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FINAL

WORK PLAN

INVESTIGATION, CHARACTERIZATION AND INTERIM CORRECTIVE MEASURE OF SITE 16, SWMU 45

NAVAL STATION ROOSEVELT ROADS
PUERTO RICO

CONTRACT TASK ORDER 0296

FEBRUARY 21, 1995

Prepared For:

DEPARTMENT OF THE NAVY
ATLANTIC DIVISION
NAVAL FACILITIES
ENGINEERING COMMAND
Norfolk, Virginia

Under:

LANTDIV CLEAN Program
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1.0 INTRODUCTION

This Work Plan provides Baker Environmental, Inc. (Baker's) approach and methodologies for conducting an investigation of two (2) 50,000 gallon underground storage tanks (USTs) associated with Building 38, the former power plant building, and the cooling water outfall tunnel at IR Site 16/Solid Waste Management Unit (SWMU) 45 at Naval Station Roosevelt Roads (NSRR). The field program to be executed is intended to meet the requirements as defined in the Final Implementation Plan/Fee Proposal (IP/FP), prepared by Baker, dated January 11, 1995. Based on the results of the field investigation, Baker will prepare an engineering analysis of potential interim corrective measures for the site. An engineering analysis report will be submitted to the Department of the Navy for review and approval. Upon approval of the engineering analysis report, Baker will prepare a Remedial Action Contract (RAC) Design Package for the selected interim remedial measure at Site 16.

1.1 Purpose and Objective

The sole purpose of this field investigation and the preparation of the RAC Design Package is to provide an Interim Remedial Measure (IRM) for the two USTs at Site 16. Additional investigations at this site, such as a geotechnical/geochemical investigation, tightness testing of the USTs, etc., will be conducted under another CTO as part of the RCRA Facility Investigation at NSRR.

The specific objectives of this Contract Task Order (CTO) are to: (1) procure analytical, excavation, and surveying subcontractors; (2) collect sediment and aqueous samples from the two USTs and the outfall tunnel; (3) identify any contaminants in these media; (4) prepare an engineering report providing recommendations for an interim action to correct any contamination found in the tanks and tunnel (or limit their potential for release to the environment) and, finally, (5) prepare a RAC design package that will provide specifications, design drawings, and a cost estimate for the selected IRM.

1.2 Work Plan Contents

This work plan consists of four sections. The first section introduced the project and its objectives. Section 2.0 presents a brief discussion of background information on the site. Section 3.0 describes

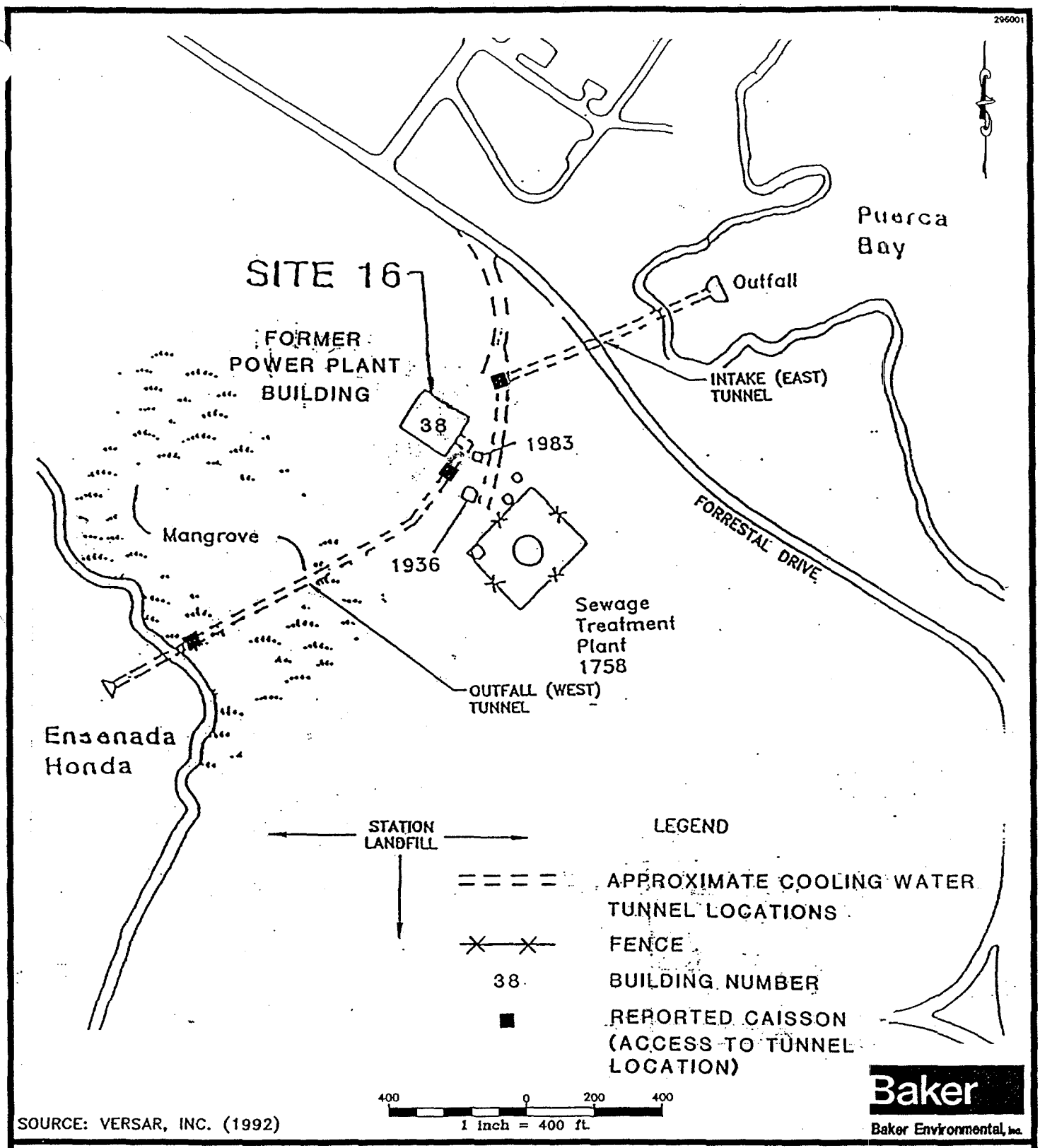
the sampling and analysis requirements. Section 4.0 discusses the surveying to be conducted at this site. A brief Health and Safety Plan (HASP) is provided in Appendix A.

2.0 SITE BACKGROUND

IR Site 16/SWMU 45 is located on the west side of a paved side road off Forrestal Drive. This side road also leads to the Activity's sewage treatment plant and base landfill. The Activity's landfill is located south of Site 16. Figure 2-1 shows the location of the site and the surrounding area. Site 16 consists of Building 38, the Old Power Plant, that was a 60-megawatt steam turbine facility that generated power from the early 1940s through 1949. The plant used Bunker "C" fuel, which was stored in the two 50,000-gallon reinforced concrete tanks that are to be investigated under this CTO. The USTs are located on the northeast side of Building 38. A cooling water intake tunnel extends from the east side of Building 38 and runs south toward Ensenada Honda. A cooling water discharge tunnel extends form the south of Building 38. The location and extent of this tunnel are not known. The tunnel's outfall location is reportedly Puerca Bay. Figure 2-2 shows the location of the storage tanks and the approximate location of the outfall tunnel.

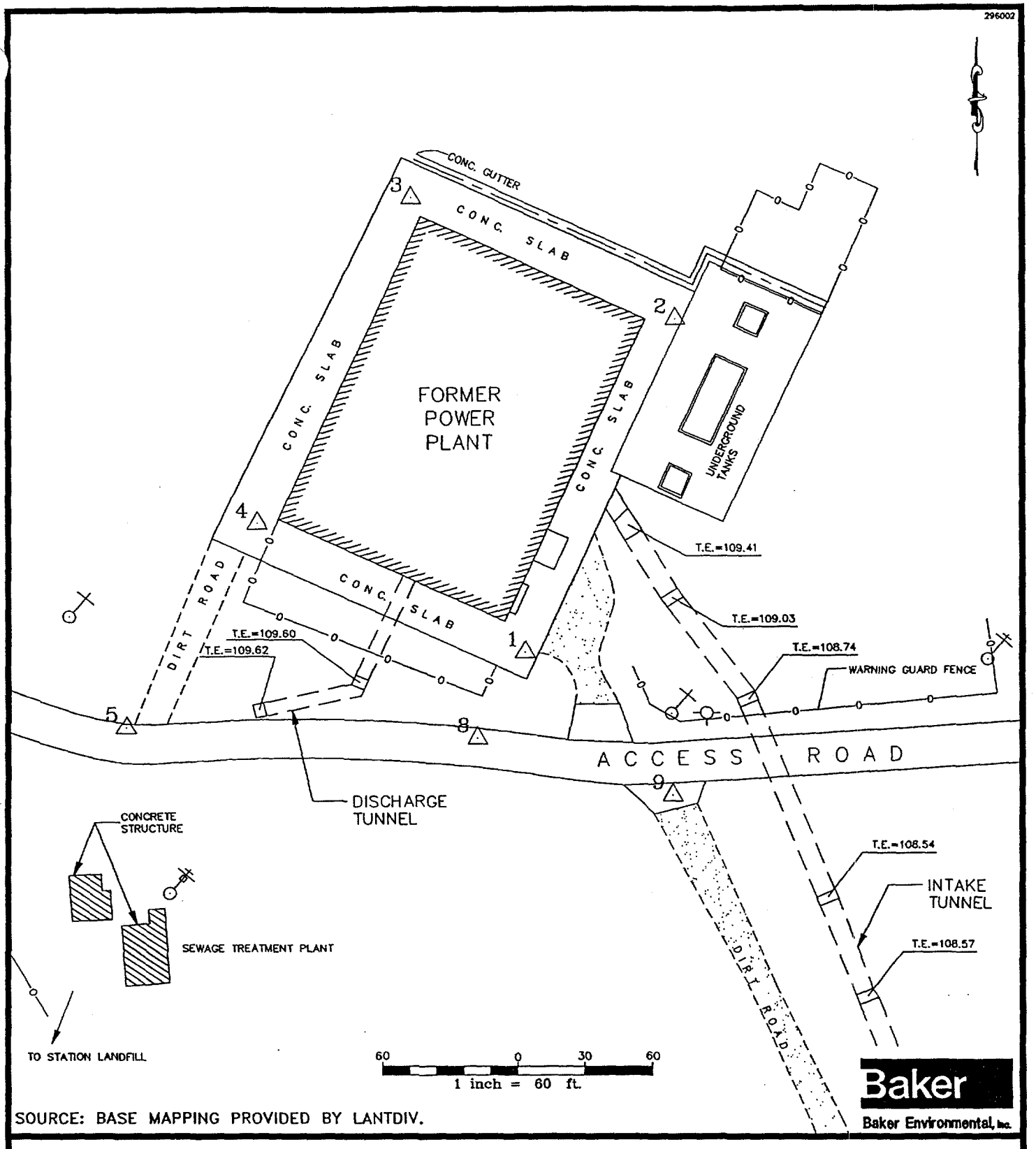
A Remedial Investigation/Feasibility Study (RI/FS) was conducted by Versar, Inc. in May, 1992. It was reported in this RI/FS that Bunker "C" fuel was observed in the manholes that are immediately above the tanks. These manholes also provide access to the piping. A cooling water intake tunnel that is also a part of the steam generating system runs adjacent to the tanks. This tunnel extends from Building 38 towards Puerca Bay and can be easily tracked from access point (manhole) to access point. This tunnel was sampled as discussed below. The original thought was that Bunker "C" fuel was entering the cooling tunnel and being discharged to Puerca Bay. Another tunnel is also present at Building 38 which is probably the outfall for the cooling water. As stated previously, this tunnel is thought to discharge to Ensenada Honda. The possible contents of this tunnel are not known. No knowledge of the route of this tunnel presently exists. One of the intents of this program is to assess the underground route of the tunnel and, to the extent possible, characterize its interior contents for possible contamination.

Versar, Inc. collected surface water and wipe samples from the tunnel discharging to Puerca Bay and the UST manways as a part of their RI/FS for Building 38. The analyses results indicated that these areas are contaminated with Polychlorinated Biphenols (PCBs), but further investigation of the USTs and tunnel were not in the scope of work for their FS. The presence of PCBs in the tunnel may indicate that waste oils containing PCBs were managed/disposed in the tanks and cooling water tunnels.



SOURCE: VERSAR, INC. (1992)

FIGURE 2-1
LOCATION PLAN
UNDERGROUND STORAGE TANKS AND
COOLING WATER TUNNEL
SWMU 45
NAVAL STATION ROOSEVELT ROADS
PUERTO RICO



SOURCE: BASE MAPPING PROVIDED BY LANTDIV.

FIGURE 2-2
SITE PLAN
UNDERGROUND STORAGE TANKS AND
COOLING WATER TUNNEL
SWMU 45
NAVAL STATION ROOSEVELT ROADS
PUERTO RICO

3.0 SAMPLING AND ANALYSIS REQUIREMENTS

The following sections describe the field activities, and the procedures and methodologies to be employed for conducting the investigations. Health and safety requirements to be implemented during the sampling operations are described in the HASP (Appendix A).

3.1 Site Inspection

Baker will conduct a site inspection of two 50,000 gallon tanks and the cooling water outfall tunnel. This visual inspection will allow Baker to incorporate any surface features or other items not on the existing drawing into the engineering report and design. The Baker team will obtain information on the tank dimensions, construction material, and associated appurtenances during their field inspection.

3.2 Sampling Investigations

Two 50,000 gallon tanks and the cooling water outfall tunnel will be sampled to assess the composition of their contents. The following provides a description of the field procedures and methodologies to be employed.

3.2.1 UST Sampling

Samples from the two tanks will be collected and submitted for laboratory analysis. The samples will consist of a floating product aqueous sample, an aqueous sample from within the water column, and a sediment sample from any sludge at the bottom of the tanks. The aqueous samples will be analyzed for volatiles (EPA Method 8240), semivolatiles (EPA Method 8270), metals (RCRA eight), vanadium, total petroleum hydrocarbons (TPH) (EPA Method 8015, both low-medium, and high boiling point hydrocarbons) and PCBs (EPA Method 8080). The aqueous analyses include vanadium because vanadium may help identify the type of petroleum contaminant present in the waste stream as vanadium is found in crude oil and the heavier fractions of petroleum products and is recommended as a possible way to track source type in ASTM-D-3327-79 CC . The sediment samples will be submitted for full (volatiles, semivolatiles, pesticides, and metals) target compound leachate procedures (TCLP) analysis and PCB analyses. A seven day laboratory turnaround time

will be requested for all samples. The samples will also be analyzed for RCRA characteristics to aid in determining how any substances in the tanks must be disposed. A summary of the analyses to be conducted is shown on Table 3-1.

The following procedures will be followed:

1) The top of each tank (i.e., manhole cover) will be opened by Baker's subcontractor.

