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FINAL WORK PLAN SITE SAFETY AND HEALTH PLAN REMEDIAL INVESTIGATION
FIREFIGHTER TRAINING AREA, LIGHTER AMPHIBIOUS RESUPPLY CARGO (LARC) 60
MAINTENANCE AREA, AND AUTO CRAFT AREA FORT STORY VA
12/1/1994
MALCOLM PIRNIE

0130

Final Work Plan

SITE SAFETY AND HEALTH PLAN

Remedial Investigation
For
Fort Story, Virginia

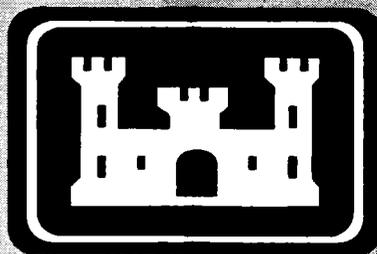
U. S. Army Transportation Center
Fort Eustis, Virginia

and

U. S. Army Corps of Engineers
Baltimore District

December 1994

0285-588



**FINAL WORK PLAN:
SITE SAFETY AND HEALTH PLAN**

**FIREFIGHTER TRAINING AREA (FTSTY-04)
LARC MAINTENANCE AREA (FTSTY-06)
AUTO CRAFT BUILDING AREA (FTSTY-07)**

**FORT STORY
VIRGINIA BEACH, VIRGINIA**

PREPARED FOR:

**U.S. ARMY CORPS OF ENGINEERS
BALTIMORE DISTRICT
BALTIMORE, MARYLAND**

**CONTRACT DACA31-94-D-0017
DELIVERY ORDER NO. 0017, 0020, 0024**

DECEMBER 1994

**MALCOLM PIRNIE, INC.
11832 Rock Landing Drive, Suite 400
Newport News, Virginia 23606**

SITE SAFETY AND HEALTH PLAN

FORT STORY, VIRGINIA

SCOPE

Malcolm Pirnie, Inc. is under contract to the U.S. Army Corps of Engineers (ACE) to conduct remedial investigations at Fort Story, Virginia. This Site Safety and Health Plan (SSHP) has been developed to address safety requirements related to the field investigation activities to be performed on site. The SSHP shall be used in conjunction with a site Field Investigation Plan and Chemical Data Acquisition Plan.

ACKNOWLEDGEMENTS

1. Site Safety and Health Plan - Reviewed by:

<u>Title</u>	<u>Signature</u>	<u>Date</u>
Project Officer	_____	_____
Project Manager	_____	_____
Corporate Health and Safety Manager	_____	_____
Site Safety and Health Officer	_____	_____

2. Employee Acknowledgment (To be signed by all MPI and subcontractor employees prior to performing work on-site):

I acknowledge that I have reviewed the information in this Site Safety and Health Plan and understand both the potential hazards which may confront me during site activities at Fort Story and the procedures outlined in this plan to minimize those hazards.

<u>Employee Signature</u>	<u>Company</u>	<u>Date</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

ADDENDA LIST

The Addenda List will be updated each time an addendum is issued. The Addenda List will list, by addendum and date, the revisions to the Plan.

REVISION LIST

The Revision List will be updated each time an addendum is issued. The Revision List will list the revisions by Plan and date; i.e., a separate list will be generated for the General Plan and any Attachment which has been revised.

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Appendix No.	Description
A	Fort Story Map

LIST OF ATTACHMENTS

Attachment No.	Description
I	Site Specific Safety and Health Plan Firefighter Training Area
II	Site Specific Safety and Health Plan LARC Maintenance Area
III	Site Specific Safety and Health Plan Auto Craft Building Area

LIST OF ABBREVIATIONS AND ACRONYMS

ACE	U.S. Army Corps of Engineers
ACNED	U.S. Army Corps of Engineers New England Division
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
BARC	Barge amphibious resupply cargo
CDAP	Chemical Data Acquisition Plan
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFT	Code of Federal Regulations
CGI	Combustible gas indicator
CIH	Certified Industrial Hygienist
CLP	Contract Laboratory Program
CPR	Cardiopulmonary resuscitation
CPT	Cone penetrometer test
CRQL	Contract required quantitation limit
CRZ	Contamination reduction zone
CSHM	Corporate Safety and Health Manager
CSP	Certified Safety Professional
1,2-DCA	1,2-Dichloroethane
1,1-DCE	1,1-Dichloroethene
DEQ	Virginia Department of Environmental Quality
DI	Deionized
DMP	Data Management Plan
DNAPL	Dense non-aqueous phase liquid
DOD	Department of Defense
DOT	Department of Transportation
DPT	Direct push technology
DQCR	Daily Quality Control Report
DQO	Data quality objective
FID	Flame ionization detector
FIP	Field Investigation Plan
FS	Feasibility Study
FTA	Firefighter Training Area
FTP	Fire Training Pit
GC	Gas chromatograph
GSSH	General Site Safety and Health Plan
HTRW	Hazardous, Toxic and Radioactive Waste
I.D.	Inside diameter
IDLH	Immediately dangerous to life and health
IRP	Installation Restoration Program
JMM	James M. Montgomery, Inc.
LARC	Lighter amphibious resupply cargo
LEL	Lower explosive limit
LNAPL	Light non-aqueous phase liquid
LOTS	Logistics Over-the-Shore
MSDS	Material Safety Data Sheet
MSHA	Mine Safety and Health Administration

MS/MSD	Matrix spike/matrix spike duplicate
NFPA	National Fire Protection Association
NGVD	National Geodetic Vertical Datum
NIOSH	National Institute of Occupational Safety and Health
NOAA	National Oceanic and Atmospheric Administration
NTU	Nephelometric turbidity unit
OSHA	Occupational Safety and Health Administration
PA/SI	Preliminary Assessment/Site Investigation
PCB	Polychlorinated biphenyl
PE	Professional Engineer
PID	Photoionization detector
PPB	Parts per billion
PPE	Personal protective equipment
PPM	Parts per million
PVC	Polyvinyl chloride
QA/QC	Quality assurance/quality control
RI	Remedial Investigation
RPD	Relative percent difference
SCBA	Self contained breathing apparatus
SSHO	Site Safety and Health Officer
SSHP	Site Safety and Health Plan
SSSHP	Site-specific Safety and Health Plan
SOP	Standard operating procedure
SOW	Scope of Work
TAL	Target Analyte List
TCA	1,1,1-Trichloroethane
TCL	Target Compound List
TEGD	Technical Enforcement Guidance Document
TPH	Total petroleum hydrocarbon
ug/L	Micrograms per liter
USAEHA	U.S. Army Environmental Hygiene Agency
USCG	U.S. Coast Guard
USCS	Unified Soil Classification System
USEPA	U.S. Environmental Protection Agency
UST	Underground storage tank
VOA	Volatile organic aromatic
VOC	Volatile organic compound

1.0 INTRODUCTION

1.1 PURPOSE

This Site Safety and Health Plan (SSHP) has been developed to protect the health and welfare of both investigative personnel and the surrounding community during the performance of field investigative activities on, and in the immediate vicinity of, Fort Story in Virginia Beach, Virginia. U.S. Army Corps of Engineers (ACE) approval of this SSHP is required prior to the commencement of the field activities.

Safety, health and emergency response procedures are outlined for preventing accidents and protecting personnel from injury and occupational illness. Included in this SSHP are the assignment of responsibilities, personnel protection requirements, safe work practices and emergency response procedures. The basis for this document includes available historical information and the assessment of potential physical and chemical hazards associated with the site.

Environmental monitoring will be performed as necessary during the course of the field investigative activities to determine personnel exposures. The SSHP will be modified as appropriate to address current site conditions and to present corrective procedures. Modification will be made by written addenda to this SSHP.

Malcolm Pirnie and its subcontractors are responsible for ensuring that all personnel in their employment will strictly comply with the requirements of this SSHP while working at the site.

Consistent with the contents of this SSHP, all work is to be performed in a safe and environmentally acceptable manner. Sound judgement is to be exercised in order to minimize the risk to the community. Enforcement and adherence to the SSHP will help prevent the loss of life, injury or health hazards to the field personnel and the community. A copy of this SSHP will be available from the Site Safety and Health Officer during all field investigative activities.

1.2 REGULATORY REQUIREMENTS AND GUIDELINES

The procedures outlined in this SSHP comply with the Occupational Safety and Health Administration (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 ACE Safety and Health Requirements Manual (EM 385-1-1), the Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities jointly prepared by the National Institute of Occupational Safety and Health (NIOSH), OSHA, the U.S. Coast Guard (USCG) and EPA and EPA's Standard Operating Safety Guides.

1.3 ORGANIZATION OF THE SITE SAFETY AND HEALTH PLAN

This plan is comprised of a General Site Safety and Health Plan (GSSHP) and Site-Specific Safety and Health Plans (SSSHP). SSSHPs for the Firefighter Training Area, LARC Maintenance Area and Auto Craft Building Area are included as attachments to the GSSHP. For reference throughout this document, the GSSHP and SSSHP will be referred to as the Site Safety and Health Plan, or SSHP. The general plan addresses the issues and concerns of the overall project site and the ubiquitous hazards that are found at the base. The site-specific plan addresses the chemicals and associated hazards that is unique to the hazardous waste site. The general plan will apply to all work that is conducted at the base under this program, and the site-specific plan will be used in conjunction with the general plan to provide the necessary information to safely conduct work at any particular area of the base. A copy of the SSHP is to be thoroughly reviewed and signed by all individuals working at the site on the base.

2.0 PROJECT DESCRIPTION

2.1 FACILITY LOCATION AND DESCRIPTION

Fort Story is located in southeastern Virginia within the city of Virginia Beach, Virginia. Fort Story occupies an area of approximately 1,450 acres and is situated on Cape Henry which roughly divides the waters of the Chesapeake Bay to the north and the Atlantic Ocean to the east. Figure 2-1 provides the location of Fort Story.

Land features encountered at Fort Story consist of linear sand ridges, sand flats and wetland areas. The topography is dominated by a series of prominent linear, well-drained sand ridges that roughly bisect the Fort Story area. The central ridges trend parallel to the coastline and are characterized by maximum elevations in excess of 85 feet, National Geodetic Vertical Datum (NGVD) of 1929. A second series of sand ridges located on Fort Story are comprised of an active dune complex located adjacent to the coastline. The coastal sand ridges attain maximum elevation in excess of 25 feet NGVD. Broad, poorly drained sand flats are located adjacent to the sand ridge areas. Land surface elevations in the sand flat areas typically range between 5 and 10 feet, NGVD. Wetland areas, which are common features of the sand flats, occur locally in closed depressions. South of the central sand ridges, the Fort Story topography consists of an extensive wooded, wetland area, formerly a back-bay, lagoonal feature. Most of the installation's facilities and operations are confined to the sand ridge and sand flat areas.

The chief potable water supply in the region is the surface water reservoir system operated by the City of Norfolk. To a minor extent, potable water is obtained from groundwater sources. Groundwater use at Fort Story is restricted to withdrawal from a single well located at the Lighter Amphibious Resupply Cargo (LARC) maintenance area. The unavailability of construction data for this well precludes a determination of which aquifer unit provides the groundwater withdrawn from this well. Water is obtained from the well for nonpotable uses only.

The Virginia Department of Environmental Quality (DEQ), Division of Water, Tidewater Region, regulates wells in the region. Information obtained by Montgomery-Watson during performance of the PA/SI indicated that groundwater use is discouraged

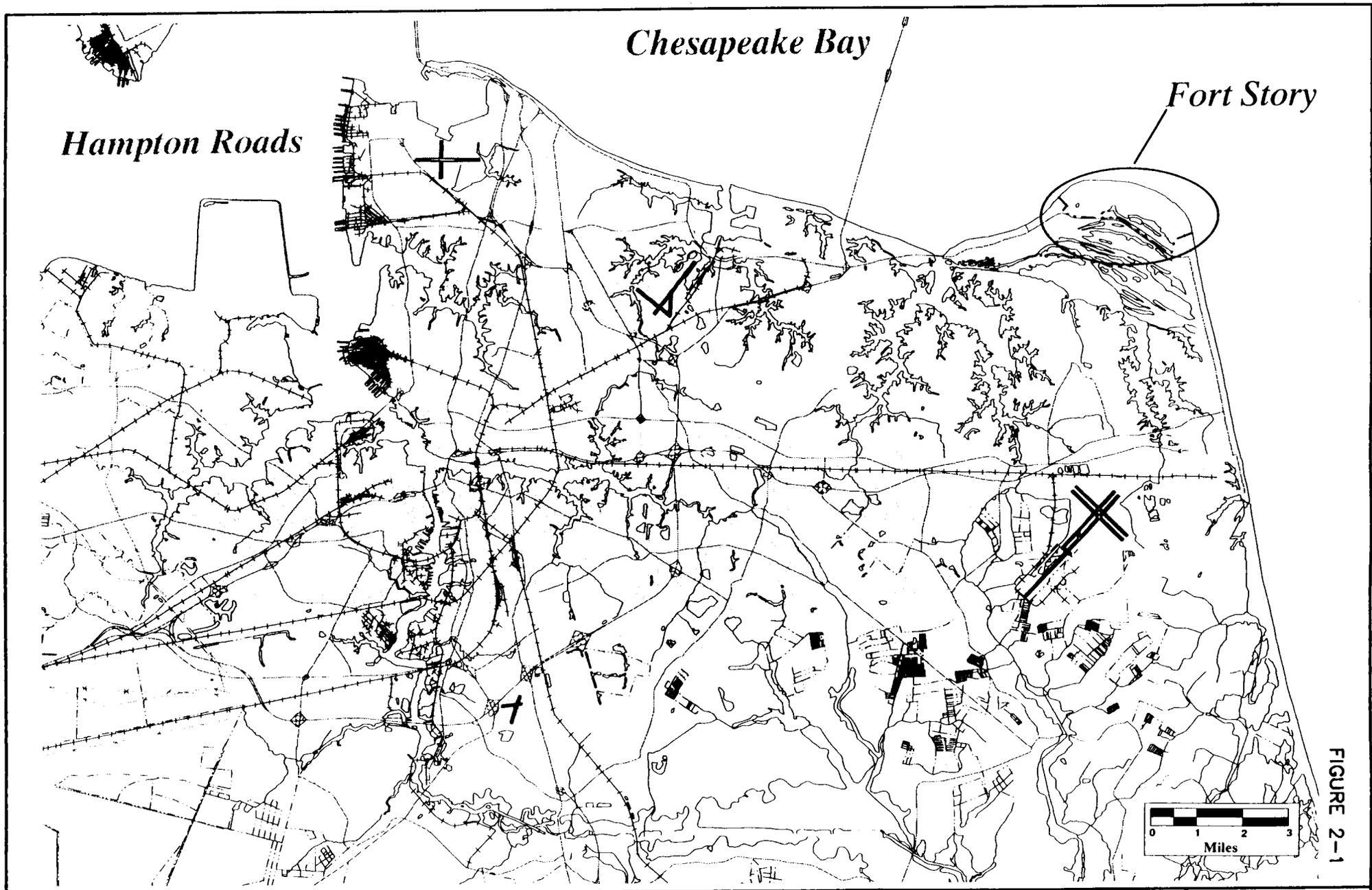


FIGURE 2-1

FORT STORY, VIRGINIA
SITE SAFETY AND HEALTH PLAN
FORT STORY LOCATION MAP

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because of poor quality and withdrawal restrictions. High dissolved iron and manganese and total solids characterize the groundwater in the upper aquifers.

2.2 FACILITY HISTORY

Fort Story began as a military installation in 1914. On 10 March 1914, the Virginia General Assembly ceded 343.1 acres, located at Cape Henry in Princess Anne County, to the U.S. Government "to erect fortifications and for other military purposes." On 14 June 1914, the U.S. District Court acquired title for the land by condemnation proceedings against the Cape Henry Syndicate and other landowners in the Cape Henry subdivision. War Department General Order No. 31, dated 24 July 1916, named this newly acquired tract of land Fort Story in honor of Major General John Patton Story.

Construction of powder magazines and projectile rooms got underway during the latter part of 1916 and by February 1917, construction of the 16-inch howitzer fortifications had begun. Also, during February 1917, the 2nd and 5th Coast Artillery Companies established the military garrison at Fort Story. From 1917 through 1925, the installation continued to develop as a small coast artillery garrison consisting of little more than its armament. The only land expansion which occurred during the period was the acquisition of 9.38 acres from the Norfolk and Southern Railway Company in March 1917.

During World War I, Fort Story was integrated into the Coast Defenses of Chesapeake Bay which included Fort Monroe (Headquarters) and Fort Wool (located at the east entrance of the Hampton Roads Bridge Tunnel). On 9 June 1925, Fort Story was designated a Harbor Defense Command by War Department General Order No. 13, but the change in designation added little to the dwindling post-war activity of the garrison.

As World War II approached, Fort Story began an extensive development. Many of the facilities which exist at Fort Story today were constructed then, and the installation increased in size to 1,439 acres. An additional 11.82 acres were acquired in 1963 which increased its size to its present 1,451 acres. In the 1940s, the construction included temporary artillery batteries, theater, chapel, fire station, mess halls, barracks, Officer and NCO clubs, shops, additional powder magazines and projectile rooms, six underground storage bunkers and 19 seacoast searchlights.

In December 1941, the Headquarters of the Harbor Defense Command was moved from Fort Monroe to Fort Story. Two harbor defense installations were added to the

network in 1941; Fort John Curtis and a mine base. On March 1, 1944, the Chesapeake Bay sector of the Harbor Defenses was inactivated, and control passed to Headquarters, Southeastern Sector, Eastern Defense Command, Raleigh, North Carolina.

By September 1944, Fort Story began a transition from a heavily fortified coast artillery garrison to a convalescent hospital. At the time of its closing on 15 March 1946, the hospital had accommodated over 13,472 patients.

At the closing of World War II, Fort Story again changed missions. This time it assumed the role which it still has today, to train units and individuals for amphibious operations. Fort Story was officially transferred to the Transportation Corps in July 1948 as a subpost of the Transportation Training Command, Fort Eustis, Virginia.

Fort Story trains army personnel in amphibious and Logistics Over-the-Shore (LOTS) operations. Fort Story is the only available facility which has the necessary natural terrain features and beaches, sand, surf, variable tide conditions (bay and ocean) and hinterlands, all of which are normally experienced by amphibious and LOTS operations. In addition, Fort Story contains beach training areas, tactical training areas and a series of trails throughout the installation. The deep water ship anchorage, off-road driving areas and soil of sufficient bearing strength for the heavy vehicles are indispensable in amphibious training, LOTS training and the testing of new equipment, doctrines and techniques.

2.3 PREVIOUS CONDITIONS

As a result of the numerous operations and activities carried out on the base, hazardous substances and hazardous wastes have been placed at various locations on the base resulting in environmental contamination.

2.4 PREVIOUS INVESTIGATIONS

Numerous studies have been performed, by others, for various sites at the Fort Story. These studies include preliminary assessments/site investigations and removal actions. A discussion of the previous investigations are provided in Section 2.0 of the Field Investigation Plan.

2.5 HAZARDOUS SUBSTANCES

This section of the GSSHP will outline the general category of hazardous substances known to be present at many of the sites at Fort Story. Because the nature of some of the work on this project is to determine the type and extent of contamination, not all hazards are known at this time. As information on additional contaminants/hazards becomes available, it will be included in the SSSHP for review and modification, if necessary, of any site safety practices.

A list of the known contaminants detected during the PA/SI above trigger levels includes:

- Total Petroleum Hydrocarbons
- Metals
 - Lead
 - Copper
 - Zinc
- Volatile Organics
 - Benzene
 - 1,2-Dichloroethane
 - 1,1-Dichloroethene
 - 1,1,1-Trichloroethane
 - Vinyl chloride
- Phenol

3.0 ORGANIZATION OF PERSONNEL

3.1 RESPONSIBILITIES OF FIELD PERSONNEL

The Project Officer, Project Manager, Corporate Health and Safety Manager, Corporate Industrial Hygienist, Site Field Manager and Site Safety and Health Officer will be responsible for the implementation of this GSSHP and all appropriate SSSHPs. The organizational structure for this project is shown on Figure 3-1. The responsibilities of these and other personnel are detailed as follows:

Project Officer

The Project Officer is the representative of Malcolm Pirnie with contract authority who is responsible for the commitment of resources required to fulfill Malcolm Pirnie's obligations to the U.S. Army Corps of Engineers (ACE). The Project Officer is accountable to both the ACE and Malcolm Pirnie's Board of Directors.

