakes, territorial seas, and those waters connected directly to them, up to a point where a body of water is less than two miles wide must be equipped with U.S.C.G. Approved visual distress signals. Vessels owned in the United States operating on the high seas must be equipped with U.S.C.G. Approved visual distress signals.

The following vessels are not required to carry day signals but must carry night signals when operating from sunset to sunrise:

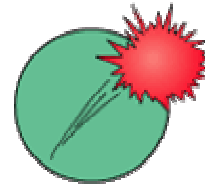
- Recreational boats less than 16 feet in length.
- Boats participating in organized events such as races, regattas, or marine parades.
- Open sailboats less than 26 feet in length not equipped with propulsion machinery.
- Manually propelled boats.



Red Flare
(hand held/day & night)



Parachute Flare
(day and night)



Red Meteor
(day and night)



Orange Smoke Signal
(hand held/day only)



Floating Orange Smoke Signal
(day only)

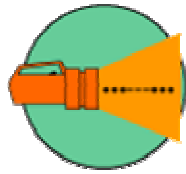
Pyrotechnic Devices

Pyrotechnic Visual Distress Signals must be Coast Guard Approved, in working condition, and readily accessible. They are marked with a date showing the service life, which must not have expired. Launchers manufactured before January 1, 1981 intended for use with approved signals are not required to be Coast Guard Approved. If pyrotechnic devices are selected, a minimum of three are required. That is, three signals for day use and three signals for night.

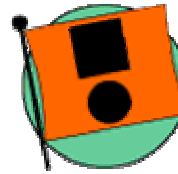
Some pyrotechnic signals meet both day and night use requirements. Pyrotechnic devices should be stored in a cool, dry location. A watertight container painted red or orange and prominently marked "DISTRESS SIGNALS" is recommended.

U.S.C.G. Approved Pyrotechnic Visual Distress Signals and Associated Devices include:

- Pyrotechnic red flares, hand-held or aerial.
- Pyrotechnic orange smoke, hand-held or floating.
- Launchers for aerial red meteors or parachute flares.



Electric Distress Signals
(night only)



Orange Flag
(day only)

Non-Pyrotechnic Devices

Non-Pyrotechnic Visual Distress Signals must be in serviceable condition, readily accessible, and certified by the manufacturer as complying with U.S.C.G. requirements. They include the Orange Distress Flag and the Electric Distress Light.

The distress flag is a day signal only. It must be at least 3 x 3 feet with a black square and ball on an orange background. It is most distinctive when attached and waved on a paddle, boathook or flown from a mast.

The electric distress light is accepted for night use only and must automatically flash the international SOS distress signal (... - - - ...).

Regulations prohibit display of visual distress signals on the water under any circumstances except when assistance is required to prevent immediate or potential danger to persons on board a vessel.

All distress signals have distinct advantages and disadvantages. No single device is ideal under all conditions or suitable for all purposes. Pyrotechnics are universally recognized as excellent distress signals. However, there is potential for injury and property damage if not properly handled. These devices produce a very hot flame and the residue can cause burns and ignite flammable material.

Hand-held pyrotechnic devices, such as flares and smoke signals, may expel ash and slag as they burn. Even though these particles cool quickly, they can cause painful burns or ignite materials that burn easily. The flare itself is very hot and can start a fire if it is dropped. Therefore, these devices when burning should be held over the side and in such a way that hot slag can not drip on the hand.

Pistol launched and hand-held parachute flares and meteors have many characteristics of a firearm and must be handled with caution. In some states they are considered a firearm and prohibited from use.

Whenever a pistol or hand-held rocket propelled distress signal is used, the wind must be taken into account. In calm winds keep your arm at approximately 60 degrees above the horizon with the wind at your back when firing the device. As the wind increases, increase the angle of the arm up to but no more than about 80 to 85 degrees. No pyrotechnic device should be fired straight up or in such a direction that it may land on your boat or another boat or on land and cause a fire.

The following illustrates the variety and combination of devices which can be carried in order to meet the requirements:

- Three hand-held red flares (day and night).
- One hand-held red flare and two parachute flares (day and night).
- One hand-held orange smoke signal, two floating orange smoke signals (day), and one electric distress light (night only).



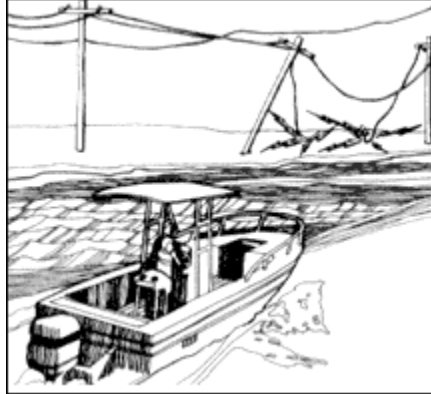
All boaters should be able to signal for help. For the CME, boaters must have current dated U.S.C.G. Approved day and night signals for all boats operating on coastal and open bodies of water. The Auxiliary also requires some method of emergency signals for inland water. This may be a signal flag for day and a flashlight for night.

Power Line Hazards

MetLife Boat Safety Tips

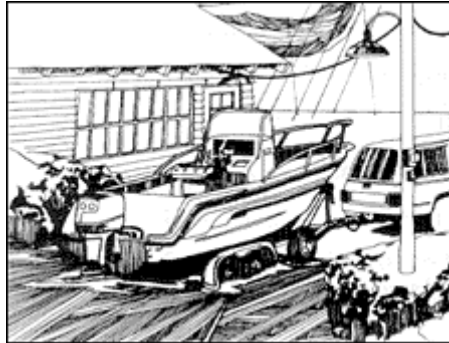
<http://www.uscgboating.org/safety/metlife/powerline.htm>

Lightning isn't the only source of lethal doses of electricity. Among the most tragic and preventable boating accidents are those in which a boat strikes a power line. Often, the boat doesn't necessarily have to touch a power line to send a current of electricity through it. Certain conditions (such as high humidity and close proximity) will cause an arcing to take place through the surrounding air and possibly into the boat.



At Launching

Power lines at launch ramps are especially hazardous to boaters. A tragedy occurred recently when a father and son were attempting to launch their small catamaran from a lakeside ramp. They were pushing the boat trailer by hand down the street from their cottage to the ramp incline, and failed to see the overhanging power lines. Prior to the boat ever reaching the water, both were electrocuted when the boat's mast touched one of the high voltage wires.



Look Up

Don't let a similar tragedy happen to you. LOOK UP to check for any overhead wires between your boat and the launching ramp before you even get near it. Make certain that you will not be raising the mast or antenna too near a power line. Exercise particular caution at older boat ramps, since they have greater likelihood of having exposed power lines strung near waterways.

Open Water

High tension transmission lines that cross reservoirs and other boating areas are also dangerous. If the tip of the mast or antenna should come close to one of these lines, the

electrical current may be strong enough to bridge the gap and flow to the boat.

The fact that you have gone under the lines previously does not guarantee that they are safe. The water level may rise from tides, flooding or controlled damming or the lines may expand and sag from the heat.

Boats have also been known to strike power lines simply because their operators didn't have up-to-date charts or didn't know how far it was from the boat's waterlines to the mastheads. Usually, power lines that span bodies of water have the minimum clearance between their lowest point and the highest waterline mark indicated on charts or signs at the approach to them. LEARN these clearance distances!

Observe!

Be observant for downed or sagging lines following storms or high winds. A watchful eye upward as well as in other directions is needed. Look to see if the area is marked with a special hazard buoy or sign. Most power companies take the responsibility to post warning signs wherever their lines span a body of water.



Don't Panic!

Should your boat come in contact with a power line, DO NOT jump into the water. The electrical charge will pass through your boat and be grounded in the surrounding water. The best thing to do is remain low in the boat and avoid touching any metal fixtures. Leave the boat only after any arcing has stopped.

Alert!

