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NAB LITTLE CREEK
5090.3a

WORK PLAN REMOVAL OF ABRASIVE BLAST MATERIAL SOLID WASTE MANAGEMENT UNIT 8 WEST ANNEX SANDBLAST AREA NAB LITTLE CREEK VA
7/1/2000
OHM REMEDIATION SERVICES CORP.

Work Plan
Removal of Abrasive Blast Material
Solid Waste Management Unit 8
Naval Amphibious Base Little Creek
Virginia Beach, Virginia

Prepared for:

DEPARTMENT OF THE NAVY
Contract No. N62470-97-D-5000
Task Order No. 0055

Prepared by:

OHM Remediation Services Corp.
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OHM Project No. 806397

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1.0 INTRODUCTION

OHM Remediation Services, Inc. (a member of The IT Group) (OHM/IT) has been retained by the United States Navy Atlantic Division (LANTDIV) under Remedial Action Contract (RAC) Contract No. N62470-94-D-5000, Task Order 055. The Task Order includes the characterization, excavation and disposal of approximately 2,500 cubic yards of soil containing Abrasive Blast Material (ABM) at the Solid Waste Management Unit (SWMU) 8, Naval Amphibious Base (NAB), Little Creek, Virginia Beach, Virginia (***Figure 1***).

1.1 BACKGROUND DESCRIPTION

The site is located to the north of Midway Road, south of Guadalcanal Road, and west of Amphibious Drive on the west side of the Base. Sandblasting and residue storage occurred at the site between 1949 and 1971. Residue accumulated at the site as ships were hauled into the area for sandblasting. An estimated 5,125 cubic yards of residue was stored in the area between 1949 and 1954, and an additional 3,525 cubic yards were stored between 1954 and 1971. The sandblast material was temporarily stored at SWMU 8 prior to off site disposal.

Previous environmental investigations conducted at the site indicate that the ABM is present within the top 4 to 6-inches of soil at the site. In the area under and adjacent to Water Tower 1553, the ABM is highly concentrated within the upper 2-inches of soil. The ABM concentration is generally 10 to 20 percent soil in that location. ***Figure 2*** shows the distribution of ABM measured at the site, and the locations of three samples collected in January 2000 for TCLP analysis. Soils at the site consist of dark to medium brown color, fine to medium-grained sand.

Three ABM samples were collected at the site in January 2000 and analyzed for the presence of the target analyte list (TAL) metals, pesticides, and polynuclear aromatic hydrocarbons (PAHs) using the Toxicity Characteristic Leaching Procedure (TCLP). Analytical results indicate that the TCLP lead concentration in the ABM sample collected from beneath the water tower was 5.42 milligrams per liter (mg/L) which exceeds the TCLP Lead concentration of 5.0 mg/L classification as a hazardous waste. All remaining TCLP parameters were below the criteria for defining a hazardous waste. A summary of the analytical results is shown in ***Tables 1-1*** and ***1-2***.

Table 1-1 NAB Little Creek SWMU 8 West Annex Sandblast Area Blast Grit TCLP Sample Results January 21, 2000				
Constituents	**LW08-01-SS-00**	**LW08-02-SS-00**	**LW08-03-SS-00**	**TCLP/Hazardous Waste Limits**
TCLP Metals (mg/L)				
Arsenic	0.05 U	0.155	0.084	5
Barium	0.520	0.337	0.259	100
Cadmium	0.05 U	0.05 U	0.05 U	1
Chromium	0.1 U	0.1 U	0.1 U	5
Lead	5.42 *	1.18	0.469	5
Mercury	0.001 U	0.001 U	0.001 U	0.2
Selenium	0.05 U	0.05 U	0.05 U	1
Silver	0.1 U	0.1 U	0.1 U	5
TCLP-Semivolatile (mg/L)				
1,4-Dichorobenzene	0.050 U	0.050 U	0.050 U	7.5
2,4,5-Trichlorophenol	0.120 U	0.120 U	0.050 U	400
2,4,6-Trichlorophenol	0.050 U	0.050 U	0.050 U	2
2,4-Dinitrotoluene	0.050 U	0.050 U	0.050 U	0.13
2-Methylphenol	0.050 U	0.050 U	0.050 U	
3+4-Methylphenol	0.050 U	0.050 U	0.050 U	
Hexachlorobenzene	0.050 U	0.050 U	0.050 U	0.13
Hexachlorobutadiene	0.050 U	0.050 U	0.050 U	0.5
Hexachloroethane	0.050 U	0.050 U	0.050 U	3
Nitrobenzene	0.050 U	0.050 U	0.050 U	2
Pentachlorophenol	0.120 U	0.120 U	0.120 U	100
Pyridine	0.050 U	0.050 U	0.050 U	5
RCI				
Corrosivity pH	5.90	6.28	5.80	<2.5; >12
Ignitability	Not ignitable	Not ignitable	Not ignitable	
Reactive Cyanide (Colorometic)	0.050 U	0.050 U	0.050 U	200 mg/L
Reactive Sulfide	0.25 U	0.95	0.25	500 mg/L

Table 1-2
NAB Little Creek
SWMU 8 West Annex Sandblast Area
Blast Grit Sample Results
January 21, 2000

Constituents Depth	LW08-01-SS-00		LW08-02-SS-00		LW08-03-SS-00		Soil RBC Residential mg/kg	Soil RBC Industrial mg/kg
TOTAL METALS (mg/kg)								
Aluminum	1080	*	9080	*	9520	*	78000	2000000
Antimony	10.5	N	41.1	N	43. 9	N	31	820
Arsenic	**0.56**	U	**11**		**16**		0.43	3.82
Barium	125		331		327		5500	140000
Beryllium	0.18	B	10.00		9.60		160	4100
Cadmium	0.55	B	0.37	B	0.86		40	1000
Calcium	203	B	5420		5390			
Chromium	177		142		47.4		200	6100
Cobalt	3	B	106		69.3		4700	120000
Copper	42.1		3430		1090		3100	82000
Iron	5250.0		50900.0		55900.0		23000	61000
Lead	**1820**	E	**1550**	E	**1070**	E	400 guidance	1,000 guidance
Magnesium	220	B	2930		3140			
Manganese	56.9		695		714		1600	41000
Mercury	0.11	U	0.11	U	0.11	U		
Nickel	7.7		433		55.7		1600	41000
Potassium	398.0	B	1810.0		2430.0			
Selenium	0.67	UN	2.9	N	3.1	N	390	10000
Silver	3.3		0.67	B	0.17		390	10000
Sodium	1640.0		10200.0		9290.0			
Thallium	0.37	U	0.38	U	0.35	U	5.5	140
Vanadium	2.6	B	24.1		20.6		550	1400
Zinc	1640	E*	9130	E*	8900	E*	23500	610000
Cyanide	0.11	U	0.11	U	0.11	U	1600	41000

Table 1-2
NAB Little Creek
SWMU 8 West Annex Sandblast Area
Blast Grit Sample Results
January 21, 2000

Constituents Depth	LW08-01-SS-00		LW08-02-SS-00		LW08-03-SS-00		Soil RBC Residential mg/kg	Soil RBC Industrial mg/kg
PESTICIDES (mg/kg)								
4,4'-DDT	0.011		0.0024	JP	0.0022	JP	1.9	170
4,4-DDE	0.0037	U	0.0015	J	0.0035	U	1.9	170
4,4-DDD	0.0037	U	0.00089	JP	0.0035	U	2.7	240
SEMIVOLATILES (mg/kg)								
Anthracene	0.2	J	0.37	U	0.35	U	23,000	61,000
Benzo(a)anthracene	**2.7**		0.37	U	0.35	U	0.87	7.8
Benzo(a)pyrene	**1.7**		0.37	U	0.35	U	0.087	0.78
Benzo(b)fluoranthene	**2.7**		0.37	U	0.35	U	0.87	7.8
Benzo(g,h,I)perylene	0.25	J	0.37	U	0.35	U		
Benzo(k)fluoranthene	1.4		0.37	U	0.35	U	8.7	78
Bis(2-Ethylhexyl)phthalate	45	D	0.31	J	0.32	J	46	410
Carbazole	0.19	J	0.37	U	0.35	U	32	290
Chrysene	2.4		0.37	U	0.35	U	87	780
Dibenz(a,h)anthracene	**0.51**		0.37	U	0.35	U	0.087	0.78
Fluoranthene	4.9	D	0.37	U	0.35	U	31,000	82,000
Indeno(1,2,3-cd)pyrene	**1.3**		0.37	U	0.35	U	0.87	7.8
Phenanthrene	1.1		0.37	U	0.35	U		
Pyrene	5.6	D	0.37	U	0.35	U	2,300	61000

Note:
Duplicate analysis was not within the control limits.
Bold values exceed Residentiual RBCs. RBC values obtained from EPA Region III RBC table dated April 13, 2000.
N = spiked sample recovery was not within control limits
J = estimated below the contract required quantitation limit
E = organics exceeded calibration range; E inorganic is estimated because of interference
B = for inorganics only below the contract required detection limit but above the instrument detection limit
D = from diluted run
U = duplicate analysis was not within the control limits

2.0 *PRE REMOVAL ACTIVITIES*

Safety is of primary importance during all tasks associated with this project. A site-specific Health and Safety Plan (HASP) has been prepared prior to initiation of the work described herein. A copy of the HASP is presented in ***Appendix A***.

2.1 MOBILIZATION

Upon receipt of notice to proceed, the site supervisor will meet with ROICC and NAB Little Creek field personnel to discuss and establish the work areas. Factors such as utilities (electrical and water), site access, signing of waste manifests, traffic routes for equipment deliveries and waste removal will also be determined.

2.2 CONSTRUCTION INTERFERENCE UTILITIES SURVEY

Prior to excavation activities, exclusion and decontamination zones will be established around and proximal to the planned work areas, by marking the areas with steel posts as approved by the ROICC. Only personnel who have received proper health and safety training will be allowed to enter the exclusion zone. The excavation limits will be clearly marked on the ground and the area surrounding the work area will be surveyed for utilities to be sure that are no obvious underground lines, overhead clearance issues or other obstructions to the work area. It is not expected that underground utilities will be encountered, however, OHM/IT will obtain all utility clearances and contact the public underground utility location center and obtain a confirmation number that the notification was made. With the assistance of the ROICC, OHM/IT will request an underground utility search from the base. Under circumstances that warrant further investigation for determining location of utilities a private contractor may also be utilized for specific scanning of the site with electromagnetic equipment as approved by the ROICC.

2.3 TEMPORARY FACILITIES, STORAGE/LAYDOWN AREA

A portable toilet will be mobilized to the site. Equipment and material storage areas will be established at the site. These areas will be located such that deliveries can easily be made and work at the site and NAB Little Creek activities will not be interrupted.

3.0 REMOVAL ACTIVITIES

The purpose of this activity is to remove the soil impacted with ABM to prevent, minimize, or mitigate damage to the public health or welfare or the environment. An Erosion and Sedimentation Control Plan (ESCP) was prepared to ensure that local bodies of water are not impacted. A copy of the ESCP is presented in ***Appendix B***.

3.1 WASTE CHARACTERIZATION SAMPLING

Soil samples will be collected and submitted to a Navy approved laboratory for characterizing the material for disposal. Six soil samples will be collected and submitted to a laboratory for characterization analysis to include TCLP volatiles, TCLP semi volatiles (SVOCs), esticides, herbicides, metals and IRC. This sampling will be conducted before excavating; so that proper disposal facilities are determined prior to the start of construction.

The site will be sampled prior to excavation. The area will be marked according to the drawings provided in the SAP, (Figure 3.1 Appendix C). The site will be gridded in 50-ft x 50-ft grids. Each grid will be quartered. Each quartered grid will be sampled in the middle, and the center of the 50-ft x 50-ft grid will be sampled, thus generating 5 grab samples per 50-ft grid. The grab subsamples will be composited from each grid and then composited to yield 1 compsite/500 yd^3. Figure 3-1 (Appendix C SAP) shows the grid layout and the grids to be composited to generate each final composite. The subsamples from each grid will be split, one jar labeled with the grid ID and one scoop of ABM used for the composite. The grid sample will be retained, in the event that a result from a composite requires additional determination of the location of hazardous TCLP lead levels. The composite samples will be analyzed for TCLP metals, TCLP SVOCs, TCLP Pesticides, and IRC. The composite sample will be collected using the following procedure:

1) At the five (5) sampling points within each grid, dig down 3 to 4 inches and collect a grab from each of the resulting holes using a stainless steel spoon.
2) Place the grab samples into a stainless steel bowl.
3) Homogenize the five (5) grab samples by the quartering techniques using the stainless steel spoon. Fills one 4-oz jar and label. Retain the balance to composite with the other grids to generate one composite/500yd^3 as shown in Figure 3-1.
4) Continue to the next grid following the same procedure combining the contents of each bowl from each grid that will be used in the final composite.
5) Fill the appropriate sample jars approximately ¾ full with the composite sample.
6) Close the jar, label, and package the sample for shipment to the lab.

The ABM samples will be sent to an off-site laboratory for Toxic Characteristic Leachate Procedure (TCLP) and IRC. If any results exceed the levels listed in Table 2.1 (of Appendix C, SAP) for Hazardous Wastes, the material represented by the sample will be considered hazardous. Contaminated materials will then sent to an appropriate disposal facility and disposed at an off-site facility. ABM that is below the levels listed in Table 2.1 (Appendix C, SAP) can be disposed at facility in accordance with non-hazardous disposal procedures. Disposal plan.

3.2 EXCAVATION PERIMETER DEFINITION

Prior to beginning the excavation of contaminated soil, the limits of the excavation will be clearly marked with flagging. Silt fencing and hay bales will be used to control erosion and sedimentation around the excavation areas. ***Appendix B*** contains the ESCP.

3.3 VEHICLE PATHWAY DEFINITION

The pathway and routes for the movement of trucks will be defined prior to the start of excavation activities. The route will be such that the disruption of traffic on local roads is minimized, the generation of dust reduced and ensure the smooth movement of trucking. The route will be reviewed and approved by the ROIIC prior to starting excavating.

3.4 EXCAVATION PROCESS

The ABM material in the soils appears as a distinct black or red-orange granular substance that is visually discernabler. Quantitative screening of the ABM will be conducted by a separate contractor using x-ray fluorescence (XRF) for lead as lead is the main contaminant of concern. It is anticipated that the soil is impacted in an area that is approximately 3 acres in area and extends up to 12 inches below the surface. It is not anticipated that groundwater will be encountered during excavating.

The excavation process will consist of initially starting soil removal in the vicinity of underneath the water tower. A tracked excavator, rubber tire backhoe, wheeled bobcat or most economical mechanical digging removal equipment as determined by a subcontractor will be used as appropriate to scrape contaminated soils away from underneath the water tower. The areas near the tower support footers and the area along the buried conduit will be hand excavated as necessary and appropriate. The first pass will remove approximate the top 6.0 inches and stock pile the contaminated soils east-southeast of Building 1555 (see figure 2). From the stock pile location the soils will be directed loaded into transports for disposal. A separate contractor will be used to field screen the areas where excavation has been performed to determine if additional soil removal is necessary. As determined by the field screening soil will (if necessary) be removed in 6 inch lifts.

Upon completion of the soil removal underneath the water tower, removal efforts will be directed to the two areas of concern just north and east of the water tower (see figure 2). These soils will be scraped off with a dozer in 6 inch lifts. Scraping will be from the north to the south where the soils will be stockpiled along the southern boundary of these areas. From the stockpiled along the southern boundary of these areas. From the stockpiled areas direct loading for transport of the soils will be conducted. After the soils are scraped and field screened as being complete the last area of excavation (south of the water tower – figure 2) will be scraped in 6 inch lifts. Scraping of these soils will be conducted from the north to the southern boundary, where along the southern boundary direct loading into transport will be performed.

As the scraping/excavation progresses those areas completely excavated will then receive backfill material for replacement of the removed material. The select back fill will be spread out by mechanical means or by hand in sensitive areas underneath the water tower. Compaction will be performed by the mechanical equipment on site with no special accommodations being made for compaction [e.g. no sheeps foot or special mechanical compacotor(s)] or compaction testing.

If the soils are characterized as being hazardous the removal process will remain the same. Differences will be that the loading will be carefully performed into permitted hazardous waste transporter vehicles that will be lined and tarped and manifested under the uniform hazardous waste manifest.

The contaminated soil will be directly loaded into dump trucks for transport to a Navy approved Subtitle D landfill. OHM/IT personnel will immediately inform the ROICC of the presence and extent of contaminated soils. The scope of work has initially estimated the excavation of 2,800 cubic yards of contaminated soil. If contaminated soil is still present after 2,800 cubic yards have been removed; a modification to the existing task order may be requested to continue the over excavation of contaminated soil.

3.5 CONFIRMATION SAMPLING OF EXCAVATION AREA

After the contaminated soil is removed, CH2M Hill personnel will collect confirmation samples. A confirmational sampling and analysis plan (SAP) is being prepared by CH2M Hill and is contained in Appendix F.

3.6 BACKFILL AND EXCAVATION RESTORATION

The excavation will be backfilled with clean borrow material. Backfilling will occur immediately after removal and field screening of removal is complete. Backfill will be compacted to the appropriate maximum density. Compaction will be achieved using a heavy, self-propelled footed roller. Compaction testing is not required. Following the completion of the backfilling of the excavation, the excavated area will be seeded.

3.7 GRADING PLAN

Backfill will be emplaced and field compacted. Compaction will consist of that accomplished by the grading equipment pre-existing excavation grade.

4.0 QUALITY CONTROL

The intent of this section is to provide general guidance to the field construction crew for items that require inspection during field activities. In addition, this section identifies some of the critical items that require spot inspection. **Appendix D** contains the Construction Quality Control Plan for this work effort. This section highlights key areas.

4.1 CONSTRUCTION INSPECTION

Contractor quality control is the means by which OHM/IT ensures that all construction, including that performed by subcontractors and suppliers, complies with the requirements of the Task Order. The efforts of inspection establishes the means by which verification of the quality of the work performed and compliance with specific requirements including the inspection of materials and workmanship before, during, and after each definable feature of work. The controls defined will be adequate to cover all construction. The Quality Control Manager's Representative will make adequate inspections to ensure adherence to the work plan for the following activities.

4.2 TESTING

Requirements of testing are provided in the Field Sampling Plan (***Appendix C***) for this project.

4.3 SUBMITTALS

Project submittals will be prepared and submitted to the Navy for review and acceptance. Submittals will include analytical laboratory reports and waste manifests. There are no other submittals anticipated for this project.

5.0 WASTE MANAGEMENT PLAN

5.1 DESCRIPTION OF WASTES

Removal activities during this project will generate soil mixed with ABM surrounding an existing water tower. Approximately 2,500 yards of material will be excavated and disposed of off-site.

5.2 WASTE CHARACTERIZATION

Waste characterization analysis will be performed during the premobilization phase of this project using procedures outlined in the site specific sampling and analysis plan. Preliminary testing indicates that the waste will not be considered RCRA hazardous waste. However, the potential does exist for some of the waste being classified RCRA hazardous for lead, requiring EPA waste code D008, dependent upon the preclassification analysis.

5.3 WASTE DISPOSAL

5.3.1 Determination of Required Treatment Technology

Each waste type generated during this project will require a different disposal method. These include:

Waste Type	Disposal Method
non-haz soils and ABM	off-site Subtitle D landfill off-site reuse/recycle
RCRA hazardous soils and ABM	off-site stabilization/landfill

5.4 DISPOSAL FACILITY SELECTION

OHM/IT will select the final disposal facility for the waste based on several factors:

- compliance with CERCLA Off-Site Policy
- TSDF capacity to accommodate incoming waste
- solicitation of bids using applicable FAR's
- verification of permits and insurance (at time of award)

OHM shall submit their section of disposal facility to the Navy (ROICC) for approval. Potential disposal facilities for this work are:

RCRA Hazardous

PermaFix Michigan, Chem-Met Services
18550 Allen Road
Brownstown, MI 48192
MID096963194

EQ
49350 North I-94 Service Drive
Belleville, MI 48111
MID048090633

RCRA Non-Hazardous

Virginia Materials & Supplies, Inc.
3306 Peterson Street
Norfolk, Virginia 23509-2415
(757) 855-0155
Permit by Rule

Soilex Corporation
P.O. Box 62601
Virginia Beach, VA 23466
Location list
Virginia Beach Permit #075
Suffolk Permit #155

In the event that the characterization of the soils determines that the soils are hazardous and require off site disposal notification will be provided to the ROICC, Navy, EPA and Virginia DEQ prior to these soils being transported off site.

5.5 WASTE ACCEPTANCE

The OHM/IT Transportation and Disposal Coordinator will complete all necessary paperwork required for approval at the selected disposal facilities for all waste generated at this site. This paperwork includes, but is not limited to, waste profiles, analytical data, and generator certifications. These documents will be forwarded to the proper Navy personnel for review and signature.

5.6 WASTE TRANSPORTATION

5.6.1 Packaging Requirements

There are no packaging restrictions on the shipment of soils and debris from this project. All soils and debris will be shipped via semi-dump trailers and/or rolloff containers.

5.6.2 Selection of Transporter

OHM/IT will select waste transporters using applicable FAR's during the solicitation process. OHM/IT will solicit bids from only those vendors who are permitted to haul each particular waste type. Verification of permits will take place at time of solicitation. OHM shall submit their selection of a transporter to the Navy (ROICC) for approval. Potential transporters for this work are:

Hazardous

Robbie D Wood, Inc.
P.O. Box 125
Dolomite, Alabama 35061
EPA ID# ALD067138891

Non-Hazardous

Truitt Trucking (757) 456—0966
4940 Rachel Street
Virginia Beach, Virginia 23462

5.6.3 Required Shipping Papers

The OHM/IT T & D Coordinator will complete all necessary paperwork required for shipment of waste off-site. These include bills of lading, non-hazardous waste manifests, and/or hazardous waste manifests and land disposal restriction (LDR) certifications. All shipping papers will be submitted to the Navy construction representative as soon as possible, not to exceed 48 hours after each shipment has left the base.

If as determined that a portion of or certain quantity of the excavated material is deemed hazardous material then inspection of trucks, signing of manifests, will be performed on an as needed basis. Schedule and coordination of signage requirements will be necessary with the ROICC Construction Representative and will be performed in alignment with ROICC Construction Representative requirements.

5.7 DOCUMENTATION AND SUBMITTALS

Formal submittals to the Navy pertaining to waste transportation and disposal will consist of the following:

- waste profiles
- sample bill of lading/hazardous waste manifest and LDR certification
- weight tickets, TSD manifest copy, and certificate of disposal

The OHM/IT project file will contain copies of:

- non-hazardous waste manifests or bills of lading
- weight tickets
- certificates of disposal.

6.0 SPILL PREVENTION

The objective in the event of an oil spill is to prevent the discharge of oil into nearby surface water bodies, or the surrounding environment. The person who detects a spill has the responsibility to report the spill to his supervisor. If a spill is in progress when detected, the person detecting the spill has the additional responsibility of initiating action to stop the spill, if safe to do so and the person is adequately trained and authorized to do so.

Rapid containment is necessary to facilitate recovery. The person detecting a spill if adequately trained and authorized, is responsible for initiating action required to contain the spill if safe to do so. The person's supervisor and the appropriate superintendent should be informed of the spill as soon as conditions permit. If available personnel on duty cannot contain the spill at the time of the spill, the supervisor has the responsibility of arranging for the callout of additional personnel necessary to contain the spill.

Spill prevention for the contaminated soils will encompass the following activities during loading and transport:

- Direct loading will be observed and conducted in an organized manner, no overloading of transports will be allowed.
- Visual inspection of each load as it is being loaded will be made.
- As appropriate all transports will be "road ready" and inspected before allowing loading or transport on highway.
- All hazardous loads will be lined and tarped and inspected as such before departing site.
- All loads leaving the site will be documented either having bill of lading or uniform hazardous waste manifest documentation depending on the type of load leaving the site.
- Only permitted transporters will be employed.
- Process controls, engineering controls will be implemented in the loading zones, e.g. the zone will be designated as an exclusion area, and as transport leaves the site necessary decon of vehicle will transpire so that latent potential contaminated soils and debris do not leave the site.

There is a potential for a spill during the refueling of equipment, operation. This section describes this activity that may result in a spill and provisions for spill prevention. Activities associated with the refueling of equipment will be conducted in a manner to ensure that product or fuel is not released to the environment. When conducting operations that may result in possible fuel release, the work will proceed in accordance with best management practices to preclude a spill. Provision for spill prevention and control that will be used during the transfer of fuel will include:

- Performing manual level checks in the portable fuel tank prior to refilling.
- Performing manual level checks in the equipment tank prior to refueling.
- Manual transfer of fuel.
- Surveillance monitoring: all tanks checked during refueling operations to ensure that overflow conditions do not occur.
- Use of process controls where feasible.
- Proper lines and berms to prevent migration of contaminants if a spill occurs.
- Immediate availability of spill mitigation equipment (e.g. absorbent materials).
- Notification: immediate notification made to NAB fire department and then to NAB ROICC personnel, if a spill occurs.

Other provisions and procedures will be discussed with the Navy prior to implementation of the refueling or transfer operations depending on the specific circumstances. The cognizant responsible Health and Safety representative to ensure availability of prevention controls will perform daily inspections of the refueling operations during field activities.

7.0 SITE RESTORATION

Upon completion of all field activities, restoration activities will commence. The purpose of site restoration is to return the site to its original condition. All areas disturbed by OHM/IT will be restored prior to demobilization is completed.

8.0 DEMOBILIZATION

Demobilization activities include:

- Demobilization of construction equipment;
- Demobilization of site personnel;
- Site clean up;
- Removal of all temporary structures, appurtenances and equipment;
- Removal of all disposable items, dumpsters, and portable toilets; and
- ROICC approval and acceptance of site conditions.

OHM/IT personnel will demobilize from the site upon completion of all site restoration activities and after the demobilization activities listed above are performed.

9.0 POST CONSTRUCTION ACTIVITIES

Following the completion of all field activities, OHM/IT will supply a Close Out Report, which will fully document the all work performed. This document will be submitted within 60 days of completion of all field activities. This report will contain sections discussing a summary of the action with subsections dealing with sampling and a summary of the field daily reports. Subsequent sections will include a final health and safety report, a summary of record documents, a discussion of field changes and contract modifications and a quality control summary. Appendices to the report will contain photographic documentation and a copy of the testing log, field test reports, the rework items list and the daily QC reports will also be appended to the RAR.

10.0 PROJECT MANAGEMENT PLAN

The project manager is the primary focal point for control of the project activities. The project manager will be supported by the Quality Assurance (QA) Management team, which will provide reviews, guidance, and technical advice on project execution issues. Members of this staff will be available on an "as-needed" basis to assist in smooth project execution. The project manager will be supported by the project team consisting of a supervisory, health and safety, technical, and QA/QC staff to ensure that the project is safely executed in compliance with applicable laws, regulations, statutes, and industry codes. Individuals of the project team are responsible for fulfilling appropriate portions of the project QA program, in accordance with assignments made by the project manager. The project manager is responsible for satisfactory completion of the project QA program. The project manager may assign specific responsibilities to the deputy project manager and other members of the project staff.

An organizational chart of the project team is presented in Section 10.1.

The responsibilities of the key members in the project organization are:

Program Manager – Roland Moreau P.E.

The Program Manager coordinates the contract requirements, supervises the PMO staff, and provide overview of all estimates, work plans, staffing and field operations. The PMO staff will report to the Program Manager, and he will conduct project reviews with assigned Project Managers (PMs) on a monthly basis.

The Program Manager will coordinate with LANTDIV for planning upcoming work and estimate submittals, will assist in answering questions and resolving programmatic issues, and will provide community outreach support. He will attend partnering sessions as required by LANTDIV, and will be available to meet with the Navy as required. He will review invoices to the Navy and prepare monthly cost and schedule status report for the PMD task order.

Program QC Manager – Charles (Pete) Hunter

The Program QC Manager will provide QC program support for all projects and will schedule and conduct independent audits and assessments to ensure that site-specific QC plans are effectively implemented. Ongoing responsibilities include providing direction to PMs on contractual QC requirements, preparing reports for management addressing the adequacy and effectiveness of the QC program, interfacing with the Navy regarding quality issues and concerns, recommending opportunities for quality improvement, and assisting Site QC Managers and the PMO staff in all matters involving QC.

Site QC Manager – Ware Warburton

The Site QC Manager is responsible for monitoring the performance of the technical aspects of the remediation and construction activities. The site QC manager will provide documentation for all construction-related aspects of the project, as well as documenting field activities on the appropriate field forms. He will be responsible for coordinating inspection and surveillance activities assisted by a sample technician and geotechnician, as needed. The technicians will assist in or conduct inspections and/or surveillance's to monitor work product or progress as applicable. The surveillance's and monitoring events are documented in a report describing the events reviewed that day.

Project Manager – Taylor Sword

The project manager is responsible for the overall direction of this project executed under his supervision. He provides the managerial administrative skills to ensure that resource allocations, planning, execution, and reporting meet contract requirements. He is ultimately accountable for all work activities undertaken on this project. The global quality-related responsibilities of the project manager can include, but are not limited to, the following:

- Organization of the project staff and assignment of responsibilities.
- Understanding of contract and scope of work for a specific project.Communication to the project staff regarding client requirements and QA practices.
- Identification, documentation, and notification to the client and project staff and QA personnel of changes in the scope of work project documentation and activities.
- Supervision of preparation and approval of project-specific procedures, work plans, and QA project plans.
- Approval of project design bases, design parameters, drawings, and reports.
- Approval of project removal action/construction methodologies.
- Dissemination of project-related information from the client such as input parameters, and drawings.
- Liaison for communications with the client and subcontractors. Liaison between the project staff and other internal groups.
- Decision of whether or not drawings require independent review.
- Investigation of nonconformances, notification of QA personnel, and implementation of corrective actions.

- Determination of the effect of nonconformance on the project and the appropriateness for reporting such items to the client, and providing appropriate documentation for reporting.
- Determination that changes, revisions, and rework are subject to the same QC requirements as the original work.
- Serve as final reviewer prior to release of project information.
- Approve and sign outgoing correspondence.
- Custodian of all project related documents.