Project Manager

The Project Manager has full responsibility for implementing and executing an effective program of site-specific personnel protection and accident prevention. The Project Manager will supervise the allocation of resources and staffing to implement specific aspects of this SSHP, and may delegate authority to expedite and facilitate any application of the program.

Corporate Health and Safety Manager

The Corporate Health and Safety Manager serves as the administrator of Malcolm Pirnie's corporate health and safety program. Malcolm Pirnie's Corporate Health and Safety Manager is a certified Industrial Hygienist (CIH) and a certified Safety Professional (CSP) and will have the assistance of staff Industrial Hygienists and Safety Specialists throughout the duration of the project. He is responsible for verifying that Malcolm Pirnie field personnel are properly trained, that they have obtained necessary medical clearance, and that they have experience in the selection, use, and maintenance of personal protective equipment. He will also serve as scientific advisor for the duration of the project, providing

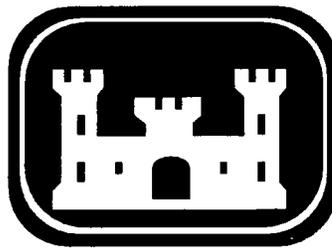
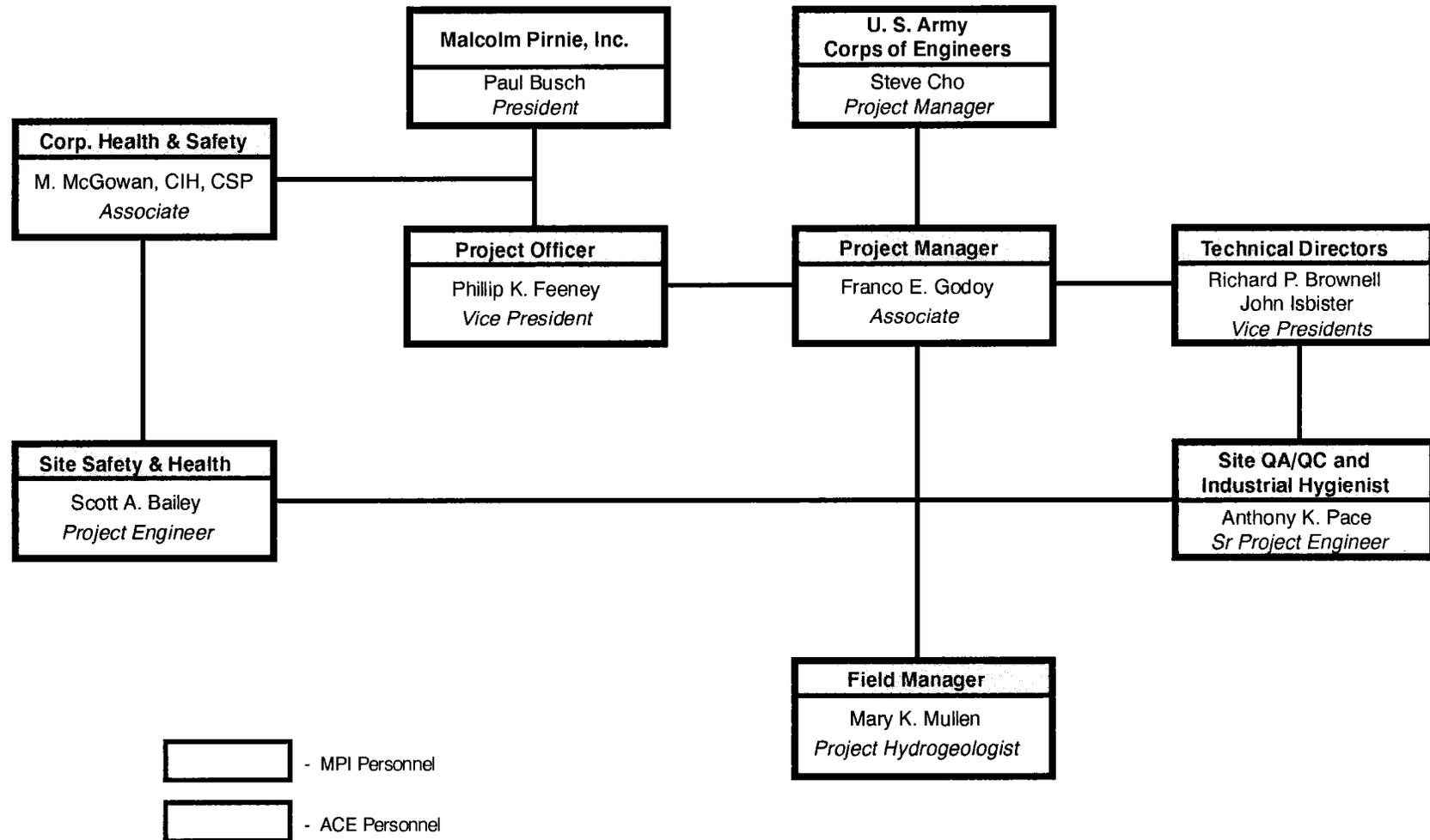


FIGURE 3-1
ORGANIZATIONAL CHART



guidance on data interpretation and the determination of appropriate levels of worker protection. The Corporate Health and Safety Manager or Industrial Hygienist will evaluate compliance with this SSHP through regular audits of the field activities.

Site Field Manager

The Site Field Manager is responsible for field team operations and safety. Responsibilities include executing the work plan and schedule, enforcing safety procedures and coordinating with the Site Safety and Health Officer in determining personal protection levels. The Site Field Manager will consult with the Site Safety and Health Officer (SSHO) before making decisions on health and safety issues which arise outside of the procedures set out in this SSHP. In general, the Site Field Manager is responsible for:

- Seeing that appropriate personal protective equipment and monitoring equipment is available at the site and properly used by all personnel.
- Monitoring Malcolm Pirnie's work and correcting any practices/conditions or modifying work scopes that may result in injury or exposure to hazardous substances.
- Assuring that field personnel are familiar with the SSHP and have signed the SSHP acceptance form.
- Verifying that field personnel and visitors have current fit-for-duty medical and training authorizations as described in Section 6.0.
- Preparing accident/incident reports.

Site Safety and Health Officer

The SSHO is the person responsible for interpreting and implementing the field health and safety provisions set out in this SSHP. The SSHO will guide the efforts of Malcolm Pirnie employees in their day to day compliance with this SSHP. The SSHO has the ability and authority to make necessary changes or additions to this SSHP and provide technical assistance to the Site Field Manager on problems relating to industrial hygiene and worksite safety. In general, the SSHO is responsible for:

- Providing on-site briefings on health and safety issues as needed.

- Setting up site control zones, establishing decontamination lines for personnel and equipment, and ensuring that emergency equipment is available where necessary.
- Conducting air monitoring for chemical contaminants to determine worker exposure levels, as well as the interpretation and documentation of air monitoring data.
- Announcing upgrades and downgrades of PPE levels, if necessary, based on air monitoring information (Note - where PPE level is mandated for a specific task in the SSHP, this level cannot be permanently downgraded without the prior approval of the Corporate Health and Safety Manager, Industrial Hygienist and the ACE).
- Maintaining a daily log of work activities, exposure monitoring results, PPE levels, individuals on-site, visitors on-site, work and rest periods, and calibration data for monitoring instrumentation, decontamination and heat/cold stress aspects.
- Conducting daily health and safety inspections.
- Communicating with the Project Manager concerning stopping the work in the event of an emergency or to correct unsafe work conditions.
- Identifying an alternate SSHO, with the approval of the Project Manager and CSHM (the SSHO or alternate SSHO must be on-site during all field operations).

Project Industrial Hygienist

The project's Industrial Hygienist will provide scientific input to both the Corporate Health and Safety Manager and the Site Safety and Health Officer throughout this project, interpreting data and providing determinations regarding worker safety, including updating worker safety requirements with regard to updated OSHA and NIOSH requirements and guidelines.

Corporate Health Physicist

The project's Health Physicist will provide guidance on radiological contamination and the interpretation and documentation of radiological data.

Field Personnel

All field personnel will be thoroughly familiar with this SSHP and follow all health and safety procedures and guidelines outlined in this SSHP. Field personnel will have the following health and safety responsibilities:

- Taking all reasonable precautions to prevent injury to themselves and their fellow employees.
- Perform only those tasks that they believe they can do safely, and immediately report any accidents and/or unsafe conditions to the SSHO or Field Manager.
- Implement the procedures set forth in the SSHP and report any deviations from the procedures in the SSHP to the SSHO or Field Manager for action.
- Remind the SSHO and Field Manager of personal medical restrictions, if any.
- Review the project SSHP and sign the project SSHP Acceptance Form.

Subcontractor Personnel

All subcontractors, as separate employers on this project, are required to produce a site-specific health and safety plan for their employees which meets the requirements of 29 CFR 1910, especially 29 CFR 1910.120, 29 CFR 1910.134, and 29 CFR 1910.141 and include applicable provisions of 29 CFR 1926. Subcontractor SSHPs shall include additional health and safety task evaluations for procedures which will only be performed by subcontractor personnel. Malcolm Pirnie shall review all subcontractor's SSHPs and provide comments, as necessary, prior to commencement of site activities.

All subcontractor personnel will be familiar with the proper use of all protective equipment and devices in order to protect themselves and fellow workers from injury and to prevent damage to material, equipment, and facilities.

The subcontractors shall be responsible for the health and safety of their employees and shall comply with all applicable laws and regulations. Malcolm Pirnie personnel will determine if subcontractors are adhering to the procedures set out in their SSHP and will provide the subcontractor's supervisor personnel with written and verbal notices of non-performance. In situations such as continual and serious violations of the subcontractor's own health and safety procedures, and with the concurrence of Contracting Officer, the Site

Field Manager may issue a stop work order. In cases of sudden or extreme emergencies such as trench collapse or IDLH conditions, the Malcolm Pirnie SSHO or Site Field Manager may be put in the position of giving guidance and direction to subcontractors and their employees.

All subcontractors are responsible for the following:

- Providing their own Site Safety and Health Officer;
- Providing and adhering to their own SSHP;
- Providing their own personal protective equipment;
- Training their employees in accordance with applicable Federal, State and local laws;
- Providing medical surveillance and obtaining medical approvals for their employees and;
- Ensuring their employees are advised of and meet the minimum requirements of this SSHP and any other additional measures required by their site activities.

Subcontractor personnel are encouraged to contribute suggestions and assist in discovering or correcting unsafe working conditions.

3.2 PERSONNEL ASSIGNMENTS AND TELEPHONE NUMBERS

The following Malcolm Pirnie personnel have health and safety responsibility for this project.

Project Manager:

Name:	Franco E. Godoy
Affiliation:	Malcolm Pirnie, Inc.
Telephone:	(804) 873-8700 (W) (804) 930-2024 (H)

Corporate Health and Safety Manager:

Name: Mark A. McGowan, CIH, CSP
Affiliation: Malcolm Pirnie, Inc.
Telephone: (914) 694-2100 (W)
(203) 350-2186 (H)

Industrial Hygienist and Site QA/QC:

Name: Anthony K. Pace
Affiliation: Malcolm Pirnie, Inc.
Telephone: (804) 873-8700 (W)
(804) 886-5815 (H)

Health Physicist:

Name: Alan Fellman
Affiliation: Malcolm Pirnie, Inc.
Telephone: (201) 529-4700 (W)
(201) 833-1706 (H)

Site Safety and Health Officer:

Name: Scott Bailey
Affiliation: Malcolm Pirnie, Inc.
Telephone: (804) 873-8700 (W)
(804) 596-7948 (H)

Field Manager:

Name: Mary Mullen
Affiliation: Malcolm Pirnie, Inc.
Telephone: (804) 873-8700 (W)
(804) 877-6537 (H)

4.0 HAZARD ASSESSMENT

4.1 HAZARDOUS SUBSTANCES CHARACTERISTICS AND TOXICOLOGY

The hazardous substances at Fort Story cover a wide range of contaminants and wastes. They range from fuel to solvents. More specific assessments of the hazards associated with each contaminant, the personal protective equipment (PPE) requirements and monitoring means and levels are outlined in the Appendices of this document. An overview of the hazards associated with each category of wastes is outlined below. A discussion of general toxicity, exposure symptoms and exposure pathways for the contaminants of concern is provided below.

Organic Contaminants

The characteristics and toxicology of the organic substances known to be on site are presented below for information purposes. Previous sampling data and work experiences at the base indicate that during field activities, organic contaminants will be encountered to varying degrees. It is therefore extremely important that the appropriate measures be taken to limit exposure to those substances and minimize any spread of the contamination at the work sites.

Jet Fuels - Jet Fuels are petroleum products similar to kerosene. A number of different jet fuels may have been used at the base, but the primary fuel of concern is JP-4. It is listed as dangerous fire hazard and a moderate explosion hazard in the form of vapor. The toxicological effects are very similar to those listed for distillate fuels as listed in the "Petroleum Hydrocarbon" section below, although it is slightly more volatile than middle distillate fuels, and thus may be more reactive (ignitable, explosive) than fuel oils.

Petroleum Hydrocarbons - Distillate fuels are refined petroleum products. They are complex mixtures of paraffins, naphthenes, and aromatics with carbon numbers predominantly in the range of C₉ through C₂₅. They may also contain minor amounts of sulfur, nitrogen, and oxygen-containing molecules.

Distillate fuels, as a class, are moderate to severe skin irritants. It is suspected that their irritating effects are a direct result of the defatting of the lipid components of the skin. Skin-painting carcinogenesis bioassays indicate that such fuels are weakly to moderately

carcinogenic in test animals. The results of long-term inhalation studies conducted on rats revealed chronic lesions associated with hydrocarbon nephropathy.

Solvents - Numerous solvents and degreasers were used throughout the operation of the base, and can be found at various work locations. They include degreasers and other chlorinated cleaning compounds. They also have been used at numerous military facilities for fire training exercises. They generally have a high affinity for lipids, and thus deposit in and dissolve fatty tissues of the body. They are central nervous system depressants, and can have varying levels of toxic properties depending on their chemical composition. Certain solvents have suspected or known carcinogenic properties, and thus must be dealt with very cautiously.

Inorganic Compounds

Heavy Metals - There are areas of the base that at one time or another have had solvent washes or removed paint dumped into pits in the ground. There is a high likelihood of heavy metal contamination in those areas. The primary concern when working in those areas (in addition to any volatile or semi-volatile organic hazards) is dermal contact with the contaminated soil/water. Additional concerns include the transference of the contaminated substances via hand to mouth contact. As with work at any hazardous waste site, every reasonable effort should be made to limit dermal exposure to the contaminated material, and at no time should any hand to mouth activities such as eating or smoking be permitted.

4.2 DESCRIPTION OF FIELD ACTIVITIES

Descriptions of field activities for each work area are outlined in the SSSHPs at the end of this document.

4.3 SUMMARY OF PROJECTED RISKS

Malcolm Pirnie and subcontractor personnel must be cognizant of the health hazards associated with potential exposure to hazardous chemicals and safety hazards associated with individual field activities and the physical environment in which the work will take place. Each of these are discussed below.

Chemical Hazards

As indicated previously, potential exposure to petroleum hydrocarbons, solvents, heavy metals on the hazardous waste site may occur through ingestion/inhalation and skin contact.

Dermal contact and inhalation of these contaminants can be avoided through use of proper personal protection equipment as described in Section 9.0 of this plan.

Environmental monitoring and provisions for donning respiratory protection for each specific task based on predetermined action levels should be sufficient to protect against inhalation exposure. Dry, dusty conditions, where inhalation of contaminated, fugitive dust may be of concern, are not anticipated. If dry, dusty conditions are encountered the Site Safety and Health Officer will stop work and reassess the levels of protection specified in this plan with the Project Manager and the Corporate Health and Safety Manager.

Protective clothing, proper hygiene and safe work practices, as outlined in this SSHP, should protect against exposures. With prompt decontamination, accidental contact with contaminated material should be of little consequence.

During any invasive investigational activities, a combustible gas indicator will be used to monitor for explosive or dangerous conditions. Action levels for combustible gas are described in Section 10.0 of this GSSHP.

Physical Hazards

Physical hazards pose safety risks that warrant consideration. These include negotiating uneven, hilly terrain, wet and loose soils, jagged debris and materials, slip/trip/fall obstacles, lifting operations, noise, insects, and the mechanical use of drill rigs, soil gas sampling devices and tools for sampling purposes. The specific areas of hazard awareness and concern will be brought to the attention of all personnel working on the site before any work begins, and review of the SSSHP for any site specific physical hazards will occur before work is initiated at any site.

Controls for slip/trip/fall hazards will include particular care to housekeeping duties during tasks and at the conclusion of tasks, sufficient number of covered waste receptacles, special concern in keeping designated pathways clearly identified and free of obstacles and debris, identification barrier placements and mitigation of newly created ruts, openings or physically hazards.

Controls for noise will include the use of hearing protectors, in addition to work practice controls as reduced time spent in such areas during noisy operations such as drilling activities.

Controls for insects will include wearing clothing made of tightly woven fabric, wearing long sleeve shirts and pulling socks over pants legs, wearing light colored clothes to easily spot and identify ticks and insects, and performing clothing checks for ticks at least daily.

Confined space entry will not be required during proposed site operation. If any unforeseen event leads to the potential for confined space entry, such entry will be in strict conformance to the proposed OSHA standard 29 CFR 1910.146 Permit Required Confined Spaces.

5.0 MEDICAL SURVEILLANCE AND EXPOSURE MONITORING

5.1 MEDICAL SURVEILLANCE

Malcolm Pirnie personnel, working at hazardous waste site assignments where there may be potential exposure to chemical and physical hazards, are included in the Malcolm Pirnie Medical Monitoring Program. A copy of the Medical Monitoring Program can be obtained by request from the Corporate Health and Safety Manager.

Subcontractors

Prior to the start of work, all subcontractors must supply medical certifications to the Malcolm Pirnie Site Health and Safety Officer for all of the subcontractor's employees who will work at Fort Story, either within the exclusion or contamination reduction zones. Subcontractors whose operations do not involve employee exposure or the reasonable possibility of employee exposure to safety and health hazards according to 29 CFR 1910.120 are exempted from this requirement. The subcontractor's Health and Safety officer will make the determination of which employees are not subject to this rule before they begin work at the site.

All subcontractor personnel involved in invasive site activities within the exclusion zone or who will be required to wear respiratory protection will undergo a baseline medical examination, in accordance with 29 CFR 1910.120(f), at the expense of the subcontractor. The examinations will be conducted by a physician practicing occupational medicine, preferably Board Certified. A medical clearance to work on a hazardous waste site and confirmation of the ability to safely wear respiratory protection is required prior to the start of work. Any medical limitations must also be documented.

5.2 EXPOSURE MONITORING

The following monitoring will be conducted to determine the required level of protection for field investigation personnel:

5.2.1 Air Monitoring

Air monitoring will be conducted according to Section 10.0 of this GSSHP.

5.2.2 Cold Stress Monitoring

The following sections discuss hazards and health and safety measures for work conducted in cold environments.

5.2.2.1 Definitions

Hypothermia is defined as a decrease in a person's body core temperature to 95°F (35°C). A freezing or rapidly dropping temperature is not needed to produce hypothermia. A person's ability to maintain normal body temperature may be affected by medications or drugs, alcohol, wind or becoming wet.

Although protective clothing provides protection from many sources of external wetting, perspiration is often increased while working, causing the skin and clothing to become moist or wet. Wet clothes and skin can conduct body heat at a rapid rate. In addition, the effects of wind and water are more than additive, creating a condition for extreme loss of body heat.