2) The depth to water and/or product will be measured using an oil/water interface probe. The thickness of the product, if present, will be recorded in a field log book. Additionally, a clear bailer will be lowered into tank and retrieved so that the column of product can be inspected.

3) Three different contents, if present, will be collected for laboratory analysis: floating product, water, and sludge/sediment. The product and water samples will be collected with a disposable bailer. A Sludge Judge® will be used for the sludge samples.

4) The bailer will be lowered slowly and gently into the tank and allowed to fill completely. Once filled, the bailer will be retrieved from the tank. The laboratory prepared bottles will then be filled in the following order, according to the analysis: volatiles, TPH, semivolatiles, PCBs, vanadium, and metals.

5) For the sludge samples, a Sludge Judge® will be lowered to the bottom of the tank. When the bottom has been reached, and the pipe has filled to surface level, a slight tug on the rope before withdrawing the sampler will seal the check valve, trapping the column. When the unit has been raised clear of the tank liquid, the amount of sludge in the sample will be read using the 1-foot increments marked on the pipe. By touching the pin extending from the bottom section against a hard surface, the material will be released from the unit. The laboratory containers will be filled in the same sequence as that described above. Note that the sludge judge is limited to 20 feet in depth. As an alternative method, a clean glass jar attached to a pipe or rod may be used to collect the samples.

6) When sampling is complete, the manhole cover on the tanks will be replaced.

TABLE 3-1

SUMMARY OF ANALYSES
PROJECT NUMBER 296-6200 - NSRR, PUERTO RICO
7 DAY TURNAROUND

Analysis	Method	Aqueous Samples	Solid Samples
		Estimated Quantity	Estimated Quantity
Volatiles	SW846-8240	5	
Semivolatiles	SW846-8270	5	
PCBs	SW846-8080	5	3
RCRA Metals	SW6010/7470	5	
TPH	418.1	5	
TCLP (Total Profile)	Listed Below		3
Ignitability	SW846-1010		3
Corrosivity	SW846-9045		3
Reactivity Cyanide	7.3.3.2		3
Reactivity Sulfide	7.3.4.2		3
Vanadium	SW846-7911	5	

1) TCLP Total Profile to include the following:
   - TCLP Volatiles - SW-846-8240
   - TCLP Semivolatiles - SW-846-8240
   - TCLP Pesticides - SW-846-8080
   - TCLP Herbicides - SW-846-8150
   - TCLP Metals - SW-846-6100/7470
   - TCLP Extraction - SW-846-1311

7) Following sample collection, the samples will be placed in an ice-filled cooler. Samples will be sent via Federal Express to the laboratory within 24 hours of collection. Chain-of-custody forms will be completed and sent with the samples to the laboratory.

3.2.2 Cooling Water Tunnel Sampling

Samples of product and/or water, and sediment will be collected from the cooling water outfall tunnel associated with the electric generating conducted at Building 38. Attempts to locate the full extent of the outfall tunnel by Baker through surface geophysical techniques were unsuccessful. Therefore, the tunnel will be located by excavating the overburden material and exposing the roof along various sections of the tunnel. An excavation permit shall be obtained from the Roosevelt Roads Public Works Facilities Maintenance Division prior to conducting any excavation work. Care will be taken to ensure that base utilities, including intake and outlet pipes for the wastewater treatment plant are not disturbed. Once the extent of the outfall tunnel is located, a hole will be opened in the top of the tunnel to provide sampling access. Excavation activities and opening of the tunnel's roof will be performed by Baker's subcontractor. Caution tape will be placed around the perimeter of the excavation to keep pedestrians from inadvertently entering the excavation area.

Additional samples may be collected from the outfall tunnel, if the tunnel proves longer than anticipated. This decision will be made in the field.

Aqueous samples will be analyzed for volatiles, semivolatiles, PCBs, TPH, metals, and vanadium using the same methods as described previously. The sediments will be analyzed for full TCLP and PCBs. A seven day laboratory turnaround time will be requested for all samples. Collection of samples will be performed utilizing the same methods described in Section 3.1.1.

After the samples have been collected, the tunnel will be repaired by placing metal sheeting over the roof and sealing with caulking. The excavated soils will be replaced in the excavation and compacted.

4.0 SITE SURVEY

Site features including the two USTs, the intake and outfall tunnels, building corners, edge of pavement, roads, utilities and any significant surface features in the area will be included in the survey. The survey will also provide elevation contours if they are not provided by the contractor currently conducting a soil removal action near the site. Both the vertical and horizonal control of these items will be measured and referenced to base coordinates. All surveying activities will be in feet and inches and performed by a licensed surveyor in Puerto Rico.

5.0 REPORTING

An Engineering Analysis Report will be prepared to present the information collected in the field investigation. This report will include a brief site summary discussing the site's history, results of previous investigations, and the results of the field investigation conducted under this CTO. The report will also present corrective engineering options for the tanks and tunnels. Cost estimates will be provided with each proposed corrective measure.

6.0 REMEDIAL ACTION CONTRACT (RAC) DESIGN PACKAGE

A RAC design package will be prepared based upon the selected engineering remediation option presented in the Engineering Analysis Report. Three versions of the design package will be submitted to LANTDIV: 60% design, 100% design, and the revised final. The RAC design package will include performance based specifications prepared in the SPECSINTACT format, design drawings, and a construction cost estimate.

The specifications will describe the appropriate erosion and sediment control, remediation, waste classification and disposal, and additional protective measures required for the preparation of an interim corrective measure for this site.

The drawings will show the RAC contractor the scope of the proposed corrective measure. The drawings will include a title page with vicinity and location maps, a site plan with notes outlining the extent of the corrective measure, and any site work details required by Navy standards.

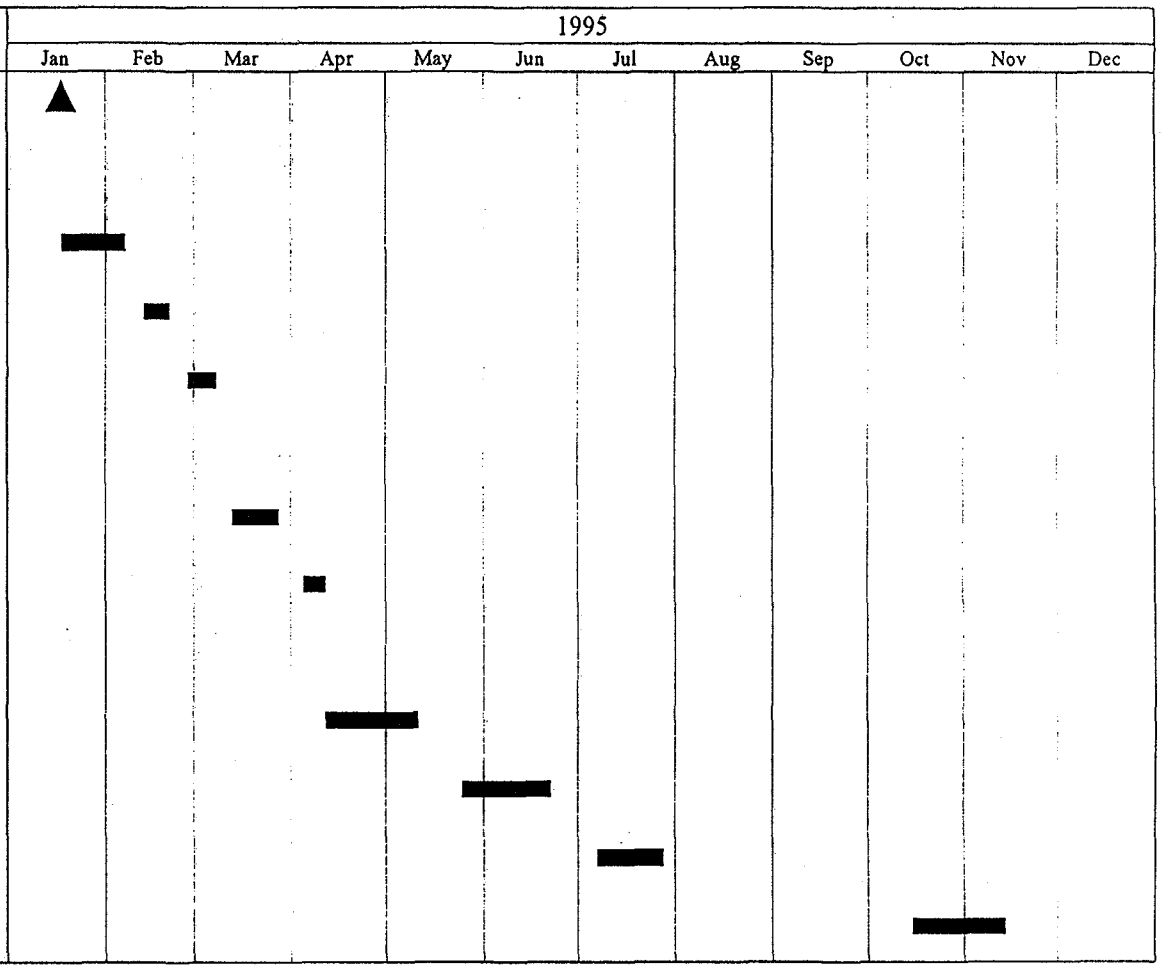
The construction cost estimate will be organized using the Work Breakdown Structure (WBS) and will be prepared based upon costs from the NAVFAC Unit Price Book, Baker historical data, construction cost data bases, and engineering judgement. The cost estimate will be prepared on Microsoft Excel spreadsheets.

7.0 SCHEDULE

Baker will perform the items described in this work plan in accordance with the following schedule.

FIGURE 5 - 1
CTO-0296: RAC Design, Site 16/SWMU 45
Naval Station, Roosevelt Roads, Puerto Rico

Site Activity	Days	Start	Finish
Award	0ed	1/18/95	1/18/95
Work Plan	0d	1/18/95	1/18/95
Draft	20ed	1/18/95	2/7/95
Final	8ed	2/13/95	2/21/95
Site Inspection	9ed	2/27/95	3/8/95
Engineering Report	0d	3/13/95	3/13/95
Draft	15ed	3/13/95	3/28/95
Final	7ed	4/5/95	4/12/95
RAC Design Package	0d	4/12/95	4/12/95
60%	29ed	4/12/95	5/11/95
100%	28ed	5/25/95	6/22/95
Final	21ed	7/7/95	7/28/95
On-Site Remediation	30ed	10/15/95	11/14/95



APPENDIX A

FINAL

HEALTH AND SAFETY PLAN

INVESTIGATION AND CHARACTERIZATION OF
SITE 16, SWMU 45
INTERIM CORRECTIVE MEASURE
NAVAL STATION ROOSEVELT ROADS
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1.0 INTRODUCTION

This Health and Safety Plan (HASP) has been designed by Baker Environmental, Inc. (Baker) to accompany the Work Plan for this project for Contract Task Order 0296. The objective of the Work Plan is to conduct an investigation and characterization of Site 16, Solid Waste Management Unit (SWMU) 45 at the Naval Station Roosevelt Roads (NSRR), Puerto Rico. The purpose of this HASP is to comply with the safety and health regulations of the OSHA General Industry and Construction Standards and to define the requirements and designate protocols to be followed during sampling activities involving potentially contaminated soils, sediment, and/or groundwater. The HASP may be amended with the approval of the Project Health and Safety Officer (PHSO) and/or the Project Manager.

All personnel on site shall be informed by the Site Health and Safety Officer (SHSO) of the site emergency response procedures and any identified potential health and safety hazards of the operations. This HASP summarizes identified potential physical and chemical hazards of the site in Section 3.0

1.1 Scope

The provisions of this HASP are applicable to Baker personnel involved with the field investigation and characterization activities. This HASP has been prepared in accordance with the U.S. Department of Labor Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response (HAZWOPER) standard, 29 CFR 1910.120 and 1926.65.

1.2 Site Description

Site 16/SWMU 45 is located on the west side of a paved side road of Forrestal Drive. This side road also leads to the Activity's sewage treatment plant. The Activity's landfill is located south of Site 16. Figure 2-1 in the Work Plan shows the location of the site and the area surrounding. Site 16 consists of Building 38, the Old Power Plant, that was a 60-megawatt steam turbine facility that generated power from the early 1940s through 1949. The plant used Bunker "C" fuel, which was stored in the two 50,000-gallon reinforced concrete tanks that are to be investigated under this

project. The USTs are located off the northeast side of Building 38. Figure 2-2 of the Work Plan shows the location of the storage tanks and the approximate location of the outfall tunnel.

During heavy rainfalls, the Bunker C fuel was observed in the manholes near the Building 38 and discharged to an adjacent beach via the old cooling water tunnel for the Power Plant. A cleanup contractor was hired twice to drain the USTs and cleanup the spill. This area, where the USTs were located, is now paved over with concrete.

Versar, Inc. collected surface water and wipe samples from a cooling water tunnel and the UST manways as a part of a Remedial Investigation/Feasibility Study (RI/FS) for Building 38. The analyses results indicated that these areas are contaminated with Polychlorinated Biphenols (PCBs), but further investigation of the USTs and tunnel were not in the scope of work for their FS.

1.3 Project Description

The work tasks that will be conducted as part of this project include the following:

- Underground storage tank (UST) sampling
- Cooling water tunnel sampling
- Site survey

1.4 References

The following publications have been referenced in the development and implementation of this HASP:

- ACGIH Threshold Limit Values for Chemical Substances 1994-1995.
- OSHA Federal Regulation. 29 CFR 1910 and 1926. 1993.

- OSHA/NIOSH/EPA/USCG Occupational Health and Safety Guidance Manual for Hazardous Waste Site Activities. October 1985.

- NIOSH Pocket Guide to Chemical Hazards. June 1990.

- Genium Publishing Corp, Genium's Reference Collection, MSDSs

- EPA Standard Operating Safety Guidelines. June 1992.

- Lewis, Richard J., Sr. Hazardous Chemicals Desk Reference. 1991.

2.0 SITE ORGANIZATION AND COORDINATION

The following personnel have direct responsibility for health and safety management at the sites under investigation, are identified as follows:

- Project Manager - Mr. Thomas C. Fuller - The Baker Project Manager has the responsibility to ensure that the elements of the Work Plan are implemented in a safe and healthy manner in accordance with the HASP.

- Project Health and Safety Officer - Mr. Ronald Krivan - The PHSO is responsible for the preparation, review, and approval of the HASP.

- Site Manager - Ms. Coreen M. Casadei - The Site Manager is responsible for assuring that day-to-day activities are conducted in accordance with the HASP. The Site Manager has the immediate authority to suspend field activities if conditions/activities develop or exist that present an immediate health or safety risk to the employees.

- Site Health and Safety Officer - Ms. Barbara Cummings - The SHSO will be responsible for continually evaluating safety on the site and ensuring adherence to the HASP. The SHSO has authority to modify the existing HASP procedures as conditions warrant. The SHSO will also be responsible for the preparation of daily reports which include the day's events from a health and safety standpoint, for documentation of measurements taken for health and safety purposes, and for reporting accidents and other relevant health and safety issues.