The Coast Guard wants to alert all boaters to the dangers of navigating near power lines and urges everyone to help prevent such accidents. All dealers, marinas, boatyards, yacht clubs and boating associations are urged to help reduce this hazard by alerting boaters who use their facilities.

First Aid for Electrical Burns (courtesy of The American Red Cross)

The signals of electrical injury include:

- Unconsciousness.
- Dazed, confused behavior.
- Obvious burns on the skin surface.
- Trouble breathing.

- Weak, irregular, or absent pulse.
- Burns both where the current entered and where it exited, often on the hand or foot.

Never approach a victim of an electrical injury until you are sure the power is off, or the power source has been removed from the injury site. **DO NOT TOUCH DOWNED POWER LINES.** Keep bystanders well away from any source of live current.

To care for a victim of an electrical injury, make sure the scene is safe. Alert the Coast Guard or Emergency Medical Services (EMS) immediately. Do a primary survey. Be aware that the victim may have trouble breathing or may be in cardiac arrest. Check for more than one burn site. Cover all burns with dry, sterile dressings and treat for shock.

Appendix G: TAMS/MPI Personnel – Health and Safety Training

**TAMS/MALCOLM PIRNIE, INC. PERSONNEL – HEALTH AND SAFETY
TRAINING**

H&TRAINING	TEAM MEMBERS				
	Field Team Leader/name	Field Team Member/name	Field Team Member/name	Field Team Member/name	Field Team Member/name
40-hour HAZWOPER Training					
8-hour HAZWOPER Refresher (exp)					
Supervisor Training					
Confined Space Entry Training					
Hazardous Communications Training					
First Aid Training (exp)					
CPR Training (exp)					
Bloodborne Pathogens Training (exp)					
Medical Clearance (exp)					
Fit Test (exp)					
Make/Size/Type					

H&TRAINING	TEAM MEMBERS				
	Field Team Member/name	Field Team Member/name	Field Team Member/name	Field Team Member/name	Field Team Member/name
40-hour HAZWOPER Training					
8-hour HAZWOPER Refresher (exp)					
Supervisor Training					
Confined Space Entry Training					
Hazardous Communications Training					
First Aid Training (exp)					
CPR Training (exp)					
Bloodborne Pathogens Training (exp)					
Medical Clearance (exp)					
Fit Test (exp)					
Make/Size/Type					

Note: Personnel whose certifications have expired will receive training prior to commencement of fieldwork.

Appendix H: Incident/Near-Miss Investigation Reports

Instructions for Completing Workplace Incident/Illness Report

Workplace Incident/Illness Report

Incident Report (Involving Contractors or Other non-Malcolm Pirnie Personnel or
Property)

Vehicle Accident Report (Automobiles, Trucks)

Boating Accident Report

Near-Miss Report

INSTRUCTIONS FOR COMPLETING WORKPLACE INCIDENT/ILLNESS REPORT

Please do not leave any spaces blank. Indicate "NA" when the question is not applicable.

1. - 13. Self-Explanatory

14. **Group** (where regularly employed). Enter the name of the group or section in which the individual is regularly employed, even though temporarily working in another department at the time of the injury.

15. - 16. Self-Explanatory

17. **Treatment.** Describe briefly treatment given for injury or illness, (e.g., sutured laceration on left wrist, x-rayed right arm for possible fracture, hospitalized for observation. etc.)

18. - 22. Self-Explanatory.

23 Case number from the OSHA No. 300 Log. (See your Human Resource Representative and/or Health & Safety Department)

24. - 27. Self-Explanatory.

28. Describe the activity, as well as the tools, equipment, or material employee was using. Be specific. Examples: "climbing a ladder while carrying roofing materials"; "spraying chlorine from hand sprayer"; "daily computer key-entry." Tell us how the injury occurred. Examples: "When ladder slipped on wet floor, worker fell 20 feet", "Worker was sprayed with chlorine when gasket broke during replacement"; "Worker developed soreness in wrist over time.")
29. (Tell us the part of the body that was affected and how it was affected; be more specific than "hurt," "pain," or "sore." Examples: "strained back"; "chemical burn, hand"; "carpal tunnel syndrome."

30. - 31. **Self-Explanatory.**

32. Examples: "concrete floor"; "chlorine floor"; "radial arm saw." If this question does not apply to the incident, leave it blank.

33. - 38. **Self-Explanatory.**

39. - 43. **Workman's Compensation/Insurance Carrier Information**

44. **AW, Away-From-Work-Case** - is any occupational injury or illness which results in death, permanent impairment, or which renders the injured person unable to work for a full day on **any** job on **any** regularly scheduled work day after the injury. (Do not include partial day off)

RA, Restricted Activity Case - is any occupational injury or illness which renders an employee unable to perform all duties of his regularly scheduled job or the employee was assigned to do a temporary job on any regularly scheduled day after the injury or illness.

NF, Non-Fatal Case - is an occupational injury or illness which did not involve a fatality or lost work days, but did result in: a) transfer to another job or termination of employment or b) medical treatment other than first aid or c) diagnosis of occupational illness or d) loss of consciousness.

FA, First Aid Case - One time treatment and subsequent observation of minor scratches, cuts, burns, splinters, which do not ordinarily require professional medical care even though the treatment was provided by a physician or registered professional personnel.

PC, Precautionary Case - When no injury or illness can be detected by qualified personnel or physicians, but the employee still alleges injury or illness, the case is precautionary. Documentation is mandatory.

NFR, Not For Record - In many situations which a case is PC the case will not be recorded on Company Records or in the U.S. on the Osha No. 300 Log. Documentation is mandatory.

45. All signatures are required.

WORKPLACE INCIDENT/ILLNESS REPORTING REPORT

1. COMPLETED BY	2. TITLE	3. TELEPHONE NUMBER	4. DATE
5. OFFICE LOCATION	OFFICE ADDRESS		
INFORMATION ABOUT THE INJURED EMPLOYEE			
6. EMPLOYEE NAME	7. EMPLOYEE #	8. SOCIAL SECURITY NO.:	9. <input type="checkbox"/> MALE <input type="checkbox"/> FEMALE
10. EMPLOYEE HOME ADDRESS			
11. DATE OF BIRTH	12. AGE	13. JOB TITLE	14. GROUP #
INFORMATION ABOUT THE PHYSICIAN OR OTHER HEALTH CARE PROFESSIONAL			
15. NAME OF THE TREATING PHYSICIAN OR OTHER HEALTH CARE PROFESSIONAL			
16. IF TREATMENT WAS GIVEN AWAY FROM THE WORKPLACE, WHERE WAS IT GIVEN?	NAME OF HOSPITAL/CLINIC	ADDRESS	
17. WHAT WAS THE TREATMENT PROVIDED TO THE INJURED?			
18. WAS A TETANUS SHOT GIVEN? <input type="checkbox"/> YES <input type="checkbox"/> NO			
19. WAS A PRESCRIPTION FOR MEDICATION GIVEN? <input type="checkbox"/> YES <input type="checkbox"/> NO			
20. WAS EMPLOYEE TREATED IN AN EMERGENCY ROOM? <input type="checkbox"/> YES <input type="checkbox"/> NO	21. WAS EMPLOYEE HOSPITALIZED OVERNIGHT AS AN INPATIENT? <input type="checkbox"/> YES <input type="checkbox"/> NO	22. DATE AND TIME OF TREATMENT:	
INFORMATION ABOUT THE INCIDENT/ILLNESS			
23. CASE # FROM THE LOG (TRANSFER THE CASE # FROM THE LOG AFTER YOU RECORD THE CASE.)		24. DATE OF INJURY OR ILLNESS:	
25. LOCATION OF ACCIDENT OR CAUSE OF ILLNESS (GIVE ADDRESS FOR LOCATIONS OF EMPLOYER'S PREMISES.)			
26. TIME EMPLOYEE BEGAN WORK <input type="checkbox"/> AM <input type="checkbox"/> PM	27. TIME OF EVENT <input type="checkbox"/> AM <input type="checkbox"/> PM <input type="checkbox"/> CHECK IF CANNOT BE DETERMINED		
28. WHAT HAPPENED? DESCRIBE THE DIRECT CAUSE OF THE ACCIDENT/ILLNESS AND LIST ANY OTHER CONTRIBUTING CAUSES.			
29. DESCRIBE THE INJURY OR ILLNESS:			
30. DID THE EMPLOYEE LOSE TIME AT WORK AS A RESULT OF THIS ACCIDENT? <input type="checkbox"/> YES <input type="checkbox"/> NO HOW MANY DAYS?			
31. DID THE PHYSICIAN PRESCRIBE RESTRICTED DUTY? <input type="checkbox"/> YES <input type="checkbox"/> NO HOW MANY DAYS?			
32. WHAT OBJECT OR SUBSTANCE DIRECTLY HARMED THE EMPLOYEE? (EXAMPLES: CONCRETE FLOOR, CHLORINE GAS, RADIAL ARM SAW.)			