In addition, dehydration, or the loss of body fluids, occurs insidiously in the cold environment and may increase the susceptibility of the worker to cold injury due to a significant change in blood flow to the extremities.

Frostbite is a local cold injury which rarely occurs unless environmental temperatures are less than freezing and usually less than 20°F (-6.7°C).

5.2.2.2 Preventative Actions/Monitoring

The following actions will be taken to reduce the potential for workers to develop cold stress injuries, such as frostbite and hypothermia, in cold environments:

- Shield the work area from the wind or wear a windbreaker to reduce wind chill effect (a water-repellant outer garment with good ventilation should be worn).
- Take special precautions for older workers or workers with circulatory problems such as the use of extra insulating clothing and/or a reduction in the duration of exposure period.

- Exposed skin should not be permitted when the wind chill factor results in a relative temperature of -25°F or below - cover exposed flesh with loose, dry clothing.
- Field personnel will frequently (e.g., every 15 minutes) inspect each other for signs of frostbite under very cold-weather conditions.
- Wet clothes should be replaced at temperatures below 36°F - efforts should be made to maintain dry clothing.
- Warm, sweet drinks and soups will be provided for caloric intake and fluid.
- If the available clothing does not give adequate protection to prevent hypothermia or frostbite, work shall be modified or suspended until adequate clothing is made available or until weather conditions improve.

5.2.2.3 Prohibitions

- The use of prescribed drugs during site activities should be reviewed with the occupational physician prior to scheduled field activities.
- Alcoholic beverage, tobacco use and illegal drug intake are strictly forbidden during field activities.
- The intake of coffee will be minimized because of its diuretic and circulatory effects.
- Avoid skin contact with bare metal, gasoline or other hydrocarbons.

5.2.2.4 Recognition/Symptoms

Hypothermia - With proper surveillance, hypothermia can be identified in its earliest stage, thus preventing a potential hazard to the worker. The single most important sign of hypothermia is a change in behavior, often subtle and best recognized by a co-worker. Physical and behavioral symptoms of hypothermia include:

- Pain in the extremities (may be the first warning of danger from cold stress)
- Decrease in usual efficiency
- Forgetfulness and a decreased level of communication
- Decline in manual dexterity

- Poor motor skills or repetitive behavior
- Poor judgement
- Lack of concern for physical needs
- Cold, pale skin appearance, shivering and "goose flesh"
- Maximum severe shivering develops when the body temperature has fallen to 95°F. This must be taken as a sign of danger to workers and exposure to cold should be immediately terminated.

Frostbite commonly occurs on the exposed portions of flesh (e.g., ears, nose, hands) and is recognized by a whitened area which, in mild cases, is slightly burning or painful.

5.2.2.5 Treatment/Response

Mild hypothermia is treated by rewarming the affected person by:

- Moving to a protected area
- Removing wet or damp clothing
- Providing hot fluids
- Wrapping in dry blankets

More **severe cases of hypothermia** require prompt intervention by medical personnel in addition to the above activities.

Mild cases of **frostbite**, where the affected area is still painful, may be treated in the field by rewarming. More serious cases of frostbite should be treated at a medical facility since attempting to thaw the frozen area can cause severe damage. A victim of serious frostbite should be protected from the environment and further heat loss prevented, but the skin should not be rubbed or thawed with warm water or dry heat.

5.2.3 Heat Stress Monitoring

Heat stress is probably one of the most common and potentially serious illnesses at hazardous waste sites. The potential for heat stress is dependent on a number of factors, including environmental conditions, clothing, workload, physical conditioning, and age. The

effects of heat stress can range from mild symptoms, such as fatigue, irritability, and decreased mobility, to death.

5.2.3.1 Recognition/Symptoms

The body's response to heat stress includes the following:

- **Heat Rash:** A result of continuous exposure to heat and humidity, heat rash decreases the body's ability to tolerate heat.
- **Heat Cramps:** A result of profuse perspiration with inadequate fluid intake and chemical replacement, heat cramps are signaled by muscle spasms and pain in the abdomen and the extremities.
- **Heat Exhaustion:** A result of increased stress on various organs. The signs of heat exhaustion include shallow breathing; pale, cool, moist skin; profuse sweating; dizziness and lassitude.
- **Heat Stroke:** The most severe form of heat stress, heat stroke must be relieved immediately to prevent severe injury or death. The signs of heat stroke are red, hot, dry skin; no perspiration; nausea; dizziness and confusion; strong, rapid pulse; coma. The body must be cooled and medical attention sought immediately.

5.2.3.2 Preventative Actions/Monitoring

Preventive measures to preclude heat stress include:

- Regular work breaks during field activities
- Regular fluid replenishment
- Availability of shelter (i.e. shaded area)

Heat stress monitoring of all personnel will commence when the ambient temperature in the work areas is above 70°F. The frequency of heat stress monitoring will depend initially on the air temperature adjusted for solar radiation and the level of physical work. A standard mercury-in-glass thermometer will be available on site to measure air temperature.

Several screening techniques can be used to detect early warning signs of heat stress. The following method, based on body temperature measurements, is simple and

straightforward and will be conducted by the SSHO as indicated. Body temperature will be measured with a digital-readout clinical thermometer with disposable tips.

Body temperature will be measured orally (3 minutes under the tongue) with a clinical thermometer at the end of each work period and before drinking. Oral temperature at the end of the work period should not exceed 99.6°F. If it does, the next work period should be shortened by 10 minutes (or 33 percent), while the length of the rest period stays the same. However, if the oral temperature exceeds 99.6°F at the beginning of the next rest period, the following work cycle should be further shortened by 33 percent. Oral temperature should be measured again at the end of the rest period to make sure that it has dropped below 99.6°F.

5.2.3.3 Prohibitions

No worker may be permitted to continue wearing semipermeable or impermeable garments when his/her oral temperature exceeds 100.6°F.

5.2.3.4 Treatment/Response

All personnel will be made aware of the symptoms of heat stress. Should one or more symptoms be detected, the affected worker will be assisted to seek shade, drink plenty of fluids, and seek medical attention, as required.

6.0 TRAINING AND HAZARD COMMUNICATION

6.1 HEALTH AND SAFETY ORIENTATION TRAINING FOR FIELD PERSONNEL

All Malcolm Pirnie field personnel who conduct invasive activities, who monitor others who are conducting invasive activities or who will be working inside the exclusion zone will have completed the training requirements specified in 29 CFR 1910.120. These requirements include:

- A minimum of 40 hours of initial instruction off the site.
- A minimum of 3 days actual field experience.
- Eight hours of annual refresher training.
- Eight hours additional training for managers/supervisors directly responsible for employees engaged in hazardous waste operations.

Subcontractors will provide evidence of appropriate health and safety training to the Malcolm Pirnie site health and safety officer for all employees conducting invasive tasks or who will be working in the exclusion zone prior to the start of work.

6.2 HEALTH AND SAFETY ORIENTATION TRAINING FOR VISITORS

Visitors will be properly oriented to existing site conditions, planned activities, levels of personal protection and other procedures outlined in this SSHP. Visitors who enter the exclusion zone will be required to have a minimum of twenty-four hours of training off-site and a minimum of one day actual field experience under the direct supervision of a trained, experienced supervisor, as specified by OSHA. They will also be required read and sign off on the health and safety procedures outlined in this SSHP in order to enter a designated work zone.

6.3 FIRST AID OR CPR

Approximately half of Malcolm Pirnie field workers have been trained and certified in First Aid and/or CPR. A First Aid/CPR trained individual will be on-site at all times during the field work.

Subcontractors will also be required to have one CPR/First Aid trained individual on site during field activities.

6.4 SPECIALIZED TRAINING

All Malcolm Pirnie field personnel are to be knowledgeable in the site-specific hazards that may be encountered during this project and familiar with standard operating safety procedures. This will be accomplished through the review of this SSHP, specialized training prior to the commencement of the field program, daily training during the execution of the program and a debriefing after the program's completion as discussed below.

6.4.1 Pre-Investigation Health and Safety Briefing

All Malcolm Pirnie and subcontractor personnel involved with the project will attend a site-specific health and safety training program prior to the initiation of field activities. The Site Safety and Health Officer will conduct the training program. The topics to be discussed include:

- Characteristics and potential hazards of chemicals and other contamination known to be present at the site.
- Signs and symptoms of overexposure to chemical hazards.
- Personal protective equipment selection, function, care and donning/doffing demonstrations.
- Personal hygiene.
- Environmental monitoring.
- Decontamination procedures.
- Work zone designations.

- Heat stress and hypothermia.
- Safe use of tools and sampling devices.
- Standard operating safety procedures.
- Hazard communication program (see Section 6.5).
- Site emergency/contingency plans.

6.4.2 Morning Safety Meetings

Morning safety meetings will be conducted, as needed, by the SSHO for Malcolm Pirnie personnel. Problems relative to respiratory protection, inclement weather, heat stress, hypothermia or the interpretation of newly available environmental monitoring data are examples of topics which might be covered during these briefings. An outline report of meetings giving the date, time, attenders, subjects discussed, and instructor shall be maintained in the daily log and copies made available to authorized health and safety auditors upon request.

6.4.3 Post-Investigation Health and Safety Briefing

A post-investigation health and safety briefing will be conducted by the SSHO to review, discuss, and evaluate past project activities. The effectiveness of the SSHP will be evaluated. An outline report of the meeting will be submitted to the Project Manager and Corporate Health and Safety Manager.

6.5 HAZARD COMMUNICATION PROGRAM

Malcolm Pirnie's written hazard communication program, which was established to meet the requirements of OSHA 29 CFR 1910.1200, can be obtained by request from the Corporate Health and Safety Manager. The SSHO shall monitor field activities for compliance with the program and the following requirements:

- A comprehensive list of chemicals, noting the anticipated location of hazardous chemicals introduced by Malcolm Pirnie to the worksite, will be appended to this SSHP and posted in the on-site trailer (if applicable) or command post.

- Material safety data sheets (MSDSs) for hazardous chemicals introduced to the site by Malcolm Pirnie are included as Appendix A for review by all on-site personnel.
- Container labeling requirements, as discussed in the written program.
- Chemical listings, MSDSs and training will be updated if additional chemicals are brought on-site during the execution of field activities.

The SSHO shall make hazard communication information for hazardous chemicals introduced to the site by Malcolm Pirnie employees available to other employers on the site. The SSHO shall make a reasonable effort to obtain the appropriate hazard communication information from other employers, including:

- Explanation of that firm's labeling system.
- The name and location of each hazardous chemical and location of MSDSs.
- Any precautionary measures other employers need to take to protect their employees from harmful exposure to hazardous chemicals under normal operating conditions and in foreseeable emergencies.

As part of the site-specific health and safety orientation conducted by the SSHO, a review of our hazard communication program will be offered to inform employees of hazardous chemicals to which they may be exposed during field activities. Other employees may also attend this hazard communication training session. Site-specific hazard communication training for hazardous chemicals introduced to the site by Malcolm Pirnie will include:

- Properties and hazards (chemical, physical, toxicological) of hazardous chemicals.
- 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 personal protective equipment, as required.
- Use of the container labeling system and 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 communication training will also cover all pertinent topics as they apply to hazardous chemicals introduced by other on-site employers.

The SSHO shall document the training, including the agenda and list of attendees. This subsection of the SSHP, 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 Malcolm Pirnie.

7.0 SITE CONTROL

7.1 WORK ZONES

Work zones will be established around the areas designated for sampling and communicated to all employees by the Site Safety and Health Officer (SSHO). The zones include:

- **Exclusion Zone ("Hot Zone"):** Is defined as the area where the highest potential for exposure to site contamination exists. It is considered to be within 20 feet of a drill rig. All personnel entering the Exclusion Zone must wear the prescribed level of personal protective equipment.
- **Support Zone:** Outermost part of the site which is considered non-contaminated or "clean". Support equipment is located in this zone. Personnel may wear normal work clothes within this zone. Any potentially contaminated clothing, equipment, and samples must remain in the Contamination Reduction Zone until decontaminated.
- **Contamination Reduction Zone (CRZ):** The transition zone between the Exclusion and Support Zones. Zone where decontamination of personnel and equipment takes place.

7.2 ACCESS/EGRESS TO WORK ZONES

The SSHO will maintain site control through the following actions:

- Lay out the work zones with stakes and caution tape or other equivalent methods.
- Locate the CRZ so as to minimize exposure to uncontaminated personnel and equipment.
- Record in the daily log the names of personnel, their site entry and exit times and their levels of personal protection.

- Verify that only personnel essential to the completion of the task are allowed access to these areas, that they meet training and medical monitoring requirements as listed in Section 6.0 and are wearing the prescribed level of protection as set forth in this GSSHP.
- Limit personnel access/egress to/from the Exclusion Zone so that all personnel **must** pass through the CRZ via its decontamination line (see Section 11.0 of this GSSHP).
- Verify that personnel are properly decontaminated as outlined in Section 11.0 before re-entering the Support Zone from the Exclusion Zone

7.3 ROUTINE SITE COMMUNICATIONS

As the site is relatively small and the buddy system is to be used at all times, the primary mode of routine communication between the field personnel will be voice communication. Walkie-talkies will be used if field personnel divide into teams and separate.

8.0 SAFE WORK PRACTICES

The following basic safe work practices will be followed during the execution of all field activities:

1. The number of personnel and equipment on the site shall be minimized, consistent with effective site operations.
2. On-site personnel shall use the "buddy" system. No one may work alone, i.e., out of earshot or visual contact with other workers.
3. In unpaved areas site activities will be performed to minimize dust production and soil disturbance. The maximum vehicle speed in those areas will be 5 mph.
4. Contact with surfaces/materials either suspected or known to be contaminated will be avoided to minimize the potential for transfer to personnel, the need for decontamination and cross contamination.
5. 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 on the site outside of the support zone or within the contamination reduction zone or exclusion zone.
6. The hands and face must be thoroughly washed upon leaving the work area and prior to engaging in any activity indicated above. Each individual must shower as soon as possible after the removal of protective clothing and equipment after the completion of the daily field activities.
7. Medicine and alcohol can potentiate the effects of exposure to toxic chemicals. Due to possible contraindications, use of prescribed drugs should be reviewed with the Malcolm Pirnie or subcontractor occupational physician. Alcoholic beverage and illegal drug intake are strictly forbidden during site work activities.
8. Respiratory protective equipment and clothing must be worn by personnel as outlined in this SSHP. Excessive facial hair (i.e., beards, long mustaches or sideburns), which interferes with the satisfactory respirator-to-face seal is prohibited.
9. Personnel should practice unfamiliar operations prior to doing the actual procedures.

10. Work area entrance and exit locations must be designated and emergency escape routes delineated. Warning signals for site evaluation must be established.
11. All employees have the obligation to correct or report unsafe work conditions.

9.0 PERSONAL PROTECTIVE EQUIPMENT

9.1 INTRODUCTION

The following Personal Protective Equipment (PPE) Plan describes PPE selection, use, limitations, maintenance and storage, specifically with regard to the field investigative activities to be conducted at Fort Story.

9.2 DURATION OF SITE ACTIVITIES

Field work to be conducted on the Fort Story sites is tentatively scheduled for January 1995 for the Firefighter Training Area, LARC Maintenance Area and Auto Craft Area. The climate of the site at this time of the year is expected to be cool to moderate with daily temperatures expected in the 40° to 60°F range.

9.3 GENERAL PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS

The following general PPE requirements apply to all work being conducted at Malcolm Pirnie work sites:

- Each employer is to provide eye, face and foot 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. Protective footwear shall consist of chemical-resistant boots or shoes with steel toe and shank.
- All protective head gear shall meet the American National Standards Institute requirements (ANSI) Z89.1, Class A or ANSI Z89.2, Class B.
- Persons requiring corrective eyewear, when required to wear eye protection, will be protected by one of the following:
 - Eyeglasses with protective lenses that also provide optical correction.
 - Goggles that can be worn over corrective lenses without interfering with the optical correction of the lenses.

- Goggles that incorporate corrective lenses mounted behind the protective lenses.
- Use of contact lenses will be prohibited. Contact lens use will not be permitted under a full-face respirator. Spectacle kits for insertion into full-face respirator will be provided for Malcolm Pirnie personnel as required.
- If noise levels are encountered, particularly around large equipment operation, hearing protection will be provided as appropriate.
- Persons handling rough, sharp-edged, abrasive materials or where the 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 appropriate.
- Employees will wear clothing/PPE suitable for the weather and work conditions. The minimum PPE requirements will be long sleeve shirt (short sleeve during summer to avoid heat stress) and long trousers, and steel toed and shank protective work shoes or boots. Canvas athletic, or deck shoes are not acceptable.
- Respiratory protection approved by NIOSH and MSHA shall be provided for all employees as required.
- PPE will be inspected regularly and maintained in serviceable and sanitary condition. Before being reissued to another person or returned to storage, PPE will be cleaned, disinfected, inspected, and repaired.

9.4 DESCRIPTION OF LEVELS OF PROTECTION

Four levels of protection, Levels A through D, have been established based on varying needs for protection from known or anticipated chemical hazards. These levels are described below.

9.4.1 Level A Personal Protection

Level A provides the highest level of respiratory and dermal protection. Dermal protection is accomplished by fully encapsulating suits. Self-contained breathing apparatus (SCBA) or supplied air respirators are utilized for respiratory protection. It is not anticipated that use of Level A protection will be required at Fort Story.

9.4.2 Level B Personal Protection

Level B also provides the highest level of respiratory protection, but less dermal protection compared to the Level A ensemble. It is not anticipated that use of Level B protection will be required at Fort Story

9.4.3 Level C Personal Protection

Equipment Requirements for Level C are as follows:

- Air-purifying respirator, full-face, equipped with chemical cartridges that are MSHA/NIOSH approved for organic vapors, acid gases, dusts, fumes, mists and radionuclides (MSA Co. cartridge type GMC-H or equivalent)
- Chemical-resistant clothing (disposable, hooded chemical-resistant coveralls)
- Coveralls (optional)
- Long cotton underwear (optional)
- Gloves (outer), chemical-resistant
- Gloves (inner), chemical-resistant
- Boots, chemical-resistant, steel toe and shank
- Boot covers (outer), chemical-resistant
- Hard hat

9.4.4 Modified Level D

Equipment Requirements for Modified Level D are as follows:

- Chemical-resistant clothing (disposable, hooded chemical-resistant coveralls)
- Coveralls (optional)
- Long cotton underwear (optional)
- Gloves (outer), chemical-resistant
- Gloves (inner), chemical-resistant

- Boots, chemical-resistant, steel toe and shank
- Boot covers (outer), chemical-resistant
- Safety glasses or chemical splash goggles (optional)
- Hard hat (face shield optional)

9.4.5 Level D

Equipment Requirements for Level D are as follows:

- Coveralls or suitable work uniform
- Gloves (optional)
- Boots/shoes with steel toe and shank, leather or chemical-resistant
- Safety glasses or chemical splash goggles (optional)
- Hard hat (face shield optional)

9.5 PPE SELECTION CRITERIA

Selection of the proper level of protection is based primarily on:

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

9.5.1 Level D and Modified Level D PPE Selection

Level D protection consists primarily of an ordinary work uniform which provides minimal protection from dermal hazards. The following criteria must be met at all times if the use of Level D protection is to be implemented:

- No respiratory or dermal hazards are suspected or known to exist.
- Work functions preclude splashes, immersion, or potential for unexpected inhalation of any chemicals.

Modified Level D PPE is selected when no respiratory hazards are suspected or known to exist, yet the potential for dermal hazards including splashes or immersion exists. If the potential for splashes or immersion exists, coated-type chemical resistant coveralls (such as Saranex) and hard hats with face shields could be selected. If the only dermal hazards which existed were related to soil sampling, a non-coated semipermeable-type coverall (such as Tyvek) could be selected, thereby avoiding the heat stress hazards associated with an impermeable coverall.

9.5.2 Level C Selection Criteria

Level C PPE is required when there is a potential for exposure to airborne contamination. Air monitoring will be conducted throughout the duration of the field investigations as specified in Section 10.0 of the GSSHP. When changes in air quality occur, the SSHO or Industrial Hygienist will reevaluate PPE requirements based on the action levels in Section 10.0.