PROJECT REPRESENTATIVES:

Mr. Art Wells, LANTDIV Navy Technical Representative	(804) 322-4587
Ms. M. B. Collier, LANTDIV Contract Specialist	(804) 322-4151
Ms. Madeline Rivera, EED/PWD	(809) 865-4429

3.0 HAZARD EVALUATION

Potential health and safety concerns for the physical and health hazards are presented in this section.

3.1 Physical Hazards

The identified potential physical hazards associated with this project include potential work over elevated heights, UST integrity, thermal stress, explosion and fire, utilities, heavy equipment. The following presents a description of these potential hazards. General physical hazards that may be present during the project activities are listed in the following subsections. No confined space entry will be permissible for these work activities.

3.1.1 Elevated Work

During the sampling of the two 50,000-gallon USTs the approximate 5 feet by 8 feet manway openings will be removed for sampling. During the work near the large opening, personnel are to have a rope attached to a permanent fixture and a lanyard attached to the waist. The rope will be of such a distance as to prevent the personnel from being able to enter the tank.

3.1.2 UST Integrity

Prior to commencing lid removal with heavy equipment and sampling activities on the top of the USTs the Baker Engineer will review the structure integrity of the tanks by:

- Reviewing any available tank drawings and calculate the tank integrity.
- Inspecting the concrete top of the USTs for visual malformations, such as broken or cracked concrete.

If the structural integrity of the USTs is questionable the Baker Engineer will discontinue the activities and notify the Project Manager to determine another means of sampling.

3.1.3 Thermal Stress

Provisions for monitoring for thermal stress are included in Attachment A - Baker Safety SOPs.

3.1.4 Explosion and/or Fire

In general, the explosion and/or fire hazards are possible from heavy equipment malfunction, during re-fueling operations, penetrating underground utilities (gas and electric lines), ignition of trapped flammable vapors or flammable vapors released from soil pockets creating flammable atmospheres, ignition of flammable liquids in storage, and vehicular accidents.

Hazard Prevention

Explosion and/or fire hazards can be prevented by grounding, approved safety cans, vehicle maintenance, fire extinguishers, no smoking, and no incendiary or igniter devices.

Site personnel should be trained in the proper use of portable fire extinguishing equipment. Site personnel should respond to fires as follows:

- Evacuate all personnel
- Call the Fire Department
- If the fire is small or confined, attempts to fight the fire with portable fire extinguishers is authorized
- Support the Fire Department response forces as appropriate (probably will be limited to providing information regarding site activities, hazards, and missing personnel, if any)

3.1.5 Utilities

A serious concern exists with striking a utility line during ground intrusive operations. Underground utility clearance must be obtained before any intrusive activities are performed. If underground utilities are identified in these areas, the ground above the utility lines are to be physically marked, such as, with spray paint or flags. Base representatives are to be notified at least one week prior to soil intrusive activities to acquire a utility clearance. A 24-inch minimum clearance must be used for work near underground utilities.

Energized overhead electric lines may present a risk of electrocution. OSHA standards require that equipment maintain certain distances from power lines. For lines 0 to 50 kilovolts (kV), a minimum distance of 10 feet must be maintained. Lines carrying over 50 kV require that the equipment location be at least 10 feet plus an additional 0.4 inch for each 1 kV over 50.

3.1.6 Heavy Equipment

One of the primary physical hazards associated with the site work is the use of heavy equipment, which includes the use of a backhoe. Only operators trained, qualified, and authorized will be permitted to operate the heavy equipment.

Hazards generally associated with backhoe operations include the following:

- Motor vehicle exhaust products (e.g., carbon monoxide) from the engine
- Overhead utility wires, (i.e., electrical and telephone), can be hazardous if the boom of the backhoe is in a upright position
- Underground pipelines and utility lines can be ruptured or damaged during intrusive operations
- High pressure hydraulic lines and air lines used on equipment are hazardous when they are leaking, worn or incorrectly assembled

Hazard Prevention

- Review the contaminants suspected to be on site and perform air monitoring as required. Shut down and/or divert exhaust fumes.

- All critical moving parts should be inspected daily for weak spots, etc.

- Ear muffs and/or ear plugs effectively reduce noise levels.

- Personal protection including safety boots, eye protection, and hard hats will be worn at all times when working around a backhoe.

- Overhead utilities should be considered "live" until determined to be otherwise.

- A thorough underground utilities search and clearance should be conducted before the commencement of intrusive activities.

- All high pressure lines should be checked prior to and during use.

- The heavy equipment subcontracting company's site supervisor is to provide, during the HASP briefing, a description of cautions to be observed when working around the backhoe.

- Hand signals will be prearranged between the operator and personnel working around the backhoe.

- Personal are to remain in the field of vision of the operator and remain clear of moving parts.

3.2 Chemical Hazards

The primary chemical hazards that may be encountered at the site are from Bunker "C" fuel (fuel oil No. 6) and polychlorinated biphenyls (PCBs). Table 3-1 identifies chemical/physical properties of these two chemicals that may be present during the sampling. A Material Safety Data Sheet is available in Attachment B for these two chemicals.

Other chemical hazards that may be present are from the preservative chemicals that will be in some of the sample containers (such as, hydrochloric acid). An MSDS will be obtained and be available with the field sampling team for all sample preservatives.

4.0 SITE CONTROL

The Site Manager is designated to control access and security on site. The Site Manager will establish site security in accordance with job locations. The following identifies the PPE level assigned to the sampling activities and the site control measures that accompany them. Refer to Section 6.0 for a definition of the protection level requirements.

4.1 Level D

Work Zones for activities conducted in Level D or a modified Level D protection level will be monitored by the SHSO to restrict unauthorized personnel from entering the sampling area during sampling activities.

4.2 Level C

Work zones for activities in Level C protection the boundaries for the following work zones will be defined as follows:

- Work Zone - The area immediately around the sampling area.
- Hotline - The boundary between the Work Zone and the Contaminate Reduction Zone (CRZ).
- CRZ - The area between the Work Zone and the Support Zone (located upwind of the sampling activities).
- Contamination Control Line - The boundary between the CRZ and the Support Zone.
- Support Zone - The outermost area next to the CRZ and upwind of the site investigative activities.

These boundaries will be demarcated using colored boundary tape, cones, natural boundaries, or equivalent .

Unauthorized personnel will not be permitted in the work areas. Personnel are to get permission from the Baker Site Manager prior to entering the work area. The Site Manager will document all personnel that entered the work area in the daily entry in their log books.

5.0 EXPOSURE MONITORING

The following information presents the air monitoring to be performed during the sampling activities. The air monitoring will consist of breathing zone, point source, and perimeter monitoring. Real-time organic vapor monitoring will be conducted using a HNu (PID) with a 10.2 eV probe and an oxygen (O_2) combustible gas monitor. Personal exposure testing is not planned.

5.1 Breathing Zone

The action level to upgrade from Level D to Level C will be a HNu PID reading in the breathing zone of greater than 2 ppm above the background for a period greater than or equal to 1 minute. If breathing zone readings exceed 10 ppm above background continuously for five minutes or longer personnel will stop work, leave the work area, and consult the SHSO.

5.2 Point Source Monitoring

The PID and O_2/combustible indicator will be used to monitor the point source during the sampling as soon as the USTs' lids are removed and during intrusive activities. If the lower explosive limit exceeds 10 percent work activities will be halted until level return to less than 10 percent.

Point source monitoring is defined as monitoring performed at the source of the work activity. If point source PID readings are detected above background, breathing zone monitoring will also be conducted.

5.3 Perimeter Monitoring

A PID will be used to monitor the perimeter of the work area to determine safe areas during a work stoppage if concentrations meet the work stoppage criteria identified in Section 5.1.

5.4 Equipment Calibration

Equipment calibration of the HNu PID will be completed daily before use or if readings appear to be erratic. The calibration will be performed in accordance with the manufacturer's requirements. The calibration information will be logged on a field calibration form. These forms will be placed in the project files upon completion of each quarterly groundwater sampling task.

5.5 Monitoring Documentation

As the air monitoring is performed, documentation of the results will be entered into a field log book by the individual performing the monitoring. Documentation is to include date, time, instrument result, work area, and specific location, such as, background, point source and breathing zone. This air monitoring documentation will be placed in the project files upon completion of site activities.

6.0 PERSONAL PROTECTIVE EQUIPMENT

The Level of Protection selected is based upon the following:

- Measured concentration of a chemical substance or substances in the ambient atmosphere
- Potential for exposure to substances in air, liquids, or direct contact with material because of work activities
- Knowledge of chemicals on-site along with properties such as toxicity, route of exposure, and contaminant matrix

6.1 Levels of Protection

Job Task	Level of Protection				
	A	B	C	D+	D
General Site Activities (such as, Mobilization/Demobilization)					x
UST Sampling				x	
Cooling Water Tunnel Sampling				x	
Surveying					x

x - Level of protection for the task identified

The SHSO will upgrade the level of protection based on the results of air monitoring at worker locations, or based on his or her professional judgement according to observations of site activities.

Protective ensembles are described below:

Level D

- Work clothes
- Work gloves (as needed)
- Steel toe boots
- Safety glasses (as needed)

Modified Level D (D+)

- Work clothes
- Gloves, chemical resistant (nitrile)
- Chemical-resistant clothing (such as polycoated tyvek)
- Steel toe boots
- Boot covers (outer), latex rubber (disposable)
- Safety glasses
- Hard Hat (during heavy equipment activities)

Level C

- Air-purifying respirator, full-face, with organic vapor cartridges (MSHA/NIOSH approved)
- Chemical-resistant clothing (such as polycoated tyvek)
- Gloves (outer), chemical resistant
- Gloves (inner), chemical resistant
- Steel toe boots
- Boot covers (outer), latex rubber (disposable)

CHANGES TO THE SPECIFIED LEVELS OF PROTECTION SHALL BE AT THE DIRECTION OF THE SHSO AND THE SITE MANAGER.

6.2 Reassessment of Protection Program

The Level of Protection shall be upgraded or downgraded based on changes in site conditions or findings of investigations.

7.0 DECONTAMINATION PROCEDURES

The following presents the information for personnel and equipment decontamination requirements.

7.1 Personnel Decontamination

Decontamination involves the orderly, controlled removal of contaminants. Standard decontamination sequences are presented in the table below. All site personnel should minimize contact with contaminants in order to minimize the need for extensive decontamination.

Level C	Level D & D+
1. Equipment drop	1. Equipment drop
2. Outer boot/glove wash	2. Boot/glove wash*
3. Outer boot/glove rinse	3. Boot/glove rinse*
4. Outer boot/glove removal	4. Boot/glove removal*
5. Coverall removal/disposal	5. Coverall removal*
6. Respirator removal	6. Hand/face wash
7. Inner glove removal/disposal	
8. Hand/face wash	
9. Respirator cleaning/sanitizing	

*Optional - depends on degree of contamination and type of PPE Used.

7.2 Equipment Decontamination

The protocols outlined in the project plans for equipment decontamination must be followed to minimize contamination extending beyond the site boundary. Disposable PPE will be bagged for disposal and decontamination fluids will be containerized. The disposal process for the PPE and decontamination fluids will be coordinated with base personnel.

8.0 EMERGENCY PREPAREDNESS AND EVALUATION PROCEDURES (EPEP)

This section defines procedures and response actions to be followed during an emergency at the site. The purpose of the EPEP are to provide pertinent information to personnel involved with, or responding to, emergencies at the site so that emergencies can be mitigated effectively. The EPEP also describes the actions that must be taken and the equipment and facilities that are maintained at the site.

8.1 Pre-Emergency Planning

During the site briefings held periodically all employees will be trained and reminded of the provisions of the emergency response plan, the communications systems, and the evacuation routes. In addition, the fire department will be notified prior to work activities to discuss site locations, work activities, and potential hazards.

8.2 Emergency Coordinator

The SHSO will act as the Emergency Coordinator and is responsible for field implementation of these emergency procedures. The next senior individual will act as the Emergency Coordinator, if the SHSO is unavailable. All site personnel will be notified of their responsibilities by the Emergency Coordinator in an emergency. They will be familiar with the emergency procedures and the Emergency Coordinator's authority.

8.3 Communication Procedures

Personnel at the site will remain in constant communication or within sight of the Site Manager, or his representative. When voice communications are not feasible or appropriate, the following standard hand signals will be used:

- Hand Gripping Throat: Out of air, can't breathe
- Grip partner'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

If voice communication and hand signals are restricted, the Site Manager will identify the site activities that can continue.

Coordination between on-site personnel is the responsibility of the Site Manager. Lines of communication will be secured prior to start-up of site activities.

8.4 Emergency Medical Care

Medical attention requirements will be directed to the local hospital. Personnel will be provided directions to the hospital prior to the start of work activities. The address of the local hospital is:

(NSRR) Naval Hospital
Building 1790
(On-base Telephone No.): 4133

Directions to the base hospital are located on Figure 8-1. Site personnel will be informed of the hospital directions and the hospital route map during the HASP briefing. The hospital map and emergency phone numbers will be maintained in the Baker field vehicle.

Local ambulance service is available from the (NSRR) Naval Hospital and can be reached at Telephone No. 4414 (on-base).

The base hospital and ambulance are to be contacted by the SHSO prior to the start of site activities.

8.5 Emergency Phone Numbers

A list of emergency phone numbers will be available during site activities. This emergency phone numbers list will be placed in a strategic location. Personnel will be informed of the location of the emergency phone numbers and instructed with the procedure for calling. The nearest telephone will be identified prior to starting activities at the site.

Agency/Facility	Phone Number On-Base	Phone Number Off-Base
Security Police	4123	(809) 865-4123
Fire Department	4333	(809) 865-4333
Ambulance	4144	(809) 865-4144
Hospital	4133	(809) 865-4133
General Information	2000	(809) 865-2000
ATSDR	(9) 404-639-0615	(404) 639-0615
On-Scene Commander		*
Florida Poison Information Center	(9) 813-253-4444	(813) 253-4444
Aero Ambulance Transport (Air Lift Emergency)	(9) 809-721-6999 (9) 800-443-8042	(809) 721-6999 (San Juan Office) (800)443-8042 (Fort Lauderdale, Florida)

* Determine phone number from base personnel during mobilization and include in the table.

8.6 Assembly Area

In the event of an emergency, personnel will be instructed before the start of operations to meet upwind of the emergency in a prearranged locations. Further instructions will be given at this point depending on the type of emergency.

8.7 Emergency Alerting

Personnel Injury: Upon occurrence of an injury the injured person will be given first aid, their condition evaluated and emergency medical services secured (the SHSO is certified in First-Aid and CPR). If required, the medical facility will be notified and ambulance support requested. No persons shall re-enter or start-up work at the site until the cause of the injury is determined and corrective procedures implemented (if needed). [If the cause of the injury, or loss of injured personnel, does not affect the safety of site personnel, operations may continue].

Fire/Explosion: Upon notification of a fire or explosion on-site, all site personnel shall move to a safe distance from the area. The fire department shall be summoned. Upon the arrival of the fire department, the SHSO/Site manager will advise the fire commander of the location, nature, and identification of the hazardous materials on-site. If it safe to do so, site personnel may fight a small localized fire with on-site fire extinguishing equipment, and/or remove or isolate flammable or other hazardous materials which might contribute to the fire.