The project manager may assign some of these responsibilities to the Site Supervisor, who will remain on site throughout the project field activities.

Site Supervisor – Ware Warburton

The site supervisor is responsible for the day-to-day management of this specific delivery order. He will ensure sufficient resource allocations to maintain project schedule and budget. He will provide daily feedback to the project manager on project progress, issues requiring resolution, etc. The quality-related responsibilities of the site supervisor include, but are not limited to, the following:

- Notification to the project manager if the project cannot be completed with regard to quality, schedule, or cost.
- Oversight and control of subcontractor services.
- Liaison for communications with OHM project staff and other internal groups as well as with the NTR and on-site inspector.
- Supervision of day-to-day site activities in accordance with project and program requirements.
- Preparing the Contractor Production Report.
- Preparing the Quality Control Reports.
- Initiating corrective actions for non-conformance identified on-site.

Project Chemical QA Officer and Laboratory Coordinator – Dorothy S. Small

The chemical QA responsibility is to implement the project chemical QA program. The officer is responsible for informing the project manager of any site-specific QA issues. The laboratory coordinating function is responsible for the procurement of a certified laboratory based on the requirements needed for the project. The responsibilities include, but are not limited to, the following:

- Reviewing subcontractor's QA Manuals and/or Laboratory Quality Management Plans (LQMPs) and if possible, performing audits on the labs.
- Certifying the level of QA that has been achieved during the generation of analytical data.
- Initiating and overseeing all audit functions.
- Stopping work if quality objectives are not being met.
- Initiating investigations for nonconformance, identifying appropriate corrective actions, and performing follow-up audits to ensure that the corrective actions were successful.
- Selection of qualified laboratories and control of laboratory services requests.
- Assist coordination of laboratory with field sample shipments.
- Management of laboratory data in conjunction with the field chemist.
- Liaison between the field and the laboratories when changes are required in the Field Sampling Plan (FSP) and Purchase Orders.

10.1 PROJECT ORGANIZATIONAL CHART

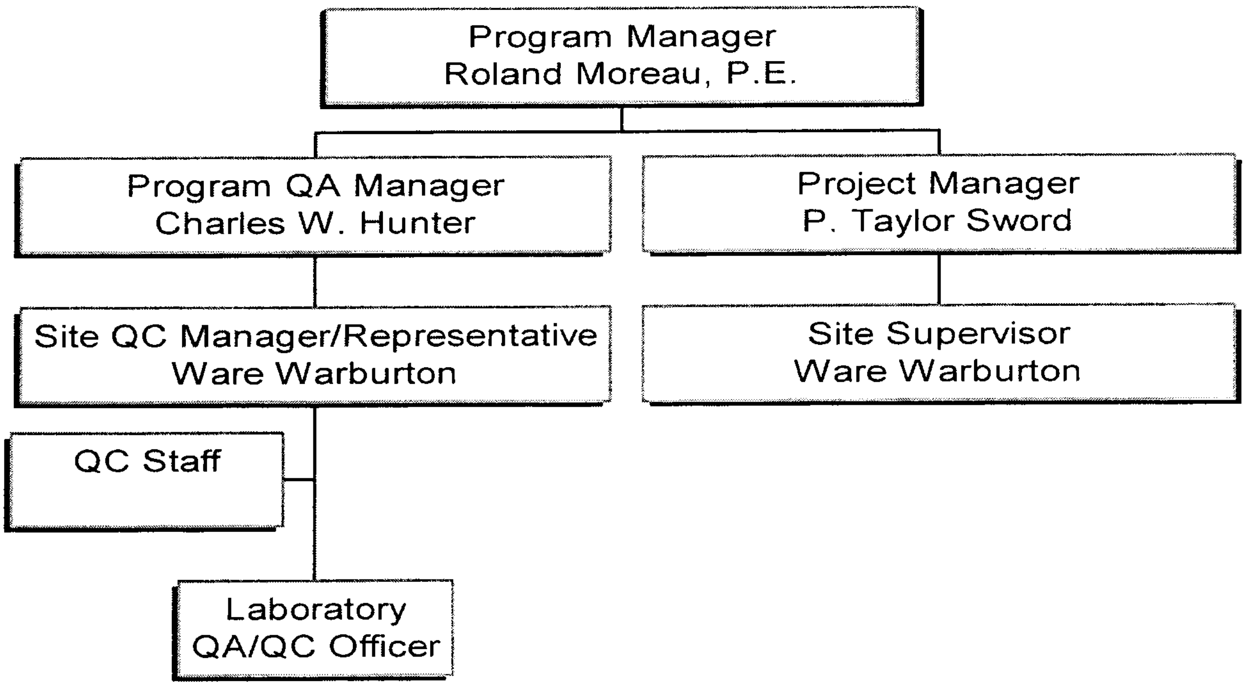
A project organizational chart is prepared to clearly define the roles of all project personnel. ***Figure 3*** shows the roles and chain of reporting for personnel working on this project.

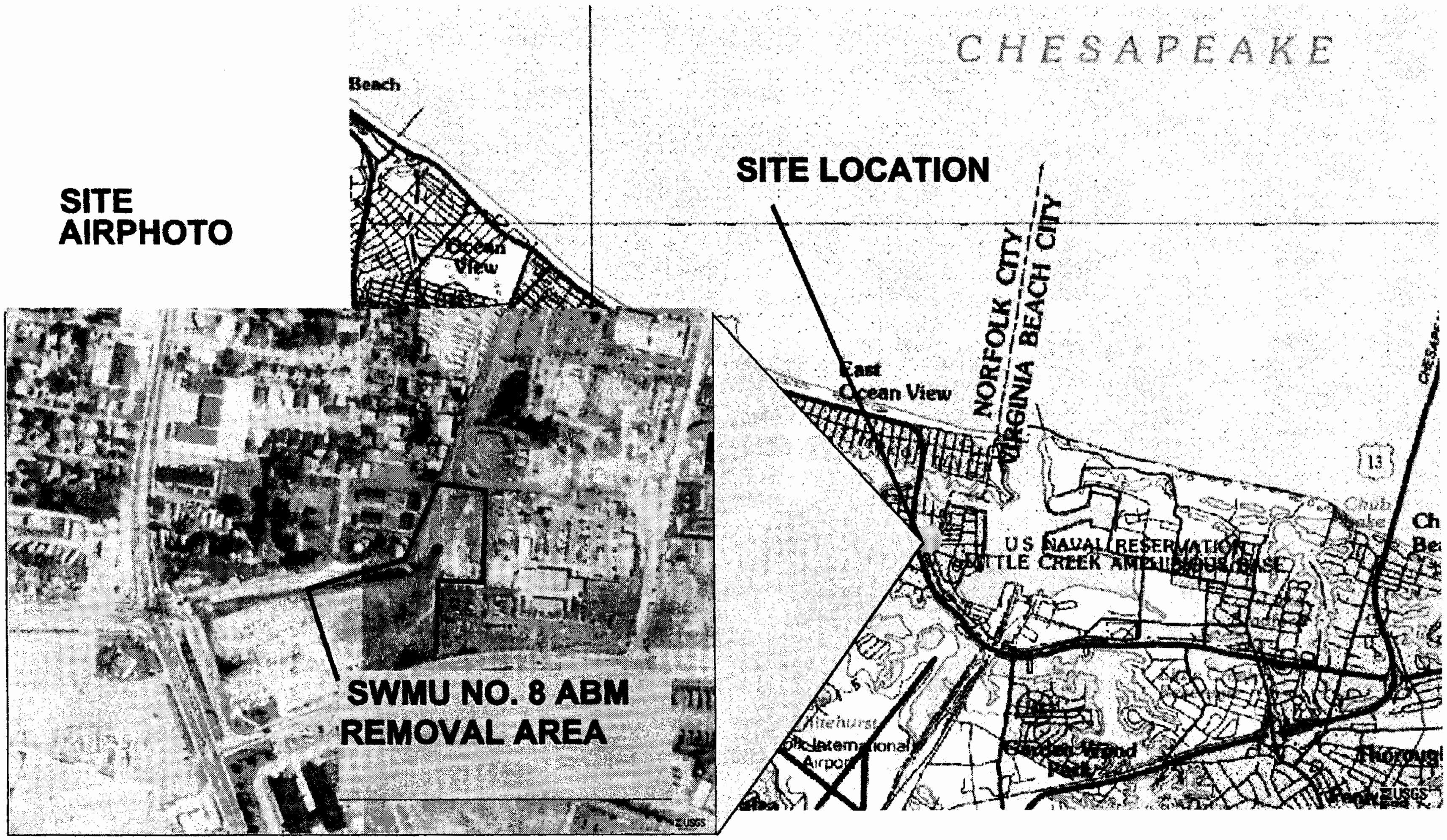
10.2 SCHEDULE

A schedule has been prepared for the project to be used to track progress and ensure that milestones are met. A copy of the project schedule is presented in ***Appendix D***.

Figure 3

Project Organization Chart





OHM Remediation Services Corp.
Trenton, NJ
A Subsidiary of OHM Corporation

SUBMITTED:	PROJECT MANAGER	DATE:	
APPROVED:	SR. PROJECT ENGINEER	DATE:	
APPROVED:	DEPT. MANAGER	DATE:	

CADD FILE: [illegible]
DRAWN: T.Beard
DESIGNED: T. Beard
CHECKED:
CHECKED:

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.
		SITE LOCATION MAP	TB	8/00	

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND

ATLANTIC DIVISION

NAVAL STATION — NORFOLK, VIRGINIA

CONTRACT N62470-97-D-5000 — TASK ORDER NO. 060

OHM PROJECT No. 000597 — LITTLE CREEK NAVAL AMPHIBIOUS BASE

FIGURE 1

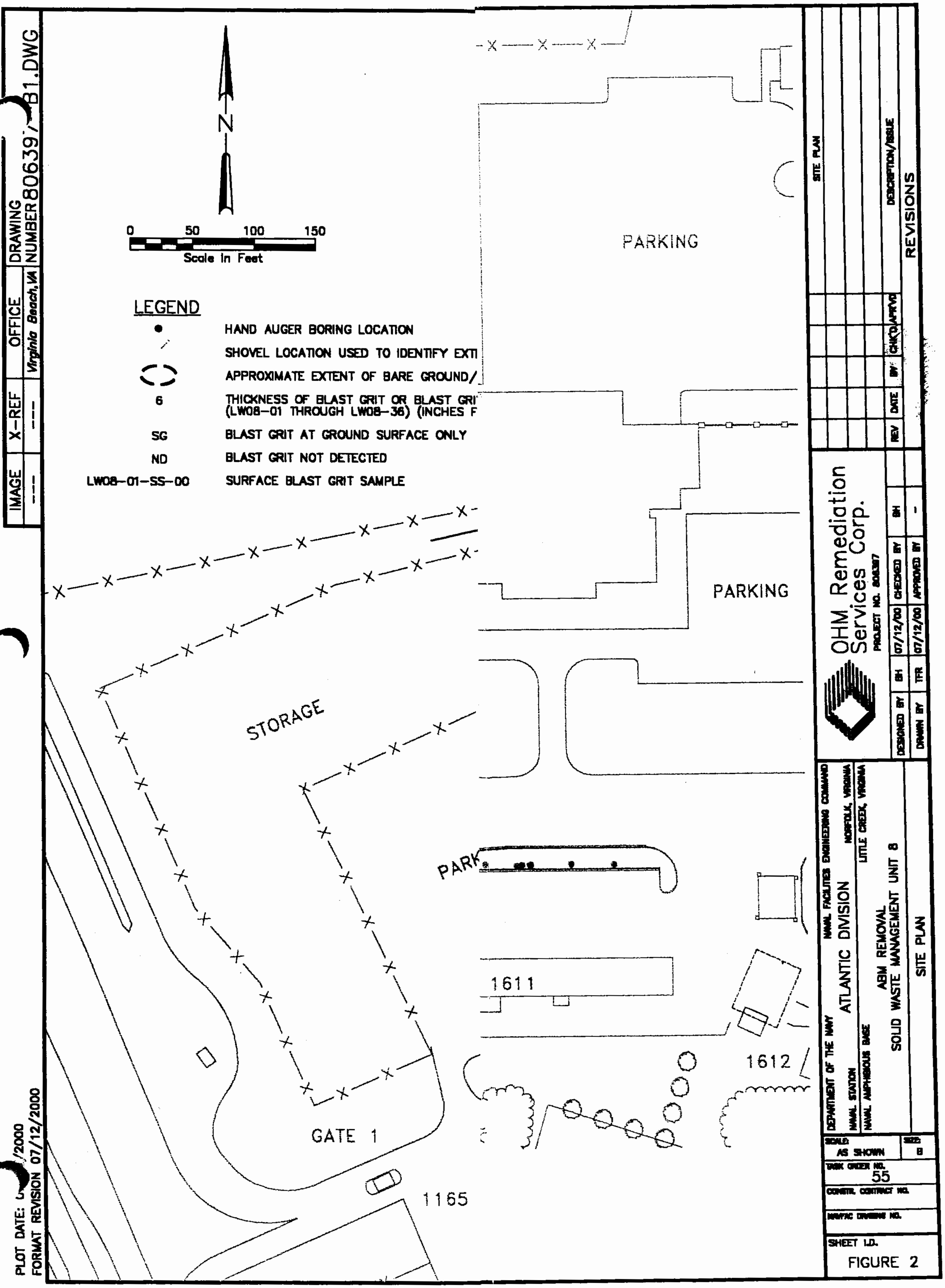
SITE LOCATION MAP
(AUGUST 2000)

SWMU NO. 8 ABM REMOVAL AREA

DRAWING NUMBER:

SHEET NUMBER: of

DATE: 8/23/00



IMAGE

X-REF

OFFICE
Virginia Beach, VA
DRAWING NUMBER 80639
B1.DWG
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0 50 100 150
Scale In Feet
LEGEND
HAND AUGER BORING LOCATION
SHOVEL LOCATION USED TO IDENTIFY EXTI
APPROXIMATE EXTENT OF BARE GROUND/
6
THICKNESS OF BLAST GRIT OR BLAST GRI
(LW08-01 THROUGH LW08-36) (INCHES F
SG
BLAST GRIT AT GROUND SURFACE ONLY
ND
BLAST GRIT NOT DETECTED
LW08-01-SS-00
SURFACE BLAST GRIT SAMPLE
PARKING
PARKING
STORAGE
PARK
1611
1612
GATE 1
1165
PLOT DATE:
/2000
FORMAT REVISION 07/12/2000
SITE PLAN
REVISIONS
REV
DATE
BY
CHK'D
APPR'D
DESCRIPTION/ISSUE
OHM Remediation Services Corp.
PROJECT NO. 806397
DESIGNED BY
BH
07/12/00
CHECKED BY
BH
DRAWN BY
TFR
07/12/00
APPROVED BY
-
DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
ATLANTIC DIVISION
NORFOLK, VIRGINIA
NAVAL STATION
NAVAL AMPHIBIOUS BASE
LITTLE CREEK, VIRGINIA
ABM REMOVAL
SOLID WASTE MANAGEMENT UNIT 8
SITE PLAN
SCALE
AS SHOWN
SIZE
B
TASK ORDER NO.
55
CONSTR. CONTRACT NO.
NAVFAC DRAWING NO.
SHEET I.D.
FIGURE 2

APPENDIX A

Health and Safety Plan

IT CORPORATION

A Member of The IT Group

SITE-SPECIFIC HEALTH & SAFETY PLAN FOR THE EXCAVATION AND DISPOSAL OF CONTAMINATED SOILS AT SWMU 8, WEST ANNEX SANDBLAST AREA NAVAL AMPHIBIOUS BASE LITTLE CREEK VIRGINIA BEACH, VIRGINIA

Prepared for:

Department of the Navy
Contract No. N62470-97-D-5000
Task Order 055

Prepared by:

OHM Remediation Services Corp.
(A member of The IT Group)

Alison Harwood

Alison Harwood, ASP
Health and Safety Coordinator III

Reviewed and Approved by:

Alison Harwood for

Robert A. Brooks, CSP
Program Health and Safety Manager

July, 2000
Project 806397
Revision 0

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APPENDICES

1 INTRODUCTION

1.1 OBJECTIVE

The objective of this plan is to provide a mechanism for establishing safe working conditions at the site. The safety organization, procedures, and protective equipment have been established based upon an analysis of potential hazards. Specific hazard control methodologies have been evaluated and selected to minimize the potential of accident or injury.

1.2 POLICY STATEMENT

The policy of OHM Remediations Services, a subsidiary of the IT Group (OHM/IT) is to provide a safe and healthful work environment for all employees. OHM/IT considers no phase of operations or administration to be of greater importance than injury and illness prevention. Safety takes precedence over expediency and shortcuts. At OHM/IT, it is believed all accidents and injuries are preventable. OHM/IT will take every reasonable step to reduce the possibility of injury, illness, or accident.

This Health and Safety Plan (HASP) prescribes the procedures that must be followed during referenced site activities. Operational changes that could affect the health and safety of personnel, the community, or the environment will not be made without the prior approval of the Project Manager and the Health and Safety Manager.

The provisions of this plan are mandatory for all personnel and subcontractors assigned to the project. All visitors to the work site must abide by the requirements of the plan.

1.3 REFERENCES

This HASP complies with applicable Occupational Safety and Health Administration (OSHA), U.S. Environmental Protection Agency (EPA), and IT Group Health & Safety policies and procedures. This plan follows the guidelines established in the following:

- Standard Operating Safety Guides, EPA (Publication 9285.1-03, June 1992).
- Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, NIOSH, OSHA, USCG, EPA (86-116, October 1985).
- Title 29 of the Code of Federal Regulations (CFR), Part 1910.
- Title 29 of the Code of Federal Regulations (CFR), Part 1926.
- Health and Safety Requirements Manual, US Army Corps. Of Engineers, EM 384-1-1, 1996
- LANTDIV Program Health and Safety Procedures Manual.

1.4 DISCLAIMER

The following (HASP) has been designed for the methods presently contemplated by OHM/IT for execution of the proposed work. Therefore, the HASP may not be appropriate if the work is not performed by or using the methods presently contemplated by OHM/IT. In addition, as the work is performed, conditions different from those anticipated might be encountered and the HASP may have to be modified. Therefore, OHM/IT only makes representations or warranties as to the adequacy of the HASP for currently anticipated activities and conditions.

2 SITE HISTORY/SCOPE OF WORK

2.1 SITE HISTORY/BACKGROUND

Between 1949 and 1971, sandblasting and residue storage occurred in areas north of Midway Road, south of Guadalcanal Road, and west of Amphibious Drive. These areas have been identified as SWMU 8. As boats were hauled into the area for sandblasting, residue accumulated on the ground. A estimated 5,125 cubic yards of residue were stored in the area between 1949 and 1954, and an additional 3,525 cubic yards were stored between 1954 and 1971. Sand blast material was temporarily stored at SWMU 8 prior to off site disposal. A reconnaissance of that area in 1999 noted ABM at the ground surface in the area surrounding Water Tower 1553.

Findings of field investigations at SWMU 8 indicate that blast grit at the site is generally limited to the upper six inches in the soil profile, and in most areas limited to the upper four inches. The maximum depth of blast grit was 10 inches noted in boring LW08-19 located near the southern boundry of the area along Midway Road. Boring adjacent to LW08-19 indicate this thickness is limited to a very small (50 square foot area or less) area. In two of the of boring (LW08-29) and (LW08-21), trace quantties of blast grit was noted to a depth of 12 inches.

2.2 SCOPE OF WORK

This Health and Safety Plan focuses on surveying and sampling activities.

The principal tasks to be conducted are listed below:

- Site Mobilization
- Install Silt Fence/Erosion Control
- Soil Sampling
- Soil Excavation
- Soil Loadout
- Backfilling
- Equipment Decontamination
- Site Restoration

These activities have been analyzed for potential hazards for which control measures are provided in Appendix D Activity Hazard Analysis.

3 KEY PERSONNEL AND MANAGEMENT

The Project Manager (PM), Site Supervisor (SS)/Site Safety Officer (SSO), Health and Safety Coordinator (HSC), Program Industrial Hygienist (CIH) and the Program Health and Safety Manager (HSM) are responsible for formulating and enforcing health and safety requirements, and for implementing this HASP. The supervisor's and employee safety responsibilities are detailed in SOP's 1-6 and 1-7. The following summarizes the health and safety responsibilities of the site management.

3.1 PROJECT SAFETY RESPONSIBILITIES

The PM has the overall responsibility for the project and to assure that the requirements of the contract are attained in a manner consistent with the HASP requirements. The PM will coordinate with the SS/SSO to assure that the work is completed in a manner consistent with the HASP. The SS is responsible for field implementation of the HASP. The SS will be the main contact in any on-site emergency situation and will insure off-site emergency agencies have been contacted prior to the start of work. The HM and SS/SSO are authorized to administer this HASP. The HM and SS/SSO is authorized to stop work when an imminent health or safety risk exists. The HSC and/or HSM are responsible for reviewing the HASP and ensuring that the HASP is complete and accurate. The HSC and/or HSM also provide technical and administrative support for the Health and Safety Program and will be available for consultation when required. Each employee is responsible for personal safety as well as the safety of others in the work area.

3.2 KEY SAFETY PERSONNEL

The following individuals share responsibility for health and safety at the site:

Project Manager	Taylor Sword (757) 363-7190 ext. 246 (office)
Site Supervisor/Site Safety Officer	Ware Warburton (757) 303-0306
ROICC	Stock Dinsmore (757) 462-7713
LANTDIV Representative	Bob Schirmer (757) 322-4751
Health and Safety Coordinator	Alison Harwood (770) 663-1428 (office)
Certified Industrial Hygienist	Paul Lawless, CIH 609-588-6391 (office)
Program Health and Safety Manager	Robert Brooks, CSP (732) 469-5599 ext. 681 (office)
Vice President, Health & Safety	Warren Houseman, CIH (412) 858-3741 (office)

4 ACTIVITY HAZARD ANALYSIS

This section outlines the potential chemical and physical hazards, which workers may be to during work at SWMU 8. Table 4.1 lists know contaminant. Chemicals which may be brought to the site for which an MSDS is necessary, is located in the Appendix A.

4.1 CHEMICAL HAZARDS

Based on site historical records and previous investigations, the primary site contaminant at SWMU 8 is lead:

TABLE 4-1

CHEMICAL	EXPOSURE ROUTES	PEL/TLV	HEALTH HAZARDS/ PHYSICAL HAZARDS
Lead	Inhalation, ingestion	0.050 mg/m^3	• Weakness, insomnia; loss of appetite, loss of weight, abdominal pain; anemia; tremors; weakness of wrists/ ankles; kidney damage; low blood pressure • Incompatible with strong oxidizers, hydrogen peroxide and acids

The following general symptoms may indicate exposure to a hazardous chemical. Personnel will be removed from the work site and provided immediate medical attention if the following symptoms occur:

- Weakness
- Nausea, headaches, or cramps
- Irritation of the eyes, nose, or throat
- Abdominal pain

4.2 HAZARD COMMUNICATION

The purpose of hazard communication (Employee Right-to-Know) is to ensure that the hazards of all chemicals located at this field project site are transmitted (communicated) according to 29 CFR 1926.59 to all personnel and subcontractors. Hazard communication will include:

4.2.1 Container Labeling

OHM/IT personnel will ensure that all drums and containers are labeled according to contents. These drums and containers will include those from manufacturers and those produced on site by operations. All incoming and outgoing labels shall be checked for identity, hazard warning, and name and address of responsible party.

4.2.2 Material Safety Data Sheets (MSDSs)

There will be an MSDS located on site for each hazardous chemical known to be used on site. All hazardous chemical MSDSs will be located in Appendix A of the SSHP.

4.2.3 Employee Information and Training

Training employees on chemical hazards is accomplished through on ongoing corporate training program. Additionally, chemical hazards are communicated to employees through daily safety meetings held at OHM/IT field projects and by an initial site orientation program.

At a minimum, OHM/IT and related subcontractor employees will be instructed on the following:

- An in-depth review of the soil and surface contaminants of concern identified listed in Section 4.1.
- OSHA regulated chemicals and their hazards in the work area
- How to prevent exposure to these hazardous chemicals
- What the company has done to prevent workers' exposure to these chemicals
- Procedures to follow if they are exposed to these chemicals.
- How to read and interpret labels and MSDSs for hazardous substances found on OHM/IT sites
- Emergency spill procedures
- Proper storage and labeling

Before any new hazardous chemical is introduced on site, each OHM/IT and related subcontractor employee will be given information in the same manner as during the safety class. The site supervisor will be responsible for seeing that the MSDS on the new chemical is available for review by on site personnel. The information pertinent to the chemical hazards will be communicated to project personnel.

Morning safety meetings will be held and the hazardous materials used on site will be discussed. Attendance is mandatory for all on site employees.

Refer to Appendix A of the site safety plan to find a list of hazardous chemicals anticipated to be brought to the site and the corresponding MSDSs for these chemicals.

4.3 PHYSICAL HAZARDS

To minimize physical hazards, OHM/IT has developed standard safety protocols that will be followed at all times. Failure to follow safety protocols will result in removal of an employee from the site and appropriate disciplinary actions.

The SS/SSO will observe the general work practices of each crew member and equipment operator, and enforce safe procedures. The crew leaders and SS will inspect Work areas. All hazards will be corrected in a timely manner. A variety of physical hazards may be encountered during work activities at this site. Activity Hazard Analyses will be developed for each principal activity and will identify all major hazards to which employees may be exposed. Hard hats, safety glasses, and steel-toe safety boots are required in all areas of the site. Site-specific hazards and all necessary precautions will be discussed at the daily safety meetings.

Physical hazards include safety and environmental hazards. The following physical hazards may be present during project activities:

- Heat stress
- Biological hazards (Poison Ivy ,Ticks, Lyme Disease)
- Manual lifting/back strain
- Vehicle Traffic
- Noise

- Lightening

Heat stress Prevention procedures will be implemented according to HS400. Personal noise exposures will be controlled by instituting the Hearing Conservation Program, according to HS402.

4.4 LIGHTNING

The procedures provided below will be used to protect site personnel from lightning related injuries.

4.4.1 Training

A tailgate safety meeting will be conducted to increase awareness to the hazards and prevention of lightning related incidents.

4.4.2 Detection of Lightning

The Site Supervisor will be proactive in monitoring conditions that may produce thunderstorms and lightning. A daily and weakly weather forecast will be tracked and communicated to site personnel. When signs of impending storms, i.e., increasing wind, darkening skies, or lightening appear, local weather monitoring will be increased. The National Weather Service (www.nws.noaa.gov/) should be consulted frequently. Personnel will be notified when thunderstorms may impact the site.

The "flash/bang" (f/b) technique of measuring the distance to lightning will be reviewed with all personnel. The f/b technique is defined as: for each five seconds from the time of observing the lightning flash to hearing the associated thunder, the lightning is one mile away.

4.4.3 Suspension/Resumption of Activities

All outside activities will be suspended when a lightning flash is immediately in the area or a f/b of 20 seconds (4 miles away) is noted. Personnel may continue indoor work activities. Outdoor activities will resume when 30 minutes has passed since the last observable f/b is 20 seconds or greater.

4.4.4 Lightning Protection

When notification is given, all outside work activities will stop and personnel will gather in the support zone for a head count and further instructions. Indoor work will continue, except for the use of electrical equipment, telephones and computers. When a safe location is not present and personnel are caught by a sudden lightning event, employees should seek the lowest possible area, away from large objects which might attract lightning or fall over, e.g., trees, utility poles. The employee should assume a crouching position with their head lowered and hands over their ears. AVOID: WATER, HIGH GROUNDS, HEAVY EQUIPMENT AND TALL, ISOLATED OBJECTS.

4.4.5 First Aid

An employee that is struck by lightning needs immediate assistance (call 911). The body will not carry an electrical charge, but receives a sever electrical shock and may be burned. Personnel certified in first aid/CPR should inspect for shock and burns around fingers, toes, buckles and jewelry. Stay with the injured employee until medical help arrives.

4.5. VEHICLE SAFETY MANAGEMENT

Motor vehicle incidents are the number one cause of occupational fatalities, accounting for one in three deaths. Fifty percent or more of vehicle safety incidents occur while backing up. OHM/IT employees involved in the operation and use of OHM/IT and/or leased or rented vehicles will comply with the ***IT Motor Vehicle/Commercial Vehicle Operation and Maintenance Procedures*** (HS800/810). OHM/IT requires employees to use seat belts at all times when traveling in IT owned or leased/rented vehicles. The SS/SSO will develop a parking area plan, including backing vehicles into parking spaces, using spotters for backing vehicles and policy mandated vehicle inspections.

OHM/IT employees are expected to incorporate safe actions and preparations to avoid vehicle accidents and personal injury during work and off-hours. Breaks should be planned into lengthy job mobilizations and demobilizations, including rotation of drivers at regular intervals. If parking areas are busy or crowded and more than one worker is traveling in the same vehicle, one worker should remain outside the vehicle as it leaves the parking space to assist the driver with traffic observation. Vehicles traveling before dawn and at dusk in rural or wooded areas should be prepared for wildlife, e.g. deer crossing roadways.

OHM/IT employees arriving at work areas should park vehicles away from delivery, heavy equipment and vehicle loading/unloading locations to prevent parked vehicles from damage by various deliveries. Heavy equipment operators should inspect areas and request vehicles to be moved or spotters used if necessary, to maneuver equipment in tight areas. Employees who observe near misses or potential risks to parked or moving vehicles must report these to the SS/SSO immediately.

OHM/IT employees are expected to use the vehicle inspection form and check/test the safety systems on the vehicle on a daily basis. Check the following: brakes, mirrors, seat belts, tires, leakage from the undercarriage, lights and turn signals. Vehicles with safety deficiencies must be reported immediately and not driven until properly repaired. Vehicles running errands from different project sites should have telephone numbers of the job site in the vehicle in case calls for assistance are required.