WORKPLACE INCIDENT/ILLNESS REPORTING REPORT

33. WAS PERSONAL PROTECTION EQUIPMENT REQUIRED? <input type="checkbox"/> YES <input type="checkbox"/> NO		34. WAS PERSONAL PROTECTION EQUIPMENT BEING WORN? <input type="checkbox"/> YES <input type="checkbox"/> NO DESCRIBE:	
35. IF THE EMPLOYEE DIED, WHEN DID THE DEATH OCCUR? DATE OF DEATH:			
36. NAME AND PHONE # OF WITNESS(ES) IF APPLICABLE:			
TO BE FILLED OUT BY HUMAN RESOURCES			
37. DATE HIRED:		38. AVERAGE EARNINGS PER WEEK:	
39. WCB CASE # (IF KNOWN)		40. CARRIER CASE #: CARRIER CODE #:	
41. WC POLICY #:		42. INSURANCE CARRIER:	
43. CARRIER'S ADDRESS:			
44. CLASSIFICATION OF INJURY OR ILLNESS (CHECK ONE BELOW)			
AW CASE <input type="checkbox"/> RA CASE <input type="checkbox"/> NF CASE <input type="checkbox"/> FA CASE <input type="checkbox"/> PC CASE <input type="checkbox"/> NFR CASE <input type="checkbox"/> ILLNESS <input type="checkbox"/>			
45. SIGNATURES (Must Be Original)			
SIGNATURE OF PERSON COMPLETING THIS FORM		DATE	
ASSOCIATE'S SIGNATURE		DATE	
OFFICER'S SIGNATURE		DATE	
COMP. & BENEFITS MANAGER'S SIGNATURE		DATE	

Distribution:

Original: Patricia Olsiewicz – HR – WHI
Copy: Mark McGowan – H&S - WHI
Copy: Legal Department – WHI
Copy: Scott Thompson – Malcolm Pirnie PM – WHI

INCIDENT REPORT
(NOTING CONTRACTORS OR OTHER NON-MALCOLM PIRNIE
PERSONNEL OR PROPERTY)

(To be completed by the Malcolm Pirnie employee with the most direct knowledge of the incident. Attach supplemental pages as necessary.)

1. Malcolm Pirnie Office	(No. & Street)	(City or Town)	(State)	(Zip)	2. Project No.
1. Name of Injured and Employee #					
4. Age		5. Sex		Male <input type="checkbox"/>	
				Female <input type="checkbox"/>	
6. Employer of Injured (Provide address, if known.)					
7. Occupation/Job Title		8. Date & Time of Injury or Illness		9. Location of accident or cause of illness (Give address)	
10. Nature and extent of injury or illness, including affected body part(s)			11. Severity of Injury/Illness (check all applicable items)		
			Non-Disabling <input type="checkbox"/> Disabling <input type="checkbox"/>		
			Medical Treatment <input type="checkbox"/> Hospitalized Fatality <input type="checkbox"/>		
12. If Property Damage, state:					
A. Equipment Involved _____					
B. Nature of Damage _____					
C. Preliminary Estimate of Cost to Repair or Replace (if known)					
D. Ownership of Damaged Property _____					
13. Describe all events leading up to the injury, including injured's actions. Clearly state activity being performed at that time.					
14. Was personal protection equipment being worn? If so, describe.					
15. Name the object, material or substance, which directly injured the employee.					
16. Date & time & description of treatment provided to the injured.					
17. Name & address of treating physician or attendant, first aid or emergency response attendants (if known) & state action taken.					
18. Name & address of hospital or clinic (if applicable)					
19. Name(s) of witness(es) (if applicable). Were written statements made by witness(es)? Attach.					
20. Any Police Reports or other Government Reports? Yes <input type="checkbox"/> No <input type="checkbox"/> (Note: Request only with prior approval from counsel .)					
21. Photographs taken? (If yes, forward upon receipt.) Yes <input type="checkbox"/> No <input type="checkbox"/> .					

SUBMIT TO PROJECT OFFICER/MANAGER, CORPORATE HEALTH & SAFETY COUNSEL WITHIN 3 WORKING DAYS
Forward to Counsel copies of all related records made and/or kept in the ordinary course of business. Unless directed otherwise, continue to provide such information to Counsel on an on-going basis.

Report by: _____
Employee Signature
Title: _____

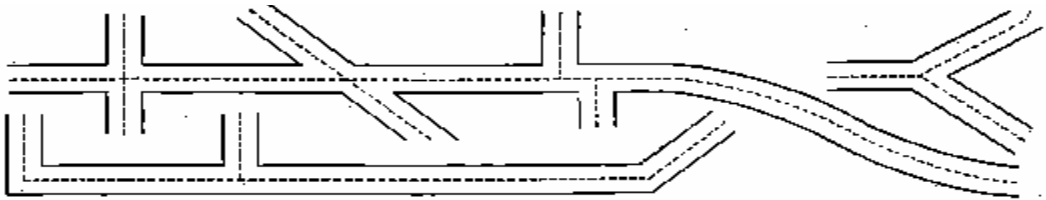
Malcolm Pirnie Vehicle Number: _____

Location: _____

TIME AND PLACE OF ACCIDENT	Accident Date _____ a.m./p.m.(circle one). Has state motor vehicle accident report been filed? <input type="checkbox"/> Yes <input type="checkbox"/> No If no, explain _____ Where _____ Street _____ City _____ County _____ State _____ Weather Conditions (e.g. dry, wet, "black ice") _____																						
MALCOLM PIRNIE DRIVER	Your Name and Title _____ Home Address _____ Home Telephone No. _____																						
MALCOLM PIRNIE (VEHICLE 1)	Model _____ Type _____ License Plate _____ State _____ Number _____ Year _____ Parts Damaged _____ Your Estimate of Damage \$ _____ Where can insurance adjuster see it? _____ Who should they call to arrange? _____ Telephone _____																						
VEHICLE 2 THE OTHER DRIVER(S) & VEHICLE(S) VEHICLE 3	Name of Owner _____ Address _____ Phone _____ Name of Driver _____ Address _____ Phone _____ Insurance Company/Policy # _____ Driver's License # _____ Model _____ Type _____ License Plate _____ State _____ Number _____ Year _____ Parts Damaged _____ Your Estimate of Damage \$ _____ Vehicle 3 – If more than one other vehicle is involved, please attach a page with the same information as vehicle 2 filled out above.																						
PERSONS INJURED	<table border="0"> <thead> <tr> <th>Name</th> <th>Address</th> <th>Telephone</th> </tr> </thead> <tbody> <tr> <td>1. _____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>2. _____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>3. _____</td> <td>_____</td> <td>_____</td> </tr> </tbody> </table> <table border="0"> <thead> <tr> <th>Name and Extent of Injuries</th> <th>Health Care Facility Taken to and by Whom</th> </tr> </thead> <tbody> <tr> <td>1. _____</td> <td>_____</td> </tr> <tr> <td>2. _____</td> <td>_____</td> </tr> <tr> <td>3. _____</td> <td>_____</td> </tr> </tbody> </table>			Name	Address	Telephone	1. _____	_____	_____	2. _____	_____	_____	3. _____	_____	_____	Name and Extent of Injuries	Health Care Facility Taken to and by Whom	1. _____	_____	2. _____	_____	3. _____	_____
Name	Address	Telephone																					
1. _____	_____	_____																					
2. _____	_____	_____																					
3. _____	_____	_____																					
Name and Extent of Injuries	Health Care Facility Taken to and by Whom																						
1. _____	_____																						
2. _____	_____																						
3. _____	_____																						
OCCUPANTS OF MALCOLM PIRNIE CAR (BESIDES YOU)	<table border="0"> <thead> <tr> <th>Name</th> <th>Address</th> <th>Telephone</th> <th>Relationship to You</th> </tr> </thead> <tbody> <tr> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> <tr> <td>_____</td> <td>_____</td> <td>_____</td> <td>_____</td> </tr> </tbody> </table>			Name	Address	Telephone	Relationship to You	_____	_____	_____	_____	_____	_____	_____	_____								
Name	Address	Telephone	Relationship to You																				
_____	_____	_____	_____																				
_____	_____	_____	_____																				