In all situations, when an on-site emergency results in evacuation, the site personnel shall not re-enter until the following conditions have been met:

- The conditions resulting in the emergency have been corrected
- The hazards have been re-assessed, and adjustments in PPE have been specified as needed
- This HASP has been reviewed and amended as needed
- Site personnel have been briefed on changes to this HASP

Reporting: Injury reports will be completed for any accidents no matter how minor the injury might appear. Also, records on equipment failure will also be completed. All injuries resulting in treatment other than first-aid will be reported to the Project Manager and the PHSO within 24 hours.

8.8 Emergency Decontamination

Emergency decontamination will include the following stations*:

Level C	Level D
1. Equipment drop	1. Equipment drop
2. Outer boot/glove removal	2. Boot/glove removal
3. Coverall removal/disposal	3. Coverall removal
4. Respirator removal	

* If circumstances dictate that contaminated clothing cannot be removed, wrap injured personnel with clean garments, blankets, etc., to avoid contaminating other personnel and transportation equipment. Notify the medical facility that injured personnel have not undergone decontamination.

8.9 Personal Protection and Emergency Equipment

PPE available for emergency response will include the same equipment available for Level C protection as identified in Section 6.1.

Emergency and first aid equipment will be available in the Baker field vehicle and include:

- Fire extinguisher
- First aid kit
- Eye wash bottle

9.0 MEDICAL SURVEILLANCE REQUIREMENTS

An essential requirement of health and safety planning for hazardous waste site operations is to ensure that project personnel who might be exposed to materials having potentially adverse and deleterious health effects have been medically examined according to their potential exposures, and are medically certified to work on the site and wear personal protective equipment including respirators.

Each Baker employee will receive a medical examination by, or under the direct supervision of, a licensed physician to meet the requirements of 29 CFR 1910.120(f). Prior to entry onto the sites all personnel will be required to provide medical clearance to the SHSO from their company physician stating that they are physically capable of performing the activities required of them.

10.0 TRAINING AND HAZARD COMMUNICATION REQUIREMENTS

Training requirements for site personnel are outlined in the following subsections.

10.1 General Worker Training

OSHA requires that personnel who will work on-site to be trained according to the requirements of 29 CFR 1910.120. Initial training must be a 40-hour course and three days of actual field experience under the direction of a trained, experienced supervisor. In addition to the initial training, personnel must attend 8-hour annual refresher courses to ensure that personnel retain the basic knowledge necessary for their safety when involved with hazardous waste site operations.

10.2 Supervisor Training

Supervisory personnel must attend 8-hour supervisory training sessions in addition to the basic 40-hour training described above. This training provides instruction in the management aspects of health and safety at hazardous waste sites. The SHSO will be qualified as a supervisor.

10.3 Site Specific Training

The SHSO will brief all individuals who will enter the site on the contents of this HASP. Each individual must certify that he or she has received the briefing, and that he or she understands the health and safety precautions to be taken by signing the Health and Safety Training Record.

10.4 Hazard Communication

In order to comply with 29 CFR 1910.1200, Hazard Communication Standard, the Baker written Hazard Communication Program will be on-site and followed. This program will be reviewed during the HASP briefing.

All containers of hazardous materials received on site will be inspected to ensure the following: (1) all containers will be clearly labeled as to the contents; (2) the appropriate hazard warnings will be noted; (3) the name and address of the manufacturer will be listed.

All secondary containers will be labeled with either an extra copy of the original manufacturer's label or with generic labels which have a block for identity and blocks for the hazard warnings.

Copies of MSDSs for all hazardous chemicals known or suspected to be on site will be maintained in the work area. MSDSs will be available to all employees for review during each work shift.

10.5 Recordkeeping

Training records relevant to safe operation of the site will be maintained by the SHSO for all Baker employees at the site.

11.0 HEALTH AND SAFETY PLAN APPROVAL

This HASP has been reviewed by the following personnel prior to the start of field activities.

Mr. Ronald Krivan	PHSO	Signature
Ms. Coreen Casadei	Project Manager	Signature
Ms. Barbara Cummings	QA/QC Reviewer	Signature

12.0 DECLARATION OF HEALTH AND SAFETY PLAN REVIEW*

All site personnel indicated below have reviewed and are familiar with this HASP for the Naval Station Roosevelt Roads, Puerto Rico Investigation and Characterization of Site 16, SWMU 45.

(Name-Print)	(Company)
(Signature)	(Date/Time)
(Name-Print)	(Company)
(Signature)	(Date/Time)
(Name-Print)	(Company)
(Signature)	(Date/Time)
(Name-Print)	(Company)
(Signature)	(Date/Time)
(Name-Print)	(Company)
(Signature)	(Date/Time)

*Reproduce this page as necessary to accommodate who need to receive training. The signature pages are to remain on-site until demobilization.

ATTACHMENT A

BAKER SAFETY STANDARD OPERATING PROCEDURES

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2.0 - RESPIRATORY PROTECTION PROGRAM

This Respiratory Protection Program presents the elements necessary for administering a successful program. Attached at the end of this program is a copy of the following Baker Environmental, Inc. (Baker) forms:

- Qualitative Respirator Fit Test Record
- Air-Supplying Respirator Inspection Form
- Air-Purifying Respirator Inspection Form

2.1 PURPOSE

The purpose of the Baker Respiratory Protection Program is to govern the selection and use of respiratory protection by Baker personnel. This program is also designed to meet requirements of the Occupational Safety and Health Administration (OSHA) standards 29 CFR 1910.134 and 1926.103, "Respiratory Protection."

2.2 SCOPE

This program applies to Baker SRN personnel including temporarily-assigned SRI and SII personnel who may be involved with potential respiratory hazards as part of their job duties. This program outlines the procedures to follow when respiratory equipment is required.

2.3 RESPONSIBILITY

Baker provides the necessary respiratory equipment to protect the safety and health of each Baker employee. The Baker SRN Project Health and Safety Officer (PHSO) and Project Manager are responsible for identifying the need for this Respiratory Protection Program at project sites. The Baker Site Health and Safety Officer (SHSO) and Site Manager are responsible for implementing and administering the Respiratory Protection Program in the field. Baker employees are to use and maintain the respiratory protection provided in accordance with training received and instructions outlined in this program.

2.4 HAZARD ASSESSMENT

The key elements of a respiratory protection program must start with an assessment of the inhalation and ingestion hazards present in the work area. Because Baker's services involve a variety of environmental and industrial hygiene studies, it is not practical to identify all possible hazards to which all employees could be exposed within the scope of this document. Therefore, it is essential that a task specific assessment be conducted prior to the initiation of any activities on a given project. This task specific assessment shall be part of the site-specific Health and Safety Plan (HASP).

After a task-specific assessment is completed and it is determined that there is a potential for airborne exposure concentrations to exceed the recommended limits, engineering and administrative controls should be implemented. If the exposure cannot be reduced, or it is not feasible to reduce

the airborne exposure below the recommended limits, respirators will be selected by the PHSO and/or SHSO on the basis of:

- Toxicity
- Maximum expected concentration
- Oxygen levels
- Warning properties of the substance(s) involved
- Sorbent limitations
- Facepiece fit
- Mobility requirements
- Type of use (routine, escape, or emergency entry)
- Possibility of ingestion of toxic materials
- Respirator attributes

2.5 TRAINING

Each respirator wearer shall be given training, by a qualified individual, which will include explanations and discussions of:

- Opportunity to wear respiratory protection in an uncontaminated environment.
- Respirator fit testing (qualitative)
- The respiratory hazard(s) and what may occur if the respirator is not used properly.
- The reasons for selecting a particular type of respirator.
- The function, capabilities, and limitations of the selected respirator.
- The method of donning the respirator and checking its fit and operation.
- The proper wearing of the respirator.
- Respirator maintenance, repair, and cleaning.
- Recognizing and handling emergency situations.

Employees who have attended the 40-hour training in accordance with 29 CFR 1910.120 (HAZWOPER) will be provided with the basic information necessary to comply with the OSHA training requirements and will only need to attend a supplementary session provided by qualified Baker personnel. The annual HAZWOPER 8-hour refresher will serve to reinforce these issues on an annual basis. Records of the training and fit-testing will be maintained for a minimum of 30 years following termination of employment for each employee.

2.6 TYPES OF RESPIRATORS

Baker purchases and provides, as necessary, the following respirators:

- North half-face (Model 7700) and full-face (Model 7600) air-purifying respirators

- North positive pressure 30-minute Self-Contained Breathing Apparatus (SCBAs) (Model 800)

- North positive pressure supplied airline respirators with 5-minute escape air cylinders (Model 85500).

- MSA Ultra Twin full-face respirator (Model 480263)

- MSA Comfo II half-face respirator (Model 479529)

Only respiratory equipment certified by the appropriate approval agencies (e.g., NIOSH, MSHA) according to Title 30, Part II of the Code of Federal Regulations, will be distributed to Baker employees. All Baker employees who regularly perform tasks requiring respiratory protection will be issued their own half-face and/or full-face respirator, provided the employee can achieve a proper fit and is medically capable of wearing the equipment.

Because 30-minute SCBAs, positive pressure supplied airline respirators, and 5-minute escape air cylinders are used less frequently, this equipment will be distributed on an as-needed basis.

2.7 AIR QUALITY

Compressed air used for respiration shall be of high purity. Breathing air shall meet at least the requirements of the specification for Grade D Breathing Air (or higher) as described in Compressed Gas Association Commodity Specification G-7.1-1966. Breathing air may be supplied to respirators from cylinders; oxygen must never be used with air-line respirators.

Air cylinders shall be tested and maintained as prescribed in the Shipping Container Specification Regulations of the Department of Transportation (49 CFR Part 178). Air-line couplings shall be incompatible with outlets for other gas systems to prevent inadvertent servicing of air-line respirators with nonrespirable gases or oxygen.

Breathing gas containers (air cylinders) shall be marked in accordance with American National Standard Method of marking Portable Compressed Gas Containers to Identify the Material Contained, A48.1-1954; Federal Specification BB-A-1034a, June 21, 1968, Air, Compressed for Breathing Purposes; or Interim Federal Specification GG-B00675b, April 27, 1965, Breathing Apparatus, Self-Contained.

Breathing air, as supplied by air compressors, shall be of high purity and meet the requirements of the specification for Grade D Breathing air (or higher) as described in Compressed Gas Association Commodity Specification G-7.1-1966.

The compressor for supplying air shall be equipped with necessary safety and standby devices. A breathing air-type compressor shall be used. Compressors shall be constructed and situated so as to avoid entry of contaminated air into the system and suitable in-line air-purifying sorbent beds and filters installed to further assure breathing air quality. A receiver of sufficient capacity to enable the respirator wearer to escape from a contaminated atmosphere in the event of compressor failure, and alarms to indicate compressor failure and overheating shall be installed in the system. If an oil-lubricated compressor is used, it shall have a high-temperature or carbon monoxide alarm, or both. If only a high-temperature alarm is used, the air from the compressor shall be frequently tested for carbon monoxide to insure that it meets the specifications outlined above.

2.8 CLEANING AND MAINTENANCE

Respiratory equipment that is used on an as-needed basis shall be maintained by qualified personnel. This equipment shall be cleaned/sanitized, then rinsed and air-dried, after each use.

Respiratory equipment that has been issued to an employee shall be cleaned/sanitized then rinsed and air-dried by the wearer, (specified by OSHA in 29 CFR 1910.134) which ensures that it will be maintained in clean and good operating condition. Inspections shall be conducted on a regular basis during usage and prior to each project requiring the potential usage of the equipment.

All respirators shall be stored in a plastic bag within a cool/dry location, in a manner that will protect them against dust, sunlight, heat, extreme cold, excessive moisture, or damaging chemicals. They shall be stored to prevent distortion of rubber or other elastomer parts. Cartridges will not be stored while attached to an air-purifying respirator at anytime.

Parts replacement and repairs shall be performed only by appropriate personnel. Equipment requiring repairs shall be reported to appropriate Baker personnel. Examples of inspection forms are included at the end of this text.

2.9 INSPECTIONS

At the time of cleaning, and before and after each use, respirators will be inspected. Deteriorated components will be replaced before the respirator is placed back into service, or the respirator will be replaced. Repair components must be obtained from the manufacturer of the respirator to maintain the NIOSH certification. Emergency-use respirators and self-contained breathing apparatuses (SCBAs) will be inspected after each use or at a minimum, once a month. Sample inspection forms for both air-purifying respirators and air supplying respirators are attached. These forms are required to be completed each time a respirator is inspected. However, during field projects in which a field logbook is in use, personnel may enter the appropriate information into their field logbook as an alternative to the inspection form. A list of the items to be covered during an inspection are as follows:

- Air-Purifying Respirator (full or half-face)
  - Face Piece
    - -- Clean and sanitized?
    - -- Cracks, tears or holes absent?
    - -- Proper shape and flexibility retained?
    - -- Air-purifying element holders intact?
    - -- Stored properly, free from heat, dirt, and sunlight?
  - Headstraps or Headbands
    - -- Signs of wear or tears?
    - -- Buckles function properly?
  - Respirator Interior
    - -- Foreign material under valve seat?
    - -- Cracks or tears in valves/valve bodies?
    - -- Valve covers/bodies installed properly?
- Supplied Air Respirators
  - Cylinder undamaged?
  - Facepiece and hoses undamaged?
  - Connections undamaged?

- Apparatus complete?
- Facemask cleaned and sanitized?
- Hoses and connections cleaned?

Note: The date and the initials of the qualified individual performing the inspection must be entered into the field logbook.

2.10 FIT-TESTING

Each respirator wearer shall be provided with a respirator that can properly form a secure face-to-mask seal. Each wearer shall be fit-tested prior to issuance of the respirator using either an irritant smoke or odorous vapor, or other suitable test agent (see example of form at end of text). Retesting shall be performed, at a minimum, on an annual basis or if a different model respirator, other than the model the wearer was previously fit-tested for, is to be used. Air-purifying respirators fit-tested qualitatively will be assigned a protection factor of 10 (APF = 10). A copy of Baker's Fit-Test Form is attached.

Facial hair, which interferes with the normally effective face to mask seal, is prohibited. Each respirator wearer shall be required to check the seal of the respirator by negative and positive pressure checks prior to entering a harmful atmosphere.

2.11 MEDICAL SURVEILLANCE

Personnel who are or may be assigned to tasks requiring use of respirators shall participate in a medical surveillance program on an annual basis. The medical surveillance program shall include, but may not be limited to, a history of respiratory disease, work history, a physical exam, and spirometry conducted by the company's physician and at the expense of the company. These parameters are conducted prior to fit testing an employee on a negative pressure respirator. Test parameters included in Baker's medical surveillance program are in each site-specific HASP.