Because of the different ways alcohol can affect behavior, even in very small amounts, the best and safest course is not to drink before driving. At OHM/IT, a driver with blood alcohol concentration (BAC) over 0.04% is considered to be under the influence and subject to disciplinary action. Personnel involved in motor vehicle incidents are subject to drug and alcohol testing. Whenever an employee is convicted or pleads no contest to a company related driving under the influence, he/she will be immediately terminated in accordance with HS800.

Weather conditions can have a profound effect on driving. On slippery roads, drive more slowly. Stop and turn with care. Keep several car lengths from other vehicles. At speeds in excess of 35 mph, the chances of hydroplaning increase with speed. In general, keep back 1 car length for every 10 mph to prevent striking the car ahead.

Vehicles will be operated in accordance with the requirements listed below:

- Seatbelt use is mandatory for all passengers;

- Personnel may not ride in the back of cargo vehicles;
- The driver must make a 360 degree walk around the assigned vehicle prior to vehicle movement;
- A ground guide is used to back up any vehicle;
- Vehicle speed is limited to the posted speed limits for developed roadways, 25 mph maximum on dirt roads and 10 mph maximum off-road (based on conditions);
- Vehicle driven in four wheel low and low gear when on dirt roads or off road driving where steep grades dictate;
- All operators must possess a valid drivers license;
- Fuel or gasoline are not transported inside the passenger compartment;
- No vehicle is left running when unattended; and
- Parking brakes are used when vehicles are parked.

In the event of a vehicle incident, notify your Site Supervisor ***immediately*** and complete all required reports.

4.6 ACTIVITY HAZARD ANALYSES

Appendix D contains Activity Hazard Analyses (AHA) for primary site tasks. They contain detailed information on physical and chemical hazards, and provide control measures for these hazards. The AHA's will be field checked by the SS/SSO on an ongoing basis and revised as necessary. All revisions will be communicated to the work crew.

5 WORK AND SUPPORT AREAS

To prevent migration of contamination from personnel and equipment, work areas will be clearly specified as designated below prior to beginning operations. Each work area will be clearly identified using signs or physical barriers.

- Exclusion Zone
- Contamination Reduction Zone
- Support Zone

A log of all personnel visiting, entering or working on the site shall be maintained by the SS/SSO.. Visitors will attend a site orientation given by the SS/SSO and sign the HASP.

The following are standard safe work practices that apply to all site personnel and will be discussed in the safety briefing prior to initiating work on the site:

- Eating, drinking, chewing gum or tobacco, smoking is prohibited in the EZ/CRZs.

- Hands and face must be washed upon leaving the EZ and before eating, drinking, chewing gum or tobacco and smoking.

- A buddy system will be used. Hand signals will be established to maintain communication.

- During site operations, each worker will consider himself as a safety backup to his partner. Off-site personnel provide emergency assistance.

- Visual contact will be maintained between buddies on site when performing hazardous duties.

- All personnel must comply with established safety procedures. Any staff member who does not comply with safety policy, as established by the SS, will be immediately dismissed from the site.

- Proper decontamination procedures must be followed before leaving the site.

- All employees and visitors must sign in and out of the site.

6 PROTECTIVE EQUIPMENT

This section specifies the levels of personal protective equipment (PPE) which are or may be required for each principal activity performed at this site. All site personnel must be trained in the use of all PPE utilized. The PPE program contained in HS600 will be applied to project activities.

6.1 ANTICIPATED PROTECTION LEVELS

The following protection levels have been established for the site work activities.

Task	Initial PPE Level	Upgrade PPE Level	Skin Protection	Respiratory Protection	Other PPE
Site mobilization, Silt fence installation, Soil excavator operator, Soil loadout, Backfilling and Site restoration.	Level D	None	Generally none; Some clearing activities may require Tyvek coveralls to prevent insect bites/contact with poisonous plants or if in direct contact with contaminated soil (i.e. sweeping off the sides of the truck)	None	Hard-hat, Steel-toe work boots, hearing protection, leather work gloves.
Spotter for soil excavation	Level D+	Level C	Tyvek coveralls, inner latex gloves, outer nitrile gloves, boot covers if in direct contact with contaminated soils.	Initial: None Upgrade: Full face air purifying respirator	Hard-hat, Steel-toe work boots, hearing protection.
Soil sampling,	Level D+	None	Sample gloves, goggles/face shield when in contact with liquid contamination	None	Hard-hat, Steel-toe work boots, and hearing protection >85 dBA
Equipment Decon	Level D+	None	Poly-coated Tyvek, inner sample gloves, outer nitrile gloves, goggles/face shield and boot covers	None	Hard-hat, Steel-toe work boots, and hearing protection >85 dBA
General SZ Activities	Level D	None	None	None	Hard-hat, Steel-toe boots, Safety glasses, hearing protection

6.2 PROTECTION LEVEL DESCRIPTIONS

This section lists the minimum requirements for each protection level. Modification to these requirements may have been noted above.

6.2.1 Level D

Level D consists of the following:

- Safety glasses with side shields
- Hard hat
- Steel-toed work boots
- Work clothing as prescribed by weather

6.2.2 Modified Level D

Modified Level D consists of the following:

- Safety glasses with side shields
- Hard hat
- Steel-toed work boots
- Tyvek coveralls (for spotter inside the excavation)
- Poly-coated Tyvek (for equipment decontamination)
- Sample gloves
- Nitrile gloves
- Face shield and goggles (when projectiles or splashes pose a hazard)
- Rain gear if necessary

6.2.3 Level C

Level C consists of the following:

- Full-face, air-purifying respirator with appropriate cartridges
- Hooded Coveralls suited for the contamination involved
- Hard hat
- Steel-toed work boots
- Nitrile, neoprene, latex or PVC overboots
- Nitrile, neoprene, or PVC gloves over latex sample gloves
- Wrists and ankles must be taped

6.3 AIR PURIFYING RESPIRATORS

A NIOSH approved full-face respirator with appropriate air purifying cartridges will be used for level C work. The crew members working in Level C will wear respirators equipped with air-purifying cartridges approved for: organic vapors <1,000 ppm; chlorine gas 10 ppm; hydrogen chloride <50 ppm; sulfur dioxide <50 ppm; dusts, fumes and mists with a TWA <0.05 mg/m^3; asbestos-containing dusts and mists and radionuclides. Cartridges will be thrown away at the end of 8 hours based on Survivair manufacturer recommendations.

7 DECONTAMINATION PROCEDURES

This section describes the procedures necessary to ensure that both personnel and equipment are free from contamination when they leave the work site.

7.1 PERSONNEL DECONTAMINATION

Decontamination procedures will ensure that material which workers may have contacted in the EZ does not result in personal exposure and is not spread to clean areas of the site. Personnel will dispose of sample gloves and clean face shield upon work completion.

7.1.1 Suspected Contamination

Any employee suspected of sustaining skin contact with chemical materials will first use the emergency shower. Following a thorough drenching, the worker will clothing, don clean clothing, and immediately be taken to the first-aid station. Medical attention will be provided based on the degree of injury.

7.1.2 Personal Hygiene

Before any eating, smoking, or drinking, personnel will wash hands, arms, neck and face.

7.2 EQUIPMENT DECONTAMINATION

All contaminated equipment will be decontaminated before leaving the site. Decontamination procedures will vary depending upon the contaminant involved, but may include sweeping, wiping, scraping, hosing, or steaming the exterior of the equipment. Personnel performing this task will wear the proper PPE as prescribed by the SS/SSO.

7.3 DISPOSAL

All decontamination liquids and disposable clothing will be treated as contaminated waste unless determined otherwise by accepted testing methods. Wastes will be disposed of according to state and federal regulations.

7.3.1 Suspected Contamination

Any employee suspected of sustaining skin contact with chemical materials will remove clothing, shower, don clean clothing, and immediately be taken to the first-aid station. Medical attention will be provided based on the degree of injury.

Before any eating, smoking, or drinking, personnel will wash hands, arms, neck and face.

8 AIR MONITORING

Air monitoring will be conducted in order to characterize personnel exposures and fugitive emissions from site contaminants. Principal contaminants of concern are listed in Section 4.0 of this HASP. The target compound selected for air monitoring purposes at SWMU 8 is lead.

8.1 WORK AREA AIR MONITORING

Work area air monitoring at SWMU 8 will consist of direct reading methods. Air monitoring will be conducted during soil excavation activities.

8.1.1 Direct Reading Air Monitoring

During soil excavation activities, direct reading air monitoring will be performed in the EZ to determine exposure to workers. A Miniram meter will be used to monitor for particulates in the breathing zone. A summary of air monitoring information is provided in the table below.

Monitoring Device	Monitoring Location/ Personnel	Monitoring Frequency	Action Level	Action
Mini Ram	Breathing Zone/ Recovery Technician (RT), during excavation	Continuously	<5.0 mg/m3* >5.0 mg/m3*	Level D+ Upgrade to Level C and contact the HSM or HSC for additional personal air monitoring requirements

*Sustained levels above background for 5 minutes

8.2 INSTRUMENTATION

The following is a description of the air monitoring equipment to be used at this site.

8.2.1 Time Aerosol Monitor (Mini Ram Model PDM-3 and Model Pr100 Data Ram)

8.2.1.1 Type And Operational Aspects

- Principle of Operation

  Detection of light in the near infrared region back-scattered to a sensor (photovoltaic detector) by airborne particulate in a sensing volume

  The higher the dust concentration the more back-scattering of light to the sensor, resulting in increased readings

Device calibrated at the factory against an air sampling filter/gravimetric analysis reference method

8.2.1.2 Calibration Methods/Frequencies

There is no calibration method or procedure for calibrating the mini-ram monitor. However, it is recommended that the mini-ram monitor be re-zeroed once a week. During a zero check, the sampled air passes through the purge air filter and dryer to effect a self-cleaning of the optical chamber.

8.2.1.3 Preventative Maintenance

Maintenance of the mini-ran consists of replacement of filters and desiccant; battery replacement; and cleaning of the optical detection assembly.

8.3 AIR MONITORING LOG

The SS/SSO will ensure that all air-monitoring data is logged into a monitoring notebook. Data will include instrument used, wind direction, work process, etc. The IT CIH and/or HSM may periodically review this data.

8.4 CALIBRATION REQUIREMENTS

The PID will be calibrated daily before and after use. A separate log will be kept detailing date, time, span gas, or other standard, and name of person performing the calibration.

8.5 AIR MONITORING RESULTS

Air monitoring results will be posted for personnel inspection, and will be discussed during morning safety meetings.

9 EMERGENCY RESPONSE

9.1 PRE-EMERGENCY PLANNING

Prior to engaging in construction/remediation activities at the site, OHM/IT will plan for possible emergency situations and have available adequate supplies and manpower to respond. In addition site personnel will receive training during the site orientation concerning proper emergency response procedures.

The following situations would warrant implementation of the Emergency Response and Contingency Plan (ERCP):

Fire/Explosion	• The potential for human injury exists. • The fire could spread on site or off site and possibly ignite other flammable materials or cause heat-induced explosions. • The use of water and/or chemical fire suppressants could result in contaminated run-off. • An imminent danger of explosion exists.
Natural Disaster	• A rainstorm exceeds the flash flood level. • The facility is in a projected tornado path or a tornado has damaged facility property. • Severe wind gusts are forecasted or have occurred and have caused damage to the facility.
Medical Emergency	• Overexposure to hazardous materials. • Trauma injuries (broken bones, severe lacerations/bleeding, burns). • Eye/skin contact with hazardous materials. • Loss of consciousness. • Heat stress (Heat stroke). • Heart attack. • Respiratory failure. • Allergic reaction.

The following measures will be taken to assure the availability of adequate equipment and manpower resources:

- Sufficient equipment and materials will be kept on site and dedicated for emergencies only. The inventory will be replenished after each use.

- On-site emergency responders will be current in regards to training and medical surveillance programs. Copies of all applicable certificates will be kept on file for on-site personnel required to respond.

- It will be the responsibility of the emergency coordinator to brief the on-site response team on anticipated hazards at the site. The emergency coordinator shall also be responsible for anticipating and requesting equipment that will be needed for response activities.

- Emergency response activities will be coordinated with the Local Emergency Management Agency (EMA) in compliance with SARA Title III requirements.

Communications will be established prior to commencement of any activities at the remediation site. Communication will be established so that all responders on site have availability to all pertinent information to allow them to conduct their activities in a safe and healthful manner. The primary communication device will be two-way radios. Air horns may be used to alert personnel of emergency conditions. A telephone will be located on site to summon assistance in an emergency.

9.2 EMERGENCY RECOGNITION AND PREVENTION

Because unrecognized hazards may result in emergency incidents, it will be the responsibility of the Site Supervisor/Site Safety Officer, through daily site inspections and employee feedback (Safety Observation Program, daily safety meetings, and Activity Hazard Analyses) to recognize and identify all hazards that are found at the site. These may include:

Chemical Hazards	• Materials at the site • Materials brought to the site
Physical Hazards	• Fire/explosion • Slip/trip/fall • Excessive noise
Mechanical Hazards	• Pinch points • Vehicle traffic
Environmental Hazards	• Electrical Storms • High winds • Heavy Rain/Snow • Temperature Extremes (Heat/Cold Stress) • Poisonous Plants/Animals

Once a hazard has been recognized, the SS/SSO will take immediate action to prevent the hazard from becoming an emergency. This may be accomplished by the following:

- Daily safety meeting
- Task-specific training prior to commencement of activity
- Personal Protective Equipment (PPE) selection/use
- Written and approved permits for hot work, confined space
- Following all OHM/IT standard operating procedures

TABLE 9.1
EMERGENCY TELEPHONE NUMBERS

Local Agencies -- All services, Little Creek, VA NAB Little Creek Fire and Police Department	 757-462-4444 757-363-4444
Hospital Sentara Bayside Hospital 800 Independence Blvd., Virginia Beach, VA *Directions:* From NAB Little Creek, exit the base at Independence Blvd., follow Independence Blvd. (Gate 5 and D Street), follow Independence, the hospital will be on the left.	(757)-363-6137
Regional Poison Control Center	800-552-6337
State Agencies DEQ TRO	 757-518-2000
Federal Agencies EPA Region Branch Response Center, Philadelphia, PA Agency for Toxic Substances and Disease Registry National Response Center	 215-597-9800 (404) 639-0615 (24 hr.) 800-424-8802
LANTDIV Representative-Bob Schirmer	(757) 322-4751
ROICC- Stock Dinsmore	(757) 462-7713
OHM/IT Personnel Project Manager – Taylor Sword Site Supervisor/Site Health and Safety Officer – Ware Warburton Health and Safety Coordinator – Alison Harwood Program Health & Safety Manger - Bob Brooks	 (757) 363-7190 ext. 246 (office) (757) 303-0306 (cellular) (770) 663-1428 (office) (678) 575-0385 (cellular) (732) 469-5599 (office)
OHM/IT Corporation (24 hour)	800-537-9540
Additional Phone #'s in Section 3 this HASP	

9.3 PERSONNEL ROLES, LINES OF AUTHORITY, AND COMMUNICATIONS

This section of the ERCP describes the various roles, responsibilities, and communication procedures that will be followed by personnel involved in emergency responses.

The primary emergency coordinator for this site is the Site Supervisor. In the event an emergency occurs and the emergency coordinator is not on site, the SS or the highest-ranking employee on site will serve as the emergency coordinator until he arrives. The emergency coordinator will determine the nature of the emergency and take appropriate action as defined by this ERCP.

The emergency coordinator will implement the ERCP immediately as required. The decision to implement the plan will depend upon whether the actual incident threatens human health or the environment. Immediately after being notified of an emergency incident, the emergency coordinator or his designee will evaluate the situation to determine the appropriate action.

9.3.1 Responsibilities and Duties

This section describes the responsibilities and duties assigned to the emergency coordinator.

It is recognized that the structure of the "Incident Command System" will change as additional response organizations are added. OHM/IT will follow procedures as directed by the fire department, LEPC, State and Federal Agencies as required. OHM/IT will defer to the local Fire Department chief to assume the role of Incident Commander upon arriving on site. Additional on-site personnel may be added to the Site Emergency Response Team as required to respond effectively.

9.3.2 On-Site Emergency Coordinator Duties

The on-site emergency coordinator is responsible for implementing and directing the emergency procedures. All emergency personnel and their communications will be coordinated through the emergency coordinator. Specific duties are as follows:

- Identify the source and character of the incident, type and quantity of any release. Assess possible hazards to human health or the environment that may result directly from the problem or its control.

- Discontinue operations in the vicinity of the incident if necessary to ensure that fires, explosions, or spills do not recur or spread to other parts of the site.

- Notify local Emergency Response Teams if their help is necessary to control the incident. Table 9.1 provides telephone numbers for emergency assistance.

- Direct on-site personnel to control the incident until, if necessary, outside help arrives.

- Ensure that the building or area where the incident occurred and the surrounding area are evacuated and shut off possible ignition sources, if appropriate. The Emergency Response Team is responsible for directing site personnel such that they avoid the area of the incident and leave emergency control procedures unobstructed.

- If fire or explosion is involved, notify facility Fire Department.

- Notify ROICC

- Notify OHM/IT Project Manager

- Have protected personnel, in appropriate PPE, on standby for rescue.

If the incident may threaten human health or the environment outside of the site, the emergency coordinator should immediately determine whether evacuation of area outside of the site may be necessary and, if so, notify the Police Department and the Office of Emergency Management.

When required, notify the National Response Center. The following information should be provided to the National Response Center:

- Name and telephone number
- Name and address of facility
- Time and type of incident
- Name and quantity of materials involved, if known
- Extent of injuries
- Possible hazards to human health or the environment outside of the facility.

The emergency telephone number for the National Response Center is 800-424-8802.

If hazardous waste has been released or produced through control of the incident, ensure that:

- Waste is collected and contained.

- Containers of waste are removed or isolated from the immediate site of the emergency.

- Treatment or storage of the recovered waste, contaminated soil or surface water, or any other material that results from the incident or its control is provided.

- Ensure that no waste that is incompatible with released material is treated or stored in the facility until cleanup procedures are completed.

- Ensure that all emergency equipment used is decontaminated, recharged, and fit for its intended use before operations are resumed.

9.4 SAFE DISTANCES AND PLACES OF REFUGE

The emergency coordinator for all activities will be the SS. No single recommendation can be made for evacuation or safe distances because of the wide variety of emergencies that could occur. Safe distances can only be determined at the time of an emergency based on a combination of site and incident-specific criteria. However, the following measures are established to serve as general guidelines.

In the event of minor hazardous materials releases (small spills of low toxicity), workers in the affected area will report initially to the contamination reduction zone. Small spills or leaks (generally less than 55 gallons) will require initial evacuation of at least 50 feet in all directions to allow for cleanup and to prevent exposure. After initial assessment of the extent of the release and potential hazards, the emergency coordinator or his designee will determine the specific boundaries for evacuation. Appropriate steps such as caution tape, rope, traffic cones, barricades, or personal monitors will be used to secure the boundaries.

If an incident may threaten the health or safety of the surrounding community, the public will be informed and, if necessary, evacuated from the area. The emergency coordinator, or his designee will inform the proper agencies in the event that this is necessary. Telephone numbers are listed in Table 9.1.

Places of refuge will be established prior to the commencement of activities. These areas must be identified for the following incidents:

- Chemical release
- Fire/explosion
- Medical emergency
- Hazardous weather

In general, evacuation will be made to the main entrance to the IT/OHM site, unless the emergency coordinator determines otherwise. It is the responsibility of the emergency coordinator to determine when it is necessary to evacuate personnel to off-site locations.

In the event of an emergency evacuation, all the employees will gather at the entrance to the site until a head count establishes that all are present and accounted for. No one is to leave the site without notifying the emergency coordinator.

9.5 EVACUATION ROUTES AND PROCEDURES

All emergencies require prompt and deliberate action. In the event of an emergency, it will be necessary to follow an established set of procedures. Such established procedures will be followed as closely as possible. However, in specific emergency situations, the emergency coordinator may deviate from the procedures to provide a more effective plan for bringing the situation under control. The emergency coordinator is responsible for determining which situations require site evacuation.

9.5.1 Evacuation Signals and Routes

Two-way radio communication and an air horn will be used to notify employees of the necessity to evacuate an area or building involved in a release/spill of a hazardous material. The crew supervisor will have a two-way radio. Only the emergency coordinator will initiate total site evacuation, however, in his absence, decision to preserve the health and safety of employees will take precedence.

9.5.2 Evacuation Procedures

In the event evacuation is necessary, the following actions will be taken:

- The emergency signal will be activated.

- No further entry of visitors, contractors, or trucks will be permitted. Vehicle traffic within the site will cease in order to allow safe exit of personnel and movement of emergency equipment.

- Shut off all machinery if safe to do so.

- ALL on-site personnel, visitors, and contractors in the support zone will assemble at the entrance to the site for a head count and await further instruction from the emergency coordinator.

- ALL persons in the exclusion zone and contamination reduction zone will be accounted for by their immediate crew leaders (e.g., foreman). Leaders will determine the safest exits for employees and will also choose an alternate exit if the first choice is inaccessible.

- During exit, the crew leader should try to keep the group together. Immediately upon exit, the crew leader will account for all employees in his crew.

- Upon completion of the head count, the crew leader will provide the information to the emergency coordinator.
- Contract personnel and visitors will also be accounted for.
- The names of emergency response team members involved will be reported to the emergency spill control coordinator.
- The emergency coordinator or designee will make a final tally of persons. No attempt to find persons not accounted for will involve endangering lives of OHM/IT or other employees by re-entry into emergency areas.

In all questions of accountability, immediate crew leaders will be held responsible for those persons reporting to them. Visitors will be the responsibility of those employees they are seeing. Contractors and truck drivers are the responsibility of the Site Manager. The security guard will aid in accounting for visitors, contractors, and truckers by reference to sign-in sheets available from the guard shack.

- Personnel will be assigned by the emergency coordinator to be available at the main gate to direct and brief emergency responders.
- Re-entry into the site will be made only after the emergency coordinator gives clearance. At his direction, a signal or other notification will be given for re-entry into the facility.
- Drills will be held periodically to practice all of these procedures and will be treated with the same seriousness as an actual emergency.

9.6 EMERGENCY SPILL RESPONSE PROCEDURES AND EQUIPMENT

In the event of an emergency involving a hazardous material spill or release, the following general procedures will be used for rapid and safe response and control of the situation. Emergency contacts found in Table 9.1 provide a quick reference guide to follow in the event of a major spill.

9.6.1 Notification Procedures

If an employee discovers a chemical spill or process upset resulting in a vapor or material release, he or she will immediately notify the on-site emergency coordinator.

On-site Emergency Coordinator will obtain information pertaining to the following:

- The material spilled or released.
- Location of the release or spillage of hazardous material.
- An estimate of quantity released and the rate at which it is being released.
- The direction in which the spill, vapor or smoke release is heading.
- Any injuries involved.
- Fire and/or explosion or possibility of these events.
- The area and materials involved and the intensity of the fire or explosion.

This information will help the on-site emergency coordinator to assess the magnitude and potential seriousness of the spill or release.

9.6.2 Procedure for Containing/Collecting Spills

The initial response to any spill or discharge will be to protect human health and safety, and then the environment. Identification, containment, treatment, and disposal assessment will be the secondary response.

If for some reason a chemical spill is not contained within a dike or sump area, an area of isolation will be established around the spill. The size of the area will generally depend on the size of the spill and the materials involved. If the spill is large (greater than 55 gallons) and involves a tank or a pipeline rupture, an initial isolation of at least 100 ft. in all directions will be used. Small spills (less than or equal to 55 gallons) or leaks from a tank or pipe will require evacuation of at least 50 ft. in all directions to allow cleanup and repair and to prevent exposure. When any spill occurs, only those persons involved in overseeing or performing emergency operations will be allowed within the designated hazard area. If possible the area will be roped or otherwise blocked off.

If an incident may threaten the health or safety of the surrounding community, the public will be informed and possibly evacuated from the area. The on-site emergency coordinator will inform the proper agencies in the event this is necessary. (Refer to Table 9.1)

As called for in regulations developed under the Comprehensive Environmental Response Compensation Liability Act of 1980 (Superfund), OHM/IT's practice is to report a spill of a pound or more of any hazardous material for which a reportable quantity has not been established and which is listed under the Solid Waste Disposal Act, Clean Air Act, Clean Water Act, or TSCA. OHM/IT also follows the same practice for any substances not listed in the Acts noted above but which can be classified as a hazardous waste under RCRA.

Clean up personnel will take the following measures:

- Make sure all unnecessary persons are removed from the hazard area.

- Put on protective clothing and equipment.

- If a flammable material is involved, remove all ignition sources, and use spark and explosion proof equipment for recovery of material.

- Remove all surrounding materials that could be especially reactive with materials in the waste. Determine the major components in the waste at the time of the spill.

- If wastes reach a storm sewer, try to dam the outfall by using sand, earth, sandbags, etc. If this is done, pump this material out into a temporary holding tank or drums as soon as possible.

- Place all small quantities of recovered liquid wastes (55 gallons or less) and contaminated soil into drums for incineration or removal to an approved disposal site.

- Spray the spill area with foam, if available, if volatile emissions may occur.

- Apply appropriate spill control media (e.g. clay, sand, lime, etc.) to absorb discharged liquids.

- For large spills, establish diking around leading edge of spill using booms, sand, clay or other appropriate material. If possible, use diaphragm pump to transfer discharged liquid to drums or holding tank.

9.6.3 Emergency Response Equipment

The following equipment will be staged in the support zone and throughout the site, as needed, to provide for safety and first aid during emergency responses.

- ABC-type fire extinguisher
- First-aid kit, industrial size
- Eyewash/safety shower
- Emergency signal horn

9.6.4 Emergency Spill Response Clean-Up Materials and Equipment

A sufficient supply of appropriate emergency response clean-up and personal protective equipment will be inventoried and inspected, visually, on a weekly basis.

The following equipment will be dedicated for spill cleanup:

- Shovels
- Sorbent sheets (diapers) for absorbing liquid spills.
- 55-gallon open-top drums for containerization of waste materials.

*NOTE: All contaminated soils, absorbent materials, solvents and other materials resulting from the clean-up of spilled or discharged substances shall be properly stored, labeled, and disposed of off-site.

9.7 EMERGENCY CONTINGENCY PLAN

This section of the ERCP details the contingency measures OHM/IT will take to prepare for and respond to fires, explosions, spills and releases of hazardous materials, hazardous weather, and medical emergencies.

9.8 MEDICAL EMERGENCY CONTINGENCY MEASURES

The procedures listed below will be used to respond to medical emergencies. The SS/SSO will contact the local hospital and inform them of the site hazards and potential emergency situations. A minimum of two First-Aid/CPR trained personnel will be maintained on site.

9.8.1 Response

The nearest workers will immediately assist a person who shows signs of medical distress or who is involved in an accident. The work crew supervisor will be summoned.

The work crew supervisor will immediately make radio contact with the on-site emergency coordinator to alert him of a medical emergency situation. The supervisor will advise the following information:

- Location of the victim at the work site
- Nature of the emergency
- Whether the victim is conscious

- Specific conditions contributing to the emergency, if known

The Emergency Coordinator will notify the Site Safety Officer. The following actions will then be taken depending on the severity of the incident:

Life-Threatening Incident
If an apparent life-threatening condition exists, the crew supervisor will inform the emergency coordinator by radio, and the local Emergency Response Services (EMS) will be immediately called. An on-site person will be appointed who will meet the EMS and have him/her quickly taken to the victim. Any injury within the EZ will be evacuated by OHM/IT personnel to a clean area for treatment by (EMS) personnel. No one will be able to enter the EZ without showing proof of training, medical surveillance and site orientation.

Non Life-Threatening Incident
If it is determined that no threat to life is present, the Site Manager will direct the injured person through decontamination procedures (see below) appropriate to the nature of the illness or accident. Appropriate first aid or medical attention will then be administered.

*NOTE: The area surrounding an accident site must not be disturbed until the scene has been cleared by the Site Supervisor.

Any personnel requiring emergency medical attention will be evacuated from exclusion and contamination reduction zones if doing so would not endanger the life of the injured person or otherwise aggravate the injury. Personnel will not enter the area to attempt a rescue if their own lives would be threatened. The decision whether or not to decontaminate a victim prior to evacuation is based on the type and severity of the illness or injury and the nature of the contaminant. For some emergency victims, immediate decontamination may be an essential part of life-saving first aid. For others, decontamination may aggravate the injury or delay life-saving first aid. Decontamination will be performed if it does not interfere with essential treatment.

If decontamination can be performed, observe the following procedures:

- Wash external clothing and cut it away.

- If decontamination cannot be performed, observe the following procedures.

- Wrap the victim in blankets or plastic to reduce contamination of other personnel.

- Alert emergency and off-site medical personnel to potential contamination, instruct them about specific decontamination procedures.

- Send site personnel familiar with the incident and chemical safety information, e.g. MSDS, with the affected person.

All injuries, no matter how small, will be reported to the SS/SSO. An accident/injury/illness report will be completely and properly filled out and submitted to the Health and Safety Director/Project CIH, in accordance with OHM/IT's reporting procedures.

A list of emergency telephone numbers is given in Table 9.1.

9.8.2 Notification

The following personnel/agencies will be notified in the event of a medical emergency:

- Local Fire Department or EMS
- On-site Emergency Coordinator
- Workers in the affected areas
- ROICC

9.9 FIRE CONTINGENCY MEASURES

OHM/IT personnel and subcontractors are not trained professional firefighters. Therefore, if there is any doubt that a fire can be quickly contained and extinguished, personnel will notify the emergency coordinator by radio and vacate the structure or area. The emergency coordinator will immediately notify the local Fire Department.

The following procedures will be used to prevent the possibility of fires and resulting injuries:

- Sources of ignition will be kept away from where flammable materials are handled or stored.

- "No smoking" signs will be conspicuously posted in areas where flammable materials are present.

- Fire extinguishers will be placed in all areas where a fire hazard may exist.

- Before workers begin operations in an area the foreman will give instruction on egress procedures and assembly points. Egress routes will be posted in work areas and exit points clearly marked.