Malcolm Pirnie Vehicle Number: _____

Location: _____

OCCUPANTS OF OTHER CAR(S) BESIDES DRIVER(S)	Name _____ _____	Address _____ _____	Telephone _____ _____	Relationship to Driver _____ _____
WITNESSES NOT INVOLVED IN ACCIDENT	Name _____ _____	Address _____ _____	Telephone _____ _____	Where was Witness At Time of Accident _____ _____
SPECIAL DATA	Speed: How fast were you traveling? _____ <i>mph</i> How fast was the other car traveling? Vehicle 1 _____ <i>mph</i> Vehicle 2 _____ <i>mph</i> Vehicle 3 _____ <i>mph</i> Responsibility: In your opinion, who was at fault and why? _____ Is the other driver(s) making a claim against Malcolm Pirnie? _____ Statements about accident made by you (to whom?) _____ Made by anyone else (to whom?) _____ Did police appear at scene of accident? <input type="checkbox"/> Yes <input type="checkbox"/> No Were they summoned? <input type="checkbox"/> Yes <input type="checkbox"/> No <hr/> Name of Officer summoned to accident _____ Badge Number _____ Phone # _____ List Vehicle/traffic violations: by you _____ by other driver(s) _____ Police, i.e., criminal charges against you: _____ against other driver(s) _____			
PLEASE SHOW HOW THE ACCIDENT HAPPENED	Identify each car and direction of travel by numbered arrow ➡. Show each car's position at the moment when crash happened. Show direction and distance each car traveled before the crash with a solid line: _____ ➡ Show direction and distance after crash by a dotted line - - - - - ➡. Show pedestrians by small circle ○. Show location of witnesses by a "W". 			
BRIEF DESCRIPTION OF ACCIDENT OR LOSS	Explain briefly how this accident occurred: _____ _____ _____ _____ Purpose of trip you were on when this accident happened? _____ Job # _____ Group # _____			

(Driver's signature required) _____

Date _____

Distribution: Gerry Cavaluzzi – Malcolm Pirnie Legal Department
Scott Thompson – Malcolm Pirnie PM

BOATING ACCIDENT REPORT

Activity/Vehicle/Boat: _____

Location: _____

THE OPERATOR/OWNER OF A VESSEL USED FOR RECREATIONAL PURPOSES IS REQUIRED TO FILE A REPORT IN WRITING WHENEVER AN ACCIDENT RESULTS IN: LOSS OF LIFE OR DISAPPEARANCE FROM A VESSEL; AN INJURY WHICH REQUIRES MEDICAL TREATMENT BEYOND FIRST AID; OR PROPERTY DAMAGE IN EXCESS OF \$500 OR COMPLETE LOSS OF THE VESSEL. REPORTS IN DEATH AND INJURY CASES MUST BE SUBMITTED WITHIN 48 HOURS. REPORTS IN OTHER CASES MUST BE SUBMITTED WITHIN 10 DAYS. REPORTS MUST BE SUBMITTED TO THE REPORTING AUTHORITY IN THE STATE WHERE THE ACCIDENT OCCURRED. THIS FORM IS PROVIDED TO ASSIST THE OPERATOR IN FILING THE REQUIRED WRITTEN REPORT.