2.12 LIMITATIONS

Wearing any respirator, alone or in conjunction with other types of protective equipment, will impose some physiological stress on the wearer. Therefore, selection of respiratory protective devices will be based on the breathing resistance, weight of the respirator, the type and amount of protection needed as well as the individual's tolerance of the given device. Additional concerns regarding the limitations of different types of PPE and the monitoring requirements for heat stress/strain will be addressed in the "Heat Stress" SOP.

2.13 SUBCONTRACTOR REQUIREMENTS

In compliance with Baker's respiratory protection program, all subcontractors under the direction of Baker personnel will be expected to comply with pertinent sections of OSHA Standards 1910.134 and 1926.103. Additionally, the subcontractor will be required to:

- Provide documentation that their employees have been fit-tested on the air-purifying respirator the employee is expected to use.

- Provide documentation that their employees have been medically certified to wear a respirator.

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QUALITATIVE RESPIRATOR FIT TEST RECORD

TEST SUBJECT NAME _____
(last) (first) (initial)

DATE _____ SOCIAL SECURITY NUMBER _____

SEX (M/F) _____ AGE _____ DEPARTMENT _____

RESPIRATOR MEDICAL DATE _____ RESPIRATOR TRAINING DATE _____

SPECIAL/UNUSUAL CONDITIONS/CONSIDERATIONS:

Yes	No		Yes	No	
☐	☐	Claustrophobia	☐	☐	Scars
☐	☐	Facial hair	☐	☐	Broken or crooked nose
☐	☐	Eyeglasses	☐	☐	Extreme facial dimensions
☐	☐	Contacts	☐	☐	Wrinkles
☐	☐	Other: _____			

RESPIRATOR SELECTION

Manufacturer/Model	Size	Style	Result
	S ___ M ___ L ___	Half ___ Full ___	Pass ___ Fail ___
	S ___ M ___ L ___	Half ___ Full ___	Pass ___ Fail ___
	S ___ M ___ L ___	Half ___ Full ___	Pass ___ Fail ___

Testing Agent	Qualitative Test	Sensitivity Check
Isoamyl Acetate	Yes: ___ No: ___	Yes: ___ No: ___
Irritant Smoke	Yes: ___ No: ___	Yes: ___ No: ___
Other: _____	Yes: ___ No: ___	Yes: ___ No: ___

TEST EXERCISES
(Check all that apply)

Normal Breathing	_____	Talking	_____
Deep Breathing	_____	Bending	_____
Head, Side to Side	_____	Jaw Movements	_____
Head, Up and Down	_____	Rainbow Passage	_____

COMMENTS: _____

Signed: _____ (Test Subject)

Signed: _____ (Technician/Instructor)

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AIR-PURIFYING RESPIRATOR INSPECTION FORM

Type (Full or Half-Face)	FACE PIECE					HEADSTRAPS OR HEADBANDS		RESPIRATOR INTERIOR			Inspected By (Initials)	Date Inspected
	Clean and Sanitized?	Cracks, Tears, or Holes?	Proper Shape and Flexibility?	Air Purifying Element Holders Operate Correctly?	Proper Storage Free From Heat, Dirt, Sunlight, etc.?	Signs of Wear or Tear?	Buckles Function Properly?	Foreign Material Under Valve Seat?	Cracks or Tears in Valves or Valve Bodies?	Valve Covers and Bodies in Good Condition and Installed Correctly?		

✓ = OK X = Not OK

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AIR-SUPPLYING RESPIRATOR INSPECTION FORM

Type (SCBA or SAR)	Cylinder Condition (Damaged or Undamaged)	Cylinder (Full or MT)	Facepiece and Hoses (Damaged or Undamaged)	Connections (Damaged or Undamaged)	Apparatus Complete (Yes/No)	Cleaned and Sanitized (Yes/No)	Remarks	Inspected By (Initials)	Date Inspected

3.0 - CARE AND CLEANING OF PERSONAL PROTECTIVE EQUIPMENT

3.1 INTRODUCTION

The following procedures cover the care and cleaning of Levels D, D+, C, and B personal protective equipment (PPE). Note: These are general procedures that apply to most situations and are not all inclusive. Procedures are subject to change at the direction of the Site Health and Safety Officer (SHSO).

3.2 INSPECTION

Proper inspection of personal protective equipment (PPE) features several sequences of inspection depending on articles of PPE and its frequency of use as follows:

- Inspection and operational testing of PPE received from the factory or distributor.
- Inspection of PPE as it is issued to workers.
- Inspection after use or training, and prior to maintenance.
- Periodic inspection of stored equipment.
- Periodic inspection when a question arises concerning the appropriateness of the selected equipment, or when problems with similar equipment arise.

The primary inspection of PPE in use for activities at the site will occur prior to immediate use, will be conducted by the user to ensure that the specific device or article has been checked out by the user, and that the user is familiar with its use.

3.2.1 Chemical Resistant Suit (Levels D+ through B)

- Determine if suit is the one specified in the Site Health and Safety Plan (HASP)
- Before donning, inspect suit for holes or tears; check to see that zippers are operable and look for signs of suit degradation.
- When wearing, avoid contact with contaminated material where possible; be aware of sharp objects that can tear suit; periodically look over suit to check for major rips or tears.
- While decontaminating, remove gross excess of material from suit; remove suit so that material does not contact inner suit; place clothing in properly labeled disposal containers.

3.2.2 Inner/Outer Gloves (Levels D+ through B)

- Determine if gloves meet the specifications in the site HASP.
- Look for rips, tears, or degradation of material. Replace as necessary or at the direction of the SHSO.

3.2.3 Chemically Resistant Boots (Levels D+ through B)

- Determine if boots meet the specifications in the site HASP.
- Nondisposable boots are to be examined on a daily basis before and after use. Disposable boots should be examined prior to donning and while in use, and disposed according to site procedures.

3.2.4 Safety (Steel Toe and/or Shank) Boots (Levels D through B)

- Examine daily for gouges, open seams, etc., anything that would lessen the integrity of the boot. Replace as boot becomes worn.

3.2.5 Hard Hats (Levels D through B)

- Should be visually inspected before donning for fit, cracks, and overall condition.

3.2.6 Safety Glasses/Goggles (Levels D through C)

- Should be visually inspected before donning for cracks, deteriorated parts, and overall condition. Replace as necessary.

3.2.7 Respirators (Levels D+ through B)

- Procedures for care of respiratory protective equipment are covered in Baker's SOP for Respiratory Protection.

3.2.8 Hearing Protection (Levels D through B)

- Disposable - Replace daily, or as material becomes worn or dirty.
- Reusable - Inspect before use, clean regularly, replace parts as necessary.

3.3 EQUIPMENT CLEANING

General procedures for cleaning of equipment are listed below. Site-specific concerns will be addressed by the SHSO prior to and during site activities. Cleaning of respiratory equipment is covered under the "Respiratory Protection Program" SOP.

3.3.1 Gross Physical Removal

Remove large amounts of contaminated soil or sediment by scraping off with a tongue depressor or other suitable instrument, then wipe off using a disposable wipe/paper towel.

3.3.2 Physical/Chemical Removal

Remove residual contamination with a soft-bristled, long-handled brush or equivalent using a nonphosphate detergent solution.

3.3.3 Rinsing/Dilution

The detergent solution and residual contaminants will be rinsed with distilled/tap water using a pressurized sprayer, a tub filled with clean wash water, or equivalent.

3.4 EQUIPMENT STORAGE

Storage of PPE is an important aspect to the daily care and cleaning therefore, the following considerations should be observed:

- Different types of PPE shall be stored in a clean and dry environment, free from elements that could damage PPE.
- PPE shall be stored and labeled so that site personnel can readily select the specified PPE.
- Contaminated, nondisposable PPE shall be decontaminated before returning to the storage area.
- Contaminated, disposable PPE shall not be returned to the storage trailer, but disposed according to the provisions identified in the Site Work Plans.

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4.0 - BLOODBORNE PATHOGENS
(Safe Handling of First Aid Incidents)

4.1 PURPOSE

The purpose of the Occupational Safety and Health Administration (OSHA) Bloodborne Pathogens Standard, Title 29 CFR Part 1910.1030, is to protect workers from bloodborne pathogens such as the (HIV) and (HBV) by reducing or eliminating workers' exposure to blood and other potentially infectious materials. Although HIV and HBV are specifically mentioned by OSHA, the standard includes any bloodborne pathogen, such as Hepatitis C, malaria, and syphilis. The standard requires the employer to develop a written exposure control plan that will reduce or eliminate employee exposure, thus reducing their risk of infection.

The purpose of the Baker Environmental (Baker) exposure control plan is to minimize the possibility of transmission of bloodborne pathogens in the workplace by establishing procedures for the safe handling of first aid incidents that may expose personnel to blood or other potentially infectious materials.

4.2 SCOPE

All Baker SRN personnel who may be exposed to blood or other potentially infectious materials as part of their job duties (e.g., those certified in Standard First Aid) are required to follow the guidelines set forth in this SOP. The exposure control plan shall be reviewed and updated at least annually, to reflect new or modified tasks and procedures that affect occupational exposure, and to reflect new or revised employee positions with occupational exposure.

4.3 RESPONSIBILITY

The Baker Project Health and Safety Office (PHSO) and Project Manager are responsible for providing support and administering this exposure control plan as necessary, from the corporate office. The Baker Site Health and Safety Officer and Site Manager are responsible for implementing this exposure control plan at project sites for their employees.

4.4 DEFINITIONS

Bloodborne Pathogens - Pathogenic microorganisms that may be present in human blood, having the potential to cause disease in humans. Two examples of bloodborne pathogens include, hepatitis B virus (HBV) and human immunodeficiency virus (HIV).

Contaminated - Means the presence or the reasonably anticipated presence of blood or other potentially infectious materials on an item or surface.

Decontamination - Physically or chemically removing, inactivating, or destroying bloodborne pathogens on a surface or item to the point where they are no longer capable of transmitting infectious particles, so that the surface or item is rendered safe for handling, use, or disposal.

Exposure Incident - A specific eye, mouth, other mucous membrane, non-intact skin, or parenteral contact with blood or other potentially infectious materials that result from the performance of an employee's duties.

Occupational Exposure - Reasonably anticipated skin, eye, mouth, mucous membrane, or parenteral contact with blood or other potentially infectious materials that may result from the performance of an employee's duties.

Other Potentially Infectious Materials - Includes the following human body fluids: semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, pericardial fluid, peritoneal fluid, amniotic fluid, saliva in dental procedures, any body fluid that is visibly contaminated with blood, and all body fluids in situations where it is difficult or impossible to differentiate between body fluids; any unfixed tissue or organ (other than intact skin) from a human; and HIV-containing cell or tissue cultures, organ cultures, and HIV- or HBV-containing culture medium or other solutions; and blood, organs, or other tissues from experimental animals infected with HIV or HBV.

Parenteral - Piercing of the mucous membranes or the skin barrier through such events as needlesticks, human bites, cuts, and abrasions.

Regulated Waste - OSHA defines a regulated waste as a liquid or semi-liquid blood or other potentially infectious materials; contaminated items that would release blood or other potentially infectious materials in a liquid state if compressed; items caked with dried blood or other potentially infectious materials that are capable of release of these materials during handling; contaminated sharps; and pathological and microbiological wastes containing blood or other potentially infectious materials.

4.5 PROCEDURES FOR EXPOSURE TO BLOODBORNE PATHOGENS

The sections below will discuss the means by which Baker personnel can determine exposure potential, modes of transmission, methods of compliance, medical monitoring, and post exposure procedures.

4.5.1 Exposure Determination

The exposure determination is based upon the job classifications with occupational exposure potential, and the activities in which these exposures can occur, as follows.

Job Classifications

- Site Manager/Site Safety and Health Officer
- Environmental Scientists
- Geologists
- Other Baker Field Personnel

Exposure Activities

- Response to first aid incidents involving site personnel
- Decontamination of personnel, personal protective equipment, work surfaces, and equipment potentially exposed to blood or other potentially infectious materials

4.5.2 Modes of Virus Transmission in the Workplace

Modes of virus transmission are similar for the viruses of concern. Primarily, virus transmission occurs as the result of direct blood contact from percutaneous inoculation, contact with an open wound, non-intact skin (e.g. chapped, abraded, or dermatitis), or mucous membranes to blood, blood-contaminated body fluids, or concentrated virus. Protective measures for workers will focus on preventing exposure to blood and other body fluids that can result from an injury or sudden illness.

4.5.3 Methods of Compliance

4.5.3.1 Universal Precautions

The unpredictable and emergent nature of exposures likely to be encountered on a site may make differentiation between hazardous body fluids and those that are not hazardous very difficult. Thus, all employees will observe "Universal Precautions" to prevent contact with blood or other potentially infectious materials. These "Universal Precautions" stress that all blood or other potentially infectious materials will be treated as if they are known to be infectious.

The universal precautions will include:

(1) Cover the skin, especially open cuts, scrapes, skin rashes, or other broken skin.

(2) Don't touch objects that could be contaminated, such as blood-covered surfaces, clothing or linens.

(3) Cover mucous membranes (i.e., mouth, nose, and eyes).

(4) Prevent direct contact with sharps, such as needles, scalpels, or broken glass that could pierce or puncture your skin.

(5) Clean and decontaminate surfaces, containers, and equipment that may have been exposed to blood or other body fluids.

4.5.3.2 Standard Work Practices

Standard work practices are to be implemented at all times by all employees who may be exposed to blood or other potentially infectious materials. Work practices are defined as specific policies or procedures whose purpose is to reduce the potential for employee exposure to bloodborne pathogens. Work practices for use by site personnel are described in the balance of this section.

Personal Hygiene

All exposed employees will observe the following hygienic practices:

- During or immediately after exposure to blood or other potentially infectious materials; do not eat, drink, chew gum, chew tobacco, smoke, apply cosmetics, balms or medications, or any other activity that increases the potential for hand-to-mouth, mucous membrane, or skin contact.

- Following exposure to blood or other potentially infectious materials, personnel will wash their hands and any other exposed skin with a disinfectant soap and water after removal of chemical-protective gloves or other personal protective equipment (PPE). This will be performed before eating, urinating, defecating, applying make-up, smoking or undertaking any activity that may result in increased potential for hand to mouth, mucous membrane, or skin contact.

Personal Protective Equipment

The basic premise for wearing the appropriate PPE is that site personnel must be protected from exposure to blood and other potentially infectious materials. Appropriate PPE is available to all site personnel.

Responders to a medical emergencies will have access to the appropriate PPE. The PPE will be present in the site trailer and field vehicles. The PPE should be used in accordance with the level of exposure encountered. Minor lacerations or small amounts of blood do not merit the same extent of PPE use as required for massive arterial bleeding. Management of the patient who is not bleeding, and has no bloody body fluids, should not routinely require the use of PPE.

The following PPE will be present in each Baker Field Vehicle and/or the Baker Site Trailer.

1. Disposable chemical-protective gloves (i.e, nitrile or latex)
2. Resuscitation equipment*
3. Safety glasses, goggles, or faceshields
4. Tyvek® coveralls

* Resuscitation Equipment - Because the risk of salivary transmission of infectious disease during artificial ventilation of trauma victims, pocket mouth-to-mouth resuscitation masks will be present in the first aid kits. The pocket mouth-to-mouth resuscitation masks are designed to isolate response personnel from contact with the victims' blood and blood-contaminated saliva, respiratory secretions, and vomitus.