9.9.1 Response

The following procedures will be used in the event of a fire:

- Anyone who sees a fire will notify his or her supervisor who will then contact the Emergency Coordinator by radio. The emergency coordinator will activate the emergency air horns and contact the local Fire Department.
- When the emergency siren sounds, workers will disconnect electrical equipment in use (if possible) and proceed to the nearest fire exit.
- Work crews will be comprised of pairs of workers (buddy system) who join each other immediately after hearing the fire alarm and remain together throughout the emergency. Workers will assemble at a predetermined rally point for a head count.
- When a worker has extinguished a small fire, the emergency coordinator will be notified.

9.10 HAZARDOUS WEATHER CONTINGENCY MEASURES

Operations will not be started or continued when the following hazardous weather conditions are present:

- Lightning
- Heavy Rains

- High Winds

9.10.1 Response

- All equipment will be shut down and secured to prevent damage.

- Personnel will be moved to safe refuge. The emergency coordinator will determine when it is necessary to evacuate personnel to off-site locations and will coordinate efforts with fire, police and other agencies.

9.10.2 Notification

The emergency coordinator will be responsible for assessing hazardous weather conditions and notifying personnel of specific contingency measures. Notifications will include:

- OHM/IT employees and subcontractors
- ROICC
- Local Emergency Management Agency

9.11 SPILL/RELEASE CONTINGENCY MEASURES

In the event of release or spill of a hazardous material the following measures will be taken:

9.11.1 Response

Any person observing a spill or release will act to remove and/or protect injured/contaminated persons from any life-threatening situation. First aid and/or decontamination procedures will be implemented as appropriate.

First aid will be administered to injured/contaminated personnel. Unsuspecting persons/vehicles will be warned of the hazard. All personnel will act to prevent any unsuspecting persons from coming in contact with spilled materials by alerting other nearby persons. Attempt to stop the spill at the source, if possible. Without taking unnecessary risks, personnel will attempt to stop the spill at the source. This may involve activities such as uprighting a drum, closing a valve or temporarily sealing a hole with a plug.

Utilizing radio communications, the emergency coordinator will be notified of the spill/release, including information on material spilled, quantity, personnel injuries and immediate life threatening hazards. Notification procedures will be followed to inform on-site personnel and off-site agencies. The emergency coordinator will make a rapid assessment of the spill/release and direct confinement, containment and control measures. Depending upon the nature of the spill, measures may include:

- Construction of a temporary containment berm utilizing on-site clay absorbent earth
- Digging a sump, installing a polyethylene liner and
- Diverting the spill material into the sump placing drums under the leak to collect the spilling material before it flows over the ground
- Transferring the material from its original container to another container

The emergency coordinator will notify the ROICC of the spill and steps taken to institute clean up. Emergency response personnel will clean up all spills following the spill clean-up plan developed by the emergency coordinator. Supplies necessary to clean up a spill will be immediately available on-site. Such items may include, but are not limited to:

- Shovel, rake
- Personal safety equipment
- Steel drums
- Miscellaneous hand tools

The major supply of material and equipment will be located in the Support Zone. Smaller supplies will kept at active work locations. The emergency coordinator will inspect the spill site to determine that the spill has been cleaned up to the satisfaction of the ROICC. If necessary, soil, water or air samples may be taken and analyzed to demonstrate the effectiveness of the spill clean-up effort. The emergency coordinator will determine the cause of the spill and determine remedial steps to ensure that recurrence is prevented. The emergency coordinator will review the cause with the ROICC and obtain his concurrence with the remedial action plan.

HOSPITAL LOCATION MAP

HOSPITAL DIRECTIONS:
Exit the base at Gate 1. Turn left onto Shore Drive (Hwy 60). Turn right onto Independence Blvd. Hospital is on the left side of the road.

HOSPITAL INFORMATION:

Name: Bayside Hospital
Address: 800 Independence Blvd.
City, State: Virginia Beach, VA

Phone: (757) 363-6137

10 TRAINING REQUIREMENTS

All personnel entering the exclusion zone will be trained in the provisions of this site safety plan and be required to sign the Site Safety Plan Acknowledgment in Appendix C.

Site-specific training for activities at SWMU 8 will include potential site contaminants, Hazard Communication as per 29 CFR 1926.59 site physical and environmental hazards, emergency response and evacuation procedures, and emergency telephone numbers will be held at the site location by the SS before any site work activities begin.

Outlines of the orientation for OHM/IT / sub-contract personnel and visitors are presented below:

OHM/IT/SUBCONTRACTORS	VISITOR ORIENTATION
• HASP sign off • Sign in/out procedures • Site background • Chain of command • Rules and regulations • Hours of work • Absences • Equipment • Emergency Information • Emergency signal • Gathering point • Responsibilities/roles • Emergency phone numbers • Work Zones • Contaminants and Material Safety Data Sheets (MSDS) [Hazard Communication Program] • Activity Hazard Analysis (AHAs) • Forms, site-specific • Incident Reporting	• Sign in/out procedures • Review of Site map • Work Zones in progress • Hazard Communication • Emergency plan/signals • Training/medical requirements • Zones/areas open to visitors

11 MEDICAL SURVEILLANCE PROGRAM

All OHM/IT personnel participate in a medical and health monitoring program. This program is initiated when the employee starts work with a complete physical and medical history and is continued on a regular basis. A listing of OHM/IT's worker medical profile is shown below. This program was developed in conjunction with a consultant toxicologist and IT/OHM's occupational health physician. Other medical consultants are retained when additional expertise is required.

The medical surveillance program meets the requirements of the OSHA Standard 29 CFR 1910.120/1926.65(f).

The following information is provided in the event that medical attention is necessary.

The IT/OHM Medical Director is:

Dr. Elayne Theriault
Continuum Health Care
800-229-3674 (office)

Non-emergency work related injuries:

Now Care Medical Center
4323 D Indian River
Chessapeake, VA 23325
(757) 424-4300

The IT/OHM Medical Director and the HSC and/or HSM will be immediately notified of any suspected exposures to hazardous materials/wastes.

APPENDIX A
MATERIAL SAFETY DATA SHEETS (MSDS's)

MSDS's for site contaminants are included in this section. A listing of chemicals that may be brought to the site are listed below. Copies of the MSDS' for those chemicals listed below will be maintained in the IT site dedicated vehicle.

Materials Brought to the Site:
Alconox
Diesel
Gasoline

Site Contaminant:
Lead

Please reduce your browser font size for better viewing and printing.

MSDS *Material Safety Data Sheet*

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

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 202-483-7616

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

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

J.T.Baker

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

ALCONOX(tm)

MSDS Number: A2052 — *Effective Date: 12/08/96*

1. Product Identification

Synonyms: Alkyl Aryl Sulfonates
CAS No.: Not applicable.
Molecular Weight: Not applicable.
Chemical Formula: Not applicable.
Product Codes: A461

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Alconox(tm)	N/A	90 - 100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! CAUSES IRRITATION.

J.T. Baker SAF-T-DATA$^{(tm)}$ Ratings (Provided here for your convenience)

Health Rating: 1 - Slight
Flammability Rating: 0 - None
Reactivity Rating: 1 - Slight
Contact Rating: 2 - Moderate

Lab Protective Equip: GOGGLES; LAB COAT
Storage Color Code: Orange (General Storage)

Potential Health Effects

Inhalation:
None identified.

Ingestion:
May be harmful.

Skin Contact:
Irritation.

Eye Contact:
Irritation.

Chronic Exposure:
No information found.

Aggravation of Pre-existing Conditions:
No information found.

---

4. First Aid Measures

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Prompt action is essential.

Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention.

Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes.

Eye Contact:
In case of eye contact, immediately flush with plenty of water for at least 15 minutes.

---

5. Fire Fighting Measures

Fire:
Not expected to be a fire hazard.

Explosion:
None identified.

Fire Extinguishing Media:
Use extinguishing media appropriate for surrounding fire.

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

6. Accidental Release Measures

Wear self-contained breathing apparatus and full protective clothing. With clean shovel, carefully place material into clean, dry container and cover; remove from area. Flush spill area with water.

7. Handling and Storage

Keep container tightly closed. Suitable for any general chemical storage area. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
None established.

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

Personal Respirators (NIOSH Approved):
For conditions of use where exposure to the substance is apparent, consult an industrial hygienist. For emergencies, or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

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

9. Physical and Chemical Properties

Appearance:

White Powder.

Odor:
No information found.

Solubility:
Appreciable (>10%)

Specific Gravity:
0.00

pH:
No information found.

% Volatiles by volume @ 21C (70F):
N/A

Boiling Point:
No information found.

Melting Point:
No information found.

Vapor Density (Air=1):
Not applicable.

Vapor Pressure (mm Hg):
Not applicable.

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

---

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:
No information found.

Hazardous Polymerization:
Will not occur.

Incompatibilities:
No information found.

Conditions to Avoid:
No information found.

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11. Toxicological Information

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

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Alconox(tm)	No	No	None

12. Ecological Information

Environmental Fate:
No information found.

Environmental Toxicity:
No information found.

13. Disposal Considerations

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

14. Transport Information

Not regulated.

15. Regulatory Information

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

Ingredient	TSCA	EC	Japan	Australia
Alconox(tm)	Yes	No	No	No

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

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Alconox(tm)	No	No	Yes	No

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

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Alconox(tm)	No	No	No	No

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

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Alconox(tm)	No	No	No

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

Australian Hazchem Code: No information found.
Poison Schedule: No information found.

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

---

16. Other Information

Label Hazard Warning:
WARNING! CAUSES IRRITATION.

Label Precautions:
Keep in tightly closed container. Wash thoroughly after handling.

Label First Aid:
In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse.

Product Use:
Laboratory Reagent. Research and Development Use Only.

Revision Information:
Pure. New 16 section MSDS format, all sections have been revised.

Disclaimer:
****
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****

Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

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

Material Safety Data Sheets Collection:

Sheet No. 470
Diesel Fuel Oil No. 2-D

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

Section 1. Material Identification

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Diesel Fuel Oil No. 2-D Description: Diesel fuel is obtained from the middle distillate in petroleum separation; a distillate oil of low sulfur content. It is composed chiefly of unbranched paraffins. Diesel fuel is available in various grades, one of which is synonymous with fuel oil No. 2-D. This diesel fuel oil requires a minimum Cetane No. (efficiency rating for diesel fuel comparable to octane number ratings for gasoline) of 40 (ASTM D613). Used as a fuel for trucks, ships, and other automotive engines; as mosquito control (coating on breeding waters); and for drilling muds.

Other Designations: CAS No. 68334-30-5, diesel fuel.

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: 2 (top), 0 (left), 0 (right), - (bottom)

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

Cautions: Diesel fuel oil No. 2-D is a skin irritant and central nervous depressant with high mist concentrations. It is an environmental hazard and moderate fire risk.

Section 2. Ingredients and Occupational Exposure Limits

Diesel fuel oil No. 2-D*

1989 OSHA PEL	1990-91 ACGIH TLV	1988 NIOSH REL	1985-86 Toxicity Data‡
None established	Mineral Oil Mist TWA: 5 mg/m^3† STEL: 10 mg/m^3	None established	Rat, oral, LD_{50}: 9 g/kg produces gastrointestinal (hypermotility, diarrhea) effects

* Diesel fuel No. 2-D tends to be low in aromatics and high in paraffinics. This fuel oil is complex mixture of: 1) >95% paraffinic, olefinic, naphthenic, and aromatic hydrocarbons, 2) sulfur (<0.5%), and 3) benzene (<100 ppm). [A low benzene level reduces carcinogenic risk. Fuel oils can be exempted under the benzene standard (29 CFR 1910.1028)]. Although low in the fuel itself, benzene concentrations are likely to be much higher in processing areas.
† As sampled by nonvapor-collecting method.
‡ Monitor NIOSH, *RTECS* (HZ1800000), for future toxicity data.

Section 3. Physical Data

Boiling Point Range: 340 to 675 °F (171 to 358 °C)
Viscosity: 1.9 to 4.1 centistoke at 104 °F (40 °C)
Specific Gravity: <0.86
Water Solubility: Insoluble

Appearance and Odor: Brown, slightly viscous liquid.

Section 4. Fire and Explosion Data

Flash Point: 125 °F (52 °C) min.	Autoignition Temperature: >500 °F (932 °C)	LEL: 0.6% v/v	UEL: 7.5% v/v

Extinguishing Media: Use dry chemical, carbon dioxide, or foam to fight fire. Use a water spray to cool fire exposed containers. Do not use a forced water spray directly on burning oil since this will scatter the fire. Use a smothering technique for extinguishing fire.

Unusual Fire or Explosion Hazards: Diesel fuel oil No. 2-D is a OSHA Class II combustible liquid. Its volatility is similar to that of gas oil. Vapors may travel to a source of ignition and flash back.

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 the pressure-demand or positive-pressure mode and full protective clothing. If feasible, remove containers from fire. Be aware of runoff from fire control methods. Do not release to sewers or waterways due to pollution and fire or explosion hazard.

Section 5. Reactivity Data

Stability/Polymerization: Diesel fuel oil No. 2-D is stable at room temperature in closed containers under normal storage and handling conditions. Hazardous polymerization cannot occur.

Chemical Incompatibilities: It is incompatible with strong oxidizing agents; heating greatly increases the fire hazard.

Conditions to Avoid: Avoid heat and ignition sources.

Hazardous Products of Decomposition: Thermal oxidative decomposition of diesel fuel oil No. 2-D can produce various hydrocarbons and hydrocarbon derivatives, and other partial oxidation products such as carbon dioxide, carbon monoxide, and sulfur dioxide.

on 6. Health Hazard Data

nor ity: Although the IARC has not assigned an overall evaluation to diesel fuels as a group, it has evaluated occupational exposures in :u ning as an IARC probable human carcinogen (Group 2A). It has evaluated distillate (light) diesel oils as not classifiable as human og Group 3).
iary of Risks: Although diesel fuel's toxicologic effects should resemble kerosine's, they are somewhat more pronounced due to additives s sulfurized esters. Excessive inhalation of aerosol or mist can cause respiratory tract irritation, headache, dizziness, nausea, vomiting, and coordination, depending on concentration and exposure time. When removed from exposure area, affected persons usually recover etely. If vomiting occurs after ingestion and if oil is aspirated into the lungs, hemorrhaging and pulmonary edema, progressing to renal in-nent and chemical pneumonitis, may result. A comparative ratio of oral to aspirated lethal doses may be 1 pt vs. 5 ml. Aspiration may also in transient CNS depression or excitement. Secondary effects may include hypoxia (insufficient oxygen in body cells), infection, pneumato-rmation, and chronic lung dysfunction. Inhalation may result in euphoria, cardiac dysrhythmias, respiratory arrest, and CNS toxicity. ged or repeated skin contact may irritate hair follicles and block sebaceous glands, producing a rash of acne pimples and spots, usually on nd legs.
:al Conditions Aggravated by Long-Term Exposure: None reported.
t Organs: Central nervous system, skin, and mucous membranes.
ry Entry Routes: Inhalation, ingestion.
Effects: Systemic effects from ingestion include gastrointestinal irritation, vomiting, diarrhea, and in severe cases central nervous system sion, progressing to coma or death. Inhalation of aerosols or mists may result in increased rate of respiration, tachycardia (excessively rapid eat), and cyanosis (dark purplish discoloration of the skin and mucous membranes caused by deficient blood oxygenation).
ic Effects: Repeated contact with the skin causes dermatitis.
Γ AID
Gently lift the eyelids and flush immediately and continuously with flooding amounts of water until transported to an emergency medical '. Consult a physician immediately.
Quickly remove contaminated clothing. Rinse with flooding amounts of water for at least 15 min. If large areas of the body have been d or if irritation persists, get medical help immediately. Wash affected area with soap and water.
tion: Remove exposed person to fresh air and support breathing as needed.
ion: Never give anything by mouth to an unconscious or convulsing person. If ingested, *do not induce vomiting* due to aspiration hazard. t a physician immediately. Position to avoid aspiration.
first aid, get appropriate in-plant, paramedic, or community medical support.
o Physicians: Gastric lavage is contraindicated due to aspiration hazard. Preferred antidotes are charcoal and milk. In cases of severe ion pneumonitis, consider monitoring arterial blood gases to ensure adequate ventilation. Observe the patient for 6 hr. If vital signs become nal or symptoms develop, obtain a chest x-ray.

on 7. Spill, Leak, and Disposal Procedures

eak: Notify safety personnel, evacuate area for large spills, remove all heat and ignition sources, and provide maximum explosion-proof tion. Cleanup personnel should protect against vapor inhalation and liquid contact. Clean up spills promptly to reduce fire or vapor hazards. nor mbustible absorbent material to pick up small spills or residues. For large spills, dike far ahead to contain. Pick up liquid for reclama-d l. Do not release to sewers or waterways due to health and fire and/or explosion hazard. Follow applicable OSHA regulations (29 9). Diesel fuel oil No. 2-D spills may be environmental hazards. Report large spills.
sa tact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.
)esignations
Hazardous Waste (40 CFR 261.21): Ignitable waste
LA Hazardous Substance (40 CFR 302.4): Not listed
Extremely Hazardous Substance (40 CFR 355): Not listed
Toxic Chemical (40 CFR 372.65): Not listed
. Designations
ntaminant (29 CFR 1910.1000, Subpart Z): Not listed

on 8. Special Protection Data

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

on 9. Special Precautions and Comments

e Requirements: Use and storage conditions should be suitable for a OSHA Class II combustible liquid. Store in closed containers in a entilated area away from heat and ignition sources and strong oxidizing agents. Protect containers from physical damage. To prevent static , electrically ground and bond all containers and equipment used in shipping, receiving, or transferring operations. Use nonsparking tools plosion-proof electrical equipment. No smoking in storage or use areas.
eering Controls: Avoid vapor or mist inhalation and prolonged skin contact. Wear protective rubber gloves and chemical safety glasses contact with liquid or high mist concentration may occur. Additional suitable protective clothing may be required depending on working ons. Institute a respiratory protection program that includes regular training, maintenance, inspection, and evaluation. Practice good al hygiene and housekeeping procedures. Do not wear oil contaminated clothing. At least weekly laundering of work clothes is recom-d. Do not put oily rags in pockets. When working with this material, wear gloves or use barrier cream.
p on Data (49 CFR 172.101)
Sh g Name: Fuel oil
Hazard Class: Combustible liquid
.: NA1993
Label: None
Packaging Exceptions: 173.118a
Packaging Requirements: None

Collection References: 1, 6, 7, 12, 73, 84, 101, 103, 126, 127, 132, 133, 136, 143, 146
ed by: MJ Allison, BS; Industrial Hygiene Review: DJ Wilson, CIH; Medical Review: AC Darlington, MD; Edited by: JR Stuart, MS

KOCH REFINING -- 0900 UNLEADED GASOLINE, 87 OCTANE - GASOLINE,AUTOMOTIVE
MATERIAL SAFETY DATA SHEET
NSN: 9130001487103
Manufacturer's CAGE: 3V260
Part No. Indicator: B
Part Number/Trade Name: 0900 UNLEADED GASOLINE, 87 OCTANE

General Information

Item Name: GASOLINE,AUTOMOTIVE
Company's Name: KOCH REFINING CO INC
Company's Street: SUNTIDE RD
Company's P. O. Box: 2608
Company's City: CORPUS CHRISTI
Company's State: TX
Company's Country: US
Company's Zip Code: 78403
Company's Emerg Ph #: 800-424-9300(CHEMTREC)/512-241-4811
Company's Info Ph #: 512-241-4811 / 316-832-8488
Record No. For Safety Entry: 073
Tot Safety Entries This Stk#: 120
Status: FE
Date MSDS Prepared: 14APR94
Safety Data Review Date: 26MAR96
Supply Item Manager: KY
Preparer's Company: ENVRIO,HEALTH & SAFETY
Preparer's St Or P. O. Box: KOCH INDUSTRIES, INC
MSDS Serial Number: BYHHF
Specification Number: VV-G-001690A
Spec Type, Grade, Class: CLASS A,B,C,D,E,REG
Hazard Characteristic Code: F2

Ingredients/Identity Information

Physical/Chemical Characteristics

Appearance And Odor: CLEAR, COLORLESS LIQUID W/SHARP, PENETRATING, AROMATIC ODOR.
Boiling Point: 90.0F,32.2C
Melting Point: -130F,-90C
Vapor Pressure (MM Hg/70 F): 348-698
Vapor Density (Air=1): 3-4
Specific Gravity: 0.73
Evaporation Rate And Ref: MODERATELY FAST, WATER=1
Solubility In Water: NEGLIGIBLE.
Percent Volatiles By Volume: 100
pH: NEUTRA

Fire and Explosion Hazard Data

Flash Point: -40F,-40C
Lower Explosive Limit: 1.4
Upper Explosive Limit: 7.6
Extinguishing Media: NONE SPECIFIED BY MANUFACTURER.
Special Fire Fighting Proc: NONE SPECIFIED BY MANUFACTURER.
Unusual Fire And Expl Hazrds: DANGER!EXTREMENLY FLAMM.VAP MAY CAUSE FLASH FIRE.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): ALL SOURCES OF IGNITION.

Materials To Avoid: INCOMPATIBLE W/OXIDIZING AGENTS.
Hazardous Decomp Products: COMBUSTION MAY PRODUCE CO, NOX, SOX & REACTIVE HDYROCARBONS.
Conditions To Avoid (Poly): NONE SPECIFIED BY MANUFACTURER.

Health Hazard Data

LD50-LC50 Mixture: UNKNOWN
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: WARNING!MAY CAUSE CARDIAC SENSITIZATION. ASPIRATION HAZ IF SWALLOWED-CAN ENTER LUNGS & CAUSE DMG.OVEREXPO MAY CAUSE CNS DEPRESS.MAY BE IRRIT TO SKIN/EYES/RESP TRACT.POTENTIAL CANCER HAZ. CONTAINS BENZENE--KNOWN HUMAN CARCINOGEN.INGEST:SLIGHTLY TOXIC.IRRIT OF MOUTH/THROAT/GI TRACT.SKIN:SLIGHTLY IRRIT.DEFAT AGENT.(SUPPLEM)
Carcinogenicity - NTP: YES
Carcinogenicity - IARC: YES
Carcinogenicity - OSHA: YES
Explanation Carcinogenicity: CONTAINS Benzene [71-43-2] WHICH IS LISTED BY NTP AND IARC AND REGULATED BY OSHA AS A CARCINOGEN.
Signs/Symptoms Of Overexp: INGEST:SALV,PAIN,NAU,VOMIT,DIARR.ASPIRATION INTO LUNGS MAY CAUSE CHEM PNEU/LUNG DMG.OVEREXPO MAY CAUSE SYSTEMIC DMG INCLUDING TARGET ORGAN EFFECTS KIDNEY,LIVER,CNS.SKIN:DRYING,REDDENING,ITCH, PAIN,INFLAMM,CRACK,2ND INFECTION W/TISSUE DMG.INHAL:CARDIAC SENS, ARRHYTHMIAS,DEATH FRM CARDIAC ARREST.
Med Cond Aggravated By Exp: PRE-EXISTING MED CONDITIONS WHICH MAY BE AGGRAVATED BY EXPOSOURE INCLUDE DISORDERS OF SKIN, KIDNEY, LIVER & RESP TRACT.
Emergency/First Aid Proc: INGEST:DO NOT INDUCE VOMIT-ASPIRATION HAZ.IF SPONT KEEP HEAD BELOW HIPS.MONITOR BREATH.KEEP WARM/@REST.GASTRIC LAVAGE. SKIN:IMMED WASH W/PLENTY OF SOAP/WATER WHILE REMOVE CONTMAIN CLOTH/SHOE. EYE:FLUSH IMMED W/LG AMTS OF WATER @LEAST 15MINS,OPN EYELIDS.INHAL:REMOVE TO FRESH AIR.NOT BREATH GIVE CPR.BREATH DIFFI CLEAR AIRWAY/GIVE OXY.KEEP WARM/@REST.IN ALL CASES IRRIT PERSIST/DEVELOPS GET IMMED MED AT

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: REMOVE ALL IGN SOURCES.ISOLATE HAZ AREA/DENY ENTRY.TAKE IMMED STEPS TO STOP/CONTAIN SPILL.EXERCISE CAUTION REGARDING PERSONNEL SAFT/EXPO.NOTIFY PROPER AUTHORITIES;RQ=333LBS.ABSORB W/INERT MATL.PLACE IN CHEM WASTE CNTNR.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: AS SUPPLIED HAZ WASTE DUE TO BENZENE & IGNIT. DISPOSE IAW 40CFR IN PROPERLY PERMITTED FACIL.CHECK STATE/LOC REGS.CHEM ADDN/PROCESSING/ALTERING MATL MAKE WASTE MANAGEMENT INFO PRESENT INCOMPLETE/INACCUT/INAPPROP.DISPOSE OF IAW ALL FED/STATE/LOC REGS.
Precautions-Handling/Storing: STORE TIGHTLY CLSD CNTNR @COOL DRY ISOLATED WELL VENTI AREA AWAY FRM HEAT/IGN SOURCES/INCOMP.AVOID STRG OXIDIZERS CONTACT.DON'T EAT/SMOK/DRK NEAR MATL
Other Precautions: GROUND LINES/EQPMT WHEN TRANSFER PROD.USE OF ANY HYDROCARBON FUEL IN AREA W/O ADEQUA VENTI MAY RESULT IN HAZ COMBUST PROD/ INADEQUA OXY LEVELS.GASOLINE ONE OF SOLVTS USED BY CHEM SUBST ABUSERS; PRESENT ACUTE/CHRONIC CNS SIGNS/SYMP/ARRHYTHMIAS

Control Measures

Respiratory Protection: NIOSH/MSHA APPROVED AIR PURIFYING RESP (LIMITED PROT)W/ORG VAP CARTRIDGE/CANISTER MAY BE PERMISSIBLE UNDER CERTAIN CIRCUMSTANCES WHERE AIRBORNE CONCEN EXPECTED TO EXCEED EXPO LIMITS.USE +PRESS AIR SUPPLIED RESP FOR UNK CONCEN/ADEQU PROTECT
Ventilation: VENTILATION & OTHER FORMS OF ENGINEERING CONTROLS ARE PREFERRED MEANS FOR CONTROLLING EXPOSURES.
Protective Gloves: APPROPRIATE CHEM PROT GLOVES.

Eye Protection: CHEM SAFTY GOGG, FACE SHILED.
Other Protective Equipment: EYEWASH FACILITY.USE GOOD PERSONAL HYGIENE.USE NON-SPARKS TOOL.
Work Hygienic Practices: LAUNDER/DISCARD CONTAMIN CLOTH;MEANWHILE KEEP IN CLSD CNTNR.INFORM CLEANERS OF CONTMAIN.DISCARD CONTAMIN LEATHER GOODS.
Suppl. Safety & Health Data: HEALTH HAZ:REPEAT/PROLONG CONTACT W/LG AMTS SLIGHT TRANSIENT IRRIT,LACRIMATION,BURNING SENSATION.IRRIT/CONJUCNTIVITIS. INHAL:NON TO SLIGHTLY TOXIC.IRRIT NOSE/THROAT/LUNGS.CNS DEPRESS. EMPTY CNTNRS CONTAIN PROD RESIDUE-TAKE NECESSARY PRECAUTIONS.

Transportation Data

Disposal Data

Label Data

Label Required: YES
Label Status: G
Common Name: 0900 UNLEADED GASOLINE, 87 OCTANE
Special Hazard Precautions: WARNING!MAY CAUSE CARDIAC SENSITIZATION. ASPIRATION HAZ IF SWALLOWED-CAN ENTER LUNGS & CAUSE DMG.OVEREXPO MAY CAUSE CNS DEPRESS.MAY BE IRRIT TO SKIN/EYES/RESP TRACT.POTENTIAL CANCER HAZ. CONTAINS BENZENE--KNOWN HUMAN CARCINOGEN.INGEST:SLIGHTLY TOXIC.IRRIT OF MOUTH/THROAT/GI TRACT.SKIN:SLIGHTLY IRRIT.DEFAT AGENT.(SUPPLEM)INGEST:SALV, PAIN,NAU,VOMIT,DIARR.ASPIRATION INTO LUNGS MAY CAUSE CHEM PNEU/LUNG DMG. OVEREXPO MAY CAUSE SYSTEMIC DMG INCLUDING TARGET ORGAN EFFECTS KIDNEY, LIVER,CNS.SKIN:DRYING,REDDENING,ITCH,PAIN,INFLAMM,CRACK,2ND INFECTION W/ TISSUE DMG.INHAL:CARDIAC SENS,ARRHYTHMIAS,DEATH FRM CARDIAC ARREST.
Label Name: KOCH REFINING CO INC
Label Street: SUNTIDE RD
Label P.O. Box: 2608
Label City: CORPUS CHRISTI
Label State: TX
Label Zip Code: 78403
Label Country: US
Label Emergency Number: 800-424-9300(CHEMTREC)/512-241-4811

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

Material Safety Data Sheets Collection:

Sheet No. 713
Lead (Inorganic)

Issued: 8/90

Section 1. Material Identification

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Lead (Inorganic) (Pb) Description: Exists widely throughout the world in a number of ores. Its main commercial source is galena (lead sulphide). Lead mineral is separated from crude ores by blast-furnace smelting, drossing, or electrolytic refining. Lead is used mostly in manufacturing storage batteries. Other uses are in manufacturing tetraethyllead and both organic and inorganic lead compounds in ceramics, plastics, and electronic devices; in producing ammunition, solder, cable covering, sheet lead, and other metal products (brass, pipes, caulking); in metallurgy; in weights and as ballast; as a chemical intermediate for lead alkyls and pigments; as a constuction material for the tank linings, piping, and equipment used to handle the corrosive gases and liquids used in sulfuric acid manufacturing, petroleum refining, halogenation, sulfonation, extraction, and condensation; and for x-ray and atomic radiation protection.
Other Designations: CAS No. 7439-92-1, lead oxide; lead salts, inorganic; metallic lead; plumbum.
Manufacturer: Contact your supplier or distributor. Consult the latest *Chemicalweek Buyers' Guide*[73] for a suppliers list.