COMPLETE ALL BLOCKS (INDICATE THOSE NOT APPLICABLE BY "NA")**ACCIDENT DATA**

DATE OF ACCIDENT		TIME AM PM	NAME OF BODY OF WATER		LOCATION (GIVE LOCATION PRECISELY)	
NUMBER OF VESSELS INVOLVED		NEAREST CITY OR TOWN		COUNTY	STATE	ZIP CODE
WEATHER (CHECK ALL APPLICABLE) <input type="checkbox"/> CLEAR <input type="checkbox"/> RAIN <input type="checkbox"/> CLOUDY <input type="checkbox"/> SNOW <input type="checkbox"/> FOG <input type="checkbox"/> HAZY		WATER CONDITIONS <input type="checkbox"/> CALM (WAVES LESS THAN 6") <input type="checkbox"/> CHOPPY (WAVES 6" TO 2') <input type="checkbox"/> ROUGH (WAVES 2' TO 6') <input type="checkbox"/> VERY ROUGH (GREATER THAN 6') <input type="checkbox"/> STRONG CURRENT		TEMPERATURE (ESTIMATE) AIR ____°F WATER ____°F	WIND <input type="checkbox"/> NONE <input type="checkbox"/> LIGHT (0-6 MPH) <input type="checkbox"/> MODERATE (7-14 MPH) <input type="checkbox"/> STRONG (15-25 MPH) <input type="checkbox"/> STORM (OVER 25 MPH)	
NAME OF OPERATOR				OPERATOR ADDRESS		
OPERATOR TELEPHONE NUMBER ()		DATE OF BIRTH MO DAY YR		OPERATOR'S EXPERIENCE <input type="checkbox"/> NONE <input type="checkbox"/> UNDER 100 HOURS <input type="checkbox"/> OVER 100 HOURS		INSTRUCTION IN BOATING SAFETY <input type="checkbox"/> STATE COURSE <input type="checkbox"/> U.S. POWER SQUADRON <input type="checkbox"/> USCG AUXILIARY <input type="checkbox"/> AMERICAN RED CROSS <input type="checkbox"/> NONE
<input type="checkbox"/> MALE <input type="checkbox"/> FEMALE						
NAME OF OWNER				OWNER ADDRESS		
OWNER TELEPHONE NUMBER ()		NUMBER OF PEOPLE ON BOARD		NUMBER OF PEOPLE BEING TOWED		RENTED BOAT? <input type="checkbox"/> YES <input type="checkbox"/> NO
BOAT NO. 1 (THIS VESSEL)						
BOAT REGISTRATION OR DOCUMENTATION NUMBER			STATE	HULL IDENTIFICATION NUMBER	BOAT NAME	
BOAT MANUFACTURER			LENGTH	MODEL	YEAR BUILT	
TYPE OF BOAT <input type="checkbox"/> OPEN MOTORBOAT <input type="checkbox"/> CABIN MOTORBOAT <input type="checkbox"/> AUXILIARY SAIL <input type="checkbox"/> SAIL (ONLY) <input type="checkbox"/> ROWBOAT <input type="checkbox"/> CANOE/KAYAK <input type="checkbox"/> PERSONAL WATERCRAFT <input type="checkbox"/> PONTOON BOAT <input type="checkbox"/> HOUSEBOAT <input type="checkbox"/> OTHER (SPECIFY)		HULL MATERIAL <input type="checkbox"/> WOOD <input type="checkbox"/> ALUMINUM <input type="checkbox"/> STEEL <input type="checkbox"/> FIBERGLASS <input type="checkbox"/> RUBBER/VINYL/CANVAS <input type="checkbox"/> RIGID HULL INFLATABLE <input type="checkbox"/> OTHER (SPECIFY)		ENGINE <input type="checkbox"/> OUTBOARD <input type="checkbox"/> INBOARD <input type="checkbox"/> INBOARD-STERNDRIVE (I/O) <input type="checkbox"/> AIRBOAT <input type="checkbox"/> NONE <input type="checkbox"/> LIGHT (0-6 MPH) <input type="checkbox"/> MODERATE (7-14H)		PROPULSION <input type="checkbox"/> PROPELLER <input type="checkbox"/> WATER JET <input type="checkbox"/> AIR THRUST <input type="checkbox"/> MANUAL <input type="checkbox"/> SAIL NUMBER OF ENGINES TOTAL HORSEPOWER
						PERSONAL FLOATATION DEVICES (PFDS): WAS BOAT ADEQUATELY EQUIPPED WITH COAST GUARD APPROVED PFDS? <input type="checkbox"/> YES <input type="checkbox"/> NO WERE PFDS ACCESSIBLE? <input type="checkbox"/> YES <input type="checkbox"/> NO FIRE EXTINGUISHERS ON BOARD? <input type="checkbox"/> YES <input type="checkbox"/> NO USED? <input type="checkbox"/> YES <input type="checkbox"/> NO
OPERATION AT TIME OF ACCIDENT (CHECK ALL APPLICABLE) <input type="checkbox"/> CRUISING <input type="checkbox"/> CHANGING DIRECTION <input type="checkbox"/> CHANGING SPEED <input type="checkbox"/> DRIFTING <input type="checkbox"/> TOWING <input type="checkbox"/> BEING TOWED <input type="checkbox"/> ROWING/PADDLING <input type="checkbox"/> SAILING <input type="checkbox"/> LAUNCHING <input type="checkbox"/> DOCKING/UNDOCKING <input type="checkbox"/> AT ANCHOR <input type="checkbox"/> TIED TO DOCK/MOORED <input type="checkbox"/> OTHER (SPECIFY)		ACTIVITY AT TIME OF ACCIDENT (CHECK ANY IF APPLICABLE) <input type="checkbox"/> FISHING <input type="checkbox"/> TOURNAMENT <input type="checkbox"/> HUNTING <input type="checkbox"/> SWIMMING/DIVING <input type="checkbox"/> MAKING REPAIRS <input type="checkbox"/> WATERSKIING/TUBING/ETC. <input type="checkbox"/> RACING <input type="checkbox"/> WHITEWATER SPORTS <input type="checkbox"/> FUELING <input type="checkbox"/> STARTING ENGINE <input type="checkbox"/> NON-RECREATIONAL <input type="checkbox"/> OTHER (SPECIFY)		TYPE OF ACCIDENT <input type="checkbox"/> GROUNDING <input type="checkbox"/> CAPSIZING <input type="checkbox"/> FLOODING/SWAMPING <input type="checkbox"/> SINKING <input type="checkbox"/> FIRE OR EXPLOSION(FUEL) <input type="checkbox"/> FIRE OR EXPLOSION(OTHER) <input type="checkbox"/> SKIER MISHAP <input type="checkbox"/> COLLISION WITH VESSEL <input type="checkbox"/> COLLISION W/FIXED OBJECT <input type="checkbox"/> COLLISION W/FLOATING OBJ. <input type="checkbox"/> FALLS OVERBOARD <input type="checkbox"/> FALLS IN BOAT <input type="checkbox"/> STRUCK BY BOAT <input type="checkbox"/> STRUCK BY MOTOR/PROPELLER <input type="checkbox"/> STRUCK BY SUBMERGED OBJ. <input type="checkbox"/> OTHER (SPECIFY) <input type="checkbox"/> HIT AND RUN		WHAT CONTRIBUTED TO ACCIDENT? (CHECK ALL APPLICABLE) <input type="checkbox"/> WEATHER <input type="checkbox"/> EXCESSIVE SPEED <input type="checkbox"/> IMPROPER LOCKOUT <input type="checkbox"/> RESTRICTED VISION <input type="checkbox"/> OVERLOADING <input type="checkbox"/> IMPROPER LOADING <input type="checkbox"/> HAZARDOUS WATERS <input type="checkbox"/> ALCOHOL USE <input type="checkbox"/> DRUG USE <input type="checkbox"/> HULL FAILURE <input type="checkbox"/> MACHINERY FAILURE <input type="checkbox"/> EQUIPMENT FAILURE <input type="checkbox"/> OPERATOR INEXPERIENCE <input type="checkbox"/> OPERATOR INATTENTION <input type="checkbox"/> CONGESTED WATERS <input type="checkbox"/> PASSENGER/SKIER BEHAVIOR <input type="checkbox"/> DAM/LOCK <input type="checkbox"/> OTHER (SPECIFY)
ESTIMATED SPEED <input type="checkbox"/> 10 - 20 MPH		<input type="checkbox"/> NONE <input type="checkbox"/> 21 - 40 MPH		<input type="checkbox"/> UNDER 10 MPH <input type="checkbox"/> OVER 40 MPH		

BOATING ACCIDENT REPORT

Activity/Vehicle/Boat: _____

Location: _____

DECEASED (IF MORE THAN 2 FATALITIES, ATTACH ADDITIONAL FORMS)			
NAME OF VICTIM		ADDRESS OF VICTIM	
DATE OF BIRTH		DEATH CAUSED BY <input type="checkbox"/> DROWNING <input type="checkbox"/> OTHER	
<input type="checkbox"/> MALE <input type="checkbox"/> FEMALE		<input type="checkbox"/> DISAPPEARANCE	
NAME OF VICTIM		ADDRESS OF VICTIM	
DATE OF BIRTH		DEATH CAUSED BY <input type="checkbox"/> DROWNING <input type="checkbox"/> OTHER	
<input type="checkbox"/> MALE <input type="checkbox"/> FEMALE		<input type="checkbox"/> DISAPPEARANCE	
INJURED (IF MORE THAN 2 INJURIES, ATTACH ADDITIONAL FORMS)			
NAME OF VICTIM		ADDRESS OF VICTIM	
DATE OF BIRTH	MEDICAL TREATMENT BEYOND FIRST AID? <input type="checkbox"/> YES <input type="checkbox"/> NO ADMITTED TO HOSPITAL? <input type="checkbox"/> YES <input type="checkbox"/> NO		DESCRIBE INJURY
WAS PFD WORN? <input type="checkbox"/> YES <input type="checkbox"/> NO		PRIOR TO ACCIDENT? <input type="checkbox"/> YES <input type="checkbox"/> NO AS A RESULT OF ACCIDENT? <input type="checkbox"/> YES <input type="checkbox"/> NO	
WAS IT INFLATABLE? <input type="checkbox"/> YES <input type="checkbox"/> NO			
NAME OF VICTIM		ADDRESS OF VICTIM	
DATE OF BIRTH	MEDICAL TREATMENT BEYOND FIRST AID? <input type="checkbox"/> YES <input type="checkbox"/> NO ADMITTED TO HOSPITAL? <input type="checkbox"/> YES <input type="checkbox"/> NO		DESCRIBE INJURY
WAS PFD WORN? <input type="checkbox"/> YES <input type="checkbox"/> NO		PRIOR TO ACCIDENT? <input type="checkbox"/> YES <input type="checkbox"/> NO AS A RESULT OF ACCIDENT? <input type="checkbox"/> YES <input type="checkbox"/> NO	
WAS IT INFLATABLE? <input type="checkbox"/> YES <input type="checkbox"/> NO			
OTHER PEOPLE ABOARD THIS BOAT (IF MORE THAN 2 PEOPLE, ATTACH ADDITIONAL FORMS)			
NAME OF VICTIM		ADDRESS OF VICTIM	
DATE OF BIRTH			
NAME OF VICTIM		ADDRESS OF VICTIM	
DATE OF BIRTH			
BOAT NO. 2 (IF MORE THAN 2 VESSELS, ATTACH ADDITIONAL IDENTIFYING INFORMATION)			
NAME OF OPERATOR		OPERATOR ADDRESS	
OPERATOR TELEPHONE NUMBER ()		BOAT REGISTRATION OR DOCUMENTATION NUMBER STATE	
NAME OF OWNER		OWNER ADDRESS	
OWNER TELEPHONE NUMBER ()			
PROPERTY DAMAGE			
ESTIMATED AMOUNT: THIS BOAT AND CONTENTS:		OTHER BOAT AND CONTENTS:	
\$		\$	
DESCRIBE PROPERTY DAMAGED		OTHER PROPERTY: \$	
WITNESSES NOT ON THIS VESSEL			
NAME	ADDRESS	TELEPHONE NUMBER ()	
NAME	ADDRESS	TELEPHONE NUMBER ()	
PERSON COMPLETIN REPORT			
NAME	ADDRESS	TELEPHONE NUMBER ()	
SIGNATURE	QUALIFICATION <input type="checkbox"/> OPERATOR <input type="checkbox"/> OWNER <input type="checkbox"/> INVESTIGATOR <input type="checkbox"/> OTHER	DATE SUBMITTED	
FOR ACCIDENT INVESTIGATION TEAM USE ONLY			
CAUSES BASED ON (CHECK ONE) <input type="checkbox"/> THIS REPORT <input type="checkbox"/> INVESTIGATION <input type="checkbox"/> INVESTIGATION AND THIS REPORT <input type="checkbox"/> OTHER			
NAME OF REVIEWING OFFICE	DATE RECEIVED	RECREATIONAL <input type="checkbox"/> COMMERCIAL <input type="checkbox"/>	NON-REPORTABLE <input type="checkbox"/>
PRIMARY CAUSE		SECONDARY CAUSE	