Decontamination procedures will follow those outlined in each site HASP.

Handling Regulated Wastes

With the exception of contaminated sharps, all other regulated wastes must be placed in closable, color-coded, labeled containers that prevent leakage of fluids. All applicable federal and state regulations must be followed for transporting and disposing of the wastes.

Training and Education

All employees with the potential for occupational exposure will receive initial training on the safe handling of first aid incidents during first aid/CPR Instruction, and subsequently during HASP briefings. See Appendix A for the suggested Bloodborne Pathogens Training Outline.

4.5.4 Medical Monitoring

All Baker personnel will follow the guidelines established by Baker's Board Certified Occupational Health Physician in association with EMR, Inc.

4.5.5 Post-Exposure Procedures and Follow-Up management

The following subsections presents the procedures to follow when a first aid incident occurs involving the presence of blood or other potentially infectious material; specific steps need to be taken to safeguard the health of Baker site personnel.

4.5.5.1 First Aid Incident Report

If there is a reasonable cause to believe that a potential exposure to blood or other potentially infectious materials has been experienced, the employee must complete the steps listed below. These steps are required when non-HBV vaccinated first aid responders participate and regardless of whether an actual "exposure incident" occurred.

1. Immediately notify the SHSO. The SHSO will determine whether an "exposure incident" occurred.

2. Wash area of contamination and remove contaminated clothing to ensure that no further contamination will occur.

3. All parties involved will complete the Supervisors Incident Report Form and the incident will be reported to Baker's Human Resources office.

Baker employees who render first aid where blood or other potentially infectious materials are present must be seen by a designated EMR physician within 24 hours of the incident. The employee must take a copy of the Supervisors Incident Report Form and a copy of OSHA Standard 1910.1030 to the physician.

Employees who respond to first aid incidents involving the presence of blood or other potentially infectious materials where the determination was made that an "exposure incident" occurred, have 90 days following baseline blood level collection to decide if they wish to have their blood tested for HIV.

The confidential medical evaluation and follow-up will include:

1. The circumstances of the exposure.

2. If consent has been obtained testing of the source individual's blood in order to determine HIV and/or HBV infectivity. If consent is not obtained this will be documented in writing.

3. If consent has been obtained, the exposed employee's blood will be tested.

The occupational health physician will provide the employer with a confidential written opinion that includes verification that the employee has been informed of the results of the evaluation and also includes a recommendation for further evaluation or treatment. A copy of this written opinion will be provided within 15 days following the medical evaluation.

4.5.5.2 "Good Samaritan" Behavior

The OSHA standard does not cover "good samaritan" behavior. However, employees who provide first aid as "good samaritans" should receive the same post incident evaluation either through an EMR designated physician or their personal physician.

4.6 REFERENCES

OSHA Title 29 CFR Part 1910.1030

U.S. Department of Labor, U.S. Department of Health and Human Services. Joint Advisory Notice: protection against occupational exposure to Hepatitis B virus and human immunodeficiency virus. Federal Register 1987; 52:41818-24.

Centers for Disease Control. Update on hepatitis B prevention. MMWR 1987; 36:353-360,366.

Centers for Disease Control. Update: Acquired immunodeficiency syndrome and human immunodeficiency virus infection among health- care workers. MMWR 1988; 37:229-34, 239.

OSHA Instruction CPL 2-2.44, February 13, 1992, Enforcement Procedures for the Occupational Exposure to Bloodborne Pathogens Standard.

Appendix A

SUGGESTED BLOODBORNE PATHOGENS TRAINING OUTLINE

I. **Introduction**

- A. Purpose of the training program
- B. Overview: Bloodborne Pathogen Standard 29 CFR 1910.1030
  - 1. Applicability to Site Personnel
  - 2. General requirements
  - 3. Overview of Baker exposure control plan

II. **Bloodborne Diseases**

- A. Types
- B. Modes of Transmission

III. **Baker Exposure Control Plan**

- A. Purpose
- B. Plan availability
- C. Bloodborne pathogen hazard recognition steps
  - 1. Concept of universal precautions
  - 2. Blood and other potentially infectious materials
- D. Potential exposure minimization
  - 1. Work practices
  - 2. Personal protective equipment
  - 3. Hygienic practices
- E. Procedures for decontamination
  - 1. Personnel
  - 2. Personal protective equipment (PPE)
    - a. Tasks and procedures requiring PPE
    - b. Location of PPE
    - c. Disposal of PPE
  - 3. Equipment
  - 4. Work surfaces
- F. Medical monitoring
  - 1. Baker medical monitoring program
  - 2. Post exposure evaluation procedures
    - a. First aid incident report
    - b. HBV and non-HBV vaccinated responders
    - c. Exposure incidents (defined)
    - e. Confidential medical evaluation
- G. Emergency Preparedness
  - 1. First aid kits
  - 2. Personal injury

5.0 - HEAT STRESS

5.1 INTRODUCTION

Heat stress in the hazardous waste industry usually is a result of protective clothing decreasing natural body ventilation, although it may occur at any time work is being performed at elevated temperatures. If the body's physiological processes fail to maintain a normal body temperature because of excessive heat, a number of physiological reactions can occur, ranging from mild (such as fatigue, irritability, anxiety, and decreased concentration, dexterity, or movement) to fatal.

5.2 CAUSES AND SYMPTOMS

The following heat stress causes and symptoms are provided for buddy monitoring purposes. Site personnel must realize that monitoring the physical condition of fellow personnel in Levels D+ through B protective ensembles will be more difficult.

1. *Heat rash* results from continuous exposure to heat or humid air and chafing clothes. The condition decreases the ability to tolerate heat. Symptoms include a mild red rash.

2. *Heat cramps* are caused by heavy sweating and inadequate fluid intake. Symptoms include muscle spasms and pain in the hands, feet, and abdomen.

3. *Heat exhaustion* occurs when body organs attempt to keep the body cool, due to inadequate fluid intake and personnel not acclimated to the environment. Symptoms include pale, cool, moist skin; heavy sweating; dizziness, headaches, and vomiting.

4. *Heat stroke* is the most serious form of heat stress. It is a MEDICAL EMERGENCY. Symptoms are red, hot, dry skin; lack of perspiration; nausea; dizziness and confusion; strong, rapid pulse rate; and coma.

The need to seek medical attention and the urgency in seeking medical attention depends on the symptoms and the severity of the symptoms displayed by the affected individual. If *heat stroke* is noted or suspected, medical attention must be sought IMMEDIATELY. Efforts should be taken to cool the body to prevent serious injury or death.

5.3 PREVENTION

Because heat stress is one of the most common and potentially serious illnesses at hazardous waste sites, regular monitoring and other preventive measures are vital. Site workers must learn to recognize and treat the various forms of heat stress. The best approach is preventive heat stress management. In general:

- Monitor for signs of heat stress.

- Fluid intake should be increased during rest schedules to prevent dehydration. Drinking cool water (maintained at 50 to 60°F) is satisfactory when light sweating occurs and temperatures are moderate to cool; however, diluted electrolyte solutions (i.e., Gatorade, Sqwincher, or equivalent) must be used in addition to water under one or all of the following conditions: continued or heavy sweating, moderate to high ambient temperatures, or heavy work loads. The intake of coffee during working hours is discouraged.

- Acclimate workers to site work conditions by slowly increasing workloads (i.e., do not begin site work activities with extremely demanding activities).

- Use cooling devices to aid natural body ventilation. These devices, however, add weight and their use should be balanced against worker efficiency. An example of a cooling aid is a cooling vest that can be worn under clothing, but not against the skin.

- In extremely hot weather, conduct field activities in the early morning and evening.

- Ensure that adequate shelter is available to protect personnel against heat that can decrease physical efficiency and increase the threat of heat stress. If possible, set up the command post in a shaded area, and encourage breaks in shaded areas.

- In hot weather, rotate shifts of workers wearing impervious clothing.

- Good hygienic standards must be maintained by frequent changes of clothing and showering. Clothing should be permitted to dry during rest periods. Persons who notice skin problems should immediately consult the SHSO.

5.4 MONITORING

Provisions for monitoring for heat stress will be determined by the SHSO and performed as outlined below. Because the incidence of heat stress depends on a variety of factors, all workers, even those not wearing protective equipment, should be monitored.

5.4.1 Monitoring for Permeable Clothing

For workers wearing permeable clothing (e.g., standard cotton or synthetic work clothes), follow recommendations for monitoring requirements and suggested work/rest schedules in the current American Conference of Governmental Industrial Hygienists' (ACGIH) Threshold Limit Values for Heat Stress. If the actual clothing work differs from the ACGIH standard ensemble in insulation value and/or wind and vapor permeability, change the monitoring requirements and work/rest schedules accordingly.

The guidelines to follow for workers above as determined by the SHSO are as follows:

1. Increased awareness of heat stress symptoms and buddy monitoring.

2. Fluid intake discipline.

3. Self monitoring of urine output quantities to prevent dehydration.

4. Attention to work-rest intervals.

5. Calculate the Heat Exposure Threshold Limit Value (TLV) for work-rest intervals using the following steps:

   a. Determine the Wet Bulb Globe Temperature (WBGT) Index using the Quest® Heat Stress Monitor.

   b. Estimate the work load using the following guidelines:

      (1) Light work = sitting or standing to control machines, performing light hand or arm work.

      (2) Moderate work = walking about with moderated lifting and pushing.

      (3) Heavy work = pick and shovel work.

   c. Evaluate the calculations against the following Heat Exposure TLVs* in °C or (°F).

Work - Rest Regimen	Work Load		
	Light	Moderate	Heavy
Continuous work	30.0 (86)	26.7 (80)	25.0 (77)
75% work - 25% rest, each hour	30.6 (87)	28.0 (82)	25.9 (78)
50% work - 50% rest, each hour	31.4 (89)	29.4 (85)	27.9 (82)
25% work - 75% rest, each hour	32.2 (90)	31.1 (88)	30.0 (86)

Special Considerations

- Acclimatization - After approximately one to two weeks, workers should be acclimated to their environment.

- Fitness - Physically fit workers will adjust more readily to a change in environment.

- Medication - Some medications can predispose individuals to heat-induced illnesses.

5.4.2 Semipermeable/Impermeable Clothing Monitoring

For workers wearing semipermeable or impermeable clothing encapsulating ensembles, the ACGIH standard cannot be used. For these situations, workers should be monitored when the temperature in the work area is above 70°F (21°C).

To monitor the worker, use one or more of the following methods:

- Heart rate. Count the radial pulse during a 30-second period as early as possible in the rest period.
  - If the heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the next work cycle by one-third and keep the rest period the same.
  - If the heart rate still exceeds 110 beats per minute at the next rest period, shorten the following work cycle by one-third.
- Oral temperature. Use a clinical thermometer (3 minutes under the tongue) or similar device to measure the oral temperature at the end of the work period (before drinking).
  - If oral temperature exceeds 99.6°F (37.6°C), shorten the next work cycle by one-third without changing the rest period.
  - If oral temperatures still exceeds 99.6°F (37.6°C) at the beginning of the next rest period, shorten the following work cycle by one-third.
  - Do not permit a worker to wear a semipermeable or impermeable garment when his/her oral temperature exceeds 100.6°F (38.1°C).
- Body water loss. Measure weight on a scale accurate to ±0.25 pound at the beginning and end of each work day to see if enough fluids are being taken to prevent dehydration. Weights should be taken while the employee wears similar clothing or preferably in underwear only. The body water loss should not exceed 1.5 percent total body weight loss in a work day.

Initially, the frequency of physiological monitoring depends on the air temperature adjusted for solar radiation and the level of physical work. The length of work cycle will be governed by the frequency of the required physiological monitoring.

5.5 CARING FOR HEAT-RELATED ILLNESS

To care for heat-related illness provide the following:

- Remove victim from heat.
- Loosen tight clothing.

- Apply cool, wet cloths to the skin.
- Fan the victim.
- If victim is conscious, give cool water to drink.
- Call for an ambulance or transport to hospital if heat stroke is suspected, victim refuses water, vomits, or starts to lose consciousness.

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AIR-PURIFYING RESPIRATOR INSPECTION FORM

Type (Full or Half-Face)	FACE PIECE					HEADSTRAPS OR HEADBANDS		RESPIRATOR INTERIOR			Inspected By (Initials)	Date Inspected
	Clean and Sanitized?	Cracks, Tears, or Holes?	Proper Shape and Flexibility?	Air Purifying Element Holders Operate Correctly?	Proper Storage Free From Heat, Dirt, Sunlight, etc.?	Signs of Wear or Tear?	Buckles Function Properly?	Foreign Material Under Valve Seat?	Cracks or Tears in Valves or Valve Bodies?	Valve Covers and Bodies in Good Condition and Installed Correctly?		

√ = OK
X = Not OK

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AIR-SUPPLYING RESPIRATOR INSPECTION FORM

Type (SCBA or SAR)	Cylinder Condition (Damaged or Undamaged)	Cylinder (Full or MT)	Facepiece and Hoses (Damaged or Undamaged)	Connections (Damaged or Undamaged)	Apparatus Complete (Yes/No)	Cleaned and Sanitized (Yes/No)	Remarks	Inspected By (Initials)	Date Inspected

* "MT" = Empty

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QUALITATIVE RESPIRATOR FIT TEST RECORD

TEST SUBJECT NAME _____
(last) (first) (initial)

DATE _____ SOCIAL SECURITY NUMBER _____

SEX (M/F) _____ AGE _____ DEPARTMENT _____

RESPIRATOR MEDICAL DATE _____ RESPIRATOR TRAINING DATE _____

SPECIAL/UNUSUAL CONDITIONS/CONSIDERATIONS:

Yes	No		Yes	No	
☐	☐	Claustrophobia	☐	☐	Scars
☐	☐	Facial hair	☐	☐	Broken or crooked nose
☐	☐	Eyeglasses	☐	☐	Extreme facial dimensions
☐	☐	Contacts	☐	☐	Wrinkles
☐	☐	Other: _____			

RESPIRATOR SELECTION

Manufacturer/Model	Size	Style	Result
	S ___ M ___ L ___	Half ___ Full ___	Pass ___ Fail ___
	S ___ M ___ L ___	Half ___ Full ___	Pass ___ Fail ___
	S ___ M ___ L ___	Half ___ Full ___	Pass ___ Fail ___

Testing Agent	Qualitative Test	Sensitivity Check
Isoamyl Acetate	Yes: ___ No: ___	Yes: ___ No: ___
Irritant Smoke	Yes: ___ No: ___	Yes: ___ No: ___
Other: _____	Yes: ___ No: ___	Yes: ___ No: ___

TEST EXERCISES
(Check all that apply)

Normal Breathing	_____	Talking	_____
Deep Breathing	_____	Bending	_____
Head, Side to Side	_____	Jaw Movements	_____
Head, Up and Down	_____	Rainbow Passage	_____

COMMENTS: _____

_____

Signed: _____ Signed: _____
(Test Subject) (Technician/Instructor)

ATTACHMENT B
MATERIAL SAFETY DATA SHEETS

Genium Publishing Corporation
1145 Catalyn Street
Schenectady, NY 12303-1836 USA
(518) 377-8854

Material Safety Data Sheets Collection:

Sheet No. 474
Fuel Oil No. 6

Issued: 10/81 Revision: A, 11/90

Section 1. Material Identification 33

Fuel Oil No. 6 Description: A high-viscosity residual oil. Used to power heavy units such as ships, trucks, and trains. A thick paste, fuel oil No. 6 is not usually used unless preheated to decrease its viscosity.
Other Designations: CAS No. 68553-00-4, bunker C.
Manufacturer: Contact your supplier or distributor. Consult the latest *Chemicalweek Buyers' Guide*(73) for a suppliers list.