R 0
I 4
S -
K 0

Genium
1
3 0
-

HMIS
H 3
F 1
R 0
PPG*
* Sec. 8

Cautions: *Inorganic lead is a potent systemic poison.* Organic lead (for example, tetraethyl lead) has severe, but different, health effects. Occupational lead poisoning is due to inhalation of dust and fumes. Major affected organ systems are the nervous, blood, and reproductive systems, and kidneys. Health impairment or disease may result from a severe acute short- or long-term exposure.

Section 2. Ingredients and Occupational Exposure Limits

Lead (inorganic) fumes and dusts, as Pb, ca 100%

1989 OSHA PELs (Lead, inorganic compounds)
8-hr TWA: 50 μg/m³
Action Level TWA*: 30 μg/m³

29 CFR 1910.1025 Lead Standard
Blood Lead Level: 40 μg/100 g

1989-90 ACGIH TLV (Lead, inorganic, fumes and dusts)
TLV-TWA: 150 μg/m³

1988 NIOSH REL
10-hr TWA: <100 μg/m³

1985-86 Toxicity Data†
Human, inhalation, TC_{Lo}: 10 μg/m³ affects gastrointestinal tract and liver
Human, oral, TD_{Lo}: 450 mg/kg ingested over 6 yr affects peripheral and central nervous systems
Rat, oral, TD_{Lo}: 790 mg/kg affects multigeneration reproduction

* Action level applies to employee exposure without regard to respirator use.
† See NIOSH, *RTECS* (OF7525000), for additional mutative, reproductive, and toxicity data.

Section 3. Physical Data

Boiling Point: 3164 °F (1740 °C)
Melting Point: 621.3 °F (327.4 °C)
Vapor Pressure: 1.77 mm Hg at 1832 °F (1000 °C)
Viscosity: 3.2 cp at 621.3 °F (327.4 °C)
Molecular Weight: 207.20
Specific Gravity (20 °C/4 °C): 11.34
Water Solubility: Relatively insoluble in hot or cold water*

Appearance and Odor: Bluish-white, silvery, gray, very soft metal.

* Lead dissolves more easily at a low pH.

Section 4. Fire and Explosion Data

Flash Point: None reported	Autoignition Temperature: None reported	LEL: None reported	UEL: None reported

Extinguishing Media: Use dry chemical, carbon dioxide, water spray, or foam to extinguish fire.
Unusual Fire or Explosion Hazards: Flammable and moderately explosive in the form of dust when exposed to heat or flame.
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 the pressure-demand or positive-pressure mode and full protective equipment. Be aware of runoff from fire control methods. Do not release to sewers or waterways.

Section 5. Reactivity Data

Stability/Polymerization: Lead is stable at room temperature in closed containers under normal storage and handling conditions. It tarnishes on exposure to air. Hazardous polymerization cannot occur.
Chemical Incompatibilities: Mixtures of hydrogen peroxide + trioxane explode on contact with lead. Lead is incompatible with sodium azide, zirconium, disodium acetylide, and oxidants. A violent reaction on ignition may occur with concentrated hydrogen peroxide, chlorine trifluoride, sodium acetylide (with powdered lead), ammonium nitrate (below 200 °C with powdered lead). Lead is attacked by pure water and weak organic acids in the presence of oxygen. Lead is resistant to tap water, hydrofluoric acid, brine, and solvents.
Conditions to Avoid: Rubber gloves containing lead may ignite in nitric acid.
Hazardous Products of Decomposition: Thermal oxidative decomposition of lead can produce highly toxic fumes of lead.

Section 6. Health Hazard Data

Carcinogenicity: Although the NTP and OSHA do not list lead as a carcinogen, the IARC lists it as probably carcinogenic to humans, but having (usually) no human evidence. However, the literature reports instances of lead-induced neoplasms, both benign and malignant, of the kidney and other organs in laboratory rodents. Excessive exposure to lead has resulted in neurologic disorders in infants. Experimental studies show lead has reproductive and teratogenic effects in laboratory animals. Human male and female reproductive effects are also documented.
Summary of Risks: Lead is a potent, systemic poison that affect a variety of organ systems, including the nervous system, kidneys, reproductive system, blood formation, and gastrointestinal (GI) system . The most important way lead enters the body is through inhalation, but it can also be ingested when lead dust or unwashed hands contaminate food, drink, or cigarettes. Much of ingested lead passes through feces without absorption into the body. Adults may absorb only 5 to 15% of ingested lead; children may absorb a much larger fraction. Once in the body, lead enters the bloodstream and circulates to various organs. Lead concentrates and remains in bone for many years. The amount of lead the body stores increases as exposure continues, with possibly cumulative effects. Depending on the dose entering the body, lead can be deadly within several days or affect health after many years. Very high doses can cause brain damage (encephalopathy).
Medical Conditions Aggravated by Exposure: Lead may aggravate nervous system disorders (e.g., epilepsy, neuropathies), kidney diseases, high blood pressure (hypertension), infertility, and anemia. Lead-induced anemia and its effect on blood presssure can aggravate cardiovascular disease.

Continue on next page

Section 6. Health Hazard Data, *continued*

Target Organs: Blood, central and peripheral nervous systems, kidneys, and gastrointestinal (GI) tract.
Primary Entry Routes: Inhalation, ingestion.
Acute Effects: An acute, short-term dose of lead could cause acute encephalopathy with seizures, coma, and death. However, short-term exposures of this magnitude are rare. Reversible kidney damage can occur from acute exposure, as well as anemia.
Chronic Effects: Symptoms of chronic long-term overexposure include appetite loss, nausea, metallic taste in the mouth, lead line on gingival (gum) tissue, constipation, anxiety, anemia, pallor of the face and the eye grounds, excessive tiredness, weakness, insomnia, headache, nervous irritability, fine tremors, numbness, muscle and joint pain, and colic accompanied by severe abdominal pain. Paralysis of wrist and, less often, ankle extensor muscles may occur after years of increased lead absorption. Kidney disease may also result from chronic overexposure, but few, if any, symptoms appear until severe kidney damage has occurred. Reproductive damage is characterized by decreased sex drive, impotence, and sterility in men; and decreased fertility, abnormal menstrual cycles, and miscarriages in women. Unborn children may suffer neurologic damage or developmental problems due to excessive lead exposure in pregnant women. Lead poisoning's severest result is encephalopathy manifested by severe headache, convulsions, coma, delirium, and possibly death.

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. Consult a physician if any health complaints develop.
Inhalation: Remove exposed person to fresh air and support breathing as needed. Consult a physician.
Ingestion: Never give anything by mouth to an unconscious or convulsing person. If large amounts of lead were ingested, induce vomiting with Ipecac syrup. Consult a physician immediately.
After first aid, get appropriate in-plant, paramedic, or community medical support.
Physician's Note: For diagnosis, obtain blood pressure, blood lead level (PbB), zinc protoporphyrin (ZPP), complete blood count for microcytic anemia and basophilic stippling, urinalysis, and blood urea nitrogen (BUN) of creatinine. Examine peripheral motor neuropathy, pallor, and gingival lead line. Use Ca-EDTA to treat poison, but *never* chelate prophylactically. Consult an occupational physician or toxicologist.

Section 7. Spill, Leak, and Disposal Procedures

Spill/Leak: Notify safety personnel and evacuate all unnecessary personnel immediately. Cleanup personnel should protect against inhalation of dusts or fume and contact with skin or eyes. Avoid creating dusty conditions. Water sprays may be used in large quantities to prevent the formation of dust. Cleanup methods such as vacuuming (with an appropriate filter) or wet mopping minimizes dust dispersion. Scoop the spilled material into closed containers for disposal or reclamation. Follow applicable OSHA regulations (29 CFR 1910.120).
Disposal: Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

EPA Designations

Listed as a RCRA Hazardous Waste (40 CFR 261.33, Appendix II—EP Toxicity Test Procedures)
Listed as a CERCLA Hazardous Substance* (40 CFR 302.4), Reportable Quantity (RQ): 1 lb (0.454 kg) [* per Clean Water Act, Sec. 307(a)]
SARA Extremely Hazardous Substance (40 CFR 355): Not listed
Listed as a SARA Toxic Chemical (40 CFR 372.65)

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).
Respirator: Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a NIOSH-approved respirator. 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. Protective clothing made of man-made fibers and lacking turn-ups, pleats, or pockets retain less dust from lead.
Ventilation: Provide general and local ventilation systems to maintain airborne concentrations below the OSHA PELs (Sec. 2). 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 washing hands before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9. Special Precautions and Comments

Storage Requirements: Store in tightly closed containers in a cool, dry, well-ventilated area away from all incompatible materials, direct sunlight, and heat and ignition sources.
Engineering Controls: Educate worker about lead's hazards. Follow and inform employees of the lead standard (29 CFR 1910.1025). Avoid inhalation of lead dust and fumes and ingestion of lead. Use only with appropriate personal protective gear and adequate ventilation. Institute a respiratory protection program that includes regular training, maintenance, inspection, and evaluation. Avoid creating dusty conditions. Segregate and launder contaminated clothing. Take precautions to protect laundry personnel. Practice good personal hygiene and housekeeping procedures. For a variety of reasons, the lead concentration in workroom air may not correlate with the blood lead levels in individuals.
Other Precautions: Provide preplacement and periodic medical examinations which emphasize blood, nervous system, gastrointestinal tract, and kidneys, including a complete blood count and urinalysis. Receive a complete history including previous surgeries and hospitalization, allergies, smoking history, alcohol consumption, proprietary drug intake, and occupational and nonoccupational lead exposure. Maintain records for medical surveillance, airborne exposure monitoring, employee complaints, and physician's written opinions for at least 40 years or duration of employment plus 20 years. Measurement of blood lead level (PbB) and zinc protoporphyrin (ZPP) are useful indicators of your body's lead absorption level. Maintain worker PbBs at or below 40 μg/100 g of whole blood. To minimize adverse reproductive health effects to parents and developing fetus, maintain the PbBs of workers intending to have children below 30 μg/100 g. Elevated PbBs increase your risk of disease, and the longer you have elevated PbBs, the greater your chance of substantial permanent damage.

Transportation Data (49 CFR 172.102)

IMO Shipping Name: Lead compounds, soluble, n.o.s.
IMO Hazard Class: 6.1
ID No.: UN2291
IMO Label: St. Andrews Cross (X, Stow away from foodstuffs)
IMDG Packaging Group: III

MSDS Collection **References:** 26, 38, 73, 84, 85, 88, 89, 90, 100, 101, 103, 109, 124, 126, 132, 133, 134, 136, 138, 139, 142, 143
Prepared by: MJ Allison, BS; **Industrial Hygiene Review:** DJ Wilson, CIH; **Medical Review:** MJ Upfal, MD, MPH; **Edited by:** JR Stuart, MS

APPENDIX B
SPECIFIC HEALTH AND SAFETY PROCEDURES

NOTE: IT health and safety procedures that will be utilized during the project are listed below.

HS020	Accident Prevention Program: Reporting Investigation and Review
HS021	Accident Prevention Program: Management Safety Reviews
HS051	Tailgate Safety Meeting
HS060	Hazard Communication Program
HS106	First Aid Kits
HS060	Hazard Communication Program
HS303	Pressurized Water Cleaning and Cutting Equipment
HS307	Excavation and Trenching
HS400	Working in Hot Environments
HS402	Hearing Conservation Program
HS600	Personal Protection Program
HS601	Respiratory Protection Program
HS800	Motor Vehicle Operation: General Requirements

PROCEDURE

Subject: ACCIDENT PREVENTION PROGRAM: REPORTING, INVESTIGATION, AND REVIEW

1.0 PURPOSE AND SUMMARY

The purpose of this procedure is to establish the requirements for incident reporting, investigation, and review. This procedure is an integral part of the company's overall accident prevention program and aids in the determination of causal factors and corrective actions necessary to prevent incident re-occurrence. Key elements of this procedure include:

- **All occupational injuries/illnesses, vehicle accidents, and near miss incidents must be promptly reported and investigated.**

- All Occupational Safety and Health Administration (OSHA) recordable injuries/illnesses and chargeable vehicle accidents must be reviewed by an Accident Review Board. The Accident Review Board report is submitted/approved up through management to the appropriate business line President.

- All incidents involving a fatality, major injury/illness, or resulting in significant property damage will be immediately reported to: the business line Health and Safety Manager; the Vice President, Health and Safety; the business line President; the Vice President, Legal Department; and the CEO.

- All business lines are required to submit a Monthly Loss Report summarizing all incidents that took place during the previous reporting period.

2.0 TABLE OF CONTENTS

3.0 RESPONSIBILITY MATRIX

3.1 Procedure Responsibility

The Vice President, Health and Safety is responsible for the issuance, revision, and maintenance of this procedure.

3.2 Action/Approval Responsibilities

The Responsibility Matrix is Attachment 1.

4.0 DEFINITIONS

Chargeable Vehicle Accident - Any **at-fault** vehicle accident meeting any **one** of the following criteria:

- An individual other than an employee of the company is a party in the accident
- Property owned by a person or entity other than the company is damaged
- When only company employees, company owned or leased (**not** rented) vehicles, and company property is involved and damage exceeds $1,000.00.

Company - All wholly-owned subsidiaries of The IT Group, Inc.

Lost Workday Case - Cases which involve days away from work, days of restricted work activity, or both. Days away from work are the number of workdays (consecutive or not), excluding the date of injury, the employee **would have worked**, but could not because of occupational injury or illness; and/or the number of workdays (consecutive or not), excluding the date of injury, on which, because of injury or illness:

- The employee was assigned to another job on a temporary basis;
- The employee worked at a permanent job less than full time; or
- The employee worked at a permanently-assigned job, but could not perform all duties normally connected with it.

Near Miss Incident - Any incident where no injury occurred, but where the potential for injury existed.

OSHA Recordable Case - All work-related deaths and illnesses, and those work-related injuries which result in loss of consciousness, restriction of work or motion, transfer to another job, or require medical treatment beyond first aid (see Attachment 7).

Vehicle - Any passenger vehicle, including trucks, used upon the highway or in private facilities for transporting passengers and/or property. For the purpose of this procedure, off-road vehicles such as earthmoving equipment, forklifts, non-highway use trucks, etc., are not considered vehicles.

5.0 TEXT

5.1 Incident Reporting Process

Employees are required to immediately report to their direct supervisor all occupational injuries, illnesses, accidents, and near miss incidents having the potential for injury. Any supervisor (but preferably the supervisor directly responsible for the involved employees) with first-hand knowledge of an incident is required to:

- Immediately arrange for appropriate medical attention and notify the responsible health and safety representative.

- Inform Continuum of all incidents requiring medical attention by calling 1-800-229-3674, Extension 303, and providing the following information:

  - Employee name
  - Name of treating medical facility and phone number
  - Brief description of incident.

  Continuum's role is to interface with the treating physician to ensure that appropriate care is provided to the injured employee.

- Complete Continuum's *Authorization for Treatment, Release of Medical Information*, and *Return to Work* (Attachment 8) for all cases requiring medical attention. The employee or his/her supervisor is to ensure that these completed forms are faxed to Continuum at (770) 209-8963 prior to leaving the medical facility or as soon as reasonably possible.

- Prior to an injured employee returning to his/her job duties, a follow-up call to Continuum must be made. The purpose of this call is to ensure work restrictions are clarified and planned work activities are consistent with medical recommendations.

- The supervisor is to initiate/complete the appropriate company documentation in accordance with the following incident classifications:

- OSHA Recordable Cases
  a. Supervisor's Employee Injury Report (Attachment 2)
  b. Incident Investigation Report (Attachment 5)
  c. Accident Review Board (Attachment 6)

- First Aid Cases
  a. Supervisor's Employee Injury Report (Attachment 2)
  b. Incident Investigation Report (Attachment 5)

- Chargeable Vehicle Accidents
  a. Vehicle Accident Report (Attachment 3)
  b. Incident Investigation Report (Attachment 5)
  c. Accident Review Board (Attachment 6)
  d. Driving Record Certification (Procedure HS800)

- Non-Chargeable Vehicle Accidents
  a. Vehicle Accident Report (Attachment 3)
  b. Incident Investigation Report (Attachment 5)

- Near Miss
  a. Incident Investigation Report (Attachment 5)

- Property Damage/General Liability
  a. General Liability, Property Damage, and Loss Report (Attachment 4).

All forms, with the exception of the Accident Review Board and Incident Investigation Report, must be completed and forwarded to the appropriate health and safety representative within **one** business day of the incident.

All incidents involving a fatality, major injury/illness, or resulting in significant property damage are to be reported to the appropriate business line President; Vice President, Health and Safety; Vice President, Legal Department; and CEO as soon as possible, but not later than the close of business on the day of the incident.

5.2 Supervisor's Employee Injury Report

The Supervisor's Employee Injury Report (Attachment 2) is to be completed for all incidents that result in an employee occupational injury or illness. It is to be initiated by the supervisor of the injured employee and forwarded to the project/location manager for comments. The appropriate health and safety representative must receive a copy of the report within one business day of the incident.

5.3 Vehicle Accident Report

The Vehicle Accident Report (Attachment 3) must be completed for any vehicle accident in which a company vehicle is involved. This includes company-owned or leased vehicles, rental vehicles, and personal vehicles being used for company business. This report is to be initiated by the employee involved in the accident or his/her direct supervisor, then forwarded to the appropriate health and safety representative.

5.4 General Liability, Property Damage, and Loss Report

The General Liability, Property Damage, and Loss Report is to be used for all losses or damage to company property in excess of $1,000.00. This form must be completed for all third party property, regardless of value, damaged as a result of company activities. The employee most familiar with the events that contributed to the loss or damage will complete the form, then forward it to the project/location manager. The Corporate Risk Management Department must receive a copy of the report within one business day of the incident.

5.5 Incident Investigation Report

All injuries, illnesses, accidents, and near miss incidents will be investigated. Once arrangements for immediate medical care have been made, the employee's direct supervisor, with assistance from the health and safety representative and/or business line Health and Safety Manager, will:

- Reconstruct the conditions which led to the incident (collect the facts);
- Describe and document (include sketch, photos, etc.) how the incident occurred;
- List witnesses and collect written statements when possible;
- Identify and discuss the causative factors;
- Identify the unsafe act or unsafe condition that contributed to the incident;
- Identify possible systematic/management deficiencies; and
- List the corrective actions which are to be taken to prevent re-occurrence of the incident, the person responsible for the corrective action, and the date by which action is to be completed.

The investigation will be started as soon as possible after the incident and a written report (Attachment 5) submitted to the appropriate health and safety representative within 72 hours. In addition to the previous information, reports from external sources (police, insurance carriers, testing laboratories, etc.) are to be obtained as soon as they become available and forwarded to the recipients of the investigation report.

5.6 Accident Review Board

Each manager whose project/location experiences an OSHA recordable or a chargeable vehicle accident is required to convene an Accident Review Board within **10 days** of the accident. The purpose of the Accident Review Board is to review the information gathered for each incident and take appropriate action to prevent its recurrence. The Accident Review Board shall be composed of the project/location manager, the employee's direct supervisor, a health and safety representative, and the employee(s) involved in the incident. When appropriate, a representative of other internal sources of expertise should be involved.

It is generally not acceptable to discipline an employee for having an accident. However, if the Accident Review Board determines that the accident resulted from an unsafe act or violation of company procedure on the employee's part, the employee should be subject to disciplinary action in accordance with the company's progressive disciplinary action system (see Human Resources Procedure HR207).

5.7 Insurance Notification

The business line Health and Safety Manager or his/her designee is to report all employee injuries/illnesses requiring outside medical treatment to Constitution State Service Company (CSSC), a subsidiary of Travelers Insurance, within 24 hours of injury/illness occurrence. This may be accomplished by calling CSSC at 1-800-243-2490.

Some states (i.e., Ohio, Washington, and West Virginia) have specific reporting requirements that differ from those previously discussed. Assistance for the reporting of incidents that occur in these states can be obtained through the Corporate Risk Management Department office at (412)-380-4097.

All vehicle accidents involving third party individuals or property, with the exception of company-rented Hertz automobiles, will be reported to CSSC by calling 1-800-243-2490 within 24 hours of the accident.

5.8 Monthly Loss Report

Each business line Health and Safety Manager is responsible to submit a Monthly Loss Report summarizing incidents that took place within their business line during the previous month. The business line Health and Safety Manager is responsible for submitting a consolidated package for the entire business line to the corporate health and safety office for **receipt no later than the 5th working day of the following month.**

6.0 EXCEPTION PROVISIONS

Variances and exceptions may be requested pursuant to the provisions of Procedure HS013, Health and Safety Procedure Variances.

7.0 CROSS REFERENCES

HR207 Disciplinary Action
HS013 Health and Safety Procedure Variances
HS800 Motor Vehicle Operations - General Requirements

8.0 ATTACHMENTS

1. Responsibility Matrix
2. Supervisor's Employee Injury Report
3. Vehicle Accident Report
4. General Liability, Property Damage, and Loss Report
5. Incident Investigation Report
6. Accident Review Board Report
7. Injury/Illness Classification Guidelines
8. Continuum Forms

ATTACHMENT 1

ACCIDENT PREVENTION PROGRAM: REPORTING, INVESTIGATION, AND REVIEW RESPONSIBILITY MATRIX

		Responsible Party					
Action	**Procedure Section**	**Employee**	**Supervisor**	**Project/ Location Manager**	**Health and Safety Representative**	**Business Line Health and Safety Manager**	**Vice President, Health and Safety**
Issue, Revise, and Maintain Procedure	3.1						X
Report All Incidents to Supervisor	5.1	X					
Notify Health and Safety Representative	5.1		X				
Arrange Medical Care	5.1		X		X		
Notify Continuum of Incident	5.1		X		X		
Complete Continuum Forms	5.1	X	X				
Initiate/Complete Company Forms	5.1		X				
Contact Continuum Prior to Employee Returning to Job Duties	5.1		X		X		
Complete Investigation of Incident	5.5		X	X	X		
Conduct Accident Review Board	5.6		X	X	X		
Report Injury/Accident to CSSC	5.7				X	X	
Complete Monthly Loss Report	5.8					X	

ATTACHMENT 2
SUPERVISOR'S EMPLOYEE INJURY REPORT

EMPLOYEE

This report is to be initiated by the employee's supervisor. Please answer all questions completely. This report must be forwarded to the appropriate Health and Safety Representative within 24 HOURS of the injury/illness.

Injured's Name ______________ Sex _____ S.S. No. ______________ Birth Date ______________
Home Address ______________
City ______________ State _______ Zip __________ Phone _(____)______________
Job Title ______________ Hire Date ______________ Hourly Wage ______________

SUPERVISOR

Date of Incident ______________ Time __________ Time Reported ________ To Whom?______________
Project/Location Name ______________ Address ______________
Project No. __________ Time Shift Began __________ Did the Employee Leave Work? ☐ No ☐ Yes When __________
Has employee returned to work? ☐ No ☐ Yes When __________ Did employee miss a regularly scheduled shift? ☐ No ☐ Yes
Doctor/Hospital Name ______________ Address ______________
Witness Name(s) ______________ Statement Attached? ☐ No ☐ Yes
Nature of Injury ______________ Exact Body Part ______________
Medical Attention: ☐ None ☐ First Aid On Site ☐ Doctor's Office ☐ Hospital ER ☐ Hospitalized
Job Assignment at Time of Incident ______________
Describe Incident: ______________

What unsafe condition and/or act contributed to the Incident? ______________

What Corrective Action has been taken to prevent Recurrence? ______________

Supervisor: ______________ ______________ ______________
(Print Name) (Signature) (Date)

MANAGER

Comments on Incident and Corrective Action ______________

Project/Location Mgr. : ______________ ______________ ______________
(Print Name) (Signature) (Date)

HEALTH AND SAFETY

Concur with Action Taken? ☐ No ☐ Yes Remarks ______________

OSHA Classification:
☐ First Aid ☐ Recordable, No Lost/Restricted Workdays ☐ Recordable, Lost Workdays ☐ Recordable, Restricted Activity ☐ Fatality
Days away from Work ______________ Days Restricted Work ______________

All injuries/illnesses requiring outside medical treatment must be reported to CSSC by calling 1-800-243-2490 within 24 hours of the incident. Contact Corporate Risk Management at (412) 380-4097 for cases occurring in Ohio, Washington, or West Virginia.

Workers' Compensation Claim Number (if applicable) ______________

Health and Safety Representative:
: ______________ ______________ ______________
(Print Name) (Signature) (Date)

ATTACHMENT 3
VEHICLE ACCIDENT REPORT

ACCIDENT DESCRIPTION

This report is to be initiated by the employee involved in the accident or his/her direct supervisor. Please answer all questions completely. This report must be forwarded to the appropriate health and safety representative within 24 HOURS of the accident.

ACCIDENT DATE ____________________ TIME ____________ ☐ A.M. or ☐ P.M.

LOCATION OF ACCIDENT (CITY, STATE) ____________________

DESCRIPTION OF ACCIDENT ____________________

____

____

WITNESS ____________________ PHONE NO. ____________

ADDRESS ____________ CITY ____________ STATE ______ ZIP ______

POLICE OFFICER'S NAME ____________________ DEPARTMENT ____________

COMPANY VEHICLE

DRIVER ____________________ DRIVERS LICENSE NO. ____________ STATE ______

ADDRESS ______ ______ CITY ____________ STATE ______ ZIP ______

WORK PHONE NO. _(____)________ S.S. NO. ________ PROJECT NAME/NO. ____________

VEHICLE NO. ______ YEAR ______ MAKE ______ MODEL ______ LICENSE PLATE NO. ______

STATE ______ VEHICLE OWNER: ☐ COMPANY ☐ LEASED/RENTED ☐ PRIVATE VEHICLE

VEHICLE TYPE: ☐ COMMERCIAL MOTOR VEHICLE ☐ NON-COMMERCIAL

IF NOT COMPANY-OWNED: OWNER ____________________ PHONE NO _(___)________

ADDRESS ______ ______ CITY ____________ STATE ______ ZIP ______

VEHICLE DAMAGE ____________________

NO. OF VEHICLES TOWED FROM SCENE ______ NUMBER OF INJURIES ______ NUMBER OF FATALITIES ______

WERE HAZARDOUS MATERIALS RELEASED? ☐ NO ☐ YES IF YES, DESCRIBE MATERIALS ____________

____

OTHER VEHICLE

DRIVER ____________________ DRIVERS LICENSE NO. ____________ STATE ______

ADDRESS ____________ CITY ____________ STATE ______ ZIP ______

PHONE NO. _(____)________ S.S. NO. ____________

OWNER'S NAME (☐ CHECK IF SAME AS DRIVER) ____________________

ADDRESS ____________ CITY ____________ STATE ______ ZIP ______

INSURANCE COMPANY ____________________ POLICY NO. ____________

AGENT'S NAME ____________________ PHONE NO. _(____)________

ADDRESS ____________ CITY ____________ STATE ______ ZIP ______

VEHICLE YEAR ______ MAKE ______ MODEL ______ PLATE NO. ______ STATE ______

VEHICLE I.D. NO. ____________________

VEHICLE DAMAGE ____________________

PASSENGERS: ☐ NO ☐ YES INJURIES: ☐ NO ☐ YES (If Yes, list names and telephone numbers below)

____

____

____

VEHICLE ACCIDENT REPORT

Page 2 of 2

WEATHER: ☐ Clear ☐ Cloudy ☐ Fog ☐ Rain ☐ Sleet ☐ Snow Other ______

PAVEMENT: ☐ Asphalt ☐ Steel ☐ Concrete ☐ Wood ☐ Gravel/Dirt ☐ Brick/Stone Other ______

CONDITION: ☐ Dry ☐ Wet ☐ Icy ☐ Pot Holes Other ______

TRAFFIC CONTROL: ☐ Traffic Light ☐ Stop Sign ☐ Railroad ☐ No Intersection ☐ No Control

ROADWAY: Number of Lanes Each Direction: ______ ☐ Residential ☐ Divided Highway ☐ Undivided Highway

Draw and name roadways showing each vehicle, direction of travel, and point of impact. Indicate travel before the accident with a solid line, and post-accident movement with a broken line.

SYMBOLS:

Your Vehicle

Other Vehicle(s)

Pedestrian

Stop Sign

Yield

Railroad

ADDITIONAL INFORMATION:

______

______

______

All vehicle accidents involving third party individuals or property, with the exception of accidents involving only company-rented Hertz automobiles, must be reported to CSSC by calling 1-800-243-2490 within 24 hours of the accident.

WAS VEHICLE ACCIDENT REPORTED TO CSSC? ☐ YES ☐ NO CLAIM NUMBER ______

EMPLOYEE ______ (Print) ______ (Signature) ______ (Date)

SUPERVISOR ______ (Print) ______ (Signature) ______ (Date)

HEALTH & SAFETY REP. ______ (Print) ______ (Signature) ______ (Date)

REPORT MUST BE CALLED IN OR FAXED TO:
CORPORATE HEALTH AND SAFETY (PHONE: 412-372-7701, FAX: 412-858-3976)
AND CORPORATE RISK MANAGEMENT (PHONE: 412-380-4097, FAX: 412-380-6218)
WITHIN 24 HOURS, OR NOT LATER THAN NEXT BUSINESS DAY

ATTACHMENT 4

GENERAL LIABILITY, PROPERTY DAMAGE, AND LOSS REPORT

This report is to be completed for all losses or damage to company property in excess of $1,000.00 and all third party damage, regardless of value, resulting from company activities.

PROJECT/LOCATION ______________________ PROJECT NO. ________ DATE ______________

ADDRESS ____

HOW DID DAMAGE OR LOSS OCCUR: ____

____

____

DESCRIPTION AND VALUE ($) OF DAMAGED/LOST/STOLEN PROPERTY: ______________________

____

LOCATION OF DAMAGED/LOST/STOLEN PROPERTY (Before Loss): ______________________

____

DATE AND TIME OF DAMAGE, LOSS, OR THEFT: Date: ______________ Time: ______________ a.m./p.m.