However, Level C should only be selected when the types of airborne substances are known, the concentrations have been measured and the following criteria for the use of air-purifying respirators are met:

- Oxygen concentrations are not less than 19.5% by volume.
- Measured air concentrations of identified atmospheric contaminants will be reduced by the respirator below the substance's permissible exposure limit (PEL) and the concentration is within the service limit of the canister.
- Atmospheric contaminant concentrations do not exceed IDLH levels.
- Atmospheric contaminants possess adequate warning properties.
- Atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect any body area left unprotected by chemical-resistant clothing.

Since the specific compounds comprising atmospheric contaminants may not be identified, a decision on use of air-purifying respirators must be made after assessing all safety considerations, including:

- The presence of (or potential for) organic or inorganic vapors/ gases against which a cartridge is ineffective or has a short service life.

- The known (or suspected) presence in air of substances with low permissible exposure limits (PEL's) or immediately dangerous to life and health (IDLH) levels.
- Dusty conditions.
- Safety factors regarding interpretation of monitoring results.
- The possibility of substances in air which do not elicit a response on the instrument used or may involve cross-sensitivity.
- The potential for higher concentrations in the ambient atmosphere or in the air adjacent to specific site operations.

9.5.3 Level A and B Selection Criteria

Should circumstances be encountered where Level C protection does not provide adequate protection, work will be stopped until the hazard is eliminated or arrangements for use of the appropriate level of protection are completed.

9.6 PPE USE, MAINTENANCE AND STORAGE

The following sections contain information on the use, maintenance and storage of the elements of the PPE ensembles to be used at Fort Story. For information on respirator training, fit-testing, use, maintenance, etc., refer to Malcolm Pirnie's Health and Safety Procedures Manual.

9.6.1 Training and Fitting

Training requirements for field personnel are contained in Section 6.0 of this GSSH. All field personnel should discuss their PPE size requirements with the SSHO or the staff of the Malcolm Pirnie equipment facility prior to mobilization for field activities. Improper sizing may impair the effectiveness of the PPE and may also present slip/trip/fall and other hazards.

9.6.2 Donning and Doffing

PPE Donning and Doffing demonstrations will be included in the Pre-Investigation Health and Safety Briefing discussed in Section 6.0 of this GSSH. The following items will be observed when donning and doffing PPE:

- Tuck outer gloves and boot covers smoothly under cuffs of coveralls before taping to prevent potential spills or splashes from running inside gloves and boot covers.
- Leave a small, protruding, folded over "tab" when taping cuffs of coveralls to allow for easier tape removal.
- Additional strips of tape may be used to "downsize" coveralls which are slightly large for personnel, avoiding the potential to catch or tear PPE on protuberances.
- Inner gloves are to be the last item removed when doffing PPE to minimize dermal contact with contaminated PPE.

9.6.3 Inspection/In-use Monitoring

All personnel will visually inspect themselves and their co-workers for deficiencies or damage to their PPE continuously throughout the duration of the work. If PPE becomes damaged or torn, the affected individual will exit the Exclusion Zone through the decontamination line, redress and re-enter the work area. As discussed in Section 7.0, the SSHO will check each individual's PPE as they enter the exclusion zone.

9.6.4 Maintenance, Re-Use and Storage

With the exception of respirators, hard hats, eye protection and safety shoes/boots, PPE to be used at Fort Story will be disposable. Coveralls, boot covers, and gloves are to be appropriately discarded at the end of the work day in accordance with Section 11 of the SSHP or when damaged. Hard hats, eye protection and safety shoes/boots will be discarded in accordance with Section 11.0 of the GSSHP and replaced if they become damaged. Re-usable PPE will be decontaminated and neatly stored at the end of each work day.

9.6.5 Upgrades/Downgrades

The SSHO may upgrade the level of PPE based on air monitoring information or other criteria, however only the Corporate Health and Safety Manager or Project Industrial Hygienist may downgrade levels of protection as discussed in Section 3.0 of this GSSHP.

Impermeable PPE has been selected only for water sampling activities where there is a potential for splash or immersion hazards. If heat stress becomes a concern, it is recommended that these sampling activities be conducted during early morning or evening hours, as a downgrade to non-impermeable PPE would present an exposure hazard.

10.0 MONITORING

10.1 INTRODUCTION

Emergency response actions and personal protective equipment selection will be based on monitoring results. Monitoring with the following direct reading instruments will be conducted to make quantitative determinations of contaminant concentrations:

- MSA Combustible Gas/Oxygen Indicator (CGI)
- Photovac Microtip Photoionization Detector (PID)

The SSHO will conduct air monitoring at the intervals specified in the sections below. Particular attention will be paid to monitoring results when:

- Work begins on a new or different portion of the site.
- Contaminants other than those previously identified are handled.
- A new operation is being initiated.
- Liquid contamination is encountered (leaking drums or containers, etc.)

10.2 EQUIPMENT CALIBRATION AND MAINTENANCE

Monitoring instrumentation will be calibrated and maintained in accordance with the manufacturer's recommendations and any special instructions listed below.

10.2.1 Combustible Gas/Oxygen Indicator (CGI)

Combination combustible gas/oxygen indicators (MSA Model 260 or equivalent) will be used to continuously monitor for the presence of explosive atmospheres and oxygen concentration in areas such as pits, depressions, excavations, etc. where flammable gases might collect. Each instrument will be set to alarm when the atmosphere being tested has reached a concentration equal to 10% of the LEL of methane.

10.2.2 Photoionization Detector (PID)

A Photovac Microtip Photoionization Detector with a 11.7 eV lamp will be used to continuously monitor the breathing zone of employees involved in field activities to assess the presence of organic vapors.

10.3 ACTION LEVELS FOR MONITORING

Action levels for air monitoring results are listed in Table 10-1. The PID action levels in the table apply to persistent readings. The PID action levels are based on EPA's rationale for relating total atmospheric vapor/gas concentrations to the selection of the level of personal protection as provided in the EPA 1988 Standard Operating Safety Guides.

TABLE 10-1

ACTION LEVELS FOR MONITORING

Monitoring Instrument	Contaminant Concentration	Level of Respiratory Protection/Protective Clothing or Prescribed Action
Photoionization Detector (PID) Detects Volatile Organics	0 ppm to background	<ul style="list-style-type: none"> - Use Level D protective equipment - Continue monitoring
	Greater than background to 1 ppm greater than background	<ul style="list-style-type: none"> - Stop activities and perform more definitive analysis of contaminant concentration to determine which chemicals are present and in what concentration - Downgrade to level D if levels do not persist - Upgrade to Level C protective equipment if contaminant concentrations are greater than chemical-specific action levels and contaminants have good warning properties - Upgrade to Level B if the contaminants are detected with concentrations greater than chemical-specific action levels and have poor warning properties which Level C respiratory protection is inadequate
	Greater than 5 ppm above background to 50 ppm above background	<ul style="list-style-type: none"> - Use Level B protective equipment
	Greater than 50 ppm above background	<ul style="list-style-type: none"> - Withdraw from work area - See Section 12.7
Combustible Gas Indicator (CGI) Detects Explosive Atmospheres	Less than 10% LEL	<ul style="list-style-type: none"> - Proceed with normal operations - Continue monitoring
	10% LEL and above	<ul style="list-style-type: none"> - Shut down/remove all sources of ignition - Cease all activities and withdraw from area - See Section 12.7
Combustible Gas Indicator (CGI) Detects Oxygen Concentrations	Less than 19.5% oxygen	<ul style="list-style-type: none"> - Withdraw from area - See Section 12.7 - Note that combustible gas readings are not valid at less than 19.5% oxygen
	19.5% - 25% oxygen	<ul style="list-style-type: none"> - Proceed with caution - Continue monitoring - Note that deviation in detected concentrations may suggest the presence of other substances
	Greater than 25% oxygen	<ul style="list-style-type: none"> - FIRE HAZARD POTENTIAL - Cease activities and withdraw from area - See Section 12.7

11.0 DECONTAMINATION

11.1 DECONTAMINATION LINE

Decontamination activities will take place in the Contamination Reduction Zone (CRZ), along a "decontamination line." The decontamination line consists of a series of stations placed sequentially and designed to decontaminate and remove outer, more heavily contaminated items of personal protective clothing first, followed by inner, less contaminated personal protective clothing. Decontamination procedures will remain flexible, allowing personnel to respond to changing environmental and sampling conditions which may arise at the site. The following actions will be taken to set up the decontamination line:

- The decontamination line (within the CRZ) will be clearly marked with flagging tape to segregate it from other areas and work zones.
- Plastic sheeting will be placed under the entire decontamination line, of adequate size to contain spilled wash and rinse water.
- Large tubs will be lined up along the egress route from the Exclusion Zone, alternately filled with soapy water for washing and empty to collect rinsewater.
- Bristle brushes will be provided for the removal of gross soil contamination.
- Pump sprayers will be provided for rinsing and disposable towels will be provided to absorb spilled and splashed water.
- Drums will be provided for the storage and disposal of wash and rinse water

11.2 PERSONNEL DECONTAMINATION

Upon leaving the site for lunch or at the end of the day, personnel will be required to decontaminate and remove all contaminated protective clothing/equipment through use of the decontamination line. To the extent practical, equipment (i.e., shovels, tools, etc.) will remain in the Exclusion Zone. The following general decontamination steps will be followed, if applicable:

- Boot covers or boots, aprons and outer gloves will be washed with non-phosphate laboratory grade detergent and tap water solution, rinsed with fresh water and removed.
- After the removal of boots/boot covers, aprons and outer gloves, outer personal protective garments such as tyvek suits will be removed and placed into collection containers.
- Respirators will be removed and placed in a collection box to await decontamination and cleaning.
- Inner gloves will be removed and placed into collection containers

Personnel will attempt to contain all wash and rinse waters in the large tubs. At the end of each work day, wash and rinse water will be drummed for storage and disposal in accordance with Section 11.4. Should semi-permeable protective clothing be splashed by contaminated liquids, the affected personnel will follow the procedures listed under Section 12.5.2., Skin Contact.

11.3 DECONTAMINATION OF FIELD EQUIPMENT

When equipment must be removed from the Exclusion Zone, it shall be decontaminated in the CRZ. Small equipment such as sampling trowels may be decontaminated in large tubs as described above. The equipment will be wiped and brushed using soapy water, rinsed using fresh water, rinsed with methanol (hexane followed by a methanol rinse for oil and grease contaminated equipment), rinsed with DI water and then dried with a disposable paper towel. Wash and rinse waters generated by the decontamination of large equipment (e.g., steam cleaning of drilling rigs) may be contained by a decontamination pad consisting of a plastic liner and sump. All wash and rinse waters and disposable equipment will be disposed as discussed in Section 11.4.

11.4 DISPOSAL PROCEDURES

Discarded materials, waste materials, or other objects shall 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, e.g., clothing, gloves, wash and rinse water, etc., will be bagged or drummed as necessary and segregated for

disposal. Grossly contaminated equipment which cannot be decontaminated shall also be drummed for storage prior to disposal. All contaminated waste materials shall be disposed of as required by the provisions included in the contract and consistent with regulatory provisions. All non-contaminated materials shall be collected and bagged for disposal as domestic waste. Malcolm Pirnie personnel shall not remove decontamination waste from the site.

12.0 EMERGENCY INFORMATION/RESPONSE

12.1 EMERGENCY PLANNING AND RESPONSIBILITIES

The Site Safety and Health Officer (SSHO) shall conduct/organize the following emergency planning activities:

- Check that emergency equipment is readily accessible and distinctly marked.
- Conduct and critique at least one on-site evacuation drill.

The SSHO shall conduct/organize the following emergency measures whenever conditions at the site warrant such action:

- Evacuation
- Emergency medical treatment
- Emergency transport of site personnel as necessary
- Notification of emergency response units via telephone, mobile telephone, radio, etc.
- Notification of appropriate Malcolm Pirnie, Inc. corporate staff
- Completion of appropriate incident reports

12.2 SITE TOPOGRAPHY AND PREVAILING WEATHER

12.2.1 Fort Story Topography

A topographic map of Fort Story is provided on the site map in Appendix A.

12.2.2 Historical Climatological Data

Historical climatological data for the Fort Story area is recorded at the Norfolk-Virginia Beach Airport, and is available from the National Atmospheric and Oceanic Administration (NOAA) through the National Climatic Data Center. The Norfolk-Virginia Beach Airport is located approximately 8 miles west of Fort Story.

The following table summarizes average precipitation and temperature for the Fort Story area from 1941 to 1970.

Average Temperature and Precipitation Data Fort Story Area (1941 - 1970) (NOAA, 1982)				
Month	Temperature (°F)			Precipitation (inches)
	Daily Min	Daily Max	Daily Mean	
January	32.2	48.8	40.5	3.35
February	32.7	50.0	41.4	3.31
March	38.9	57.3	48.1	3.42
April	47.9	67.7	57.8	2.71
May	57.2	76.2	66.7	3.34
June	65.5	83.5	74.5	3.62
July	69.9	86.6	78.3	5.70
August	68.9	84.9	76.9	5.92
September	63.9	79.6	71.8	4.20
October	53.3	70.1	61.7	3.06
November	42.6	60.5	51.6	2.94
December	34.0	50.6	42.3	3.11
Annual	50.6	68.0	59.3	44.68

Fort Story climate is characterized by mild winters and hot summers. Temperatures are affected by air flowing through the area from the Atlantic Ocean. Average relative humidity is high in the area, with an afternoon average humidity of approximately 60 percent, which rises in the nighttime to 80 percent. In Winter, the average temperature is 41°F, with the lowest temperature recorded of 5°F for the period of record. The average Summer temperature is 76°F with a highest recorded temperature of 104°F.

The greatest percentage of precipitation occurs between April and September, which encompasses most of the growing season. The maximum amount of rainfall recorded in the area was 9.95 inches in a 1-day period.

12.3 EMERGENCY EQUIPMENT

The following emergency equipment will be provided at the site by Malcolm Pirnie (or subcontractors where appropriate), readily accessible and distinctly marked. Malcolm Pirnie personnel will be familiar with the location and trained in the use of emergency equipment. Emergency equipment that will be available on-site includes:

- **Wind Sock**
 - A wind sock or strip of caution tape will be positioned on a pole or stake for the determination of wind direction
- **Fire Extinguishers**
 - Two Class A, B dry chemical fire extinguishers will be located on site. One will be located in the field vehicle and one will be located within the Contamination Reduction Zone (within 100' of field personnel). If present, a fire extinguisher will be kept on the CPT rig.
 - Fire extinguishers will be inspected, serviced, and maintained in accordance with the manufacturer's instructions. At a minimum, all extinguishers shall be checked monthly and weighed semi-annually, and recharged if necessary.
 - Immediately after each use, fire extinguishers will be either recharged or replaced.
- **First Aid Kits**
 - One First Aid Kit will be maintained in the support zone and will 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 weekly by the SSHO to ensure that the expended items are replaced.
- **Eye Wash**
 - To provide emergency treatment for eye injuries due to contact with dust particles during soil sampling or accidental splashing during groundwater sampling procedures, an emergency eye wash will be available on-site during all field activities.

- Portable emergency eye-washes will meet the minimum ANSI Z358.1 requirements.
- **Spill Control Materials**
 - Two five gallon buckets with covers, a shovel and absorbent material will be provided to contain any minor spills (such as spills of decontamination solvents) that may occur.
 - Expendable spill control materials shall be replenished after use.
- **Emergency-Use Respirators**
 - Emergency-use respirators will not be required for this phase of the work to be conducted at Fort Story.
- **Communication Equipment**
 - The emergency communications equipment listed in Section 12.4 will be provided.

12.4 EMERGENCY COMMUNICATION

- **Telephones:** Access to a telephone will be provided on site to allow for immediate contact with response personnel in the event of an emergency. A mobile phone will be on-site in the field vehicle or another strategic location at all times. The nearest public phones shall be identified; however, a phone farther than 1/4 mile or more than 2 minutes from the trailer shall not be considered an adequate substitute for an on-site mobile phone. Working order of the phone shall be assured before site operations begin.
- **Walkie-Talkies:** Hand held units shall be utilized as much as possible by field teams for communication between downrange operations and the command post/base-station.
- **Air Horns:** Air horns will be used by personnel to signal emergency conditions. One (1) short blast, repeated, may be used to alert on-site personnel to changing conditions and the need to proceed with caution. Two (2) short blasts, repeated, will indicate that all personnel should leave the Exclusion Zone and assemble in the Support Zone. Three short (3) blasts, repeated, would indicate an "all clear" condition.
- **Hand Signals:** To be employed by field personnel along with utilizing the buddy system. These signals are also very important when working around heavy equipment. They shall be agreed upon by all parties, covered during

site-specific training and known by all on-site personnel before operations commence. The following hand signals may be used:

Hand gripping throat	=	out of air, can't breathe
Grip "buddy's" 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

12.5 EMERGENCY FIRST AID/MEDICAL TREATMENT

Figure 12-1, Personal Injury and Chemical Exposure Decision Chart, should be referenced when injuries and/or exposures occur and first aid/medical treatment is required. The following sections provide further detail regarding actions to be taken. See also evacuation requirements for minor and serious injuries/incidents in Section 12.7.

12.5.1 Personal Injury

In the event of personal injury, the following actions will be taken in their listed order:

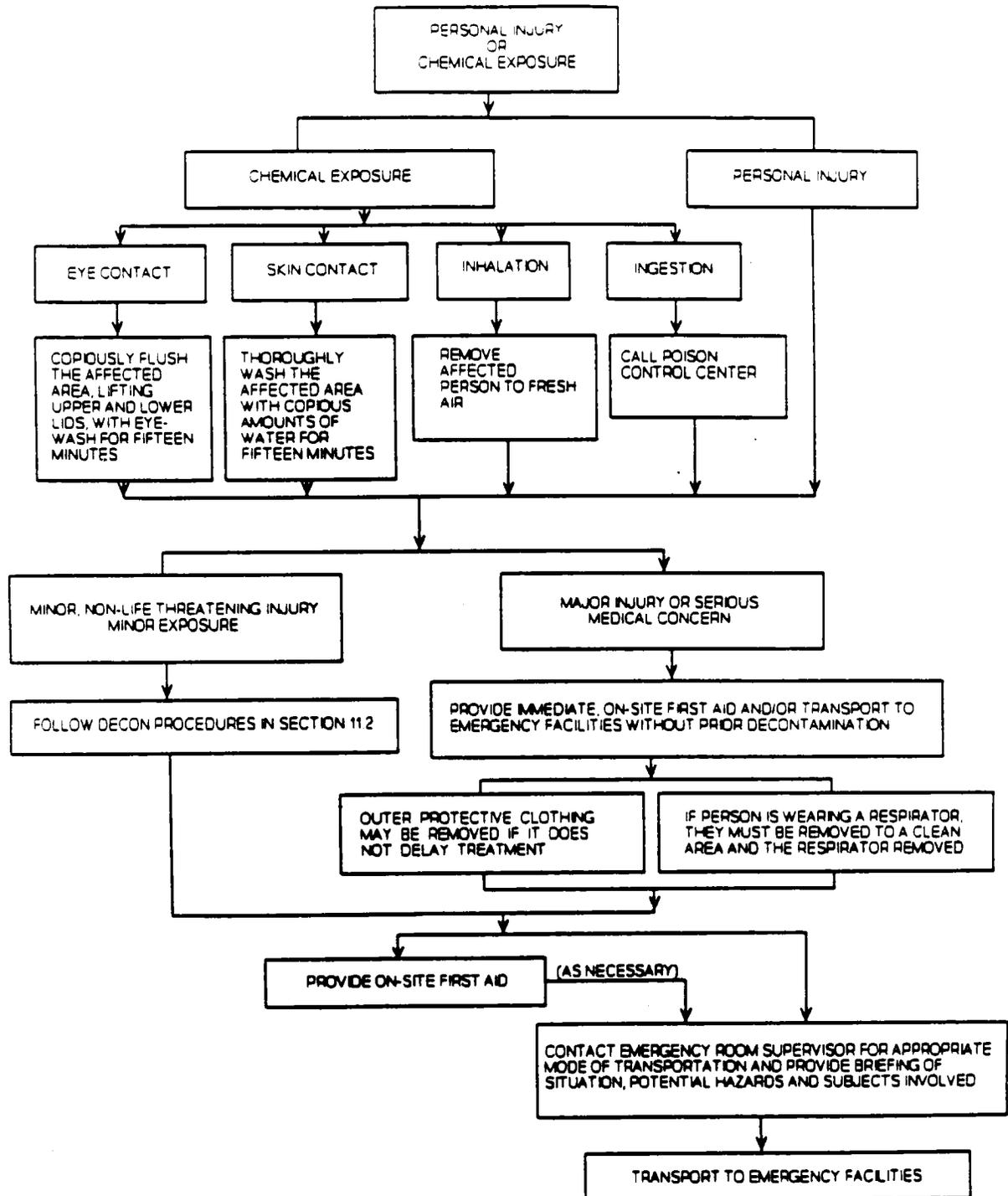
- The First Aid/CPR-trained field personnel will advise the SSHO whether additional assistance by paramedics or transportation to the hospital is immediately required.
- If immediate aid by paramedics or hospitalization is required, follow actions listed in Section 12.5.4.
- Decontamination will be conducted as described in Section 12.5.3.
- Emergency first aid will be applied on-site as deemed necessary.