R	1
I	-
S	2
K	2

NFPA

HMIS
H 0
F 2
R 0
PPG*
* Sec. 8

Cautions: Fuel oil No. 6 is a respiratory irritant and central nervous system (CNS) depressant. It is a moderate fire hazard when exposed to heat or flame.

Section 2. Ingredients and Occupational Exposure Limits

Fuel oil No. 6*

1989 OSHA PEL	1990-91 ACGIH TLV	1988 NIOSH REL	1985-86 Toxicity Data†
None established	None established	None established	Rat, oral, LD_{50}: 9 g/kg

* A complex mixture of paraffinic, olefinic, naphthenic, and aromatic hydrocarbons, including polycyclic aromatic hydrocarbons. Sulfur content is <2.8%. A fuel oil No. 6 with low sulfur (0.2 and 1.2%) is commercially available.
† Monitor NIOSH, *RTECS* (HZ1800000), for future toxicity data.

Section 3. Physical Data

Boiling Point: 500 °F (>260 °C)
Vapor Pressure: 0.2 mm Hg at 70 °F (21 °C)
Viscosity: 36,000 centistoke at 100 °F (37.8 °C)
Specific Gravity: ~0.966
Water Solubility: Insoluble
Appearance and Odor: Black liquid to heavy paste with a petroleum odor.

Section 4. Fire and Explosion Data

Flash Point: 150 to 270 °F (66 to 132 °C)	Autoignition Temperature: 765 °F (407 °C)	LEL: 3.9% v/v	UEL: 20.1% v/v

Extinguishing Media: Use dry chemical, carbon dioxide, foam, water fog, or spray. Do not use a forced water spray directly on burning oil since this scatters the fire. Use a smothering technique to extinguish fire. Cool fire-exposed containers with water spray.
Unusual Fire or Explosion Hazards: Fuel oil No. 6 is an OSHA Class IIIA combustible liquid that exhibits "boil-over" characteristics.
Special Fire-fighting Procedures: Isolate hazard area and deny entry. Since fire may produce toxic fumes, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in pressure-demand or positive-pressure mode and full protective clothing. If feasible, remove containers from fire hazard area. Be aware of runoff from fire control methods. Do not release to sewers or waterways.

Section 5. Reactivity Data

Stability/Polymerization: Fuel oil No. 6 is stable at room temperature in closed containers under normal storage and handling conditions. Hazardous polymerization cannot occur.
Chemical Incompatibilities: Incompatible with strong oxidizing agents; heating greatly increases fire hazard.
Conditions to Avoid: Avoid heat and ignition sources.
Hazardous Products of Decomposition: Thermal oxidative decomposition of fuel oil No. 6 can produce various hydrocarbons and hydrocarbon derivatives and partial oxidation products including carbon dioxide, carbon monoxide, and sulfur dioxide.

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Section 6. Health Hazard Data

rcinogenicity: The IARC lists fuel oils, residual (heavy) as possible human carcinogen (Group 2B); animal evidence-limited.
mmary of Risks: Residual oils are generally more viscous and less toxic than kerosene due to their low volatility and limited absorption rough the intestinal tract. Inhalation of heated or misted fuel oil No. 6 can cause the same systemic and local pulmonary effects seen with lighter grade fuel oils, respiratory tract irritation, headache, dizziness, nausea, stupor, convulsions, or unconsciousness, depending on concentration and time of exposure. When removed from exposure area, affected persons usually experience complete recovery. The residual (heavy) oils have a lower aspiration hazard since heavy oils are more viscous. Aspiration is limited to inhalation from vomiting after ingestion and dilution with gastric contents. Significant ingestion is unlikely. In addition, intestinal absorption of long-chain hydrocarbons is low. Its primary toxicities, then, are its laxative effect, mild gastrointestinal (GI) irritation, and skin irritation. After prolonged skin contact, changes in rabbit bladder linings are reported. Prolonged or repeated skin contact may cause irritation and block the sebaceous glands, with a rash of acne-like pimples and spots, usually on the arms and legs. Repeated prolonged dermal contact may also have systemic effects. Heavy repeated application of fuel oil No. 6 to rabbit skin gave severe skin changes and systemic toxicity including an increased incidence of hyperplasia of the urinary bladder epithelium.*
Medical Conditions Aggravated by Long-Term Exposure: None reported.
Target Organs: Central nervous system (CNS), skin, and mucous membranes.
Primary Entry Routes: Inhalation, ingestion.
Acute Effects: Systemic effects from ingestion include gastrointestinal (GI) irritation, vomiting, diarrhea, and in severe cases, CNS depression, progressing to coma and death. Inhalation of aerosol or mists may result in increased rate of respiration, tachycardia (excessively rapid heart beat), and cyanosis (dark purplish coloration of the skin and mucous membranes caused by deficient oxygentation of the blood).
Chronic Effects: Repeated skin contact causes dermatitis and possible systemic toxicity.
FIRST AID
Eyes: Gently lift the eyelids and flush immediately and continuously with flooding amounts of water until transported to an emergency medical facility. Consult a physician immediately.
Skin: *Quickly* remove contaminated clothing. Rinse with flooding amounts of water for at least 15 min. For reddened or blistered skin, consult a physician. Wash affected area with soap and water.
Inhalation: Remove exposed person to fresh air and support breathing as needed.
Ingestion: Never give anything by mouth to an unconscious or convulsing person. If ingested, *do not induce vomiting*. Consulting a physician immediately.
After first aid, get appropriate in-plant, paramedic, or community medical support.
Note to Physicians: Gastric lavage is contraindicated due to aspiration hazard. Preferred antidotes are charcoal and milk.

* EPA (TOSCA) document 8EHQ-0181-0377, December, 1980.

Section 7. Spill, Leak, and Disposal Procedures

Spill/Leak: Notify safety personnel, evacuate area for large spills, remove all heat and ignition sources, and provide maximum explosion-proof ventilation. Cleanup personnel should protect against vapor inhalation and liquid contact. Clean up spills promptly to reduce fire or vapor hazards. Use a noncombustible absorbent material to pick up small spills or residues. For large spills, dike far ahead to contain. Pick up liquid for reclaim or disposal. Do not release to sewers or waterways due to health and fire and/or explosion hazard. Follow applicable OSHA regulations (29 CFR 1910.120). Report large oil spills.
Disposal: Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.
PA Designations
CRA Hazardous Waste (40 CFR 261.33): Not listed
CERCLA Hazardous Substance (40 CFR 302.4): Not listed
SARA Extremely Hazardous Substance (40 CFR 355): Not listed
SARA Toxic Chemical (40 CFR 372.65): Not listed
OSHA Designations
Air Contaminant (29 CFR 1910.1000, Subpart Z): Not listed

Section 8. Special Protection Data

Goggles: Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133).
Respirator: Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, use a NIOSH-approved respirator with mist filter and organic vapor cartridge. For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA. *Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.*
Other: Wear impervious gloves, boots, aprons, and gauntlets to prevent skin contact.
Ventilation: Provide general and local explosion-proof ventilation systems to maintain airborne concentrations that promote worker safety and productivity. Local exhaust ventilation is preferred since it prevents contaminant dispersion into the work area by controlling it at its source.[103]
Safety Stations: Make available in the work area emergency eyewash stations, safety/quick-drench showers, and washing facilities.
Contaminated Equipment: Never wear contact lenses in the work area: soft lenses may absorb, and all lenses concentrate, irritants. Remove this material from your shoes and equipment. Launder contaminated clothing before wearing.
Comments: Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9. Special Precautions and Comments

Storage Requirements: Use and storage conditions should be suitable for an OSHA Class IIIA combustible liquid. Store in closed containers in a well-ventilated area away from heat and ignition sources and strong oxidizing agents. Protect containers from physical damage. To prevent static sparks, electrically ground and bond all containers and equipment used in shipping, receiving, or transferring operations. Use nonsparking tools and explosion-proof electrical equipment. No smoking in area of storage or use.
Engineering Controls: Avoid prolonged skin contact and vapor or mist inhalation. Use only in a well-ventilated area with personal protective gear. Institute a respiratory protection program that includes regular training, maintenance, inspection, and evaluation. Practice good personal hygiene and housekeeping procedures. Do not wear oil-contaminated clothing. Do not put oily rags in pockets. When working with this material, wear gloves or use barrier cream.

Transportation Data (49 CFR 172.101)
DOT Shipping Name: Fuel oil
DOT Hazard Class: Combustible liquid
ID No.: NA1993
DOT Label: None
DOT Packaging Exceptions: 173.118a
DOT Packaging Requirements: None

MSDS Collection References: 1, 6, 7, 12, 73, 84, 103, 126, 131, 132, 133, 136, 143
Prepared by: MJ Allison, BS; Industrial Hygiene Review: DJ Wilson, CIH; Medical Review: W Silverman, MD; Edited by: JR Stuart, MS

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Material Safety Data Sheets Collection:

Sheet No. 683
Polychlorinated Biphenyls (PCBs)

Issued: 11/88 Revision: A, 9/92

Section 1. Material Identification

Polychlorinated Biphenyls [$C_{12}H_{10-n}Cl_n$ (n=3, 4, 5)] Description: A class of nonpolar chlorinated hydrocarbons with a biphenyl nucleus (two benzene nuclei connected by a single C-C bond) in which any or all of the hydrogen atoms have been replaced by chlorine. Commercial PCBs are mixtures of chlorinated biphenyl isomers with varying degrees of chlorination. Prepared industrially by the chlorination of biphenyl with anhydrous chlorine in the presence of a catalyst such as ferric chloride or iron filings. Except for limited research and development applications, PCBs have not been produced in the US since 1977. When large quantities of PCBs were manufactured in the US, they were marketed under the tradename Aroclor (Monsanto) and were characterized by four digit numbers. The first two digits indicating biphenyls (12), triphenyls (54), or both (25, 44); the last two digits indicating the weight percent of chlorine. PCBs' thermal stability, nonflammability, and high dielectric capability made them very useful in electrical equipment. Formerly used as additives in hydraulic fluids, heat transfer systems, lubricants, cutting oils, printer's ink, fire retardants, asphalt, brake linings, automobile body sealants, plasticizers, adhesives, synthetic rubber, floor tile, wax extenders, dedusting agents, pesticide extenders, and carbonless reproducing paper. PCBs are still used in certain existing electrical capacitors and transformers that require enhanced electrical protection to avoid heating from sustained electric faults.

Other Designations: CAS No. 1336-36-3, Aroclor, Clophen, Chlorextol, chlorinated biphenyls, chlorinated diphenyl, chlorinated diphenylene, chloro biphenyl, chloro-1,1-biphenyl, Dykanol, Fenclor, Inerteen, Kaneclor, Montar, Noflamol, Phenoclor, Pyralene, Pyranol, Santotherm, Sovol, Therminol FR-1

R 1
I 4
S 3*
K 1
* Skin absorption

NFPA
1 2 0 –

HMIS
H 2‡
F 1
R 0
PPE†
† Sec. 8
‡ Chronic Effects

Cautions: PCBs are potent liver toxins that may be absorbed through skin. Potentially, chronic or delayed toxicity is significant because PCBs accumulate in fatty tissue and may reasonably be anticipated to be carcinogens. PCBs are a bioaccumulative environmental hazard. When burned, decomposition products may be more hazardous than the PCBs.

Section 2. Ingredients and Occupational Exposure Limits

PCBs, contain various levels of polychlorinated dibenzofurans and chlorinated naphthalenes as contaminants

1991 OSHA PELs, Skin
8-hr TWA (Chlorodiphenyl, 42% chlorine): 1 mg/m^3
8-hr TWA (Chlorodiphenyl, 54% chlorine): 0.5 mg/m^3

1990 DFG (Germany) MAK, Danger of Cutaneous Absorption
TWA (Chlorodiphenyl, 42% chlorine): 0.1 ppm (1 mg/m^3)
Category III: Substances with systemic effects, onset of effect > 2 hr., half-life > shift length (strongly cumulative)
Short-term Level: 1 ppm, 30 min., average value, 1 per shift
TWA (Chlorodiphenyl, 54% chlorine): 0.05 ppm (0.5 mg/m^3)
Category III: (see above)
Short-term Level: 0.5 ppm, 30 min., average value, 1 per shift

1985-86 Toxicity Data*
Rat, oral, TD: 1250 mg/kg administered intermittently for 25 weeks produced liver tumors.
Mammal, oral, TD_{Lo}: 325 mg/kg administered to female for 30 days prior to mating and from the 1st to the 36th day of gestation produced effects on newborn (stillbirth; live birth index; viability index).

1990 NIOSH REL
TWA (Chlorodiphenyl, 42% chlorine): 0.001 mg/m^3
TWA (Chlorodiphenyl, 54% chlorine): 0.001 mg/m^3

1992-93 ACGIH TLVs, Skin *
TWA (Chlorodiphenyl, 42% chlorine): 1 mg/m^3
TWA (Chlorodiphenyl, 54% chlorine): 0.5 mg/m^3

* These guidelines offer reasonably good protection against systemic intoxication, but may not guarantee that chloroacne won't occur.
† See NIOSH, *RTECS* (TQ1350000), for additional reproductive, tumorigenic, and toxicity data.

Section 3. Physical Data*

Boiling Point: 644-707 °F (340-375 °C)
Melting Point: 42%: -2.2 °F (-19°C); 54%: 14 °F (-10 °C)
Vapor Pressure: 1 mm Hg at 100 °F (38 °C); 10^{-6} to 10^{-3} mm at 20 °C
Molecular Weight: 188.7 to 398.5
Specific Gravity: 1.3 to 1.8 at 20 °C
Water Solubility: Low solubility (0.007 to 5.9 mg/L)
Other Solubilities: Most common organic solvents, oils, and fats; slightly soluble in glycerol and glycols.

Appearance and Odor: PCBs vary from mobile oily liquids to white crystalline solids and hard non-crystalline resins, depending upon chlorine content.

* Physical and chemical properties vary widely according to degree and to the position of chlorination.