Activity/Vehicle/Boat: _____

Location: _____

ACCIDENT DESCRIPTION

DESCRIBE WHAT HAPPENED (SEQUENCE OF EVENTS. INCLUDE FAILURE OF EQUIPMENT. INCLUDE A DIAGRAM IF NEEDED. CONTINUE ON ADDITIONAL SHEETS IF NECESSARY. INCLUDE ANY INFORMATION REGARDING THE INVOLVEMENT OF ALCOHOL AND/OR DRUGS IN CAUSING OR CONTRIBUTING TO THE ACCIDENT. INCLUDES ANY DESCRIPTIVE INFORMATION ABOUT THE USE OF PFD'S.)

Distribution: Gerry Cavaluzzi, Malcolm Pirnie Legal Department
Scott Thompson, Malcolm Pirnie PM

NEAR-MISS INCIDENT REPORT

Activity/Vehicle/Boat: _____

Location: _____

INCIDENT DATA					
DATE OF INCIDENT	TIME	AM PM	NAME OF ROAD, LOCATION OR RIVER MILE:	LOCATION (GIVE LOCATION PRECISELY)	
AUTOMOBILES, VESSELS, EQUIPMENT, PERSONNEL INVOLVED:	NEAREST CITY OR TOWN		COUNTY	STATE	ZIP CODE
WEATHER (CHECK ALL APPLICABLE) <input type="checkbox"/> CLEAR <input type="checkbox"/> RAIN <input type="checkbox"/> CLOUDY <input type="checkbox"/> SNOW <input type="checkbox"/> FOG <input type="checkbox"/> HAZY	WATER CONDITIONS <input type="checkbox"/> CALM (WAVES LESS THAN 6") <input type="checkbox"/> CHOPPY (WAVES 6" TO 2') <input type="checkbox"/> ROUGH (WAVES 2' TO 6') <input type="checkbox"/> VERY ROUGH (GREATER THAN 6') <input type="checkbox"/> STRONG CURRENT		TEMPERATURE (ESTIMATE) AIR ____°F WATER ____°F	WIND <input type="checkbox"/> NONE <input type="checkbox"/> LIGHT (0-6 MPH) <input type="checkbox"/> MODERATE (7-14 MPH) <input type="checkbox"/> STRONG (15-25 MPH) <input type="checkbox"/> STORM (OVER 25 MPH)	
VISIBILITY <div style="display: flex; justify-content: space-between;"> <div> DAY <input type="checkbox"/> GOOD <input type="checkbox"/> FAIR <input type="checkbox"/> FOG </div> <div> NIGHT <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> </div> </div>					

Describe all events leading up to the incident. Clearly state activity being performed at that time. Include use of PPE. Include failure of equipment. Include a diagram if needed. Include "Lessons Learned" so that the project team can anticipate and avoid future near-misses or actual incidents. Continue on additional sheets if necessary.

Provide copies of this report to Scott Thompson (Malcolm Pirnie PM), the Project Safety Officer, and the Field Team Leader.

LOWER PASSAIC RIVER RESTORATION PROJECT
HEALTH AND SAFETY PLAN

**ADDENDUM – DREDGING AND DECONTAMINATION PILOT
STUDY**

REVIEW AND APPROVAL

Site Safety and Health Plan - Prepared and Approved by:

<u>Signature</u>	<u>Phone Number</u>	<u>Date</u>
_____	_____	_____
Corporate Health and Safety Manager		
_____	_____	_____
Project Officer – Vice President		
_____	_____	_____
Project Manager		
_____	_____	_____
Deputy Project Manager		

LOWER PASSAIC RIVER RESTORATION PROJECT

HEALTH AND SAFETY PLAN

ADDENDUM – DREDGING AND DECONTAMINATION PILOT STUDY

TAMS/Earth Tech and Malcolm Pirnie Team Member Acknowledgment:

I acknowledge that I have reviewed the information in this Health and Safety Plan and understand both the potential hazards which may confront me during site activities at the Lower Passaic River Restoration Project site and the procedures outlined in this plan to minimize those hazards. I agree to follow the procedures in this Health and Safety Plan and to act in the manner which promotes the greatest safety for other team members and me.

<u>Employee Signature</u>	<u>Printed Name</u>	<u>Company</u>	<u>Date</u>

LOWER PASSAIC RIVER RESTORATION PROJECT
HEALTH AND SAFETY PLAN
ADDENDUM – DREDGING AND DECONTAMINATION PILOT STUDY

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1 INTRODUCTION

1.1 USE OF DOCUMENT

This document is a task-specific Health and Safety Plan (HASP) Addendum for dredging oversight and sediment resuspension monitoring activities of the Lower Passaic River Restoration Project (LPRRP) during the Environmental Dredging and Sediment Decontamination Pilot Study. This task-specific HASP Addendum will be used in conjunction with the HASP Core Document (Malcolm Pirnie, Inc., 2005a), which provides discussion of general health and safety issues regarding field activities for the remedial investigation/feasibility study (RI/FS). This task-specific HASP Addendum only addresses health and safety issues that are not covered in the HASP Core Document (Malcolm Pirnie, Inc., 2005a) and the Safe Work Plan (Earth Tech, Inc. June 2005).

1.2 SCOPE

As part of the Water Resources Development Authorization (WRDA) portion of the LPRRP investigation, one of the primary field programs is a pilot scale environmental dredging and sediment decontamination study. The Environmental Dredging and Sediment Decontamination Technology Pilot Study is authorized under contract to New Jersey Department of Transportation, Office of Maritime Resources (NJDOT-OMR). Surface water data will be collected and used to evaluate the spatial extent of contamination, prepare human health and ecological risk assessments, develop hydrodynamic, sediment transport, and fate and transport models, and to evaluate resuspension of sediments and associated contamination during dredging activities. The studies addressed in this addendum are:

- Oversight of dredging operations during the Dredging and Decontamination Pilot Study.
- Sediment resuspension monitoring during dredging activities.

The objectives of the pilot scale dredging and decontamination study are to evaluate:

- Dredging productivity.
- Resuspension of sediments.
- Decontamination of dredged sediments.