During all field activities, at least one person on the site will be certified in First Aid and CPR.

12.5.2 Personnel Exposure

The following emergency procedures are to be followed by field personnel in the case of personnel exposure to site contaminants:

**FIGURE 12-1
PERSONAL INJURY & CHEMICAL EXPOSURE DECISION CHART**



- **Skin Contact:** Use copious amounts of soap and water to wash and rinse the affected area for at least 15 minutes. Decontaminate and provide medical attention. If necessary, transport to the hospital as described in Section 12.5.4. Personnel wearing semi-permeable protective equipment that are splashed by contaminated liquids will decontaminate and shower.
- **Eye Contact:** Portable eye-washes will be provided and placed in the support zone. If the eye is not cut, copiously flush the affected area, lifting the upper and lower lids, for at least fifteen minutes. If eye is cut or a protruding object is visible, stabilize object and wrap bandage around both eyes. Decontaminate and provide medical attention. If necessary, transport to the hospital as described in Section 12.5.4.
- **Inhalation:** Move the affected person to fresh air. Decontaminate and provide medical attention. If necessary, transport to the hospital as described in Section 12.5.4.
- **Ingestion:** Decontaminate and transport to the hospital as described in Section 12.5.4. If necessary, call Poison Control Center.

12.5.3 Decontamination for Medical Emergencies

Prior to removing an injured person from the work area for first aid and transportation to emergency facilities, decontamination shall be conducted to the extent possible without harming the injured person or delaying care in a life-threatening situation.

- For a **minor, non-life threatening injury**, personnel should follow the decontamination procedures outlined in Section 11.2, then administer first aid or transport the injured person to emergency facilities.
- For a **major injury or other serious medical concern**, immediate on-site first aid is to be administered or the injured party will immediately be transported to emergency facilities without prior decontamination efforts.
 - Outer protective clothing may be removed if it does not delay treatment or aggravate the injury.
 - If the injured person is wearing a respirator, he/she must be removed to a clean area and the respirator removed.

12.5.4 Transportation to Emergency Facilities/Hospital

In the event of a serious medical emergency, victims shall be treated at Virginia Beach General Hospital. The following actions are to be taken in their listed order:

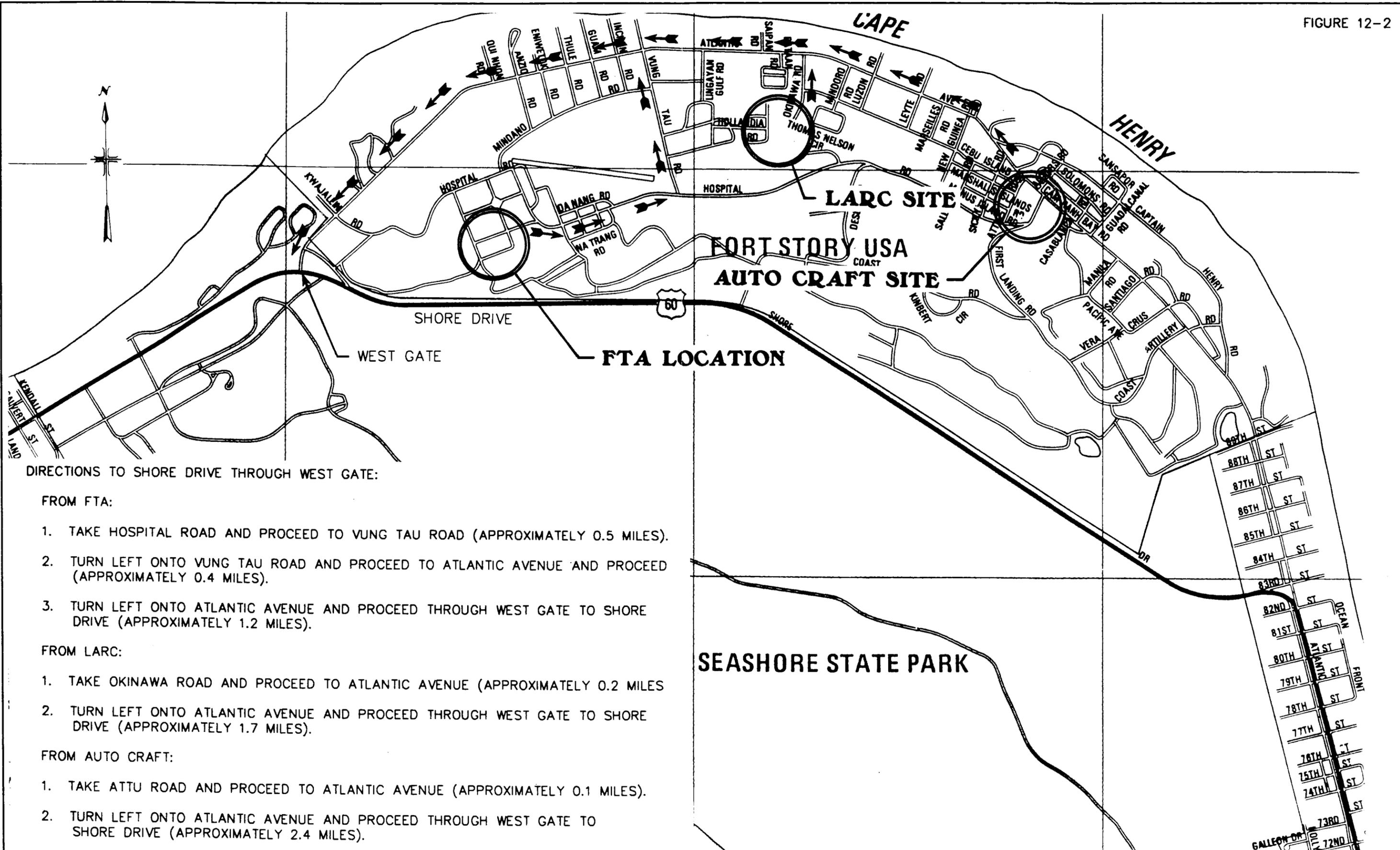
- Contact the Emergency Room Supervisor for determination of the appropriate mode of transportation to the hospital (i.e., by Malcolm Pirnie or personal vehicle, ambulance, or ambulance after on-site treatment by paramedics).
- Brief the Emergency Room Supervisor on the situation, the potential hazards, and the substances involved.
- Determine whether decontamination may be conducted (Section 12.5.3)
- If the injured individual is to be transported by Malcolm Pirnie or personal vehicle, the SSHO or a designated party will drive the injured individual to the hospital, using the route map and written directions provided (Figures 12-2 and 12-3).
- The SSHO will provide appropriate medical data sheets to the emergency medical facility/hospital.

Written directions and maps of the route to the hospital (Figures 12-2 and 12-3) shall be posted at the site and kept in each Malcolm Pirnie vehicle on-site during all activities. Figure 12-2 provides directions from each site to Shore Drive through the West Gate. Figure 12-3 provides the directions from Shore Drive to the hospital.

12.6 ENVIRONMENTAL ACCIDENT (Spread/Release of Contamination)

The following notifications and actions will be conducted in their listed order in the event of an environmental accident:

- Immediately notify the Field Manager and the SSHO of any environmental accidents.
- Conduct air monitoring for the presence of airborne contaminants - see Section 12.7 for evacuation action levels.
- If airborne contaminant concentrations are below evacuation action levels in Section 12.7 (monitor continuously), adequate personal protective equipment is being used and spill/release response materials are available, secure the spread of contamination immediately as described in Section 12.10.
- Notify appropriate emergency response groups and management if necessary (if a significant release has occurred, the National Response Center should be contacted).



DIRECTIONS TO SHORE DRIVE THROUGH WEST GATE:

FROM FTA:

1. TAKE HOSPITAL ROAD AND PROCEED TO VUNG TAU ROAD (APPROXIMATELY 0.5 MILES).
2. TURN LEFT ONTO VUNG TAU ROAD AND PROCEED TO ATLANTIC AVENUE AND PROCEED (APPROXIMATELY 0.4 MILES).
3. TURN LEFT ONTO ATLANTIC AVENUE AND PROCEED THROUGH WEST GATE TO SHORE DRIVE (APPROXIMATELY 1.2 MILES).

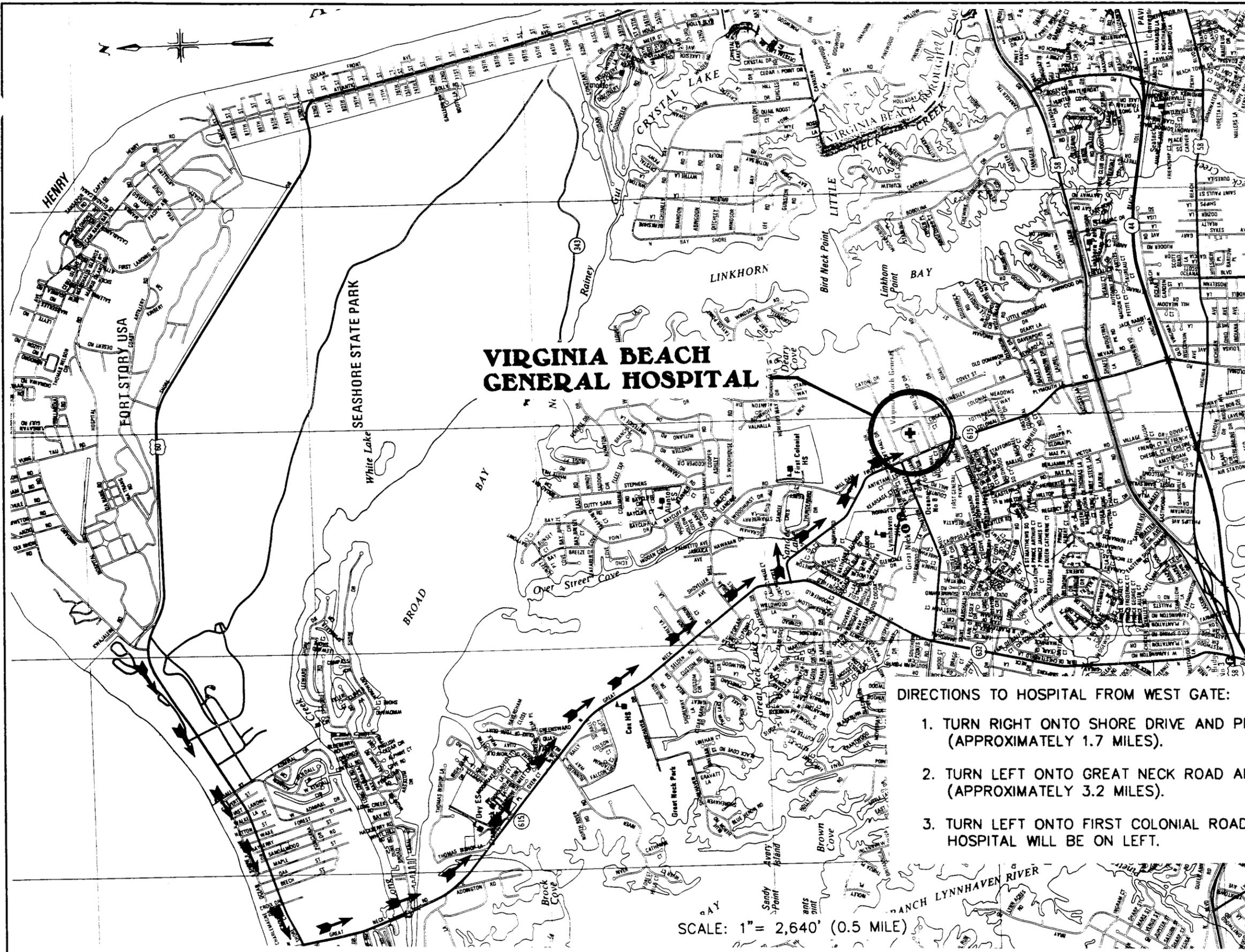
FROM LARC:

1. TAKE OKINAWA ROAD AND PROCEED TO ATLANTIC AVENUE (APPROXIMATELY 0.2 MILES)
2. TURN LEFT ONTO ATLANTIC AVENUE AND PROCEED THROUGH WEST GATE TO SHORE DRIVE (APPROXIMATELY 1.7 MILES).

FROM AUTO CRAFT:

1. TAKE ATTU ROAD AND PROCEED TO ATLANTIC AVENUE (APPROXIMATELY 0.1 MILES).
2. TURN LEFT ONTO ATLANTIC AVENUE AND PROCEED THROUGH WEST GATE TO SHORE DRIVE (APPROXIMATELY 2.4 MILES).

SEASHORE STATE PARK



**VIRGINIA BEACH
GENERAL HOSPITAL**

DIRECTIONS TO HOSPITAL FROM WEST GATE:

1. TURN RIGHT ONTO SHORE DRIVE AND PROCEED TO GREAT NECK ROAD (APPROXIMATELY 1.7 MILES).
2. TURN LEFT ONTO GREAT NECK ROAD AND PROCEED TO FIRST COLONIAL ROAD (APPROXIMATELY 3.2 MILES).
3. TURN LEFT ONTO FIRST COLONIAL ROAD AND PROCEED APPROXIMATELY 1 MILE. HOSPITAL WILL BE ON LEFT.

SCALE: 1" = 2,640' (0.5 MILE)

FORT STORY, VIRGINIA
SITE SAFETY AND HEALTH PLAN
DIRECTIONS TO HOSPITAL

- Notify the Corporate Health and Safety Manager and Malcolm Pirnie Project Manager.

The appropriate contact phone numbers are listed at the end of this section.

12.7 EVACUATION

The SSHO will determine whether a site emergency warrants evacuation. Three types of evacuation procedures are provided for in this section:

- Evacuation of immediate work area
- Evacuation of site
- Evacuation of nearby area facilities

Evacuation triggers are listed in Section 12.7.1, 12.7.2 and 12.7.3. Evacuation procedures are described in Section 12.7.4. The site evacuation plan shall be reviewed and rehearsed as part of the overall training program for site operations. For efficient and safe site evacuation and assessment of the emergency situation, the SSHO will have authority to request assistance from outside services, if required.

12.7.1 Evacuation of Immediate Work Area

Withdrawal to a safe, upwind location outside the exclusion zone will be required should any of the following occur:

- Concentrations of contaminants in the exclusion zone exceed the following:
 - Volatile organic compounds persist at or above 50 ppm above background levels in the breathing zone
 - Combustible gases detected above 10 percent of the LEL
 - Oxygen concentrations above 25 percent or below 19.5 percent
- A minor accident occurs

- A new source of contamination or previously unidentified contaminant is encountered
- Equipment malfunctions

12.7.2 Evacuation of Site (All Work Zones)

Withdrawal to a safe, upwind location outside the site will be required should any of the following occur:

- Significant airborne contaminant concentrations (as described in Section 12.7.1) or other indications of a hazardous atmosphere are detected throughout each of the work zones
- A major accident or injury occurs
- Fire or explosion occurs

12.7.3 Evacuation of Nearby Area Facilities

Evacuation of nearby area facilities may be required should any of the following occur:

- Significant airborne contaminant concentrations (as described in Section 12.7.1) or other indications of a hazardous atmosphere are detected near occupied on-site buildings.
- Significant airborne contaminant concentrations (as described in Section 12.7.1) or other indications of a hazardous atmosphere are detected at the site boundary.

12.7.4 Evacuation Procedures

The following actions will be taken in their listed order should evacuation be warranted:

- The SSHO shall use the air horn to sound the evacuation alarm (two short blasts, repeated).

- Field personnel should leave the area through the Contaminant Reduction Zone; if this is not possible, personnel should leave via the shortest route possible.
- All personnel will evacuate and assemble at a safe, upwind mustering point, selected by the SSHO.
- The SSHO will conduct a head count to confirm safe evacuation of all personnel.
- Work will be temporarily stopped until first aid has been administered or faulty equipment has been repaired or replaced.
- Work will be temporarily stopped until the source of contamination is established and controlled or appropriate PPE is provided.
- Air monitoring will be continuously conducted and personnel will continue withdrawal, if necessary, as described in Sections 12.7.2 and 12.7.3.
- Notify appropriate response groups as required.
- Coordinate evacuation of nearby buildings with site authorities if action levels are exceeded in their vicinity and proceed to monitor site boundaries.
- Notify the local police, local fire departments and the Malcolm Pirnie Corporate Health and Safety Manager and Project Manager if action levels are exceeded at the site boundaries - a mutual decision will be reached regarding warning, instructing and evacuating off-site populations.
- The SSHO will notify the Malcolm Pirnie Corporate Health and Safety Manager and Project Manager of the evacuation activities.
- Site control measures will be established so that neither incoming personnel nor visitors are allowed to proceed into the evacuated area without the permission of the SSHO.
- The SSHO must see that access for emergency response services is provided and that all equipment capable of igniting a combustible atmosphere has been shut down once evacuation is initiated.
- When the Corporate Health and Safety Manager and SSHO have decided that personnel are to re-enter the site, the SSHO will use the air horn to sound the "all clear" signal (three short blasts, repeated).

12.8 ADVERSE WEATHER CONDITIONS

In the event of adverse weather conditions, the SSHO (after communication with the Project Manager) will determine if work shall be stopped to avoid adversely affecting the health and safety of Malcolm Pirnie personnel. Some of the items to be considered prior to determining if work should continue are:

- Potential for heat stress
- Inclement weather-related working conditions
- Limited visibility
- Potential for electrical or dust storms

12.9 FIRE PROTECTION AND PREVENTION

During subsurface investigations, combustible gas indicators and photoionization detectors will be used to monitor levels of potentially combustible gases and volatile organics. Fire extinguishers will be kept readily available. Local fire departments will be alerted to the nature and location of field investigation activities. When required by the client or regulatory authorities, the project management will prepare and submit a Fire Protection Plan for the approval of the contracting officers, authorized representative or other designated official. Essential considerations for the Fire Protection Plan will include:

- Proper site preparation and safe storage of combustible and flammable materials.
- Availability of coordination with private and public fire authorities.
- Adequate job-site fire protection and inspections for fire prevention.
 - Adequate indoctrination and training of employees.
 - Recommended practices and standards of the National Fire Protection Association (NFPA) and other applicable regulations will be followed in the development and application of Project Fire Protection Programs.

- All storage, handling, or use of flammable and combustible substances will be under the supervision of qualified persons.
- All tanks, containers, and pumping equipment, portable or stationary, used for the storage or handling of flammable and combustible liquids, will meet the recommendations of the National Fire Protection Association.

12.10 SPILL CONTAINMENT PROGRAM

Minor spills, such as spills of small quantities of decontamination solvents, sample preservatives or sample material, shall be contained using granular absorbent materials. The absorbent material shall be collected with a shovel after being applied and temporarily stored in plastic five gallon buckets with covers to await appropriate disposal.