OWNER OF DAMAGED/LOST/STOLEN PROPERTY:

Name ______________________ Phone No. (   ) ______________

Address ______________________ City ______________

Employer and Address ____

INJURED PARTIES (Also complete a Supervisor's Employee Injury Report if a Company Employee):

Name ______________________ Phone No. (   ) ______________

Address ______________________ City ______________

Employer and Address ____

Description of Injury ____

WITNESSES:

1. Name ______________________ Phone No. (   ) ______________

   Address ______________________ City ______________

   Employer and Address ____

2. Name ______________________ Phone No. (   ) ______________

   Address ______________________ City ______________

   Employer and Address ____

WERE PICTURES TAKEN? ☐ YES ☐ NO

WERE POLICE NOTIFIED? ☐ YES ☐ NO DEPT. ______________ REPORT NO. ______________

COMPLETED BY: ______________ ______________ ______________

(Print) (Signature) (Date)

PROJECT/LOCATION MANAGER: : ______________ ______________ ______________

(Print) (Signature) (Date)

REPORT MUST BE CALLED IN OR FAXED TO:
CORPORATE RISK MANAGEMENT (PHONE: 412-380-4097, FAX: 412-380-6218)
WITHIN 24 HOURS, OR NOT LATER THAN NEXT BUSINESS DAY

ATTACHMENT 5
INCIDENT INVESTIGATION REPORT

*** MUST BE COMPLETED WITHIN 72 HOURS ***

Investigation Date ____________________ Date of Incident ____________________

Employee Name ____________________

Supervisor Name ____________________

Project Number/Name ____________ / ____________

Location of Incident ____________________

- Incident Classification

Injury	☐ First Aid	Vehicle	☐ Chargeable	DOT	☐ DOT Vehicle
	☐ OSHA Recordable		☐ Non-chargeable		☐ DOT Reportable
	☐ Lost Workday				
	☐ Restricted Workday	Near Miss	☐	General Liability	☐

- Description (Provide facts, describe how incident occurred, provide diagram [on back] or photos)

____

____

- Analysis 1 (What unsafe acts or conditions contributed to the incident?)

____

____

- Analysis 2 (What systematic or management deficiencies contributed to incident?)

____

____

- Corrective Action(s) (List corrective action items, responsible person, scheduled completion date)

____

____

- Witnesses (Attach statements or indicate why unavailable)

____

____

Investigated By	____________ Print Name	____________ Signature	________ Date
Project/Location Mgr.	____________ Print Name	____________ Signature	________ Date

(Attach Additional Pages if Needed)

ATTACHMENT 6

ACCIDENT REVIEW BOARD

DATE:	LOCATION:
BOARD MEMBERS:	
ACCIDENT DATE:	EMPLOYEE(S) INVOLVED IN INCIDENT:
INVESTIGATION COMPLETE: YES ☐ NO ☐	ACCIDENT CLASSIFICATION:
THE FOLLOWING INFORMATION MUST BE PROVIDED BY THE REVIEW BOARD FOR THIS INCIDENT (PRINT):	
SUPERVISOR: ______	PROJECT/LOCATION MGR.: ______
CAUSE OF ACCIDENT:	
ACTION BY BOARD*:	
* ALL ACTIONS BY THE ACCIDENT REVIEW BOARD ARE SUBJECT TO FINAL REVIEW BY THE HUMAN RESOURCES AND LEGAL DEPARTMENTS.	
ACCEPTED: ______ (Employee Signature)	______ (Supervisor Signature)
APPROVED: ______ (Project/Location Manager)	REJECTED FOR: ______ ______
APPROVED: ______ (Business Line Health and Safety Manager or Designee)	REJECTED FOR: ______ ______
APPROVED: ______ (Business Line Vice President)	REJECTED FOR: ______ ______

ATTACHMENT 7

INJURY/ILLNESS CLASSIFICATION GUIDELINES

Medical Treatment - The following are generally considered medical treatment. Work-related injuries for which this type of treatment was provided or should have been provided are almost always recordable.

- Treatment of **INFECTION**;
- Application of **ANTISEPTICS during second or subsequent visit** to medical facility;
- Treatment of **SECOND OR THIRD DEGREE BURN(S)**;
- Application of **SUTURES** (stitches);
- Application of **BUTTERFLY ADHESIVE DRESSING(S) or STERI STRIP(S)** in lieu of sutures;
- Removal of **FOREIGN BODIES EMBEDDED IN EYE**;
- Removal of **FOREIGN BODIES FROM WOUND**; if procedure is **COMPLICATED** because of depth of embedment, size, or location;
- Use of **PRESCRIPTION MEDICATIONS** (except a single dose administered on first visit for minor injury or discomfort);
- Use of hot or cold **SOAKING THERAPY during second or subsequent visit** to medical facility;
- Application of hot or cold **COMPRESS(ES) during second or subsequent visit** to medical facility;
- **CUTTING AWAY DEAD SKIN** (surgical debridement);
- Use of **WHIRLPOOL BATH THERAPY during second or subsequent visit** to medical facility;
- **POSITIVE X-RAY DIAGNOSIS** (fractures, broken bones, etc.); and
- **ADMISSION TO A HOSPITAL** or equivalent medical facility **FOR TREATMENT**.

First Aid Treatment - The following are generally considered first aid treatment (i.e., one-time treatment and subsequent observation of minor injuries) and should not be recorded if the work-related injury does not involve loss of consciousness, restriction of work or motion, or transfer to another job:

- Application of **ANTISEPTICS during first visit** to medical facility;
- Treatment of **FIRST DEGREE BURN(S)**;
- Application of **BANDAGE(S)** during any visit to medical facility;
- Use of **ELASTIC BANDAGE(S) during first visit** to medical facility;
- Removal of **FOREIGN BODIES NOT EMBEDDED IN EYE** if only irrigation is required;
- Removal of **FOREIGN BODIES FROM WOUND**; if procedure is **UNCOMPLICATED**, and is, for example, removed by tweezers or other simple technique;
- Use of **NON-PRESCRIPTION MEDICATIONS AND** administration of **single doses of PRESCRIPTION MEDICATION** on first visit for minor injury or discomfort;

- **SOAKING THERAPY on initial visit** to medical facility or removal of bandages by **SOAKING;**
- Application of hot or cold **COMPRESS(ES) during first visit** to medical facility;
- Application of **OINTMENTS** to abrasions to prevent drying or cracking;
- Use of **WHIRLPOOL BATH THERAPY during first visit** to medical facility;
- **NEGATIVE X-RAY DIAGNOSIS**; and
- **OBSERVATION** of injury during visit to medical facility.

The following procedure, by itself, is not considered medical treatment:

- Administration of TETANUS SHOT(S) or BOOSTER(S). However, these shots are often given in conjunction with more serious injuries; consequently, injury requiring these shots may be recordable for other reasons.

Loss of Consciousness - If an employee loses consciousness as the result of a work-related injury/illness, the case must be recorded no matter what type of treatment was provided. The rationale behind this recording requirement is that loss of consciousness is generally associated with the more serious injuries.

Restriction of Work or Motion - Restricted work activity occurs when the employee, because of the impact of a job-related injury, is physically or mentally unable to perform all or any part of his or her normal assignment during all or any part of the workday or shift. The emphasis is on the employee's ability to perform normal job duties. Restriction of work or motion may result in either a lost worktime injury or a non-lost worktime injury, depending upon whether the restriction extended beyond the day of injury.

Transfer to Another Job - Injuries requiring transfer of the employee to another job are also considered serious enough to be recordable regardless of the type of treatment provided. Transfers are seldom the sole criterion for recordability because injury cases are almost always recordable on other grounds, primarily medical treatment or restriction of work or motion.

ATTACHMENT 8
CONTINUUM FORMS

CASE*Trac* CASE MANAGEMENT SERVICES AUTHORIZATION FOR TREATMENT OF OCCUPATIONAL INJURY/ILLNESS

Employee Name: ____________________
Social Security #: ____________________ Injury: ☐ Illness: ☐
Job Title: ____________________ Incident Date: ____________________
Project/Location ____________________ Location of Accident/Exposure:
Telephone #: ____________________ ____________________
H&S Representative: ____________________
Body Part(s) Injured: ____________________
Describe in detail how incident occurred: ____________________

TO TREATING PHYSICIAN:

In the case of occupational injury/illness, please examine the employee and render necessary conservative treatment directly related to the occupational injury/illness.

Light Duty Work:
It is the policy of our company to provide work assignments, whenever possible, for employees with physical activity restrictions resulting from an occupational injury/illness. If the employee will be subject to a restriction, please contact **CASE*Trac*** Case Management before releasing the employee, so that a light duty assignment may be arranged.

Medically Unfit to Return to Work:
It is the policy of our company to assist employees unable to return to work, due to an injury/illness, in obtaining needed medical care and other available benefits. Medical findings are also used to help evaluate unsafe conditions that may have led to the incident. Please help us assist our employees by contacting **CASE*Trac*** Case Management with your findings as soon as possible, preferably before the employee leaves your office, but not later than the close of business on the day of initial treatment.

CASE*Trac* Case Management: Telephone: 1-800-229-3674, Ext. 303 Fax: 1-770-209-8963

Please Send Reports To: **CASE*Trac*** Case Management Services
3850 Holcomb Bridge Rd., Suite 300
Norcross, Georgia 30092

Please Send Bills To: Workers' Compensation Claims Administrator
Constitution State Service Company (Travelers)

DOCTOR, Please provide:
Medical Diagnosis: ____________________
Treatment Provided: ____________________

Recommended Work Limitation/Restriction: ____________________
Return Visit Needed: No ☐ Yes ☐ Date if Yes ____________________ First Aid Only ☐
Physician Name: ____________________ Physician Telephone: ____________________
Physician Signature: ____________________ Date: ____________________

YOU MUST CALL CASE*Trac* CASE MANAGEMENT FOR ALL OCCUPATIONAL INJURIES/ILLNESSES REQUIRING OUTSIDE MEDICAL TREATMENT: 1-800-229-3674, EXTENSION 303. FAX COMPLETED FORM TO CASE*Trac* (770) 209-8963.

ATTACHMENT 8B
CONTINUUM FORMS

CASE*Trac* CASE MANAGEMENT SERVICES AUTHORIZATION FOR RELEASE OF MEDICAL INFORMATION

I, ______________________________, grant authorization to ______________________________
(Print Full Name) *(Treating Physician's Name)*
for the release of any information concerning my occupational injury/illness to:

CASE*Trac* CASE MANAGEMENT SERVICES
3850 Holcomb Bridge Rd., Suite 300
Norcross, Georgia 30092
Phone: (800) 229-3674, Extension 303
Fax: (770) 209-8963

for the purpose of disability follow-up and return to work authorization.

Please provide the following information:

EMPLOYEE INFORMATION:

Full Name: ______________________________
Date of Birth: ______________________________
Social Security #: ______________________________
Home Address: ______________________________

Home Phone: ______________________________
Work Phone: ______________________________

MEDICAL INFORMATION:

Treating Physician's Name: ______________________________
Physician's Address: ______________________________

Phone Number: ______________________________
Fax Number: ______________________________

Employee Signature: ______________________________ Date: ______________

ATTACHMENT 8C
CONTINUUM FORMS

CASE*Trac* CASE MANAGEMENT SERVICES RETURN-TO-WORK EXAMINATION FORM

Exam Date: ______ / _____ / _____ **Employee Name:** ______________________________

Birth Date: ______ / _____ / _____ **Social Security #:** ________ - ________ - ________

Job Title: ______________________________ **Sex:** Male Female

Examining Provider: **Please complete this form and fax to CASE*Trac* CASE MANAGEMENT SERVICES at (770) 209-8963. Please contact CASE*Trac* CASE MANAGEMENT SERVICES at (800) 229-3674 to report status of employee post-treatment.**

~~DIAGNOSIS:~~ ______________________________

TREATMENT PLAN: ______________________________

MEDICATIONS: ______________________________

PHYSICAL THERAPY: ______________________________

OTHER: ______________________________

May return to full duty work effective ___/___/___

May return to limited duty from ___/___/___ to ___/___/___

Unable to return to work from ___/___/___ to ___/___/___

WORK LIMITATIONS:

Restricted lifting/pushing/pulling: maximum weight in lbs: _________ (company limits all lifting to 60 lbs).

Work only with right/left hand. Restricted repetitive motion right/left hand.

Sitting job only. Restricted operation of moving equipment.

Other: ______________________________

FOLLOW-UP PLAN:

Release from care.

Schedule for follow-up appointment on ___/___/___.
Time _________ AM/PM

Referral to ____________________
Appointment date ___/___/___ Time __________ AM/PM

Comments: ______________________________

________________________ ________________________ ____________

Examiner's Name (*print*) Examiner's Signature Date

PROCEDURE

Subject: ACCIDENT PREVENTION PROGRAM: MANAGEMENT SAFETY INSPECTIONS

1.0 PURPOSE AND SUMMARY

This procedure establishes the requirement for management safety inspections of project and office locations. These inspections are an integral part of the overall accident prevention program and help to demonstrate management's commitment to safety. Key requirements of this procedure include:

- Project managers are required to conduct one inspection per month and ensure that at least one other inspection is conducted during the month;
- Office managers are required to conduct an office safety inspection once every six months; and
- Completed inspection reports are given to the project/office health and safety representative for review. A copy of the completed report will then be forwarded to the respective business line health and safety manager.

2.0 TABLE OF CONTENTS

3.0 RESPONSIBILITY MATRIX

3.1 Procedure Responsibility

The Vice President of Health and Safety is responsible for the issuance, revision, and maintenance of this procedure.

3.2 Action/Approval Responsibilities

The Responsibility Matrix is Attachment 1.

4.0 TEXT

Inspections of project and office locations by managers, supervisors, and the health and safety staff are critical factors in a comprehensive accident prevention program. Management safety inspections help demonstrate management's commitment to safety and verify that proper work practices are in use. These inspections are also used to verify the existence of safe work conditions and regulatory compliance. All employees are afforded the opportunity to participate in the inspection process via the safety interview process.

4.1 Safety Inspections and Documentation

Safety inspections are required by various tiers of the management structure. The objective is for operation managers to visibly demonstrate their concern for safety in the workplace by direct contact with employees while in the workplace. Each inspection is to be documented on the appropriate Safety Inspection Report (Attachment 2 or 3).

The primary responsibilities of the inspector include:

- Interviewing employees with regard to health and safety issues and how they might be corrected;
- Observing and correcting unsafe conditions and acts; and
- Verifying that corrective actions have been assigned to a responsible employee and implemented.

Positive safety observations and safety issues not specifically addressed in the Safety Inspection Report can be documented on the last page of the report. A list of all corrective action items will be maintained showing the corrective action, responsible person, and the date action is to be completed. Completed reports are to be given to the project/office health and safety representative, then forwarded to the respective business line health and safety manager.

4.1.1 Management Site Visits

Each senior manager is encouraged to make an informal safety inspection and review previously conducted inspection reports, during each site visit, to demonstrate their commitment to safety and reinforce the responsibilities of project management. Findings during this informal inspection are to be brought to the attention of the project manager so that corrective action can be initiated.

4.1.2 Project Managers

All project managers are required to complete at least one safety inspection per month and ensure that at least one other safety inspection per month is conducted. In the event that the project manager is not present at the project site during the month, this responsibility may be delegated to the project supervisor.

4.1.3 Office Managers

Office managers are required to conduct an office safety inspection once every six months. Managers are encouraged to conduct more frequent inspections if the office location is being remodeled or if new space is being occupied that was not previously inspected.

4.1.4 Project Supervisors

Project supervisors are expected to inspect their projects monthly and ensure that corrective actions are implemented. Dependent upon project manager participation, project supervisors may also be required to conduct an additional monthly inspection. The requirement to conduct these inspections cannot be delegated.

4.1.5 Health and Safety Representative

Health and safety representatives must continually observe activities and correct unsafe acts/conditions as soon as reasonably possible. They are also required to review each Safety Inspection Report completed at their location to ensure that corrective actions are implemented. Once this review is complete, they will forward the reports to the appropriate business line health and safety manager.

4.2 Workshops

Health and safety representatives will present workshops and/or conduct joint inspections to help managers and supervisors develop their inspection skills.

5.0 EXCEPTION PROVISIONS

Variances and exceptions may be requested pursuant to the provisions of Procedure HS013, Health and Safety Procedure Variances.

6.0 CROSS REFERENCES

HS013 Health and Safety Procedure Variances

7.0 ATTACHMENTS

1. Responsibility Matrix
2. Project Safety Inspection Report
3. Office Safety Inspection Report

ATTACHMENT 1

ACCIDENT PREVENTION PROGRAM : MANAGEMENT SAFETY INSPECTIONS RESPONSIBILITY MATRIX

Action	Procedure Section	*Responsible Party*				
		Senior Managers	**Project/ Office Manager**	**Project Supervisors**	**Health and Safety Representative**	**Vice President, Health and Safety**
Issue, Revise, and Maintain Procedure	3.1					X
Conduct Informal Safety Inspections and Review Previously Completed Reports	4.1.1	X				
Conduct Safety Inspections	4.1.2 4.1.3 4.1.4		X	X		
Give Completed Reports to Health and Safety Representative	4.1.2 4.1.3 4.1.4		X	X		
Review Reports and Forward to Health and Safety Manager	4.1.5				X	
Conduct Inspection Workshops	4.2				X	

ATTACHMENT 2

PROJECT SAFETY INSPECTION REPORT

PROJECT ______________________ **DATE** ______________________

BUSINESS LINE: __________ PROJECT NAME/NUMBER: __________
PROGRAM MANAGER: __________ PROJECT MANAGER: __________
GENERAL PROJECT DESCRIPTION: ______________________
SITE ACTIVITIES AT TIME OF INSPECTION: ______________________
____

INTERVIEWED EMPLOYEE: ______________________
SAFETY ISSUE: ______________________
CORRECTIVE ACTION: ______________________
____

ASSIGNED TO: ______________________ FOLLOW-UP DATE: __________
CORRECTION VERIFIED BY: ______________________ DATE: __________

INTERVIEWED EMPLOYEE: ______________________
SAFETY ISSUE: ______________________
CORRECTIVE ACTION: ______________________
____

ASSIGNED TO: ______________________ FOLLOW-UP DATE: __________
CORRECTION VERIFIED BY: ______________________ DATE: __________

INSPECTION COMPLETED BY: ______________________ DATE: __________

HEALTH AND SAFETY REVIEW BY: ______________________ DATE: __________

PROJECT SAFETY INSPECTION REPORT

PROJECT ______________________ **DATE** ______________________

	YES	NO	N/A
FIRST AID			
1. Are first aid kit locations identified and accessible?	____	____	____
2. Are emergency eye wash/safety showers available and inspected monthly?	____	____	____
3. Are first aid kits inspected weekly?	____	____	____
4. Is a qualified first aid/CPR provider on site?	____	____	____
PERSONAL PROTECTIVE EQUIPMENT			
1. Have levels of personnel protection been established?	____	____	____
2. Are respirators decontaminated, inspected, and stored according to standard procedures?	____	____	____
3. Have employees been fit-tested?	____	____	____
4. Is defective personal protective equipment tagged and taken out of service?	____	____	____
5. Does compressed breathing air meet CGA Grade "D" minimum?	____	____	____
6. Are there sufficient sizes and quantities of protective equipment?	____	____	____
7. At a minimum, are employees utilizing safety glasses, hard hats, and steel toe boots?	____	____	____
FIRE PREVENTION			
1. Are employees smoking only in designated outdoor areas?	____	____	____
2. Are fire lanes established and maintained?	____	____	____
3. Are flammable liquid dispensing systems bonded?	____	____	____
4. Are approved safety cans available for storage of flammable liquids?	____	____	____
5. Has the local fire department been contacted?	____	____	____
6. Are fire extinguishers available and inspected monthly?	____	____	____
7. Are flammables and combustibles properly stored?	____	____	____
8. Are flammable storage cabinets available and used when needed?	____	____	____
AIR MONITORING			
1. Is required air monitoring being conducted?	____	____	____
2. Are air monitoring instruments calibrated daily?	____	____	____
3. Are air monitoring logs up to date?	____	____	____
4. Are instrument user manuals available?	____	____	____
5. Are instruments being maintained?	____	____	____
6. Are employees notified of personal sampling results within 5 days of receipt?	____	____	____
WELDING AND CUTTING			
1. Are fire extinguishers present at welding and cutting operations?	____	____	____
2. Are confined spaces evaluated prior to and during cutting and welding operations?	____	____	____
3. Have Hot Work Permits been completed?	____	____	____
4. Are proper helmets, goggles, aprons, and gloves available for welding and cutting operations?	____	____	____
5. Are welding machines properly grounded?	____	____	____
6. Are oxygen and fuel gas cylinders stored a minimum of 20 feet apart?	____	____	____
7. Are only trained personnel permitted to operate welding and cutting equipment?	____	____	____
8. Are gas cylinders transported in a secured vertical position with caps in place?	____	____	____

PROJECT SAFETY INSPECTION REPORT

PROJECT ______________________ **DATE** ______________________

	YES	NO	N/A
HAND AND POWER TOOLS			
1. Are defective hand and power tools tagged and taken out of service?	____	____	____
2. Is eye protection available and used when operating power tools?	____	____	____
3. Are guards and safety devices in place on power tools?	____	____	____
4. Are power tools inspected before each use?	____	____	____
5. Are nonsparking tools available when necessary?	____	____	____
6. Is the correct tool being used for the job?	____	____	____
MOTOR VEHICLES			
1. Are vehicles regularly inspected?	____	____	____
2. Are personnel licensed for the vehicles they operate?	____	____	____
3. Are unsafe vehicles tagged and reported to supervision?	____	____	____
4. Is vehicle's safety equipment operating properly?	____	____	____
5. Are loads secure?	____	____	____
6. Are vehicle occupants using safety belts?	____	____	____
7. Are current insurance cards and blank accident report forms located in vehicles?	____	____	____
EMERGENCY PLANS			
1. Are emergency telephone numbers posted?	____	____	____
2. Have emergency escape routes been designated?	____	____	____
3. Are employees familiar with the emergency signal?	____	____	____
4. Has the emergency route to the hospital been established and posted?	____	____	____
5. Is a vehicle on site that can transport injured employees to the hospital?	____	____	____
MATERIALS HANDLING			
1. Are materials stacked and stored to prevent sliding or collapsing?	____	____	____
2. Are tripping hazards identified?	____	____	____
3. Are semi-trailers chocked?	____	____	____
4. Are fixed jacks used under semi-trailers?	____	____	____
5. Are riders prohibited on materials handling equipment?	____	____	____
6. Are approved manlifts provided for the lifting of personnel?	____	____	____
7. Are personnel in manlifts wearing approved fall protection devices?	____	____	____
FIRE PROTECTION			
1. Has a fire alarm system been established?	____	____	____
2. Do employees know the location and use of all fire extinguishers?	____	____	____
3. Are fire extinguisher locations posted?	____	____	____
4. Are combustible materials segregated from open flames?	____	____	____
5. Have fire extinguishers been professionally inspected during the last year?	____	____	____
6. Are fire extinguishers visually inspected monthly?	____	____	____
ELECTRICAL			
1. Is electrical equipment and wiring properly guarded and maintained in good condition?	____	____	____
2. Are extension cords kept out of wet areas?	____	____	____
3. Is damaged electrical equipment tagged and taken out of service?	____	____	____
4. Have underground electrical lines been identified by proper authorities?	____	____	____
5. Has a lockout/tagout system been established?	____	____	____
6. Are GFCIs being used on all temporary electrical systems and as needed?	____	____	____

PROJECT SAFETY INSPECTION REPORT

PROJECT ______________________ **DATE** ______________________

	YES	NO	N/A
ELECTRICAL (continued)			
7. Are extension cords being inspected daily (i.e., group pin in place, no unapproved splices)?	____	____	____
8. Are warning signs exhibited on high voltage equipment (250V or greater)?	____	____	____
9. Is adequate distance maintained from overhead electrical lines?	____	____	____
10. Are switches, circuit breakers, and switchboards installed in wet locations enclosed in weatherproof enclosures?	____	____	____
CRANES AND RIGGING			
1. Are cranes inspected daily prior to use?	____	____	____
2. Are crane swing areas barricaded or demarked?	____	____	____
3. Is all rigging equipment tagged with an identification number and rated capacity?	____	____	____
4. Is rigging equipment inspection documented?	____	____	____
5. Are slings, chains, and rigging inspected before each use?	____	____	____
6. Are damaged slings, chains, and rigging tagged and taken out of service?	____	____	____
7. Are slings padded or protected from sharp corners?	____	____	____
8. Do employees keep clear of suspended loads?	____	____	____
9. Are rated load capacities and special hazard warnings posted on crane?	____	____	____
10. Are the records of annual crane inspection available?	____	____	____
11. Has accessible areas within the swing radius of the rear of the crane been barricaded?	____	____	____
12. Do crane operators have required training/certification?	____	____	____
COMPRESSED GAS CYLINDERS			
1. Are breathing air cylinders charged only to prescribed pressures?	____	____	____
2. Are like cylinders segregated and stored in well ventilated areas?	____	____	____
3. Is smoking prohibited in cylinder storage areas?	____	____	____
4. Are cylinders stored secure and upright?	____	____	____
5. Are cylinders protected from snow, rain, etc.?	____	____	____
6. Are cylinder caps in place before cylinders are moved?	____	____	____
7. Are fuel gas and oxygen cylinders stored a minimum of 20 feet apart?	____	____	____
8. Are propane cylinders stored and used only outside of buildings?	____	____	____
SCAFFOLDING			
1. Is scaffolding placed on a flat, firm surface?	____	____	____
2. Are scaffold planks free of mud, ice, grease, etc.?	____	____	____
3. Is scaffolding inspected before each use?	____	____	____
4. Are defective scaffold parts taken out of service?	____	____	____
5. Have employees completed scaffold user training?	____	____	____
6. On scaffolds where platforms are overlapped, is planking overlapped a minimum of 12 inches?	____	____	____
7. Does scaffold planking extend over end supports between 6 to 18 inches (dependent upon platform length)?	____	____	____
8. Are employees restricted from working on scaffolds during storms and high winds?	____	____	____
9. Are all pins in place and wheels locked?	____	____	____
10. Is required perimeter guarding (top rail, mid rail, and toe board) present?	____	____	____
11. Has a competent person been designated to oversee scaffold construction?	____	____	____
12. Are employees prohibited from moving mobile scaffold horizontally while employees are on them?	____	____	____
13. Are all scaffold components manufactured by the same company?	____	____	____

PROJECT SAFETY INSPECTION REPORT

PROJECT ______________________ **DATE** ______________________

WALKING AND WORKING SURFACES	YES	NO	N/A
1. Are ladders regularly inspected?	____	____	____
2. Are accessways, stairways, ramps, and ladders clean of ice, mud, snow, or debris?	____	____	____
3. Are ladders being used in a safe manner?	____	____	____
4. Are ladders kept out of passageways, doors, or driveways?	____	____	____
5. Are broken or damaged ladders tagged and taken out of service?	____	____	____
6. Are metal ladders prohibited in electrical service?	____	____	____
7. Are stairways and floor openings guarded?	____	____	____
8. Are safety feet installed on straight and extension ladders?	____	____	____
9. Is general housekeeping being maintained?	____	____	____
10. Are ladders tied off?	____	____	____
11. Are handrails and siderails installed along the unprotected sides of stairways having 4 or more risers or rising more than 30 inches?	____	____	____

SITE SAFETY PLAN			
1. Is a site safety plan available on site or accessible to all employees?	____	____	____
2. Does the safety plan accurately reflect site conditions and tasks?	____	____	____
3. Have potential hazards been described to employees on site?	____	____	____
4. Is there a designated safety official on site?	____	____	____
5. Have all employees signed the safety plan acknowledgment form?	____	____	____

SITE POSTERS			
1. Are the following posters displayed in a prominent and accessible area?			
A. Minimum Wage	____	____	
B. OSHA Job Protection	____	____	
C. Equal Employment Opportunity	____	____	
2. Are all required state-specific posters displayed?	____	____	

SITE CONTROL			
1. Are work zones clearly marked?	____	____	____
2. Are support trailers located to minimize exposure from a potential release?	____	____	____
3. Are support trailers accessible for approach by emergency vehicles?	____	____	____
4. Is the site properly secured during and after work hours?	____	____	____
5. Is an exclusion zone sign-in/sign-out log maintained?	____	____	____
6. Are only employees with current training and physicals permitted in exclusion zone?	____	____	____

HEAVY EQUIPMENT			
1. Is heavy equipment inspected as prescribed by the manufacturer?	____	____	____
2. Is defective heavy equipment tagged and taken out of service?	____	____	____
3. Are project roads and structures inspected for load capacities and proper clearances?	____	____	____
4. Is heavy equipment shut down for fueling and maintenance?	____	____	____
5. Are backup alarms installed and working on mobile equipment?	____	____	____
6. Have qualified equipment operators been designated?	____	____	____
7. Are riders prohibited on heavy equipment?	____	____	____
8. Are guards and safety appliances in place and used?	____	____	____
9. Are operators using the "three point" system when mounting/dismounting equipment?	____	____	____