Section 4. Fire and Explosion Data

Flash Point: 286-385 °F (141-196 °C) OC*	Autoignition Temperature: 464 °F (240 °C)	LEL: None reported	UEL: None reported

Extinguishing Media: Use extinguishing media suitable to the surrounding fire. Use dry chemical, foam, carbon dioxide (CO_2), or water spray. Water spray may be ineffective. Use water spray to cool fire-exposed containers or transformers. Do not scatter PCBs with high-pressure water streams. **Unusual Fire or Explosion Hazards:** Combustion products (hydrogen chloride, phosgene, polychlorinated dibenzofurans, and furans) are more hazardous than the PCBs themselves. **Special Fire-fighting Procedures:** Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in pressure-demand or positive-pressure mode. Approach fire from upwind to avoid highly toxic decomposition products. Structural firefighter's protective clothing will provide *limited* protection. Do not release runoff from fire control methods to sewers or waterways. Dike for later disposal.

* Flash points shown are a range for various PCBs. Some forms do not have flash points.

Section 5. Reactivity Data

Stability/Polymerization: PCBs are very stable materials but are subject to photodechlorination when exposed to sunlight or UV (spectral region above 290 nanometers). Hazardous polymerization cannot occur. **Chemical Incompatibilities:** PCBs are chemically inert and resistant to oxidation, acids, and bases. **Conditions to Avoid:** Avoid heat and ignition sources.
Hazardous Products of Decomposition: Thermal oxidative decomposition [1112-1202 °F (600-650 °C)] of PCBs can produce highly toxic derivatives, including polychlorinated dibenzo-para-dioxins (PCDDs), polychlorinated dibenzofurans (PCDFs), hydrogen chloride, phosgene and other irritants.

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Section 6. Health Hazard Data

Carcinogenicity: The IARC,[164] and NTP[169] list PCBs as an IARC probable carcinogen (overall evaluation is 2A; limited human data; sufficient imal data) and NTP anticipated carcinogen, respectively. **Summary of Risks:** PCBs are potent liver toxins that can be absorbed through broken skin in toxic amounts without immediate pain or irritation. PCBs have low acute toxicity, but can accumulate in fatty tissue and severe ..ealth effects may develop later. Generally, toxicity increases with a higher chlorine content; PCB-oxides are more toxic. The toxic action on the liver also increases with simultaneous exposure to other liver toxins, e.g. chlorinated solvents, alcohol, and certain drugs. Pathological pregnancies (abnormal pigmentations, abortions, stillbirths, and underweight births) have been associated with increased PCB serum levels in mothers; PCBs can be passed in breast milk. PCBs can affect the reproductive system of adults. **Medical Conditions Aggravated by Long-Term Exposure:** Skin, liver, and respiratory disease. **Target Organs:** Skin, liver, eyes, mucous membranes, and respiratory tract. **Primary Entry Routes:** Inhalation, dermal contact, ingestion. **Acute Effects:** Exposure to PCB vapor or mist is severely irritating to the skin, eyes, nose, throat, and upper respiratory tract. Intense acute exposure to high concentrations may result in eye, lung, and liver injury. Systemic effects include nausea, vomiting, increased blood pressure, fatigue, weight loss, jaundice, edema and abdominal pain. Cognitive, neurobehavior and psychomotor impairment and memory loss have also been seen after acute exposure. **Chronic Effects:** Repeated exposure to PCBs can cause chloroacne; redness, swelling, dryness, thickening and darkening of the skin and nails; swelling and burning of the eyes, and excessive eye discharge; distinctive hair follicles; gastrointestinal disturbances; neurological symptoms including headache, dizziness, depression, nervousness, numbness of the extremities, and joint and muscle pain; liver enlargement; menstrual changes in women; and chronic bronchitis. Cancer, primarily liver, is also a possible result of exposure, but data is inconclusive.

FIRST AID **Eyes:** *Do not* allow victim to rub or keep eyes tightly shut. Rinsing eyes with medical oil (olive, mineral) initially may remove PCB and halt irritation better than water rinsing alone. Gently lift eyelids and flush immediately and continuously with flooding amounts of water until transported to an emergency medical facility. Consult a physician immediately. **Skin:** *Quickly* remove contaminated clothing. Rinse with flooding amounts of water for at least 15 min. Wash exposed area with soap and water. *Multiple soap and water washings are necessary.* Avoid the use of organic solvents to clean the skin. For reddened or blistered skin, consult a physician. **Inhalation:** Remove exposed person to fresh air and support breathing as needed. **Ingestion:** In most cases, accidental PCB ingestion will not be recognized until long after vomiting would be of any value. Never give anything by mouth to an unconscious or convulsing person. Vomiting of the pure substance may cause aspiration. Consult a physician. **Note to Physicians:** Monitor patients for increased hepatic enzymes, chloroacne, and eye, gastrointestinal, and neurologic symptoms listed above. Diagnostic tests include blood levels of PCBs and altered liver enzymes.

Section 7. Spill, Leak, and Disposal Procedures

Spill/Leak: Notify safety personnel, evacuate all unnecessary personnel, provide adequate ventilation, and isolate hazard area. Cleanup personnel should protect against vapor inhalation and skin or eye contact. For small spills, take up with sand or other noncombustible material and place into containers for later disposal. For larger spills, dike far ahead of spill to contain for later disposal. Follow applicable OSHA regulations (29 CFR 1910.120). **Environmental Transport:** PCBs have been shown to bio-concentrate significantly in aquatic organisms. **Ecotoxicity:** Bluegill, TLm: 0.278 ppm/96 hr. Mallard Duck, LD_{50}: 2000 ppm. **Environmental Degradation:** In general, the persistence of PCBs increases with an increase degree of chlorination. **Soil Absorption/Mobility:** PCBs are tightly absorbed in soil and generally do not leach significantly in most aqueous soil systems. However, in the presence of organic solvents, PCBs may leach rapidly through the soil. Volatilization of PCBs from soil may be slow, but over time may be significant. **Disposal:** Approved PCB disposal methods include: incineration with scrubbing, high-efficiency boilers, landfills, and EPA-approved alternative disposal methods. Each disposal method has various criteria. Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

EPA Designations
RCRA Hazardous Waste (40 CFR 261.33): Not listed
SARA Extremely Hazardous Substance (40 CFR 355): Not listed
Listed as a SARA Toxic Chemical (40 CFR 372.65)
Listed as a CERCLA Hazardous Substance* (40 CFR 302.4): Final Reportable Quantity (RQ), 1 lb (0.454 kg) [* per CWA, Sec. 311(b)(4) and 307(a)]

OSHA Designations
Listed as an Air Contaminant (29 CFR 1910.1000, Table Z-1-A)

Section 8. Special Protection Data

Goggles: Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133). Because contact lens use in industry is controversial, establish your own policy. **Respirator:** Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a MSHA/NIOSH-approved respirator. Select respirator based on its suitability to provide adequate worker protection for given working conditions, level of airborne contamination, and presence of sufficient oxygen. Minimum respiratory protection should include a combination dust-fume-mist and organic vapor cartridge or canister or air-supplied, depending upon the situation. For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA. *Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.* If respirators are used, OSHA requires a written respiratory protection program that includes at least: medical certification, training, fit-testing, periodic environmental monitoring, maintenance, inspection, cleaning, and convenient, sanitary storage areas. **Other:** Wear chemically protective gloves, boots, aprons, and gauntlets to prevent all skin contact. Butyl rubber, neoprene, Teflon, and fluorocarbon rubber have break through times greater than 8 hrs. **Ventilation:** Provide general and local exhaust ventilation systems to maintain airborne concentrations below the OSHA PEL (Sec. 2). Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its source.[103] **Safety Stations:** Make available in the work area emergency eyewash stations, safety/quick-drench showers, and washing facilities. **Contaminated Equipment:** Separate contaminated work clothes from street clothes and launder before reuse. Segregate contaminated clothing in such a manner so that there is no direct contact by laundry personnel. Implement quality assurance to ascertain the completeness of the cleaning procedures. Remove this material from your shoes and clean PPE. **Comments:** Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9. Special Precautions and Comments

Storage Requirements: Store in a closed, labelled, container in a ventilated area with appropriate air pollution control equipment. **Engineering Controls:** To reduce potential health hazards, use sufficient dilution or local exhaust ventilation to control airborne contaminants and to maintain concentrations at the lowest practical level. **Administrative Controls:** Inform employees of the adverse health effects associated with PCBs. Limit access to PCB work areas to authorized personnel. Consider preplacement and periodic medical examinations with emphasis on the skin, liver, lung, and reproductive system. Monitor PCB blood levels. Consider possible effects on the fetus. Keep medical records for the entire length of employment and for the following 30 yrs.

Transportation Data (49 CFR 172.101)

DOT Shipping Name: Polychlorinated biphenyls
DOT Hazard Class: 9
ID No.: UN2315
DOT Packing Group: II
DOT Label: CLASS 9
Special Provisions (172.102): 9, N81

Packaging Authorizations
a) Exceptions: 173.155
b) Non-bulk Packaging: 173.202
c) Bulk Packaging: 173.241

Quantity Limitations
a) Passenger Aircraft or Railcar: 100 L
b) Cargo Aircraft Only: 220 L

Vessel Stowage Requirements
a) Vessel Stowage: A
b) Other: 34

MSDS Collection References: 26, 73, 89, 100, 101, 103, 124, 126, 127, 132, 133, 136, 163, 164, 168, 169, 174, 175, 180
Prepared by: MJ Wurth, BS; Industrial Hygiene Review: PA Roy MPH, CIH; Medical Review: AC Darlington, MD

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SECTION 3.0 TABLES

TABLE 3-1

TOXICOLOGICAL PROPERTIES OF CHEMICALS
INVESTIGATION AND CHARACTERIZATION OF SITE 16, SWMU 45
NAVAL STATION ROOSEVELT ROADS
PUERTO RICO

Chemical Compound (a)	Hazard Rating (b) H F R	Volatility (c)	Skin Absorption (d)	Carcinogen (e)	Exposure Limit (f)	STEL (g)	IDLH (h)	IP (i)
Fuel Oil No. 6	0 2 0	0.02	No	Yes	-	-	-	<10.2
PCB	2 1 0	0.005 mm @ 100° C	No	Yes	0.5 mg/m^3	-	-	-

Notes:

(a) Chemical compound of potential concern obtained from previous investigation.
(b) Hazard Rating - based upon Health (H), Fire (F), or Reactivity (R) hazard from NFPA 704 Standard Rating System (0 = no hazard, 4 = high hazard)
(c) Volatility Rating - based upon vapor pressure in mm Hg at 68° F, 20° C
(d) Skin Absorption - "Yes" indicates potential exposure through skin and mucous membranes, either by airborne or, more particularly, by direct contact - ACGIH 1993-1994
(e) Carcinogen - "Yes" indicates a compound is a confirmed or suspect human carcinogen by the IARC, NIOSH, NTP, EPA or ACGIH
(f) Exposure Limit - Based on the Time Weighted Average from the 1994-1995 TLV - Threshold Limit Value of the ACGIH or OSHA Permissible Exposure Limits (PEL), whichever is lower
(g) Short Term Exposure Limit - "STEL" denotes a 15 minute time weighted average which may not be exceeded - ACGIH 1994-1995
(h) IDLH - Immediately Dangerous to Life and Health.
(i) Ionization Potential - expressed in electron volts (eV) from the NIOSH Pocket Guide To Chemical Hazards

SECTION 8.0 FIGURES

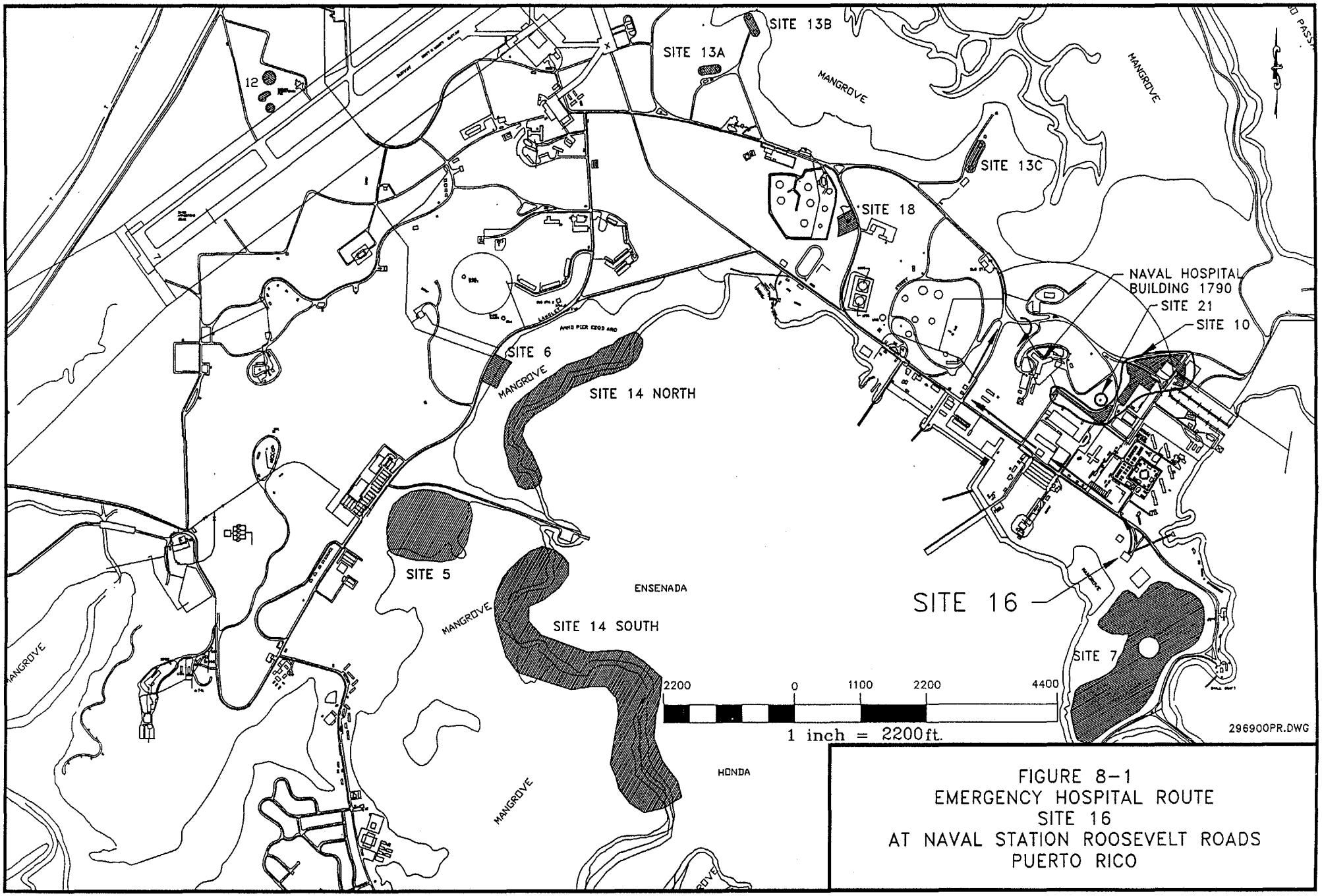

FIGURE 8-1
EMERGENCY HOSPITAL ROUTE
SITE 16
AT NAVAL STATION ROOSEVELT ROADS
PUERTO RICO