Should a more **serious spill or release** occur, the SSHO will contact appropriate emergency response groups for assistance. To avoid the potential for on-site spills or releases, work will be stopped if previously unidentified storage vessels or drums are encountered and the situation discussed with the Malcolm Pirnie Project Manager.

12.11 EMERGENCY NUMBERS

The telephone numbers listed on Table 12-1 will be posted conspicuously on site at all times in case of emergency.

TABLE 12-1

EMERGENCY TELEPHONE NUMBERS

Virginia Beach General Hospital (off-base)	481-8890 (ER) 481-8000 (Operator)
On-base Fire Department	17
Off-base Fire Department	911
On-base Ambulance	17
Off-base Ambulance	911
On-base Security	17
MPI Corporate Medical Consultant	(800) 229-3674
Dr. David Barnes, EMR	
Poison Control Center (Richmond)	1-800-552-6337
Poison Control Center (National)	1-800-962-1253
Hazardous Material Emergency	1-800-424-8802
(USEPA National Response Center)	
MPI Industrial Hygienist	(804) 873-8700 (office)
Mr. Anthony Pace	(804) 886-5815 (home)
MPI Project Manager	(804) 873-8700 (office)
Mr. Franco Godoy	(804) 930-2024 (home)
USACE Project Manager	(410) 962-2700 (office)
Steve Cho	

13.0 RECORDKEEPING

It will be the responsibility of the Project Manager and Site Safety and Health Officer (SSHO) to maintain adequate records as follows:

To be recorded in the Field Log by the SSHO:

- Daily list of field personnel
- Record of all visitors
- Training logs (site-specific and visitors)
- Daily air monitoring results
- Levels of personal protection worn by personnel and, as appropriate, visitors
- Exposure work-hours and a log of occupational injuries and illness
- Accident investigations
- Daily record of all first aid treatments not otherwise reportable
- Daily safety inspection logs

To be recorded in the Office Files by the Project Manager:

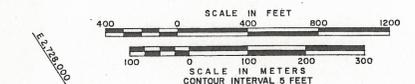
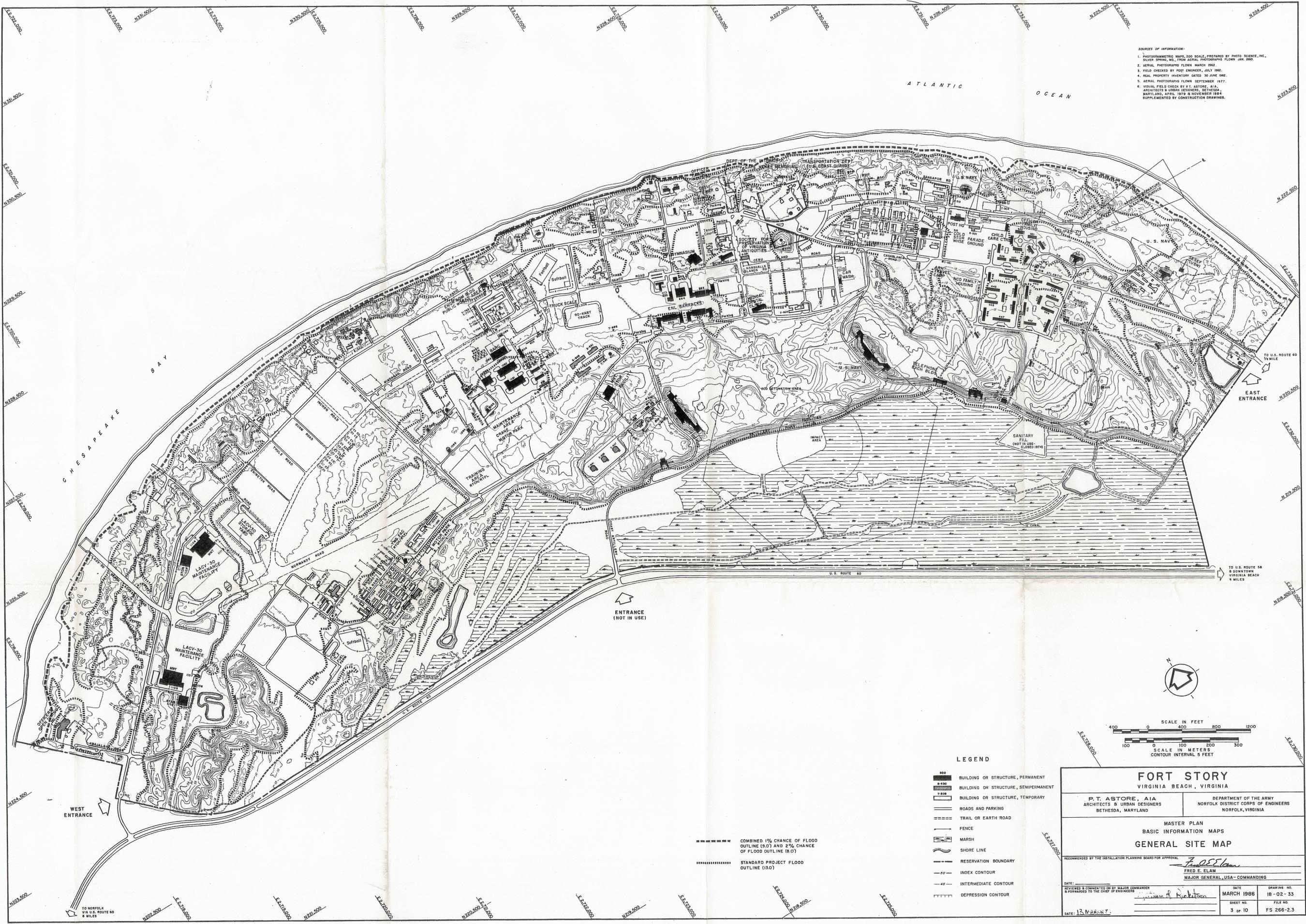
- Reports to insurance carrier or state compensation agencies
- Related reports required by the client
- Related records and reports required by local, state and federal agencies
- Related correspondence
- OSHA-required health and safety training and medical certificates
- CPR and first aid training certificates
- Hazard communication program and MSDSs for hazardous chemicals introduced to the site by Malcolm Pirnie

In the event of any accident/incident, the SSHO will immediately notify the Malcolm Pirnie Corporate Health and Safety Manager. All accidents will be investigated, reported, and analyzed. Within two working days of any reportable accident, the SSHO will complete and submit to the ACE Contracting Officer an Accident Report on ENG Form 3394 in accordance with AR 385-40 and USACE Supplements to that regulation. Injured persons are responsible for reporting all injuries as soon as possible to the SSHO and their direct Supervisor. An incident report shall be filed with the Malcolm Pirnie Benefits Administrator.

APPENDIX A

FORT STORY MAP

SOURCES OF INFORMATION:
 1. PHOTOGRAMMETRIC MAPS, 200 SCALE, PREPARED BY PHOTO SCIENCE, INC., SILVER SPRING, MD., FROM AERIAL PHOTOGRAPHS FLOWN JAN. 1960.
 2. AERIAL PHOTOGRAPHS FLOWN MARCH 1962.
 3. FIELD CHECKED BY POE ENGINEER, JULY 1962.
 4. REAL PROPERTY INVENTORY DATED 30 JUNE 1962.
 5. AERIAL PHOTOGRAPHS FLOWN SEPTEMBER 1977.
 6. VISUAL FIELD CHECK BY P. T. ASTORE, AIA, ARCHITECTS & URBAN DESIGNERS, BETHESDA, MARYLAND, APRIL 1978 & NOVEMBER 1984.
 SUPPLEMENTED BY CONSTRUCTION DRAWINGS.



LEGEND

- 000 — BUILDING OR STRUCTURE, PERMANENT
- 0-430 — BUILDING OR STRUCTURE, SEMIPERMANENT
- 1-200 — BUILDING OR STRUCTURE, TEMPORARY
- — — — — ROADS AND PARKING
- — — — — TRAIL OR EARTH ROAD
- — — — — FENCE
- — — — — MARSH
- — — — — SHORE LINE
- — — — — RESERVATION BOUNDARY
- 60 — INDEX CONTOUR
- 45 — INTERMEDIATE CONTOUR
- — — — — DEPRESSION CONTOUR

- — — — — COMBINED 1% CHANCE OF FLOOD OUTLINE (8.0') AND 2% CHANCE OF FLOOD OUTLINE (8.0')
- — — — — STANDARD PROJECT FLOOD OUTLINE (13.0')

FORT STORY
 VIRGINIA BEACH, VIRGINIA

P. T. ASTORE, AIA ARCHITECTS & URBAN DESIGNERS BETHESDA, MARYLAND
 DEPARTMENT OF THE ARMY NORFOLK DISTRICT CORPS OF ENGINEERS NORFOLK, VIRGINIA

MASTER PLAN
 BASIC INFORMATION MAPS
 GENERAL SITE MAP

RECOMMENDED BY THE INSTALLATION PLANNING BOARD FOR APPROVAL	
<i>Fred E. Elam</i> FRED E. ELAM MAJOR GENERAL, USA - COMMANDING	
DATE:	DATE: MARCH 1986
DESIGNED & COMMENTED ON BY MAJOR ENGINEER & FORWARDED TO THE CHIEF OF ENGINEERS	DRAWING NO. 18-02-33
	SHEET NO. 3 OF 10
DATE: 13 MARCH 86	FILE NO. FS 266-2.3

ATTACHMENT I
SITE SPECIFIC SSHP
FIREFIGHTER TRAINING AREA

ATTACHMENT I
SITE-SPECIFIC SAFETY AND HEALTH PLAN
FIREFIGHTER TRAINING AREA
FORT STORY, VIRGINIA

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ATTACHMENT I
SITE-SPECIFIC SAFETY AND HEALTH PLAN
FIREFIGHTER TRAINING AREA

I-1.0 SITE LOCATION AND DESCRIPTION

The Firefighter Training Area (FTA) is located in a sandy flat area situated adjacent to the northern flank of the central sand ridge in the southwestern section of Fort Story along Hospital Road. Figure I-1 provides the location of the site.

A temporary hospital facility was located on the site until 1960 when its operations were relocated and the structure demolished. From 1960 through 1978, the area adjacent to the southern boundary along U.S. Route 60 was used as a wildlife game preserve. The site was cleared and used for fire training exercises in the latter part of 1978. Prior to 1980, these exercises consisted of extinguishing JP-4 aviation fuel, which was released and ignited directly to the surface soils of the site. The releases were reportedly extinguished by a mixture of firefighting foam and water.

A concrete pit was constructed in 1980 and used for firefighting training exercises. The 100 foot square by 2 foot deep pit was used on a monthly basis. Procedures included:

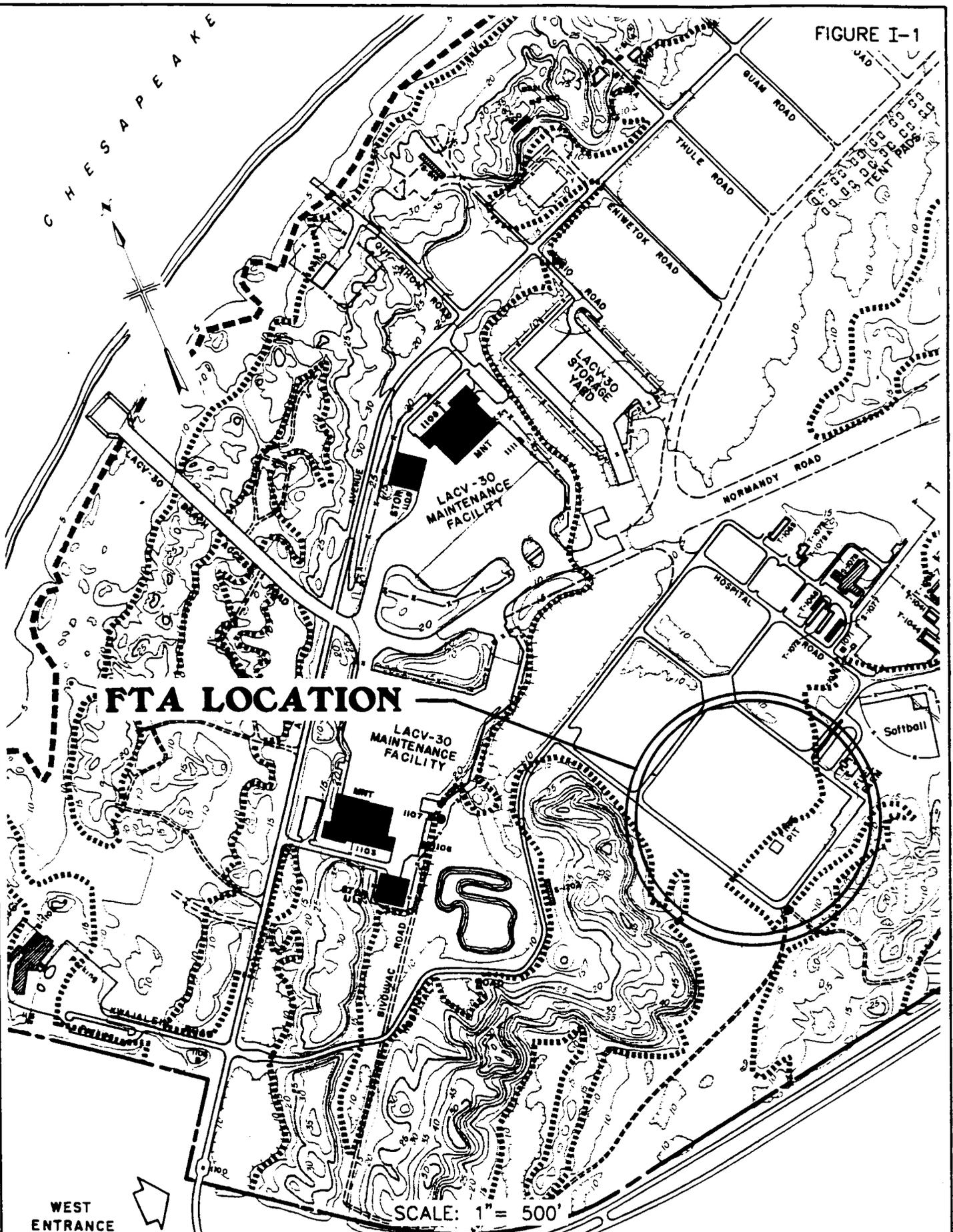
- Filling the pit with several inches of water and 75 to 400 gallons of fuel (i.e., JP-4, contaminated fuels and hydraulic fluid).
- Igniting the mixture and allowing it to burn.
- Extinguishing the fire with 50 to 150 gallons of firefighting foam.
- Allowing the residues of the fuel and extinguishing mixtures to evaporate naturally.

Additionally, during 1980 through 1986, many installation personnel reportedly used the area as an unauthorized dumping site. The site is currently free of any surface debris or evidence of buried debris. In June 1988, firefighting training activities were discontinued at this site.

The site is underlain by Holocene Age sand deposits. The sand is typically subrounded to subangular, usually poorly graded and medium to coarse grained. The coarse

FIGURE I-1

C H E S A P E A K E



FTA LOCATION

WEST ENTRANCE

SCALE: 1" = 500'

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FORT STORY, VIRGINIA
SITE SAFETY AND HEALTH PLAN
FTA SITE LOCATION MAP

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grained facies is generally restricted to depths in excess of 4 feet. Silty sand is present to a depth of 2 to 4 feet in the eastern area of the site.

Water table elevations range from 8.5 feet NGVD in the northern portion of the site to less than 8.3 feet NGVD in the southern portion. Groundwater flow is directed from the northwest across the site to the south and east. Hydraulic conductivity values calculated at the site range from 1.17×10^{-2} to 1.37×10^{-2} centimeters per second (cm/sec) with an average value of 1.24×10^{-2} cm/sec.

I-2.0 HAZARD ASSESSMENT

I-2.1 Description of Field Activities

Samples will be collected to physically and chemically characterize the surface and subsurface soils, groundwater, sediment and surface water. A site map with proposed sample locations is provided as Figure I-2.

Soils - Approximately seventy-two (72) soil samples will be collected at the site. Soil samples will be collected from three (3) depths at twenty-two (22) soil boring locations to determine horizontal and vertical extent of contamination. In addition, six (6) surface soil samples will be collected at the northern section of the site.

Groundwater - Eighteen (18) groundwater samples will be collected using the DPT rig throughout the site. Four (4) groundwater samples will be collected from existing wells while four (4) additional samples will be collected from four new groundwater monitoring wells. Refer to the Field Investigation Plan for more detailed sampling information.

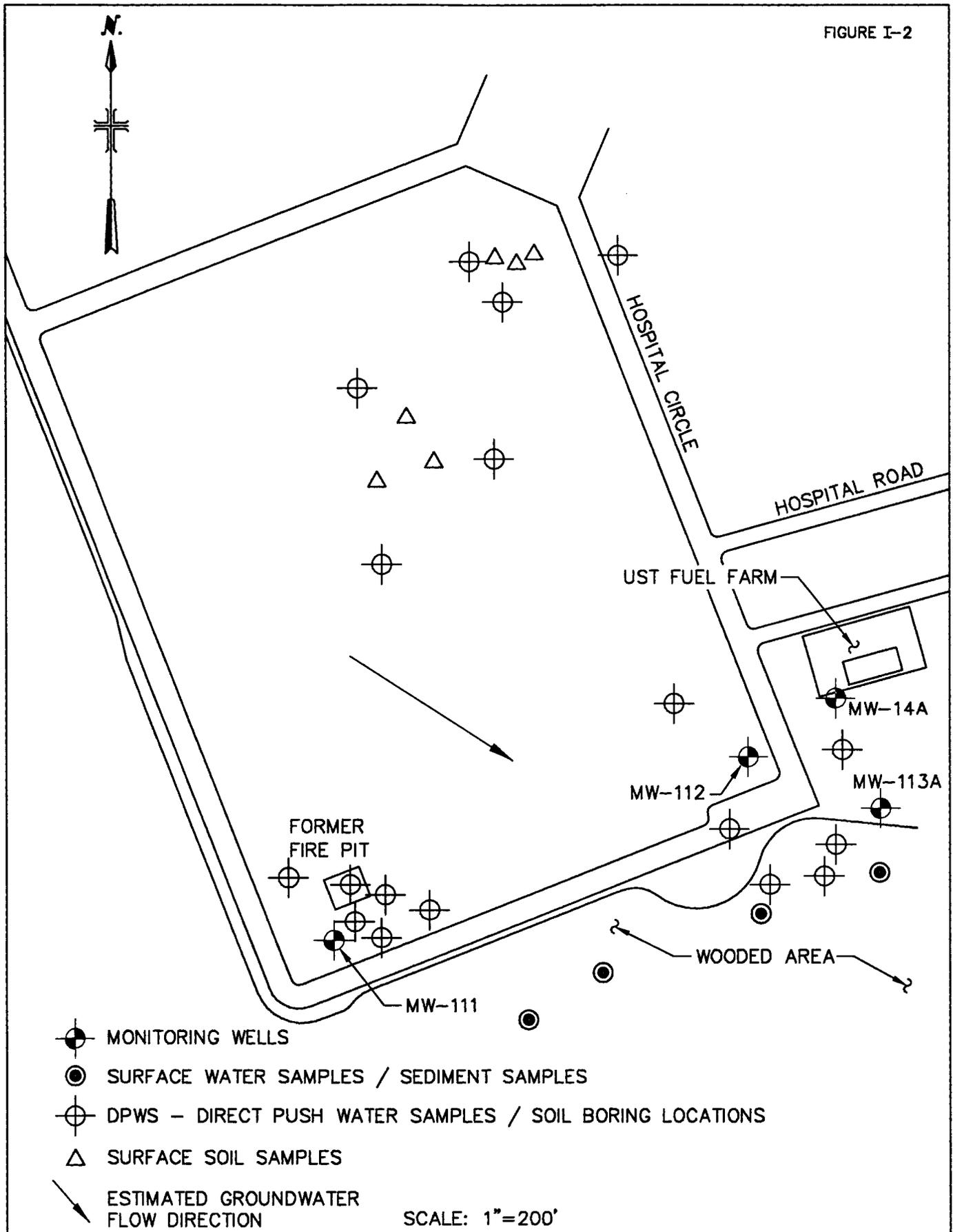
Sediment - Four (4) sediment samples will be collected from the area where run-off from the site potentially impacts the wetland area to the west of the site.