PROJECT SAFETY INSPECTION REPORT

PROJECT ______________________________ **DATE** ________________________

	YES	NO	N/A
EXCAVATION			
1. Has a "competent person" been designated to oversee excavation activities?	____	____	____
2. Prior to opening excavations, are utilities located and marked?	____	____	____
3. Has a professional engineer evaluated all excavations greater than 20 feet deep?	____	____	____
4. Is there rescue equipment on site and accessible to the excavation area?	____	____	____
5. Is excavated material placed a minimum of 24 inches from the excavation?	____	____	____
6. Are the sides of excavations sloped or shored to prevent cave ins?	____	____	____
7. Have excavations greater than 4 feet deep been monitored for hazardous atmospheres (i.e., LEL/O_2 deficiency)?	____	____	____
8. Are ladders or ramps used in excavations over 4 feet deep?	____	____	____
9. Are means of egress available so as to require no more than 25 feet of lateral travel?	____	____	____
10. Are barriers, i.e., guardrails or fences, placed around excavations near pedestrian or vehicle thoroughfares?	____	____	____
11. Is excavation inspected daily by competent persons and documented?	____	____	____
CONFINED SPACES			
1. Have employees been trained in the hazards of confined spaces?	____	____	____
2. Are confined space permits posted at entrance to confined space?	____	____	____
3. Is a copy of the confined space entry procedure available?	____	____	____
4. Has a rescue plan been established?	____	____	____
5. Is an entry supervisor present at each permit-required entry?	____	____	____
6. Are required extraction/fall protection devices being used?	____	____	____
DECONTAMINATION			
1. Are decontamination stations set up on site?	____	____	____
2. Is decontamination water properly contained and disposed of?	____	____	____
3. Are all pieces of equipment inspected for proper decontamination before leaving the site?	____	____	____
4. Are shin/metatarsal guards being used during power washing activities?	____	____	____
HAZARD COMMUNICATION			
1. Is there a copy of the HAZCOM procedure on site?	____	____	____
2. Are there MSDSs for required materials/chemicals present on site?	____	____	____
3. Are all containers properly labeled, as to content, hazard?	____	____	____
4. Have employees been trained in accordance with the HAZCOM procedure?	____	____	____
5. Do employees (including subcontractors) know and understand the effects of exposure from the chemicals on site?	____	____	____
6. Have all personnel signed the HAZCOM acknowledgment form?	____	____	____
7. Is there an updated list of chemicals maintained on site?	____	____	____
TRAINING			
1. Are tailgate safety meetings being conducted daily?	____	____	____
2. Are current training/medical records maintained on site?	____	____	____
DOCUMENTATION			
1. Is an OSHA 200 Log maintained on site and posted during the month of February?	____	____	____
2. Are accident report forms available?	____	____	____
3. Is a copy of health and safety policy and procedures available on site?	____	____	____

PROJECT SAFETY INSPECTION REPORT

PROJECT ______________________________ **DATE** ________________

ALL NEGATIVE RESPONSES	CORRECTIVE ACTION	ASSIGNED TO	DATE ASSIGNED	DATE COMPLETED	VERIFIED BY

DESCRIBE POSITIVE SAFETY OBSERVATIONS

ATTACHMENT 3

OFFICE SAFETY INSPECTION REPORT

OFFICE ______________________ **DATE** ______________________

DATE: __________ OFFICE NAME: ______________________

OFFICE MANAGER: ______________________

AREA(S) OF OFFICE INSPECTED: ______________________

____

INTERVIEWED EMPLOYEE: ______________________

SAFETY ISSUE: ______________________

CORRECTIVE ACTION: ______________________

____

ASSIGNED TO: ______________________ FOLLOW-UP DATE: __________

CORRECTION VERIFIED BY: ______________________ DATE: __________

INTERVIEWED EMPLOYEE: ______________________

SAFETY ISSUE: ______________________

CORRECTIVE ACTION: ______________________

____

ASSIGNED TO: ______________________ FOLLOW-UP DATE: __________

CORRECTION VERIFIED BY: ______________________ DATE: __________

INSPECTION COMPLETED BY: ______________________ DATE: __________

HEALTH AND SAFETY REVIEW BY: ______________________ DATE: __________

OFFICE SAFETY INSPECTION REPORT

OFFICE ______________________________ **DATE** ______________________

	YES	NO	N/A
FIRST AID			
1. Are first aid kits accessible and identified?	____	____	____
2. Are emergency eye wash/safety showers available where needed and inspected?	____	____	____
3. Are first aid kits inspected weekly?	____	____	____
FIRE PREVENTION			
1. Are employees smoking only in designated outdoor areas?	____	____	____
2. Are fire lanes/evacuation routes established and maintained?	____	____	____
3. Are approved safety cans/cabinets available for storage of flammable liquids?	____	____	____
4. Are fire exits clearly identified and unobstructed?	____	____	____
FURNITURE AND EQUIPMENT			
1. Are desks, file cabinets, etc. arranged so that drawers do not open into aisles or walkways?	____	____	____
2. Are desk and file drawers closed after use?	____	____	____
3. Is weight distributed in file cabinets so that upper drawer contents does not create a top-heavy condition?	____	____	____
4. Are cabinets, bookcases, and shelves secured to prevent their falling over?	____	____	____
5. Are faulty desks, chairs, or other office equipment repaired or taken out of service?	____	____	____
6. Is adequate and sufficient lighting provided in all work areas?	____	____	____
7. Are paper cutter blades in fully down and locked position when not in use?	____	____	____
8. Are work stations arranged to be comfortable without unnecessary strains on backs, arms, necks, etc.?	____	____	____
9. Do machines with exposed moving parts have appropriate guards?	____	____	____
AISLES AND FLOORS			
1. Is aisle clearance adequate for two-way traffic and for unobstructed access to all parts of the office and building?	____	____	____
2. Does office arrangement allow easy egress under emergency conditions?	____	____	____
3. Are wastebaskets, briefcases, or other objects placed where they are not a tripping hazard?	____	____	____
4. Are floors clear of pencils, bottles, and other loose objects?	____	____	____
5. Are tripping hazards from electrical cords, phone outlets, or other protrusions on the floor prevented by arrangement of furniture or other means?	____	____	____
6. Are floors free of loose tiles and projections that can create a tripping hazard?	____	____	____
7. Is carpeting in good condition and not badly worn or torn?	____	____	____
HAND AND POWER TOOLS			
1. Are defective hand and power tools tagged and taken out of service?	____	____	____
2. Is eye protection available and used when operating power tools?	____	____	____
3. Are guards and safety devices in place on power tools?	____	____	____
4. Are power tools inspected before each use?	____	____	____
5. Is the correct tool being used for the job?	____	____	____
6. Do knife blades have guards when not in use?	____	____	____

OFFICE SAFETY INSPECTION REPORT

OFFICE ______________________ DATE ____________________

MOTOR VEHICLES	YES	NO	N/A
1. Are vehicles regularly inspected?	____	____	____
2. Are personnel licensed for the vehicles they operate?	____	____	____
3. Are unsafe vehicles reported to supervision?	____	____	____
4. Is safety equipment on vehicles?	____	____	____
5. Are loads secure on vehicles?	____	____	____
6. Are vehicle occupants using safety belts?	____	____	____
7. Are current insurance cards and blank accident report forms located in vehicles?	____	____	____
EMERGENCY PLANS			
1. Are emergency telephone numbers posted?	____	____	____
2. Have emergency escape routes been designated?	____	____	____
3. Are employees familiar with the emergency signal?	____	____	____
4. Has an emergency route to the hospital been established and posted?	____	____	____
MATERIALS HANDLING			
1. Are materials stacked and stored to prevent sliding or collapsing?	____	____	____
2. Are flammables and combustibles stored in approved containers?	____	____	____
3. Are tripping hazards identified?	____	____	____
4. Are riders prohibited on material handling equipment?	____	____	____
FIRE PROTECTION			
1. Has a fire alarm system been established?	____	____	____
2. Do employees know the location and use of all fire extinguishers?	____	____	____
3. Are fire extinguisher locations marked?	____	____	____
4. Have fire extinguishers been professionally inspected during the last year?	____	____	____
5. Are fire extinguishers visually inspected monthly?	____	____	____
6. Is there an operating fire detection system?	____	____	____
ELECTRICAL			
1. Are extension cords kept out of wet areas?	____	____	____
2. Are certified electricians used for electrical work?	____	____	____
3. Are GFCIs being used as needed?	____	____	____
4. Are extension cords not being used in lieu of permanent wiring?	____	____	____
5. Are warning signs exhibited on high voltage equipment (250V or greater)?	____	____	____
6. Are switches, circuit breakers, and switchboards installed in wet locations enclosed in weatherproof enclosures?	____	____	____
7. Are electric fans protected with guards of not over one-half inch mesh, which prevents fingers getting inside guard?	____	____	____
8. Are cords, panels, receptacles, and plugs in good condition?	____	____	____
9. Are multi-outlet strips not plugged into other multi-outlet strips?	____	____	____
10. Are extension cords not plugged into other extension cords?	____	____	____
11. Are circuit breakers or fuse panels properly labeled, kept closed, and accessible?	____	____	____
12. Are extension cords arranged so that they are not placed over radiators, steam pipes, through doorways, or under carpets?	____	____	____
13. Do space heaters have automatic shut-offs that will actuate if the heater tips over?	____	____	____
14. Are space heaters UL listed and plugged directly into a wall receptacle?	____	____	____
15. Are space heaters located at least 3 feet from combustible material?	____	____	____

OFFICE SAFETY INSPECTION REPORT

OFFICE ______________________________ **DATE** ______________________

	YES	NO	N/A
WALKING AND WORKING SURFACES			
1. Are cords, cables, and other items not placed in walkways?	____	____	____
2. Are ladders regularly inspected?	____	____	____
3. Are accessways, stairways, ramps, and ladders clean of ice, mud, snow, or debris?	____	____	____
4. Are ladders being used in a safe manner?	____	____	____
5. Are ladders kept out of passageways, doors, or driveways?	____	____	____
6. Are broken or damaged ladders tagged and taken out of service?	____	____	____
7. Are metal ladders prohibited in electrical service?	____	____	____
8. Are stairways and floor openings guarded?	____	____	____
9. Are safety feet installed on straight and extension ladders?	____	____	____
10. Are employees walking instead of running?	____	____	____
11. Are handrails and siderails installed along the unprotected sides of stairways having 4 or more risers or rising more than 30 inches?	____	____	____
12. Are there torn, loose, or curled carpets?	____	____	____
HOUSEKEEPING			
1. Is good housekeeping maintained?	____	____	____
2. Are paper and materials stored properly?	____	____	____
3. Are cleaning fluids used only in small quantities and stored in closed containers that are kept in well-ventilated areas?	____	____	____
4. If cleaning fluids are flammable, are they not used near a flame or an open heating element?	____	____	____
5. Are wastebaskets emptied on a daily basis?	____	____	____
SITE POSTERS			
1. Are the following posters displayed in a prominent and accessible area?			
A. Minimum Wage	____	____	
B. OSHA Job Protection	____	____	
C. Equal Employment Opportunity	____	____	
2. Are all required state-specific posters displayed?	____	____	
HAZARD COMMUNICATION			
1. Is the written HAZCOM program available?	____	____	____
2. Is there a MSDS FOR EACH HAZARDOUS CHEMICAL present in the office?	____	____	____
3. Are all containers properly labeled, as to content, hazard?	____	____	____
4. Have employees been trained on chemical hazards?	____	____	____
5. Have all employees signed the HAZCOM acknowledgment form?	____	____	____
6. Is there a list of chemicals maintained on site?	____	____	____
DOCUMENTATION			
1. Is an OSHA 200 Log maintained and posted during the month of February?	____	____	____
2. Are accident report forms available?	____	____	____
3. Is a copy of health and safety policy and procedures available?	____	____	____

OFFICE SAFETY INSPECTION REPORT

OFFICE ______________________________ DATE _______________

ALL NEGATIVE RESPONSES	CORRECTIVE ACTION	ASSIGNED TO	DATE ASSIGNED	DATE COMPLETED	VERIFIED BY

DESCRIBE POSITIVE SAFETY OBSERVATIONS

PROCEDURE

Subject: TAILGATE SAFETY MEETINGS

1.0 PURPOSE AND SUMMARY

This procedure establishes the requirement for the conductance of tailgate safety meetings. These meetings are to be conducted at each company project site, on a daily basis, prior to the start of any work activities.

2.0 TABLE OF CONTENTS

3.0 RESPONSIBILITY MATRIX

3.1 Procedure Responsibility

The Vice President, Health and Safety is responsible for the issuance, revision, and maintenance of this procedure.

3.2 Action/Approval Responsibilities

The Responsibility Matrix is Attachment 1.

4.0 DEFINITIONS

Company - All wholly-owned subsidiaries of The IT Group, Inc.

Tailgate Safety Meeting - A short training or informative session that provides safety guidelines for the planned work activities for the day or shift.

5.0 TEXT

The project supervisor or his/her designee conducts a tailgate safety meeting at the beginning of each shift or whenever new employees arrive at the work site. The topics discussed at the tailgate safety meeting should cover the work assignments for the day, the expected hazard(s) presented by the work, and an explanation on how employees will protect themselves from those hazards.

The meetings are to be documented by the completion of a Tailgate Safety Meeting Form. The project supervisor will assure that the form is properly completed and signed by all attendees. Completed forms will be maintained in the project files.

The following sections provide guidance for the completion of the form:

A. **Project Name/Number** - Specific project name and number assigned to the project.

B. **Date** - Date of meeting.

C. **Time** - Time at which meeting is held.

D. **Client** - Identification, name, etc. of entity for whom work is to be performed.

E. **Work Activities** - Detailed description of the work activities to be performed that day.

F. **Hospital Name/Address** - Hospital name and address designated to be used for the project.

G. **Phone Number** - Designated hospital non-emergency phone number.

H. **Ambulance** - Phone number for medical emergency transportation.

I. **Safety Topics Presented:**

1. **Chemical Hazards** - Specific chemical name and adverse properties of all chemicals to be encountered on the job that day. A Material Safety Data Sheet (MSDS) for each should be available and discussed in accordance with Procedure HS060.

2. **Physical Hazards** - Address physical hazards associated with the work site, such as slipping/tripping/falling hazards, pinch points, overhead hazards, and nearby operations that could pose a hazard.

3. **Personal Protective Equipment** - Specify levels of protective clothing and protective devices to be used by employees for each of the day's activities.

4. **New Equipment** - Indicate proper work techniques and any hazards associated with new or unfamiliar equipment.

5. **Other Safety Topic(s)** - List any remaining safety topics pertinent to the potential hazards of the job for that day. This is an area where different, unique subjects can be introduced to make the tailgate safety meeting more interesting.

J. **Attendees** - Printed name and signature of all persons in attendance. (Also, list affiliation if not employed by the company.)

K. **Meeting Conducted By** - Printed name and signature of individual conducting the tailgate safety meeting.

6.0 EXCEPTION PROVISIONS

Variances and exceptions may be requested pursuant to the provisions of Procedure HS013, Health and Safety Procedure Variances

7.0 CROSS REFERENCES

HS013 Health and Safety Procedure Variances
HS060 Hazard Communication Program

8.0 ATTACHMENTS

1. Responsibility Matrix
2. Tailgate Safety Meeting Form

PROCEDURE

Subject: HAZARD COMMUNICATION PROGRAM

1.0 PURPOSE AND SUMMARY

This procedure has been developed to ensure that all affected company employees are provided with current information on the hazardous chemicals that they may encounter during their work. The basic principle of Hazard Communication (HAZCOM) is that anyone that works with hazardous chemicals has both a need and a right to know the identities and the hazards of any chemical to which they may be occupationally exposed. This principle has been propagated by the Occupational Safety and Health Administration (OSHA) in 29 Code of Federal Regulations (CFR) 1910.1200 *Hazard Communication.*

Some company activities are likely to occur in states or localities that either have or will have requirements that differ from those contained within the federal standard. In such circumstances, the local health and safety representative will be responsible for ensuring that these requirements are included in either a site health and safety plan or a similar document and conveyed to all affected employees. If federal, state, or local regulations vary or conflict, the more protective requirements and practices will be followed.

2.0 TABLE OF CONTENTS

3.0 RESPONSIBILITY MATRIX

3.1 Procedure Responsibility

The Vice President, Health and Safety is responsible for the issuance, revision, and maintenance of this procedure.

3.2 Action/Approval Responsibilities

The Responsibility Matrix is Attachment 1.

4.0 DEFINITIONS

Article - A manufactured item other than a fluid or particle which is formed to a specific shape or design during manufacture, has end use function dependent in whole or in part upon its shape or design during end use, which under normal conditions of use does not release more than trace amounts of a hazardous substance and does not pose a physical hazard or health risk to employees.

Affected Employee - Any company employee who may be exposed to hazardous chemicals under normal operating conditions or in foreseeable emergencies.

Company - All wholly-owned subsidiaries of The IT Group, Inc.

Hazardous Chemical - Any chemical which poses a physical or health hazard.

Health Hazard - A chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. Health hazards include chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic system, and agents which damage the lungs, skin, eyes, or mucous membranes.

Immediate Use - When hazardous chemicals will be under the control of and used only by the person who transfers it from a labeled container and only within the work shift in which it is transferred.

Label - Any written, printed, or graphic material displayed on or affixed to containers of hazardous chemicals.

Local Health and Safety Representative - The person who is responsible for the management and/or oversight of health and safety activities at a particular workplace. He/she may be assigned as a site health and safety officer or act as a home office health and safety manager who is responsible for multiple workplaces. This person does not necessarily need to be physically located at a workplace in which they are responsible for ensuring that the requirements of this procedure are fulfilled. The local health and safety representative may designate another qualified individual to assume some or all of the responsibilities delineated in this procedure.

Physical Hazard - A chemical for which there is scientifically valid evidence that it is a combustible liquid, compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable, or reactive.

Responsible Party - The entity responsible for preparation or distribution of Material Safety Data Sheets (MSDS) that can provide additional information on the hazardous chemical and appropriate emergency procedures.

Trade Secret - Any confidential formula, pattern, process, device, information, or compilation of information that is used in an employer's business, and that gives the employer an opportunity to obtain an advantage over competitors who do not currently know or use it.

Workplace - An establishment, job site, laboratory, office, or project at one geographic location containing one or more work areas.

5.0 TEXT

In accordance with the requirements established in 29 CFR 1910.1200, employers are required to develop, implement, and maintain at each workplace a HAZCOM program. The program contained herein is intended to ensure that the hazards of all chemicals used by employees are evaluated and that information concerning the hazards of each chemical are conveyed to affected employees. The company program generally consists of five provisions, including hazardous chemical inventories, procurement of hazardous chemicals, container labeling, MSDSs, and the development and implementation of employee training programs. Since the company does not typically produce, distribute, or import hazardous chemicals, the focus of this procedure is on establishing an effective consumer/handler type HAZCOM program and the communication of information to our affected employees.

There are some types of chemicals that are specifically exempt from this procedure. These materials include:

- Any hazardous waste as defined by the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1967, as amended (42 U.S.C. 6901 *et seq.*), when subject to regulations issued under that Act by the U.S. Environmental Protection Agency.

- Any hazardous chemical as defined by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) when the hazardous chemical is the focus of remedial or removal actions being conducted under CERCLA in accordance with U.S. Environmental Protection Agency regulations.

- Tobacco or tobacco products.

- Wood or wood products, including lumber which will not be processed, where the manufacturer or importer can establish that the only hazard they pose to employees is the potential for flammability or combustibility. Wood or wood products which have been treated with a hazardous chemical are covered by this procedure, and wood which may be subsequently sawed or cut, generating dust.

- Articles.

- Food or alcoholic beverages which are sold, used, or prepared in a retail establishment, or foods intended for personal consumption by employees while in the workplace.

- Any drug, as defined by the Federal Food, Drug, and Cosmetic Act, when it is in solid, final form for direct administration to patient; drugs which are packaged by the manufacturer for sale to consumers in a retail establishment; and drugs intended for personal consumption by employees while in the workplace.

- Cosmetics which are packaged for sale to consumers in a retail establishment, and cosmetics intended for personal consumption by employees while in the workplace.

- Any consumer product or hazardous chemical, as defined by Consumer Product Safety Act and Federal Hazardous Chemicals Act, where the employer can show that it is used in the workplace for the purpose intended by the manufacturer or importer of the product, and the use results in a duration and frequency of exposure which is not greater than the range of exposures that could reasonably be experienced by consumers when used for the purpose intended.

- Nuisance particulates where the manufacturer, distributor, or importer can establish that they do not pose any physical or health hazard covered under this procedure.

- Ionizing and nonionizing radiation.

- Biological hazards.

5.1 Hazardous Chemical Inventories

A complete list of all hazardous chemicals known to be present in the workplace which may expose an employee to a physical or health hazard will be maintained. This list will be placed in the front section of the MSDS binder discussed in Section 5.4. The local health and safety representative will be responsible for updating and revising the inventory list as new chemicals are procured or when chemicals are no longer used and have been removed from the workplace. The identity of the hazardous chemical maintained on the list will be consistent with that which appears on the MSDS. All affected employees will be made aware of the location of the MSDS binder.

5.2 Procurement of Hazardous Chemicals

Since the company does not typically manufacture, distribute, or import hazardous chemicals, procurement is the primary method of obtaining hazardous chemicals. The person initiating the procurement of a hazardous chemical will be responsible for requesting a MSDS from the manufacturer or distributor. This MSDS is to be provided either prior to or at the time of receipt of the chemical. Hazardous chemicals are strictly forbidden to be accepted without an accompanying MSDS. Upon receipt of a hazardous chemical, the person receiving the shipment will notify the local health and safety representative so that a review of the MSDS can be conducted. Also, note that the supplier is only required to submit a MSDS with the initial shipment of a hazardous chemical to a specific location.

In the unlikely event that a hazardous chemical is either manufactured, imported, or distributed by the company, the Vice President, Health and Safety will be notified so that required actions, as dictated by OSHA, can be implemented.

5.3 Container Labeling

Labeling on hazardous chemical containers is meant to provide immediate information to affected employees about the hazards of chemicals they will be expected to handle during the course of their job duties. It is the responsibility of the manufacturer, importer, or distributor of the chemical to ensure that each hazardous chemical leaving their place of business is labeled, tagged, or marked with the following information:

- Identity of the hazardous chemical (must be common to the label, the MSDS, and the chemical inventory list);
- Appropriate warnings of the hazardous effects of a chemical (words, pictures, symbols, or any combination that appears on the label and convey the specific physical or health hazards including target organ effects); and
- Name and address of the chemical manufacturer, importer, or other responsible party.

The person receiving the shipment is responsible to ensure that each container of hazardous chemical(s) has been provided with this labeling information. Hazardous chemicals that do not contain adequate labeling will not be accepted by the receiving person. In the event that hazardous chemicals that do not contain adequate labeling are inadvertently received, they are not to be handled until the identity of the material and appropriate hazard warnings are provided. If the hazardous chemical is regulated by a chemical-specific health standard, then it must be labeled in accordance with the requirements of that standard.

As long as the hazardous chemicals are maintained in their original, properly labeled container and their composition is not altered, there is no need for additional labeling. In the event that the chemical is transferred from a labeled container to an unlabeled portable container, the user must label this secondary container unless the container is intended for immediate use of the employee who performs the transfer.

In locations where employees are present who only communicate in languages other than English, all labeling information must be presented in their language as well as in English.

5.4 Material Safety Data Sheets (MSDS)

MSDSs are written documents that convey specific, detailed information about the hazards associated with a specific chemical. It is the responsibility of the manufacturer, importer, or distributor to either provide MSDSs prior to shipment or with the shipped materials. The employee receiving the shipment of materials is responsible to ensure that a MSDS has been supplied. As described in Section 5.2, the employee initiating the procurement is responsible for requesting a MSDS from the manufacturer or distributor. In the event that a MSDS has not been provided, it is the responsibility of the receiving person to obtain one from the manufacturer or distributor as soon as possible. The material will not be handled prior to the receipt of a MSDS.

Each MSDS will be forwarded to the local health and safety representative or a designee who will then place a copy into the MSDS binder. This binder will be maintained in the workplace and updated as new materials arrive. The local health and safety representative will ensure that this binder is reviewed with all affected employees and is readily accessible during each work shift. A designated area for the storage of the binder will be established and all employees are to be informed of its location. Employees can request a personal copy of a MSDS by completing the Employee Request for MSDS form provided in Attachment 2. Where employees travel between workplaces during a work shift, the MSDSs may be kept at the primary workplace. Affected employees must be able to immediately obtain information from the MSDSs in the event of an emergency.

MSDSs will be in English and other languages, as necessary, for the particular employees in which the MSDSs will be used. MSDSs are to include the following information:

- Name, address, and telephone number of the responsible party;
- Identity of the chemical as it appears on the label;
- Hazardous ingredients;
- Physical and chemical characteristics;
- Physical and health hazards;
- Primary route(s) of entry;
- OSHA permissible exposure limit (PEL) or other applicable exposure limits;
- Carcinogen information;
- Safe handling and use information;

- Control measures;
- Emergency and first aid procedures; and
- Date of preparation and latest revision date.

5.5 Training

All affected employees will be provided with information and training on the hazardous chemicals in their work area at the time of their initial assignment, when new information about the hazards of a chemical is discovered, and whenever a new physical or health hazard that the employees have not previously been informed of is introduced into the workplace. The HAZCOM training record has been provided as Attachment 3.

Training on this HAZCOM program may be satisfied by the use of two different types of training sessions. These sessions include:

- **Tailgate Safety Meetings** - These meetings will be used to convey the methods and observations that may be used to detect the presence or release of a hazardous chemical in the workplace, the physical and health hazards of the chemicals in the workplace, and the measures that can be taken to protect affected employees from these hazards. The guidelines for this meeting are described in Procedure HS051, Tailgate Safety Meetings.

- **Workplace-Specific or Annual Refresher Training** - Either of these training sessions can be used to convey the details of this HAZCOM program. These details include an explanation of labeling systems, the use of MSDSs, and how employees can obtain and use the appropriate hazard information. These training sessions are discussed further in Procedure HS050, Training Requirements.

Workplace-specific and tailgate safety meetings will be facilitated by the local health and safety representative or another individual who is knowledgeable on the requirements of the HAZCOM program and the specific chemicals that are being discussed. Annual refresher training can only be conducted by personnel previously approved by the company Training Department.

5.6 Trade Secrets

Some hazardous chemical manufacturers, importers, and distributors may withhold proprietary information required to be present on a MSDS. In such instances, the name and telephone number of the manufacturer, importer, or distributor will be forwarded to the Vice President of Health and Safety for further action. It will be the responsibility of the Vice President of Health and Safety to either obtain the necessary information or to decide to reject the chemical for use in company workplaces.

5.7 Contractors

During the execution of our work, there will be situations when the company will be at locations where employees of other entities may be exposed to chemicals being used by the company. It will be the responsibility of the local health and safety representative or designee to provide the other entities' site representative(s) with copies of all MSDSs in which their employees may be exposed, as well as the labeling system in place, the protective measures to be taken, safe handling procedures to be used, and the location and availability of the MSDS binder.

Periodically, company work areas will be located on or adjacent to a facility operated by another entity. In these situations, the local health and safety representative or designee will contact the other entity to obtain applicable MSDS(s) for hazardous chemicals that company employees may be exposed to.

6.0 EXCEPTION PROVISIONS

Variances and exceptions may be requested pursuant to the provisions of Procedure HS013, Health and Safety Procedure Variances.

7.0 CROSS REFERENCES

HS013 Health and Safety Procedure Variances
HS050 Training Requirements
HS051 Tailgate Safety Meetings
HS500 OSHA Regulated Toxic and Hazardous Chemicals
OSHA 29 CFR 1910.1200

8.0 ATTACHMENTS

1. Responsibility Matrix
2. Employee Request for MSDS
3. HAZCOM and Right-to-Know Standards Employee Training Record

ATTACHMENT 1
HAZARD COMMUNICATION PROGRAM

Responsibility Matrix

Action	Procedure Section	*Responsible Party*				
		Purchaser	**Receiver**	**Affected Employee**	**Local Health and Safety Representative**	**Vice President, Health and Safety**
Understand and Comply With State and/or Local Regulations	1.0				X	
Issuance, Revision, and Maintenance of Procedure	3.1					X
Review and Understand This Procedure	5.0	X	X	X	X	
Establish, Update, and Revise MSDS Binder	5.1				X	
Request MSDSs for Procured Chemicals	5.2	X				
Initial Review of MSDSs	5.2				X	
Implement Requirements For Company Manufactured, Imported, or Distributed Chemicals	5.2					X
Review Incoming Shipments for Hazard Labeling/MSDS	5.3		X			
Request Missing MSDSs From Manufacturer or Distributor	5.4		X			
Provide HAZCOM Training	5.5				X	
Receive HAZCOM Training	5.5			X		
Obtain Information on Proprietary Chemicals	5.6					X
Transmit MSDSs to Contractors	5.7				X	
Obtain MSDSs From Other Entities	5.7				X	

ATTACHMENT 2

EMPLOYEE REQUEST FOR MATERIAL SAFETY DATA SHEET (MSDS)

Employee Name: (Please print) ______________________________

Employee Number: ______________________________

Job Title/Location: ______________________________

Department/Work Area: ______________________________

I am requesting a copy of the MSDS(s) for the following chemical(s):

(Chemical name, Common name, Trade name)

1. ______________________________
2. ______________________________
3. ______________________________

______________________________ ______________________________
Signature Date

I have received a copy of the above MSDS(s) I requested.

______________________________ ______________________________
Signature Date

cc: Local Health and Safety Representative

ATTACHMENT 3

HAZARD COMMUNICATION AND RIGHT-TO-KNOW STANDARDS EMPLOYEE TRAINING RECORD

INITIAL:

1. I have been informed about the Hazard Communication Program, Material Safety Data Sheets (MSDS), their use and location, and the procedures to obtain copies. ☐

2. I have been informed that some of my work may involve exposure to toxic substances, the hazards of which will be reviewed with me in tailgate safety meetings or site-specific training. ☐

3. I have been informed about the right of employees to have access to relevant exposure and medical records, and the procedures for requesting access. ☐

4. I understand that the company must act upon a request in a reasonable amount of time so as to avoid interruption of normal work operations. ☐

5. I have been provided access to the applicable regulations governing hazard communication, and access to employee exposure and medical records. ☐

PRINT NAME: ______________________________

SIGNATURE: ______________________________

EMPLOYEE NUMBER: ______________________________

DATE: ______________________________

PROCEDURE

Subject: FIRST AID KITS

1.0 PURPOSE AND SUMMARY

This procedure specifies the contents, use, restocking, inspection, and personnel qualification requirements for first aid kits in IT Corporation.

2.0 TABLE OF CONTENTS

3.0 RESPONSIBILITY MATRIX

3.1 Procedure Responsibility

The Corporate Director, Health and Safety is responsible for the issuance, revision, and maintenance of this procedure.

3.2 Action/Approval Responsibilities

The Responsibility Matrix is Attachment 1 in Section 8.0.

4.0 DEFINITIONS

(None.)