The USGS, Rutgers, TAMS Consultants, Inc., an Earth Tech Company (TAMS/ET) and Malcolm Pirnie, Inc. (Malcolm Pirnie) are responsible for executing resuspension monitoring. The USACE-NYD and TAMS/ET are responsible for overseeing dredging operations. Dredging, transport, and decontamination of dredged sediments and associated material (*e.g.*, water, debris) will be conducted by contractors hired by NJDOT-OMR and are not addressed in this HASP addendum. The contractors' HASPs will be appended to this document when provided by the selected dredging contractor and other contractors. (*e.g.*, Aqua Survey Inc., who is providing a boat to TAMS/ET and Malcolm Pirnie personnel will develop a HASP that will be appended to this addendum; dredging contractor).

The objective of the water column monitoring and sampling activities during the Environmental Dredging Pilot Study is to evaluate resuspension of sediments and associated contaminants related to dredging activities. The load of total suspended solids (TSS) will be estimated by monitoring TSS concentrations in the near-field dredge area and comparing it to TSS concentrations upriver of the dredging activity. TSS concentrations will be monitored by LISST probes and turbidity meters stationed on moorings and sampling boats. Water column data collected from the pilot scale dredging study will be used in determining the following:

- Resuspension release rate.
- Resuspension export rate.
- Mass balance for the dredging pilot study area.
- Turbidity levels of the water within and in the vicinity of the dredging pilot study area.

1.3 PROPOSED WORK/SCHEDULED ACTIVITIES

The sediment resuspension monitoring activities proposed for the Environmental Dredging and Sediment Decontamination Technology Pilot Study are described in the Dredging and Decontamination Pilot Study Work Plan (TAMS/ET and Malcolm Pirnie, Inc., 2005). The components comprising this field investigation program will be located in a 1,000-foot bank-to-bank portion of the Harrison Reach (approximately River Mile 2.8). This program is expected to occur in December 2005.

During the pilot scale dredging study, the following field activities will be conducted:

- Dredging Operations Oversight: The scope of this portion of the study is to observe dredging equipment, workers, and associated vessels used in dredging operation and check for compliance with the NJDOT-OMR contract and bid documents (NJDOT-OMR, TAMS/ET and MPI, 2005). Field personnel will observe the Dredging Contractor work crews and equipment from boats and/or the land, and will maintain communication with other personnel (e.g., TAMS/ET, USGS, Rutgers University, subcontractors, dredging personnel) using two-way radios, cellular telephones, and/or hand signals.
- Resuspension Monitoring: The scope of this portion of the study is to use water quality instruments to monitor resuspension of sediments and associated contamination as a result of dredging activities. Water quality instruments will be used on moorings and on boats. These aspects of the program are described below.
 - Six anchored moorings will be stationed within the near-field plume to collect continuous water column data to monitor sediment resuspension. These moorings will be equipped with the following instruments: Conductivity, Temperature, Depth (CTD) Probe; LISST Probe; Turbidity Meter; Acoustic Doppler Current Profiler (ADCP). These instruments are described in the Dredging Pilot Work Plan. Fixed moorings are expected to be installed and removed by Rutgers University; in the event that they are not, and TAMS/ET and Malcolm Pirnie personnel are required to install moorings, then these activities shall be conducted in accordance with the Hydrodynamics Studies HASP Addendum written for the LPRRP investigation.
 - To monitor TSS within the near-field plume, four sampling boats will be used to collect data within the near-field plume; these sampling boats will be equipped with the instruments listed above [as well as a Trace Organics Platform Sampler (TOPS)] and will either sweep across the near-field plume, be anchored at the base of the near-field plume, or move back and forth at the base of the near-field plume. Water will be filtered through resin material in the TOPS and removed/submitted for chemical analysis.
- Sampling Boat: Malcolm Pirnie will provide a sampling boat and a captain.

A detailed description of the field work and sampling activities, as well as the Standard Operating Procedures that are applicable to this program are provided in the attached Work Plan and QAPP (TAMS/ET and Malcolm Pirnie, Inc., 2005).

2 POTENTIAL HEALTH AND SAFETY HAZARDS AND CONTROLS

2.1 FIELD ACTIVITIES, HAZARDS, AND CONTROL MEASURES

For general team communication, VHF Marine radio channel 72 will be used, with channel 71 reserved as an alternative. Marine emergencies should be reported on radio channels 16 or 9. To receive continuous marine information, weather updates, and U.S. Coast Guard announcements, personnel on boats should monitor radio broadcasts for small craft and other weather related advisories. Note that radio channel 64 will be reserved for monitoring dredging activities and communicating with the dredge operator.

TAMS/ET and Malcolm Pirnie personnel working in the vicinity of dredging equipment must be aware of the hazards of being around heavy equipment, overhead hazards, and moving parts. Minimum distances between the active dredge operation and the monitoring vessels have been established for this project at 100 feet. No monitoring vessels will be allowed closer than this distance. In the event that a vessel becomes disabled and is drifting toward the dredge, no matter the distance from the dredge, the captain of the disabled vessel will throw anchor to halt the drifting vessel and notify the dredge operator of their situation using VHF channel 64. The captain will also notify the shuttle boat for assistance. Any vessels that become disabled due to engine failure, no fuel, etc. will notify the shuttle vessel and await assistance. If the captain deems it necessary an anchor shall also be dropped. In the event that the shuttle vessel becomes disabled assistance will be requested from one of the monitoring vessels. These hazards are addressed in Section 4.1.2 (Barge-Based Drilling) of the HASP Core Document (Malcolm Pirnie, 2005a). Slip Trip, and Fall Hazards, Falling Objects, and Boating Safety are addressed in Sections 4.3.4, 4.3.9, and 4.5 of the HASP Core Document (Malcolm Pirnie, 2005a), respectively.

Collection of data during the sediment resuspension monitoring field task will be conducted from boats using electronic instrumentation as described in Section 1.3

(Proposed Work/Scheduled Field Activities). Slip Trip, and Fall Hazards and Boating Safety are addressed in Sections 4.3.4 and 4.5 of the HASP Core Document (Malcolm Pirnie, 2005a), respectively. As part of the sediment resuspension monitoring program, water column samples may be collected using depth-integrated water column sampling devices. Health and safety concerns associated with collecting water column samples from vessels are addressed in Section 4.1.3 (Water Column Sampling) of the HASP Core Document (Malcolm Pirnie, 2005a). When using electrical generators aboard the boats GFCIs shall be utilized. In addition to these concerns, TAMS/ET and Malcolm Pirnie personnel collecting water samples must be aware of the hazards of cold weather and minimal daylight, which are typical in the months of December and January in New Jersey. Basic operational times will be between sunrise and sunset. However, during clear days this window may increase due to available lighting. The H&S officer will determine if adequate lighting is available and if boats are properly equipped to operate under such conditions. All personnel should wear appropriate winter clothing, PFDs and personnel on small boats should wear survival suits (Mustang type or equivalent), which are equipped with light reflective tape, water activated lighting, or glow sticks which assist in locating personnel in the dark. Mustang suit use is discussed further in Section 3.1 of this HASP Addendum. All boats should be equipped with hand-held or portable spotlights.

The navigational paths of the shuttle, L, M, and T boats will cross each other during the monitoring activities. Therefore, captains operating the shuttle, L, M, and T boats must maintain visual contact with each other during all monitoring activities. The captains must take care to slow down or alter course when approach the other boats performing the monitoring. Captains will maintain communication as needed during these encounters.

During water sampling, it is anticipated that supplies and personnel will need to be transferred between vessels, including the transfer of personnel between the sampling boats and the USACE boat (*i.e.*, *Hudson*) as well as between the shuttle boat and other sampling boats. When transferring personnel and supplies from the shuttle boat to a sampling boat, the two boats will be securely tied together and captains will then

coordinate the safe transfer of personnel and supplies. Personnel will remain behind the guardrail/gunwale until the captains give the signal to secure the vessels. During this operation one of the boats may be anchored securely, and bumpers should be placed between vessels to prevent damage to the vessels. Note that jumping between vessels is not allowed. When transferring personnel and supplies from the *Hudson* to another boat, the *Hudson* will be responsible for providing safe passage for personnel and/or supplies from the smaller vessel through ladders, ramps, and/or seamen assistance as appropriate.