Surface Water - Four (4) surface water samples will be collected from the area where run-off from the site potentially impacts the wetland area to the west of the site.

I-2.2 Summary of Project Risks

Malcolm Pirnie personnel must be cognizant of the health hazards, chemical and physical, associated with the individual field activities to be conducted and the physical environment in which the work will take place. It should be noted that risks presented here are only speculated risks based on limited information from previous activities and previous investigations at the site. Since unidentified risks may exist, all field personnel shall exercise

FIGURE I-2



extreme care during all field activities. As more specific information is obtained about chemical contaminants, additional precautions may be implemented by the Site Safety and Health Officer (SSHO) and Project Industrial Hygienist. A hazards analysis of each work task is provided in Table I-1. These hazards are discussed below.

I-2.2.1 Chemical Hazards

While conducting site investigations, a potential exists for exposure to chemical contaminants through ingestion/inhalation and skin contact. Chemical contaminants previously detected at the site which are regulated by the Occupational Safety and Health Administration (OSHA) are listed in Table I-2.

Dermal contact and inhalation of these contaminants can be avoided through the use of proper personal protective equipment as described in Section I-4.0, Personal Protective Equipment, below.

Although there will be no monitoring of dust during field activities, because of the presence of heavy metals in some soils at the site, dust generation will be reduced through water application during drilling and sampling activities if visible dust is present during these activities.

In addition to the monitoring requirements stated in the GSSHP, a combustible gas indicator will be used to monitor for explosive or dangerous conditions during all site subsurface sampling and drilling activities. Action levels for combustible gas are described in Section 10.0 of the GSSHP.

General chemical, physical, and toxicological data, protective exposure standards, and first aid procedures for each contaminant of concern is given in Table I-2.

I-2.2.2 Physical Hazards

The primary physical hazard which may be encountered during site investigations is injury due to working around heavy equipment. The driving mechanism of the drilling rigs is of particular concern. To address this hazard, the following protective equipment shall be used at all times:

- Hard hats
- Steel-toed work boots

**TABLE I-1
HAZARDS ANALYSIS**

Work Task	Slip/ Trip/Fall	Noise Exposure	Fire/ Explosions	Dust Inhalation	Vapor/Gas Inhalation	Insects/ Bio Hazards	Exposure to Contaminated Media	Flying Particles
Surface Soil Sampling	X			X	X	X	X	
Sediment Sampling	X			X	X	X	X	
Surface Water Sampling	X				X	X	X	
Subsurface Soil Sampling (By DPT)	X	X	X	X	X	X	X	X
Groundwater Sampling (By DPT)	X	X	X		X	X	X	X
Groundwater Sampling (Monitoring Well)	X				X	X	X	
Well Installation	X	X	X	X	X	X	X	X
Site Survey	X				X	X	X	
Drum Sampling	X		X		X	X	X	

**TABLE I-2
TOXICOLOGICAL SUMMARY**

Compound	Vapor Pressure (mm Hg)	Ionization Potential (eV)	PEL STEL IDLH	Action Level	Odor Threshold	Target Organs	Route of Entry	Symptoms and Toxicological Effects	First Aid
Inorganics									
Lead	0	N/A	0.05 mg/m ³ (PEL) 700 mg/m ³ (IDLH)	N/A	N/A	GI tract, CNS, blood, kidneys, gingival tissue	Inhalation, Skin/eye contact Ingestion	Weakness, insomnia, facial palor, tremor, abdominal pain, eye irritation, colic, anemia, constipation, low weight	Eye: Irrigate immediately Skin: Wash with soap Breath: Respiratory support Swallow: Immediate medical attention
Copper	0	N/A	1 mg/m ³ (PEL)	N/A	N/A	Respiratory system, skin, liver, kidneys	Inhalation, Skin/eye contact Ingestion	Eye, skin, mucous membrane irritation, metallic taste In animals: lung, liver & kidney damage, anemia	Eye: Irrigate immediately Skin: Wash with soap Breath: Respiratory support Swallow: Immediate medical attention
Organics									
Benzene	75	9.24	1 ppm (PEL) 5 ppm (STEL) 3000 ppm (IDLH)	0.5 ppm	4.68 ppm	CNS, blood, skin, bone marrow, eyes, respiratory system	Inhalation, Absorption, Ingestion, Skin/eye contact	Eye, nose and throat irritation, headache, nausea, fatigue, bone marrow depressant, staggered gait, lassitude anorexia	Eye: Irrigate immediately Skin: Wash with soap Breath: Respiratory support Swallow: Immediate medical attention
1,2-Dichloroethane	64	11.04	1 ppm (PEL) 2 ppm (STEL) 1000 ppm (IDLH)	0.5 ppm	10 ppm	CNS, eyes, liver, skin, kidneys	Inhalation, Absorption, Skin/eye contact Ingestion,	CNS depressant, nausea, vomiting, eye & skin irritation, corneal opacity	Eye: Irrigate immediately Skin: Wash with soap Breath: Respiratory support Swallow: Immediate medical attention
1,1-Dichloroethene	180 - 264	9.65	1 ppm (PEL) 4000 ppm (IDLH)	0.5 ppm	5 ppm	CNS, eyes, liver, skin, kidneys	Inhalation, Absorption, Ingestion, Skin/eye contact	CNS depressant, nausea, vomiting, eye & skin irritation, headache	Eye: Irrigate immediately Skin: Wash with soap Breath: Respiratory support Swallow: Immediate medical attention
Phenol	0.4	8.50	5 ppm (PEL) 250 ppm (IDLH)	2.5 ppm		Liver, skin, and kidneys	Inhalation, Absorption, Skin/eye contact Ingestion,	Eyes, nose and throat irritation, anorexia, weakness, muscle ache, dark urine, liver & kidney damage, tremor, convulsions, twitching	Eye: Irrigate immediately Skin: Wash with soap Breath: Respiratory support Swallow: Immediate medical attention
1,1,1-Trichloroethane		11.25	350 ppm (PEL) 450 ppm (STEL)	175 ppm		CNS, eyes, liver, nose, kidneys	Inhalation, Absorption, Ingestion, Skin/eye contact	Headache, dizziness, nausea, vomiting, hyperirritability, convulsions, eye and skin irritation	Eye: Irrigate immediately Skin: Wash with soap Breath: Respiratory support Swallow: Immediate medical attention

Notes: N/A - Data not available
PEL - OSHA Permissible Exposure Limit
STEL - OSHA Short Term Exposure Limit

IDLH - Immediately Dangerous to Life and Health
CNS - Central Nervous System
PNS - Peripheral Nervous System

- Durable work gloves

This protective clothing shall be utilized in conjunction with the PPE requirements, if any, specified in Section I-4.0, below, for protection from chemical hazards.

I-3.0 SITE CONTROL

The following work zones for soil boring and sampling activities will be established and communicated to all employees by the SSHO:

- Exclusion Zone ("Hot Zone"): The Exclusion Zone will be considered to be within 20' of the rear of any drill rig or any other heavy machinery used to install monitoring wells and collect subsurface soil and groundwater samples.
- Contamination Reduction Zone (CRZ) and Support Zone ("Clean Zone"): The CRZ is the designated area where personnel and equipment decontamination will take place. The CRZ will be located between the Exclusion Zone and the Support Zone. The CRZ will be of sufficient size to permit decontamination activities to be conducted efficiently. The location of the Support Zone will be chosen by the SSHO, preferably upwind of and adjacent to the CRZ.

Figure I-2 shows the general layout of the site. Specific boundary locations will be determined by the SSHO based on the actual boring and/or sample locations.

Prior to the installation of sampling activities, the work zones will be clearly marked using traffic cones and safety tape. If operations at the base or proximity to roads conflict with zone requirements, zones will be established at the discretion of the SSHO.

I-4.0 PERSONAL PROTECTIVE EQUIPMENT

Personal protective equipment (PPE) usage will be in accordance with Section 9.0 of the GSSHP.

Soil boring, well installation, groundwater sampling and other sampling activities will be conducted in Level D personal protective equipment. To minimize dermal contact and the spread of contamination from contact with the site soils, the following additional equipment will be required:

- Latex inner gloves
- Nitrile outer gloves
- Disposable booties

Upgrading to higher levels of PPE will be based upon criteria outlined in Section 9.0 of the GSSHP.

I-5.0 DECONTAMINATION

I-5.1 Personnel Decontamination

Personnel decontamination will be conducted in accordance with Section 11.0 of the GSSHP. The CRZ shall be equipped with wash/rinse/disposal stations in accordance with the GSSHP. Stations shall be set up and equipped as appropriate for the required level of PPE being employed.

I-5.2 Equipment Decontamination

Malcolm Pirnie's Field Investigation Plan specifies the sequential decontamination procedures to be used in the preparation of sampling equipment. The drill rigs and accessories are to be steam-cleaned in the CRZ before arriving on-site and prior to leaving the site upon completion of activities. A decontamination basin or equivalent will be constructed in the CRZ to collect the rinsewater generated by the cleaning of the DPT push rods and drill rig split spoons. Rinsewater generated by the decontamination process will be containerized for treatment and disposal if it contains decontamination solvents.

ATTACHMENT II
SITE SPECIFIC SSHP
LARC 60 MAINTENANCE AREA

ATTACHMENT II
SITE-SPECIFIC SAFETY AND HEALTH PLAN
LARC 60 MAINTENANCE AREA
FORT STORY, VIRGINIA

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ATTACHMENT II
SITE-SPECIFIC SAFETY AND HEALTH PLAN
LARC 60 MAINTENANCE AREA

II-1.0 SITE LOCATION AND DESCRIPTION

The Lighter Amphibious Resupply Carco (LARC) 60 maintenance area, which is the maintenance and wash rack area for LARC vehicles is located in the sand flat area that lies between the coastal dune complex to the north and the central sand ridge to the south. The LARC area includes Buildings 1081, 1082, 1083 and 1084. The location of the site is provided on Figure II-1.

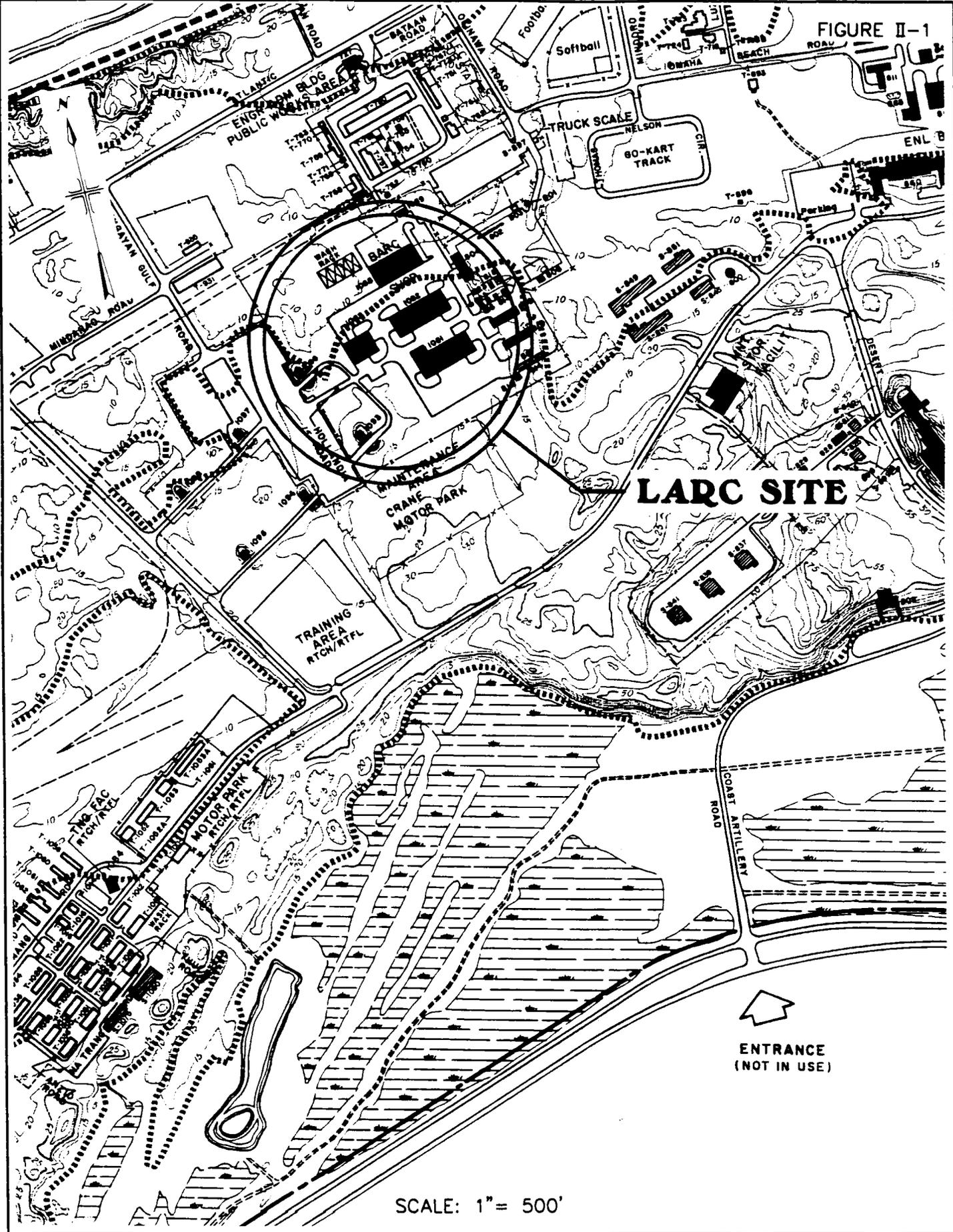
During the 1950s, the wash rack area was first used as the barge amphibious resupply cargo (BARC) motor pool and maintenance facility. In 1964, the BARC vehicle was phased out and the LARC vehicle was prototyped. Presently, this is the only facility on the East Coast available to the Army Transportation Corps for amphibious training.

In 1982, the LARC facility was modified with the construction of a concrete wash rack pad. In 1987, the U.S. Army Environmental Hygiene Agency (USAEHA) conducted a study at Site 6 and concluded that the soil north of the wash rack area was contaminated with grease, oil, lead and chromium but that this contaminated material did not pose a significant health hazard.

The underground storage tank (UST) area is located approximately 600 feet south of the wash rack area. A 10,000 gallon UST is located at the north gate of the LARC vehicle motor pool. This tank was installed in 1983. Although JMM's April 1990 field visits to this area identified soil-stained zones around the UST, no reports of tank failing or leaking have been documented. These soil-stained areas may have been caused by overfilling or spillage during use. In 1987, the USAEHA sampled the UST and found it contained oil, water, 1,1,1-trichloroethane and chromium. This UST is not presently being used.

The LARC area is underlain by Holocene age sand deposits. The sand is typically described as fine to medium grained, poorly graded, subrounded and occasionally slightly silty. At one location within the site area, a peat lense less than 1 foot in thickness was encountered at relativey shallow depths.

The measured depth to groundwater at the site ranged from 7.47 below ground surface to 5.07 feet below ground surface. Measured groundwater elevations ranged from



SCALE: 1" = 500'

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FORT STORY, VIRGINIA
SITE SAFETY AND HEALTH PLAN
LARC SITE LOCATION MAP

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6.5 feet NGVD to 4.97 feet NGVD. Based on water level data from on-site and nearby off-site wells, the water table elevation ranges from approximately 8 feet NGVD in the southern portion of the site to less than 5 feet NGVD in the unpaved, wash rack area. Additionally, the water level data suggest the possible existence of a cone of depression in the vicinity of the wash rack supply well located at the southwestern corner of the wash rack area. The minimum groundwater level elevation within the cone of depression is approximately 4 feet NGVD. Though locally variable in magnitude and direction, the prevailing hydraulic gradient for the site is directed in a northward direction toward the coastline. Hydraulic conductivity values calculated range from 1.99×10^{-3} to 1.84×10^{-2} centimeters per second (cm/sec) with an average value of 7.42×10^{-2} cm/sec.

II-2.0 HAZARD ASSESSMENT

II-2.1 Description of Field Activities

Samples will be collected to physically and chemically characterize the surface and subsurface soils, groundwater, sediment and surface water. A site map with proposed sample locations is provided as Figure II-2.

Soils - Approximately sixty-nine (69) soil samples will be collected at the site. Soil samples will be collected from three (3) depths at twenty-two (23) soil boring locations to determine horizontal and vertical extent of contamination.

Groundwater - Nineteen (19) groundwater samples will be collected using the DPT rig throughout the site. Four (4) groundwater samples will be collected from existing groundwater monitoring wells. Refer to the Field Investigation Plan for more detailed sampling information.

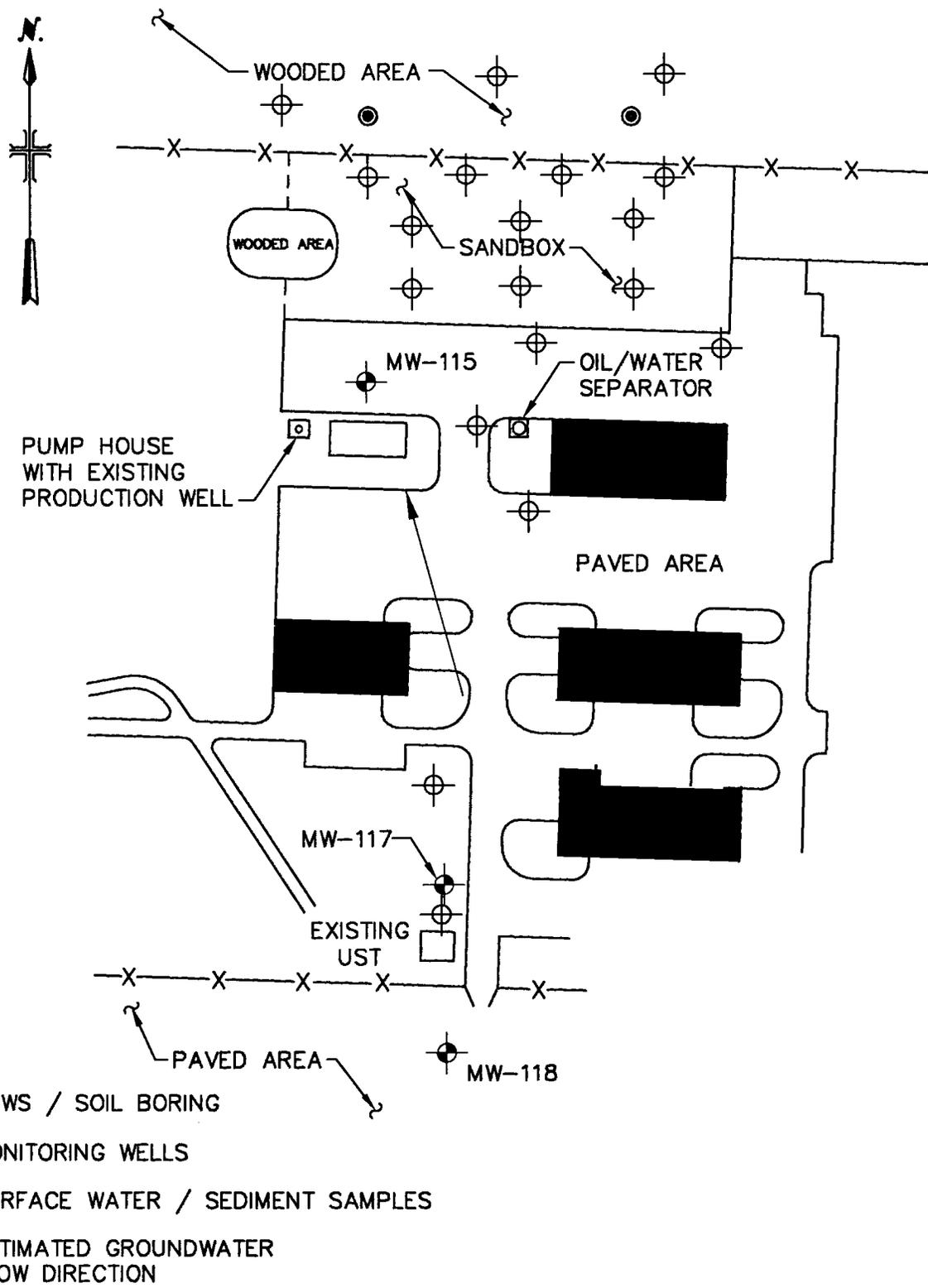
Sediment - Two (2) sediment samples will be collected from the drainage ditch located between the sandbox area and the wooded area.

Surface Water - Two (2) surface water samples will be collected from the drainage ditch located between the sandbox area and the wooded area.

II-2.2 Summary of Project Risks

Malcolm Pirnie personnel must be cognizant of the health hazards, chemical and physical, associated with the individual field activities to be conducted and the physical environment in which the work will take place. It should be noted that risks presented here are only speculated risks based on limited information from previous activities and previous

FIGURE II-2



SCALE: 1"=200'

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FORT STORY, VIRGINIA
SITE SAFETY AND HEALTH PLAN
LARC SITE MAP

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investigations at the site. Since unidentified risks may exist, all field personnel shall exercise extreme care during all field activities. As more specific information is obtained about chemical contaminants, additional precautions may be implemented by the Site Safety and Health Officer (SSHO) and Project Industrial Hygienist. A hazards analysis of each work task is provided in Table II-1. These hazards are discussed below.

II-2.2.1 Chemical Hazards

While conducting site investigations, a potential exists for exposure to chemical contaminants through ingestion/inhalation and skin contact. Chemical contaminants previously detected at the site which are regulated by the Occupational Safety and Health Administration (OSHA) are listed in Table II-2.

Dermal contact and inhalation of these contaminants can be avoided through the use of proper personal protective equipment as described in Section II-4.0, Personal Protective Equipment, below.

Although there will be no monitoring of dust during field activities, because of the presence of heavy metals in some soils at the site, dust generation will be reduced through water application during drilling and sampling activities if visible dust is present during these activities.

In addition to the monitoring requirements stated in the GSSHP, a combustible gas indicator will be used to monitor for explosive or dangerous conditions during all site subsurface sampling and drilling activities. Action levels for combustible gas are described in Section 10.0 of the GSSHP.

General chemical, physical, and toxicological data, protective exposure standards, and first aid procedures for each contaminant of concern is given in Table II-2.

II-2.2.2 Physical Hazards

The primary physical hazard which may be encountered during site investigations is injury due to working around heavy equipment. The driving mechanism of the drilling rigs is of particular concern. To address this hazard, the following protective equipment shall be used at all times:

- Hard hats
- Steel-toed work boots

**TABLE II-1
HAZARDS ANALYSIS**

Work Task	Slip/ Trip/Fall	Noise Exposure	Fire/ Explosions	Dust Inhalation	Vapor/Gas Inhalation	Insects/ Bio Hazards	Exposure to Contaminated Media	Flying Particles
Surface Soil Sampling	X			X	X	X	X	
Sediment Sampling	X			X	X	X	X	
Surface Water Sampling	X				X	X	X	
Subsurface Soil Sampling (By DPT)	X	X	X	X	X	X	X	X
Groundwater Sampling (By DPT)	X	X	X		X	X	X	X
Groundwater Sampling (Monitoring Well)	X				X	X	X	
Well Installation	X	X	X	X	X	X	X	X
Site Survey	X				X	X	X	
Drum Sampling	X		X		X	X	X	

**TABLE II-2
TOXICOLOGICAL SUMMARY**

Compound	Vapor Pressure (mm Hg)	Ionization Potential (eV)	PEL STEL IDLH	Action Level	Odor Threshold	Target Organs	Route of Entry	Symptoms and Toxicological Effects	First Aid
Inorganics									
Copper	0	N/A	1 mg/m ³ (PEL)	N/A	N/A	Respiratory system, skin, liver, kidneys	Inhalation, Skin/eye contact, Ingestion	Eye, skin, mucous membrane irritation, metallic taste In animals: lung, liver & kidney damage, anemia	Eye: Irrigate immediately Skin: Wash with soap Breath: Respiratory support Swallow: Immediate medical attention
Lead	0	N/A	0.05 mg/m ³ (PEL) 700 mg/m ³ (IDLH)	N/A	N/A	GI tract, CNS, blood, kidneys, gingival tissue	Inhalation, Skin/eye contact, Ingestion	Weakness, insomnia, facial pallor, tremor, abdominal pain, eye irritation, colic, anemia, constipation, low weight	Eye: Irrigate immediately Skin: Wash with soap Breath: Respiratory support Swallow: Immediate medical attention
Zinc	1	N/A	N/A	N/A	N/A	GI tract, blood, immune system	Inhalation, Skin/eye contact, Ingestion	Digestive difficulties, anemia, altered immune system	Eye: Irrigate immediately Skin: Wash with soap Breath: Respiratory support Swallow: Immediate medical attention
Organics									
Benzene	75	9.24	1 ppm (PEL) 5 ppm (STEL) 3000 ppm (IDLH)	0.5 ppm	4.68 ppm	CNS, blood, skin, bone marrow, eyes, respiratory system	Inhalation, Absorption, Ingestion, Skin/eye contact	Eye, nose and throat irritation, headache, nausea, fatigue, bone marrow depressant, staggered gait, lassitude, anorexia	Eye: Irrigate immediately Skin: Wash with soap Breath: Respiratory support Swallow: Immediate medical attention
1,1-Dichloroethene	180 - 264	9.65	1 ppm (PEL) 4000 ppm (IDLH)	0.5 ppm	5 ppm	CNS, eyes, liver, skin, kidneys	Inhalation, Absorption, Ingestion, Skin/eye contact	CNS depressant, nausea, vomiting, eye & skin irritation, headache	Eye: Irrigate immediately Skin: Wash with soap Breath: Respiratory support Swallow: Immediate medical attention
Vinyl chloride	2,660	9.99	1 ppm (PEL) 5 ppm (STEL)	0.5 ppm	3.4 ppm	CNS, liver, blood, lymphatic and respiratory system	Inhalation	Weakness, GI bleeding, abdominal pain, hepatomegaly, pallor or cyanosis of extremities	Breath: Respiratory support

Notes: N/A - Data not available
 PEL - OSHA Permissible Exposure Limit
 STEL - OSHA Short Term Exposure Limit
 IDLH - Immediately Dangerous to Life and Health
 CNS - Central Nervous System

- Durable work gloves

This protective clothing shall be utilized in conjunction with the PPE requirements, if any, specified in Section II-4.0, below, for protection from chemical hazards.

II-3.0 SITE CONTROL

The following work zones for soil boring and sampling activities will be established and communicated to all employees by the SSHO:

- **Exclusion Zone ("Hot Zone"):** The Exclusion Zone will be considered to be within 20' of the rear of any drill rig or any other heavy machinery used to install monitoring wells and collect subsurface soil and groundwater samples.
- **Contamination Reduction Zone (CRZ) and Support Zone ("Clean Zone"):** The CRZ is the designated area where personnel and equipment decontamination will take place. The CRZ will be located between the Exclusion Zone and the Support Zone. The CRZ will be of sufficient size to permit decontamination activities to be conducted efficiently. The location of the Support Zone will be chosen by the SSHO, preferably upwind of and adjacent to the CRZ.

Figure II-2 shows the general layout of the site. Specific boundary locations will be determined by the SSHO based on the actual boring and/or sample locations.

Prior to the installation of sampling activities, the work zones will be clearly marked using traffic cones and safety tape. If operations at the base or proximity to roads conflict with zone requirements, zones will be established at the discretion of the SSHO.

II-4.0 PERSONAL PROTECTIVE EQUIPMENT

Personal protective equipment (PPE) usage will be in accordance with Section 9.0 of the GSSHP.

Soil boring, well installation, groundwater sampling and other sampling activities will be conducted in Level D personal protective equipment. To minimize dermal contact and the spread of contamination from contact with the site soils, the following additional equipment will be required:

- Latex inner gloves
- Nitrile outer gloves
- Disposable booties

Upgrading to higher levels of PPE will be based upon criteria outlined in Section 9.0 of the GSSHP.

II-5.0 DECONTAMINATION

II-5.1 Personnel Decontamination

Personnel decontamination will be conducted in accordance with Section 11.0 of the GSSHP. The CRZ shall be equipped with wash/rinse/disposal stations in accordance with the GSSHP. Stations shall be set up and equipped as appropriate for the required level of PPE being employed.

II-5.2 Equipment Decontamination

Malcolm Pirnie's Field Investigation Plan specifies the sequential decontamination procedures to be used in the preparation of sampling equipment. The drill rigs and accessories are to be steam-cleaned in the CRZ before arriving on-site and prior to leaving the site upon completion of activities. A decontamination basin or equivalent will be constructed in the CRZ to collect the rinsewater generated by the cleaning of the DPT push rods and drill rig split spoons. Rinsewater generated by the decontamination process will be containerized for treatment and disposal of it contains decontamination solvents.

ATTACHMENT III
SITE SPECIFIC SSHP
AUTO CRAFT BUILDING AREA

ATTACHMENT III
SITE-SPECIFIC SAFETY AND HEALTH PLAN
AUTO CRAFT BUILDING AREA
FORT STORY, VIRGINIA

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ATTACHMENT III
SITE-SPECIFIC SAFETY AND HEALTH PLAN
AUTO CRAFT BUILDING AREA

III-1.0 SITE LOCATION AND DESCRIPTION

The Auto Craft Building is located in the sand flat area south of the coastal dune complex at the junction of Atlantic Avenue and Cebu Road. The location of the site is provided on Figure III-1.

Two solvent dip tanks were used for the storage of spent degreasing solvents and waste oils when the building was in use. Previously, waste oil generated at the site was piped out of the building and into the adjacent UST. The UST has subsequently been removed.

Prior to its use as the Auto Craft Building, the site was used as a motor pool for wheeled vehicles. During the winter of 1989 and 1990, a portion of the building was destroyed by fire. A portion of the building's concrete foundation and some debris remain in the area. A previous investigation indicated that waste solvents were poured directly on the ground to control weed growth along the fence surrounding the site. A visual inspection by JMM in 1990 verified the presence of an apparent petroleum-based product around the area and distinctive petroleum odor at the site.

The site is underlain by Holocene age sand deposits. The sand is typically characterized as fine to medium grained, subrounded and poorly graded. Discontinuous units of clay and silt are located in the north area of the site at depths of 5 feet and thicknesses of 2 feet.

Depths to groundwater at the site vary from 7.80 feet below ground surface to 10.25 feet below ground surface. Water table elevations at the site ranged from 5.3 feet NGVD near the building to 5.07 feet NGVD. The lateral hydraulic gradient at the site is directed to the northeast. Based upon a limited number of wells, hydraulic conductivity values range from 3.23×10^{-3} to 7.11×10^{-3} centimeters per second (cm/sec) with an average value of 5.17×10^{-3} cm/sec.

III-2.0 HAZARD ASSESSMENT

III-2.1 Description of Field Activities

Samples will be collected to physically and chemically characterize the surface and subsurface soil and groundwater. A site map with proposed sample locations is provided as Figure III-2.

Soils - Approximately eighteen (18) soil samples will be collected at the site. Soil samples will be collected from three (3) depths at six (6) soil boring locations to determine horizontal and vertical extent of contamination.

Groundwater - Six (6) groundwater samples will be collected using the DPT rig throughout the site. One (1) groundwater sample will be collected from the existing groundwater monitoring well. Refer to the Field Investigation Plan for more detailed sampling information.

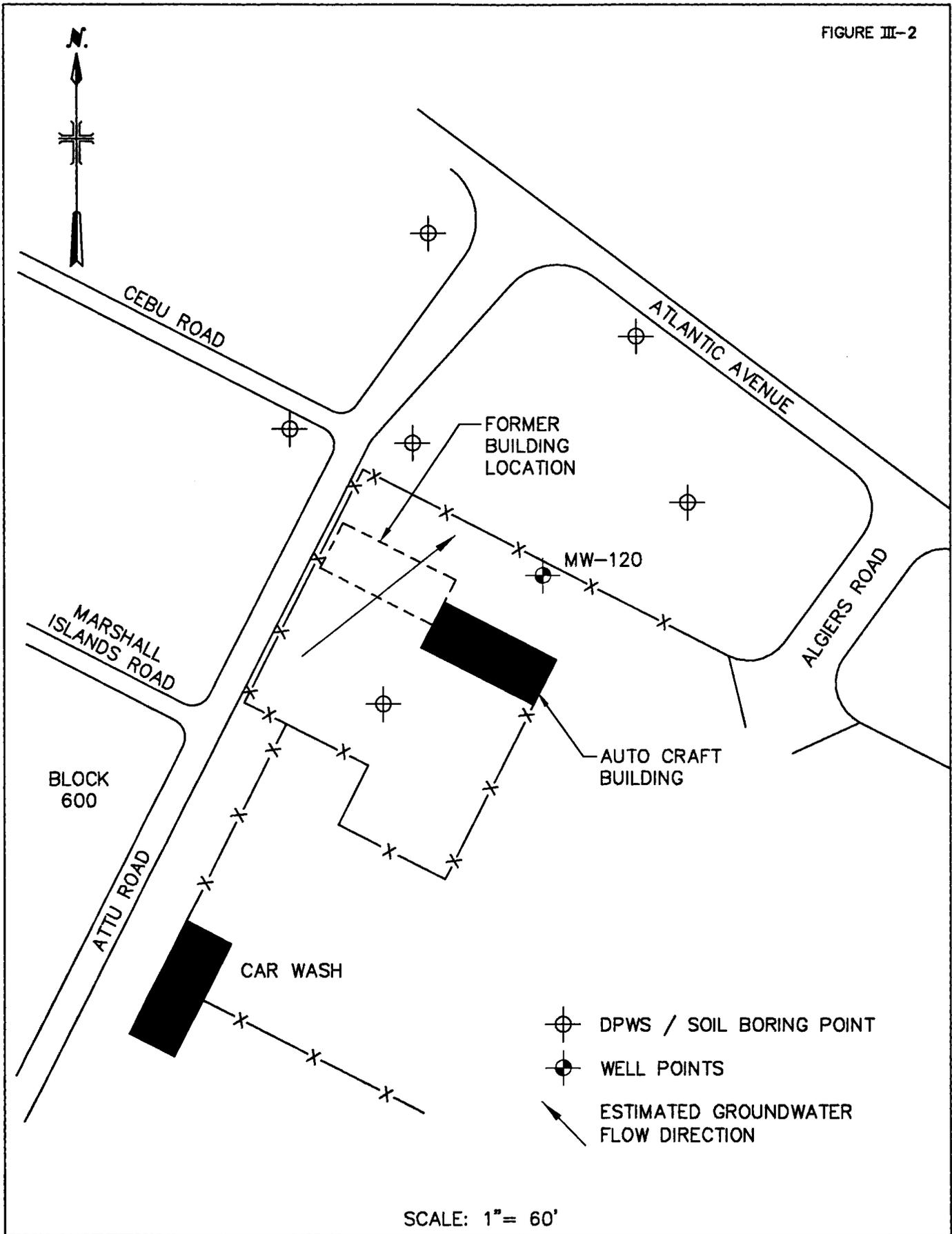
III-2.2 Summary of Project Risks

Malcolm Pirnie personnel must be cognizant of the health hazards, chemical and physical, associated with the individual field activities to be conducted and the physical environment in which the work will take place. It should be noted that risks presented here are only speculated risks based on limited information from previous activities and previous investigations at the site. Since unidentified risks may exist, all field personnel shall exercise extreme care during all field activities. As more specific information is obtained about chemical contaminants, additional precautions may be implemented by the Site Safety and Health Officer (SSHO) and Project Industrial Hygienist. A hazards analysis of each work task is provided in Table III-1. These hazards are discussed below.

III-2.2.1 Chemical Hazards

While conducting site investigations, a potential exists for exposure to chemical contaminants through ingestion/inhalation and skin contact. Chemical contaminants previously detected at the site which are regulated by the Occupational Safety and Health Administration (OSHA) are listed in Table III-2.

Dermal contact and inhalation of these contaminants can be avoided through the use of proper personal protective equipment as described in Section III-4.0, Personal Protective Equipment, below.



- ⊕ DPWS / SOIL BORING POINT
- WELL POINTS
- ↘ ESTIMATED GROUNDWATER FLOW DIRECTION

SCALE: 1" = 60'

**TABLE III-1
HAZARDS ANALYSIS**

Work Task	Slip/ Trip/Fall	Noise Exposure	Fire/ Explosions	Dust Inhalation	Vapor/Gas Inhalation	Insects/ Bio Hazards	Exposure to Contaminated Media	Flying Particles
Surface Soil Sampling	X			X	X	X	X	
Subsurface Soil Sampling (By DPT)	X	X	X	X	X	X	X	X
Groundwater Sampling (By DPT)	X	X	X		X	X	X	X
Groundwater Sampling (Monitoring Well)	X				X	X	X	
Well Installation	X	X	X	X	X	X	X	X
Site Survey	X				X	X	X	
Drum Sampling	X		X		X	X	X	

**TABLE III-2
TOXICOLOGICAL SUMMARY**

Compound	Vapor Pressure (mm Hg)	Ionization Potential (eV)	PEL STEL IDLH	Action Level	Odor Threshold	Target Organs	Route of Entry	Symptoms and Toxicological Effects	First Aid
Inorganics									
Lead	0	N/A	0.05 mg/m ³ (PEL) 700 mg/m ³ (IDLH)	N/A	N/A	GI tract, CNS, blood, kidneys, gingival tissue	Inhalation, Skin/eye contact Ingestion	Weakness, insomnia, facial palor, tremor, abdominal pain, eye irritation, colic, anemia, constipation, low weight	Eye: Irrigate immediately Skin: Wash with soap Breath: Respiratory support Swallow: Immediate medical attention
Zinc	1	N/A	N/A	N/A	N/A	GI tract, blood, immune system	Inhalation, Skin/eye contact Ingestion	Digestive difficulties, anemia, altered immune system	Eye: Irrigate immediately Skin: Wash with soap Breath: Respiratory support Swallow: Immediate medical attention

Notes: N/A - Data not available
 PEL - OSHA Permissible Exposure Limit
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- Contamination Reduction Zone (CRZ) and Support Zone ("Clean Zone"): The CRZ is the designated area where personnel and equipment decontamination will take place. The CRZ will be located between the Exclusion Zone and the Support Zone. The CRZ will be of sufficient size to permit decontamination activities to be conducted efficiently. The location of the Support Zone will be chosen by the SSHO, preferably upwind of and adjacent to the CRZ.

Figure III-2 shows the general layout of the site. Specific boundary locations will be determined by the SSHO based on the actual boring and/or sample locations.

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III-5.0 DECONTAMINATION

III-5.1 Personnel Decontamination

Personnel decontamination will be conducted in accordance with Section 11.0 of the GSSHP. The CRZ shall be equipped with wash/rinse/disposal stations in accordance with

the GSSH. Stations shall be set up and equipped as appropriate for the required level of PPE being employed.

III-5.2 Equipment Decontamination

Malcolm Pirnie's Field Investigation Plan specifies the sequential decontamination procedures to be used in the preparation of sampling equipment. The drill rigs and accessories are to be steam-cleaned in the CRZ before arriving on-site and prior to leaving the site upon completion of activities. A decontamination basin or equivalent will be constructed in the CRZ to collect the rinsewater generated by the cleaning of the DPT push rods and drill rig split spoons. Rinsewater generated by the decontamination process will be containerized for treatment and disposal if it contains decontamination solvents.