If in the event of cold weather where personnel on a boat that does not have a heated cabin become chilled due to the weather the captain will request that the individual be temporarily transferred to a heated vessel to warm up. Coordination between the captains of the Malcolm Pirnie boat and the ASI R/V Delaware have already been established for such a contingency.

In the event of an approaching vessel not associated with the monitoring or dredging operations, captains will notify the other vessels in the monitoring party of the approaching vessel. These vessels will be directed away from the dredge via radio or the shuttle vessel. In the event that these vessels do not heed the warning the USCG or harbor patrol will be notified.

A Task Hazard Analysis is included as Table 4-2 in the HASP Core Document (Malcolm Pirnie, 2005a) for collection of water column samples.

3 PERSONAL PROTECTIVE EQUIPMENT

3.1 REQUIRED LEVEL OF PROTECTION

Based upon current information regarding the contaminants present at the LPRRP Site and hazard evaluations of the various tasks to be completed, the required level of personal protection is provided by task in Table 3-1. The Malcolm Pirnie Corporate Health and Safety Program Guide (Malcolm Pirnie, Inc., 1988) contains the protocol for personal protective equipment (PPE) and respiratory protection, as required by the Occupational Safety and Health Administration (OSHA) (29 CFR 1910.120, 131, 132, 133, 134).

Table 3-1: Required Level of Protection

Task	Anticipated Level of PPE
Oversight of dredging activities	Level D
Sediment resuspension monitoring	Level D
Water column sampling	Level D

The levels of protection identified in Table 3-1 require the following equipment:

Level D

Equipment Requirements for Level D are as follows:

- Coveralls or suitable work clothing, in accordance with cold weather conditions (*e.g.*, blue jeans and heavy shirt).
- Personal Flotation Device (PFD) when working on a boat, barge, shoreline, bridge, or dock (unless adequate railings exist on bridges).
- Survival suit (Mustang type) when working on a small vessel or near the water during cold weather.
 - General guidance on the use of Mustang suits:
First and foremost, the safety of all monitoring and dredge operations personnel and the public is our primary concern.

The possibility of someone going overboard and their retrieval is something we take very seriously. However, the requirement of wearing a Mustang style suit at all times on the water may not be necessary for all personnel for this project.

Hypothermia, while a real risk, is not the only safety concern. Work suits, while protecting against hypothermia, create other risks such as heat exhaustion while working onboard the boat in warm air temperatures. Bulkiness of a suit can cause tripping, catching on equipment, etc. If not properly worn it may create a danger (i.e. legs floating up if the suit is worn tied around the waist while torso is not in the suit). When working in cold and potentially hazardous conditions in remote or difficult to rescue situations, the suit is truly the right piece of safety gear.

Our activities at the Passaic River Dredging Pilot Study site will involve some moderate activities involving movement by most personnel. Wearing normal safety gear with a personal floatation device will provide a safe attire for most workers. However, these suits will be carried aboard each vessel for sampling personnel working near the sides of the boats. If weather conditions change then the site safety office may require that the effected personnel don this equipment.

Mustang suits may be worn by any person requesting them, no matter the conditions. As darkness approaches it is advised that Mustang suits be worn by the sampling crew.

Should an individual get in the water from a small vessel, it should only take minutes to retrieve them. Each vessel will have aboard a throwing ring attached to a safety line, and a boat hook. If someone were to go overboard the life ring will be thrown and the captain will position the boat to safely retrieve the person. Propellers will be kept off when the person is near the boat. The captain will notify all vessels of a "Man Overboard." The shuttle boat will assist with any rescue. Both the NJ Marine Police in Newark Bay (should be on site in under 20 minutes) and USCG Sector NY (should be on site in under 30 minutes) should also be notified if an immediate rescue cannot be performed.

Note: All vessels should not converge on the site for a rescue since the congestion of too many boats may create a hazard to the person in the water.

The current water temperature is approximately 49 degrees in the bay and will slowly drop over the next several weeks. Based on USCG estimates at 50 degrees water temperature a person in the water with a lifejacket on has a estimated survival time of 2.0 hours, At 35 degrees survival drops to 0.75 hours.

If site conditions begin to deteriorate (due to choppy water, heavy winds, etc.) returning to the boat dock will be preferred over having all personnel don Mustang suits.

- Outer gloves (Nitrile), chemical-resistant.
- Inner gloves (Latex), chemical-resistant (optional).
- On land: Chemical-resistant, steel-toe, safety boots which meet American National Standards Institute (ANSI) Z41.
- On vessels: Non-skid rubber overboots or workboots
- Safety glasses or chemical splash goggles which meet ANSI Z87 if working with preservatives such as acid or caustic..\\.
- Hearing protection in accordance with Malcolm Pirnie's Corporate Hearing Conservation Program (included in the HASP Core Document as Appendix D). If

noise levels exceed 85 dBA (as measured with a noise dosimeter), then personal protective equipment with a USEPA Noise Reduction Ratio (NRR) sufficient to bring the noise exposure to below 85 dBA shall be utilized as described in the Corporate Hearing Conservation Program. On the monitoring vessels ear plugs will be worn if ambient noise requires individuals to raise their voices to be heard over the generator. A board or other engineering barrier may be used to deflect the noise from the generator and reduce the need for earplugs.

4 PERSONNEL

4.1 PROJECT TEAM PERSONNEL

Team members and their roles for the Dredging and Decontamination Pilot Study are provided below in Table 4-1.

Table 4-1: Team Members and Roles

Role	Team Member	Organization
Client Contact	Lisa Baron Peter Wepler	NJDOT-OMR USACE-NYD
Project Officer	Ken Goldstein, CGWP	Malcolm Pirnie
Project Manager	Scott Thompson, P.E.	Malcolm Pirnie
Project Officer	Frank Baragona, P.E.	TAMS/ET
Project Manager	Maheyar Bilimoria	TAMS/ET
Project QA Manager	Allen Burton	TAMS/ET
Field Team Leader	Maheyar Bilimoria	TAMS/ET
Health and Safety Officer	Chris Purkiss	Malcolm Pirnie
Field Personnel	Sameer Ahsan Robert Forstner Celeste Foster Amit Haryani Paul Kareth John Rollino Lisa Swan Liam Bossi John Peake David Foster Solomon Gbondo- Tugbawa Dave Lewitt Erika Zamek	TAMS/ET TAMS/ET TAMS/ET TAMS/ET TAMS/ET TAMS/ET TAMS/ET Malcolm Pirnie Malcolm Pirnie Malcolm Pirnie Malcolm Pirnie Tugbawa Malcolm Pirnie Malcolm Pirnie Malcolm Pirnie

Table 4-2 provides a summary of health and safety training for field team personnel. All personnel should have appropriate and updated medical clearance.

Table 4-2: Health and Safety Training Summary

H&S Training	Team Members				
	Field Team Leader/name	Field Team Member/name	Field Team Member/name	Field Team Member/name	Field Team Member/name
40-hour HAZWOPER Training					
8-hour HAZWOPER Refresher (exp)					
Supervisor Training					
Boat Safety Training					
Hazardous Communications Training					
First Aid Training (exp)					
CPR Training (exp)					
Bloodborne Pathogens Training (exp)					

5 REFERENCES

- Malcolm Pirnie, Inc., 2005a. *Lower Passaic River Restoration Project – Health and Safety Plan: Core Document*. January 2005.
- Malcolm Pirnie, Inc., 1998. *Malcolm Pirnie Corporate Health and Safety Program Guide*. June 1998.
- TAMS/ET and Malcolm Pirnie, Inc., 2005. *Lower Passaic River Restoration Project – Project Plans for Environmental Dredging Pilot Study*. November 2005.