5.0 TEXT

Special fill first aid kits in weather proof containers, approved by the IT Corporation Medical Director and meeting regulatory requirements, shall be present in all locations when IT Corporation employees will be working. Items not specifically authorized by the Medical Director, especially over-the-counter medications taken internally, are prohibited.

5.1 Kit Selection

5.1.1 Type I Kit

All fixed facilities, field offices, shops, storerooms, field jobs, etc., shall provide a minimum of one (1) Type I First Aid Kit (Attachment 2). Additional kits shall be provided based on the number of personnel at the location.

5.1.2 Type II Kit

All owned or leased vehicles shall be equipped with a Type II First Aid Kit (Attachment 3).

5.2 Issuance/Placement of Kits

Kits must be located in a visible location readily accessible in the event of an injury or emergency. Kits located in fixed facilities or field offices shall be securely mounted on a wall or other appropriate surface.

5.3 Usage

Use of any item from a first aid kit requires the completion of a Supervisor's Employee Injury Report (Attachment 4), which must be submitted to the HS department within 24 hours. This includes "first aid only" or "non-occupational" incidents, which should be so noted on the SEIR.

5.4 Restocking

All Type I kits located in a permanent or semi-permanent facilities shall be inspected weekly. They may either be set-up for monthly restocking by an outside vendor or restocked weekly from on-hand supplies. Note that any kit set-up for monthly restocking, but that is found seriously depleted when inspected, must be restocked immediately.

All Type II kits, and those Type I kits used for field job support shall be restocked after every use. Field kits should be inspected daily, and vehicle kits should be checked by the driver as part of his pre-trip checkout. Deficiencies are to be corrected immediately.

5.5 Personnel Qualifications

Other than for self-administration to the user, all first aid kit users shall possess a valid first aid card.

6.0 EXCEPTION PROVISIONS

All exceptions to established policy shall follow the provisions of ITC Procedure HS013: Health and Safety Procedure Variances.

7.0 CROSS REFERENCES

HS020: Accident Prevention Program: Investigation and Review.

8.0 ATTACHMENTS

1. Responsibility Matrix
2. Type I First Aid Kit Inventory
3. Type II First Aid Kit Inventory
4. Supervisor's Employee Injury Report

ATTACHMENT 1

FIRST AID KITS

Responsibility Matrix

Action	Procedure Section	*Responsible Party*		
		IT Medical Director	Location Manager	Supervisor
Specify approved kit inventory	5.0	X		
Provide approved kits for facilities, projects, vehicles	5.1		X	
Properly/visibly place kits	5.2		X	
Complete SEIR when kit used, and submit to HS	5.3			X
Establish inspection and restocking procedures	5.4		X	
Train personnel in FA/CPR to meet kit use criteria	5.5		X	

ATTACHMENT 2

FIRST AID KIT INVENTORY LIST: TYPE I

Contents	Quantity
Telfa Bandage Compress, 4" x 4"	23
Adhesive Bandages, 1" x 3-3/8"	40
Ammonia Inhalants	5
Triangular Bandage	3
Eye Dressing Packet	1
Eye Flush, 1 oz.	2
Kwik-Kold Ice Pak	1
Adhesive Tape, 1"	1 roll
Scissors and Forceps Kit	1
Emergency Blanket	1
Disposable Gloves	4 pairs
Flashlight	2
Cottontip Applicators	25
Disposable Mouth-to-Mouth Resuscitators	1
Multi-Trauma Dressings 8" x 10"	1
2" Gauze Bandage Roll	1
Supervisor's Employee Injury Report	6
Inventory Kit	1

Peter P. Greaney, M.D.
Occupational Medicine Consultant

Signature Date

ATTACHMENT 3

FIRST AID KIT INVENTORY LIST: TYPE II

Contents	Quantity
Telfa Bandage Compress, 4" x 4"	4
Adhesive Bandages, 1" x 3-3/8"	10
Ammonia Inhalants	5
Triangular Bandage	1
Eye Dressing Packet	1
Eye Flush, 1 oz.	1
Kwik-Kold Ice Pak	1
Adhesive Tape, 1"	1 roll
Scissors and Forceps Kit	1
Disposable Gloves	2 pairs
Flashlight	1
Cottontip Applicators	10
Disposable Mouth-to-Mouth Resuscitators	1
Multi-Trauma Dressings 8" x 10"	1
2" Gauze Bandage Roll	1
Supervisor's Employee Injury Report	2
Inventory Kit	1

Peter P. Greaney, M.D.
Occupational Medicine Consultant

Signature Date

ATTACHMENT 4

SUPERVISOR'S EMPLOYEE INJURY REPORT

This report is to be initiated by the employee's supervisor. Please answer all questions completely. This report must be forwarded to the appropriate health and safety representative within 24 HOURS of the injury/illness.

EMPLOYEE

Injured's Name ______ Sex ____ S.S. No. ______ Birth Date ______
Home Address ______
City ______ State ______ Zip ______ Phone (   ) ______
Job Title ______ Hire Date ______ Hourly Wage ______

SUPERVISOR

Date of Incident ______ Time ______ Time Reported ______ To Whom? ______
Project/Location Name ______ Address ______
Project No. ______ Time Shift Began ______ Did the Employee Leave Work? ☐ No ☐ Yes When ______
Has employee returned to work? ☐ No ☐ Yes When ______ Did employee miss a regularly scheduled shift? ☐ No ☐ Yes
Doctor/Hospital Name ______ Address ______
Witness Name(s) ______ Statement Attached? ☐ No ☐ Yes
Nature of Injury ______ Exact Body Part ______
Medical Attention: ☐ None ☐ First Aid On Site ☐ Doctor's Office ☐ Hospital ER ☐ Hospitalized
Job Assignment at Time of Incident ______
Describe Incident ______

What Unsafe Condition and/or Act Contributed to the Incident? ______

What Corrective Action Has Been Taken to Prevent Recurrence? ______

Supervisor ______ (Print) ______ Signature ______ Date

MANAGER

Comments on Incident and Corrective Action ______

Project/Location Mgr. ______ (Print) ______ Signature ______ Date

HEALTH AND SAFETY

Concur With Action Taken? ☐ No ☐ Yes Remarks ______

OSHA Classification:
☐ First Aid ☐ Recordable, No Lost/Restricted Workdays ☐ Recordable, Lost Workdays ☐ Recordable, Restricted Activity ☐ Fatality

Days Away From Work ______ Days Restricted Work ______

All injuries/illnesses requiring outside medical treatment must be reported to CSSC by calling 1-800-243-2490 within 24 hours of the incident. Contact Corporate Risk Management at (412) 380-4097 for cases occurring in Ohio, Nevada, Washington, or West Virginia.

Workers' Compensation Claim Number (if applicable) ______

Health and Safety Representative:

______ (Print) ______ Signature ______ Date

PROCEDURE

Subject: PRESSURIZED WATER CLEANING AND CUTTING EQUIPMENT

1.0 PURPOSE AND SUMMARY

This procedure covers the personnel requirements, operator training, operating procedures, and recommended equipment performance/design for the proper operation of all types of pressure water jet cleaning and cutting equipment as normally used by industries concerned with construction, maintenance, repair, cleaning, cutting, and demolition work.

The term "high-pressure water jetting" covers all water jetting operations, including the use of additives or abrasives at pressures above 1000 psig.

Any person required to operate or maintain pressure water jetting equipment shall have been trained and have demonstrated the ability and knowledge to do so in accordance with the original equipment manufacturer's instructions, specifications, and training programs.

2.0 TABLE OF CONTENTS

3.0 RESPONSIBILITY MATRIX

3.1 Procedure Responsibility

The National Director, Health & Safety is responsible for the issuance, revision, and maintenance of this procedure.

3.2 Action/Approval Responsibilities

The Responsibility Matrix is Attachment 1.

4.0 DEFINITIONS

Dump System

The discharge orifice operator-controlled, manually operated device or system that reduces the pressure to a level that yields a pressure flow at the nozzle that is considerably below the risk threshold.

High-Pressure Water Cleaning

The use of high-pressure water, with or without the addition of other liquids or solid particles, to remove unwanted matter from various surfaces, where the pressure of the liquid jet exceeds 1000 psig at the orifice.

Warning: The limit of 1000 psig does not mean that pressures below 1000 psig cannot cause injury or require any less attention to the principles of this practice. Adequate precautions, similar to those of this practice, are required at all pressures.

High-Pressure Water Cutting

The use of high-pressure water, with or without the addition of other liquids or solid particles, to penetrate into the surface of a material for the purpose of cutting that material, where the pressure of the liquid jet exceeds 1000 psig at the orifice.

Hose Assembly

A hose with safety coupling attached in accordance with manufacturer's specifications.

Lance

A rigid metal tube used to extend the nozzle from the end of the hose.

Lancing

An application whereby a lance and nozzle combination is inserted into, and retracted from, the interior of a pipe or tubular product.

Moleing

An application whereby a hose fitted either with a nozzle or with a nozzle attached to a lance is inserted into, and retracted from, the interior of a tubular product. It is a system commonly intended for cleaning the internal surfaces of tubes, pipes, or drains. It can be self-propelled by its backward-directed jets and is manufactured in various shapes, sizes, and combinations of forward- and backward-directed jets.

Nozzle
A device with one or more openings where the fluid discharges from the system. The nozzle restricts the area of flow of the fluid, accelerating the water to the required velocity and shaping it to the required flow pattern and distribution for a particular application. Combinations of forward and backward nozzles are often used to balance the thrust. Such nozzles are commonly referred to as tips, jets, orifices, etc.

Operator
A person who has been trained in accordance with the original manufacturer's instructional training program and has been qualified through demonstrating the knowledge, experience, and ability to perform the assigned task.

Operator Trainee
A person not fully qualified due to the lack of sufficient knowledge or experience, or both, to perform the assigned task without supervision.

Pressure Water Jet System
Water delivery systems that have nozzles or other openings whose function is to increase the speed of liquids that may cause injury. Solid particles or additional chemicals may also be introduced, but the exit in all cases will be in a free stream. The system shall include the pumps (pressure-producing devices), hoses, lances, nozzles, valves, safety devices, and personal protective equipment, as well as any heating elements or injection systems, attached thereto.

Shotgunning
An application whereby a lance or nozzle combination can be manipulated in virtually all planes of operation.

5.0 TEXT

This procedure is intended to provide guidance on the proper operation of pressure water jet cleaning and cutting equipment.

This procedure is also applicable at lower pressures at which there is foreseeable risk of injury.

All equipment shall be operated in a manner consistent with the manufacturer instructions for the specific model of equipment to be used. Such instructions and manuals <u>shall</u> be kept in a water-proof compartment with the equipment. (NOTE: Rental equipment shall not be accepted without the manufacturer's manual.)

5.1 Qualified Operators

Only personnel who have undergone a proper training program and who have demonstrated the knowledge and skill, and gained the experience to perform all likely assigned tasks shall operate water jetting equipment. They may also supervise the training of new operators.

5.2 Training

Before being assigned to their first water jetting jobs, associates shall receive proper training. A core module for pressurized water systems is available from the Training Department. This shall be supplemented with site-specific, hands-on training per the manufacturer's instructions for the specific equipment in use. Training shall cover the following topics.

5.2.1 **Cutting Action.** The cutting action of a water jet and the potential hazard it poses to the human body shall be demonstrated through the use of audiovisual aids or actual use of equipment (by cutting through a piece of lumber, a concrete block, etc.).

5.2.2 **System Operation.** The operation of water jetting systems shall be explained by pointing out potential problems and proper corrective actions.

5.2.3 **Operating Pressure.** The need to operate equipment at or below the manufacturer's recommended working pressure shall be stressed.

5.2.4 **Control Devices.** The operation of all control devices shall be explained. The importance of not tampering with any control devices, as well as the importance of keeping them in proper working order, shall be stressed.

5.2.5 **Equipment Maintenance.** The importance of the proper and timely care and maintenance of water jetting equipment shall be presented. Instructions shall be provided on the procedures to follow in maintaining equipment and when the equipment must be returned for care by more qualified associates.

Stress that equipment shall not be repaired, or connections tightened, when the unit is in operation or the pump is running.

5.2.6 **Valve Maintenance.** Point out that valves and seating surfaces in pressure regulating devices encounter high wear during water jetting. These items require frequent inspections, maintenance, and/or replacement to ensure proper operation.

5.2.7 **Hose.** The proper method of identifying and connecting hoses, including laying out without kinks, protecting hoses from excessive wear, identifying a worn or unsafe hose, and proper tools to use on couplings and fittings shall be explained. Fittings and couplings on hoses shall not be tightened or tampered with while the hose is pressurized. Safety connectors (whipchecks) should be used across all hose connections.

5.2.8 **Stance.** The proper stance for sound footing and how to use the various devices for lancing, shotgunning, and moleing shall be demonstrated. The trainee, under close supervision, shall be trained to use the various devices while the unit is slowly pressurized and is operating at its normal working capacity.

5.2.9 **Proficiency.** Personnel shall demonstrate knowledge and skill in the proper operation of equipment through practical applications before performing indirectly supervised work.

5.3 Personal Protective Equipment

The minimum personal protective equipment (PPE) shall be explained. Instructions shall be given as to when and how specific clothing and other types of protective devices shall be worn according to the type of work performed, locations, etc.

5.3.1 **Compliance.** All applicable recommended practices and regulations, instructions, and warnings covering PPE shall be followed as prescribed by the original equipment manufacturer's programmed instructional material.

5.3.2 **Head Protection.** All operators shall wear hard hats with attached face shields.

5.3.3 **Eye Protection.** Suitable eye protection (adequate for the purpose and of adequate fit on the person) shall be provided to all operators of pressure water jetting equipment and must be worn within the working area. Where liquids liable to cause eye damage (see Material Safety Data Sheets) are encountered, it is necessary to use either a combination of visor and impact-resistant goggles, or a full hood with shield.

5.3.4 **Body Protection.** All operators shall be supplied with suitable waterproof clothing and jet-resistant PPE (i.e., foot and leg guards) having application for the type of work being undertaken. Garments shall provide full protective cover to the operator, including arms. Liquid- or chemical-resistant suits shall be worn where there is a reasonable probability of injury (see Material Safety Data Sheets) that can be prevented by such equipment.

5.3.5 **Hand Protection.** Adequate hand protection shall be supplied to all operators and shall be worn when there is a reasonable probability of injury that can be prevented by such equipment. (See original equipment manufacturer specifications.)

5.3.6 **Foot and Leg Protection.** All operators shall be supplied with waterproof boots with steel toecaps and shanks. **Metatarsal guards and leg guards shall be used by the jetting gun operators.**

5.3.7 **Hearing Protection.** Pressure water jetting operations may produce noise levels in excess of 90 dB(A). Suitable ear protection issued in accordance with the recommended practices of the original equipment manufacturer must be worn. Provision shall be made for regular inspection and maintenance, including daily cleaning of hearing protection devices that are of the reusable type. All personnel and operators shall receive instruction in the correct use of ear protectors such that noise exposure lies within the limits as specified by the original equipment manufacturer's instructions.

5.3.8 **Respiratory Protection.** A respiratory protection program shall be implemented where there is a reasonable probability of injury that can be prevented by such a program.

5.3.9 **Equipment Limitations.** It should be recognized that some protective equipment may not necessarily protect the operator from injury by direct high-pressure water jet impact. Shields and guards shall be used as provided in the original equipment operator's instructions and training programs to prevent any injury.

5.4 Pre-operating Procedures

5.4.1 **Planning.** Preplan each job. Follow the steps outlined in the original manufacturer's instrustions and programmed training materials. Personnel familiar with the item to be cleaned, the material to be cut, and the work environment shall meet with the personnels that will be performing the work and outline potential hazards of the work area, environmental problems, safety standards, and emergency aid procedures.

5.4.2 **Checklist.** Use the manufacturer's checklist, or listing of critical items, to ensure that the proper equipment selection is followed (see Attachment 2).

5.4.3 **Dump Valve.** All systems shall incorporate at least one fluid shut-off or dump device. The orifice operator must always be able to shut down the water jet by releasing pressure on the trigger, switch, or foot valve pedal.

5.4.4 **Warning Barriers.** Erect suitable barriers to encompass the hazard area and post signs to warn personnel they are entering a hazardous area. The perimeter should be outside the effective range of the jet wherever possible. Barriers may be of rope, safety tape, barrels, etc., as long as they give an effective warning and are highly visible.

5.4.5 **Hook-ups.** Hose shall be arranged so that a tripping hazard does not occur. Support hoses, pipes, and fittings to prevent excessive sway or wear, or both, created by vibration or stress on the end connections when laid on the ground, over sharp objects or on vertical runs, shall be used. Check all hoses for evidence of damage, wear, or imperfections. The check shall be made periodically during the operation.

5.4.5.1 **Fittings.** Clean and lubricate all fittings before installing in the system. Be sure all fittings, hoses, and nozzles are fit for the purpose.

5.4.5.2 **Pre-flushing.** Flush the system completely with sufficient water to remove any contaminants before installing the nozzle.

5.4.5.3 **Nozzles.** Remove nozzles and check all orifices for any blockage or damage, or both, or for imperfections.

5.4.5.4 **Electrical Equipment.** Any electrical equipment in the immediate area of the operation that presents a hazard to the operator shall be de-energized, shielded, or otherwise made safe. GFCIs shall be used for any necessary power hook-ups.

5.5 Operational Procedures

5.5.1 **Work Area.** Isolate the workpieces/items to be jetted from any unprotected areas to a protected pressure water jetting area. Cutting or cleaning in place or adjacent to the installed position can be done with the necessary clearance and permission of the occupier and equipment/facility owner.

5.5.2 **Area Limits.** Area limits applicable to the cutting or cleaning operations shall be defined by barriers and should be marked with notices to warn against access to other personnel and specific hazards present. Suitable barriers shall be an approved form of hazard warning, rope, or tape, as a minimum. Alternatively, a suitable barrier shield is acceptable at any reasonable distance. Notices should read "Danger - Keep Clear, Pressure Water Jetting in Operation - Severe Injury May Result", or other suitable wording.

5.5.3 **Corrosive Materials.** Where there is a possibility of encountering corrosive or toxic material, the general contractor or employer or owner shall be requested to inform the person in charge of pressure water jetting of any precautions that may be necessary, including the collection and disposal of waste materials.

5.5.4 **Work Surface.** Operators should have good access to the workpiece, safe walking and working surfaces, and secure footing. The work area should be kept clear of loose items and debris to prevent tripping and slipping hazards.

5.5.5 **Unauthorized Access.** Prevent access by unauthorized persons into the area where pressure water jet cleaning or cutting, or both, is taking place. The area shall be secured as described in Section 5.5.2. The perimeter should be outside the effective range of the jet wherever possible.

5.5.6 **Approaching the Operator.** Personnel having reasons to enter the pressure water jet cleaning and cutting area must wait until the jet is stopped and their presence is known. Personnel wishing to have the jet stopped shall approach a team member other than the jet operator. The jet operator shall not be distracted until the jet has been stopped.

5.5.7 **Side Protection.** Suitably placed side shields shall be provided to safeguard personnel and equipment against contact with grit or solids removed by the jet.

5.5.8 **Pressurizing the System.** Increase pressure slowly on the system while it is being inspected for leaks or faulty components, or both. Repair or replace components only when the equipment is properly locked out and tagged. The system shall be depressurized, shut down, and the key removed for repairs.

5.5.9 **Team Operations.** In jetting operations a minimum of two persons, one at the pump and one at the orifice or gun, shall be employed at all times.

5.5.10 **Supervision.** All pressure water jetting operations shall be controlled by a supervisor who has been trained in accordance with the instructions of the original equipment manufacturer in all aspects of the jetting operation.

5.5.11 **Number of Operators.** The operators of the pressure water jetting equipment should consist of two or more operators according to the equipment being used and the nature of the job. These operators shall work as a team, with one member designated in charge. The operator of the gun or lance shall take the lead role while jetting is in progress.

5.5.12 **Gun Operator.** One operator from the team shall hold the lance, gun, or delivery hose with the nozzle mounted on it. That operator's primary duty is to direct the jet.

5.5.13 **Second Operator.** The second operator of the team shall attend the pump unit, keep close watch on the first operator for signs of difficulty or fatigue, and watch the surrounding area for intrusion by other persons or unsafe situations. If required, the operator will shut off the pressure until any unsafe acts or conditions have been corrected and it is safe to continue.

Warning: Exercise caution in shutting off the pressure rapidly, as this can cause loss of footing by the gun operator.

5.5.14 **Additional Operators.** Additional operators are required in the following circumstances:

- To assist the first operator with the handling of the lance if it is too long or too heavy for one person; or

- To provide communication if the lance operator is out of sight of the pump unit operator.

5.5.15 **Job Rotation.** The team members should rotate their duties during any job to minimize fatigue to the operator holding the lance or gun.

5.5.16 **Team Leader.** The team leader is responsible for basic equipment checks, the preparation of the working area for safe operation, and for obtaining a permit to work (if applicable).

5.5.17 **Code of Signals.** Before starting a jetting operation, the team members, one of whom must be in charge, shall agree on signals to be used during the operation of the equipment.

5.5.18 **Fitness.** The operator and other team members shall be capable of performing the required operations safely. All shall be capable of speaking and reading the instructions and warnings in the language of their place of work.

5.6 Single Person Operation

Single person operation is allowed where the pressure does not constitute a hazard to personnel. Single person operations are prohibited at operating pressures exceeding 1000 psig and may be deemed unsafe at lower pressures due to jobsite conditions. (NOTE: All HAZWOPER operations are required to use the buddy system.)

5.6.1 **Single Operator Guidelines.** All other recommendations pertaining to team operations shall apply.

5.7 Shotgunning

5.7.1 **Controls.** The person operating the nozzle shall have direct control of the dump system.

5.7.2 **Attendance.** The pressurized system shall never be left unattended.

5.7.3 **Multiple Operation.** When more than one shotgunning operation is being performed within the same area, install a physical barrier or maintain adequate spacing between operators to prevent the possibility of injury from the pressure water.

5.7.4 **Target Holding.** Never manually hold objects to be cleaned.

5.7.5 **Connection Protection.** The point where the hose connects to the gun shall be shrouded by a protective device such as a heavy duty hose, shoulder guard, and the like, to prevent injury to the operator should the hose, pipe, or fitting rupture.

5.7.6 **Minimum Length.** When used, the minimum length of the shotgun lance extension shall be 4 feet (1.2 mm) from the triggering device to the nozzle.

5.7.7 **Hose Protection.** Use steel-braided hoses on air-operated, fail-safe systems to keep the system from being activated by someone stepping on the hose or running over it.

5.8 Moleing or Flex Lancing

5.8.1 **Control.** The operator shall have direct control of the dump system.

5.8.2 **Reversing.** A positive method shall be used to prevent the nozzle from reversing direction inside the item being cleaned. Safety guards for this purpose shall be used.

5.8.3 **Retrojets.** During manual operations, the entrance to a line or pipe shall not be cleaned with a nozzle containing back jets without adequate shielding.

5.8.4 **Clearance.** The clearance between the outside diameter of the hose, lance, and nozzle assembly and the inside wall of the item being cleaned shall be sufficient to allow adequate washout of water and debris.

5.8.5 **Pressurization.** During manual operation, insert the nozzle into the tube prior to pressurizing. Conversely, depressurize the system before removing the nozzle from the tube.

5.8.6 **End Identification.** Hoses shall be conspicuously marked no closer than 24 inches (600 mm) from the nozzle to warn the operator of the nozzle location.

5.8.7 **Nozzle Support.** Where the length of the nozzle and rigid coupling is less than the inside diameter of the pipe, a length of rigid pipe of not less than the diameter of the pipe being cleaned shall be fitted directly behind the nozzle, or a suitable safety shield shall be provided to protect the operator. This is to prevent the nozzle from turning around 180° and doubling back towards the operator. Specific safety guards shall be used for this purpose.

5.9 Ridge Lancing

5.9.1 Control. The operator inserting the nozzle shall have direct control of the dump system.

5.9.2 Clearance. The clearance between the outside diameter of the lance and nozzle and the inside wall of the item being cleaned shall be sufficient to allow adequate washout of water and debris.

5.9.3 Pressurization. When under manual operation the nozzle shall be inserted into the tube prior to pressurizing. Conversely, the system shall be depressurized before removal of the nozzle from the tube, unless proper shielding is provided.

5.9.4 Shields. When lancing tubes with a rigid lance, a guard shall be installed around the lance to prevent a lance nozzle from being inadvertently withdrawn and causing injury.

5.10 Additives

Any water additive (chemical, detergent, or solid particle) shall be used in accordance with the manufacturer's recommendations.

5.11 Proper Operation

5.11.1 Start-up. Do not start the pump unit and bring it up to pressure unless each team member is in his designated position, the nozzle is held in or directed at the workpiece, and the lance or gun is securely held.

5.11.2 Adjustments. Apart from operational procedures, no attempt shall be made to perform maintenance or adjust any nut, hose connection, fitting, etc., while the system is under pressure. Stop the pumps, discharge any pressure in the line, and remove the key prior to making any such adjustment. Take care to release the pressure in the dry shut-off gun and the line when the unit is switched off.

5.11.3 Equipment Malfunction. If for any reason the water flow does not shut off when the trigger or foot pedal is released, cease work until the item has been serviced, repaired, or changed by properly trained personnel. Equipment shall be shut down, depressurized, and the key removed prior to making repairs.

5.11.4 Reaction Force. The operators shall be allowed to experience the reaction force of the jet progressively until the required operating pressure is reached. Use the lowest pressure compatible with the work to be done. Do not adjust the pressure without the operator being aware of this operation.

5.11.5 Effect of Line Pulses. Operators shall be made aware of the reactive effect of pressure in the line that can transmit a severe jolt to the operator when the dump valve or dry shut-off valve is operated. To minimize this effect, keep total hose lengths as short as possible. Damping devices shall be introduced into the system in accordance with the original equipment manufacturer's designs or instructions.

5.11.6 Thermoplastic Hoses. Thermoplastic hose shall not be used for water jetting unless specifically designed for this purpose.

5.11.7 Operator Position. While operating, the team members shall be safely positioned. Stop the jetting if any person encroaches into the working area.

5.11.8 Work Stoppage. Stop work in the following cases:

- In the event that leaks or damage become apparent;
- If any person becomes aware of any change in conditions or of any hazards being introduced or existing;
- If plant or work alarms are sounded; or
- If any of the practices in this procedure are not being followed.

5.11.9 Hose Protection. Protect all hoses from being run over and crushed by vehicles, fork lift trucks, and the like.

5.11.10 Back Thrust. The back thrust from a linearly directed jet can be calculated from the equation:

$$B = 0.052\ Q(P)0.5$$

where:

B = Back thrust, lb(kg)
Q = Flow rate, gal/min (or metric equivalents), and
P = Jet pressure (psi)

It is not recommended that one person be required to withstand a back thrust of more than one third of his or her body weight for any extended period of time.

5.12 Use of Lances and Nozzles

5.12.1 Lances. Lances that are rigid or semirigid, having nozzles fitted to them with any combination of forward, backward, or 90° angle jets, shall be used with either a dump system or dry shut-off control valve. When a flexible lance or nozzle mounted on a hose is in use, do not operate the jet at pressure unless the nozzle is properly positioned inside the workpiece or the operator is protected by screens or proper shielding from the rear-facing jets. If necessary, clean the lead-in to the workpiece by other methods.

5.12.2 **Flexible Lances.** Flexible lances, used to clean pipes where the inside diameter of the pipe is not small enough to prevent the lance from turning back on itself, shall have a piece of rigid straight tube, slightly longer than the diameter of the pipe, fitted immediately behind the nozzle to prevent this from happening.

5.12.3 **Distance Indicator.** When using an assembly that allows the nozzle to enter the workpiece with restricted visibility, clearly mark the lance, hose, or floor in a manner that enables the operator to judge how far the nozzle is in the workpiece before pressure is applied and, conversely, so that pressure is released before the apparatus is completely withdrawn from the workpiece.

5.12.4 **Lance Length.** The length of a rigid lance or combination of lances shall be such that the operator can maintain control at all times.

5.12.5 **Jet Pressure.** Operators shall select the nozzle and minimum operating pressure to allow effective and efficient jetting.

5.12.6 **Improper Use.** Should an operator enter a manhole or access port for any purpose (with the jetting machine turned off), the hose shall not be used to support his weight when climbing up or down.

5.12.7 **"T" Pieces.** A "T" piece or nozzle carrier "T" (devices for producing two equal and opposite jets at the end of the land and at right angles to the normal flow) shall inserted into a tube or vessel, or between two surfaces, before the system is pressurized. This is necessary to ensure that should one jet be larger than the other, or one jet become blocked or partially blocked, the operator of the lance will not be spun out of control. When a "T" piece is used to provide a balancing jet on a long lance to clean a single surface, it is not always possible to check for equal thrust from both jets in the above described manner; therefore, check these lances by progressive pressure increases.

Caution: This shall also apply to any form of multi-jet nozzle having a radial component.

5.13 Health and Safety Plan

The HS professional for the job shall include appropriate assessment and hazard control information in the project HASP.

6.0 EXCEPTION PROVISIONS

Exceptions shall be per the requirements of IT Procedure HS013.

7.0 CROSS REFERENCES

ASTM E-1575-93, *Standard Practice for Pressure Water Cleaning and Cutting*

Water Jet Technology Association's *Recommended Practices for the Use of Manually Operated High Pressure Water Jetting Equipment*

8.0 ATTACHMENTS

1. Responsibility Matrix
2. Reservice and Operational Checklist for Pressure Water Jet Cleaning and Cutting Equipment

ATTACHMENT 1
PRESSURIZED WATER CLEANING AND CUTTING EQUIPMENT

Responsibility Matrix

Action	Procedure Section	*Responsible Party*			
		Location Manager	Site Supervisor	Project Manager	HS
Provide training	5.2	X		X	
Job set-up/checklist	5.4.2		X	X	
Incorporate requirements in HASP	5.13			X	X

PROCEDURE

Subject: EXCAVATION AND TRENCHING

1.0 PURPOSE AND SUMMARY

The purpose of this procedure is to describe the company requirements for excavation and trenching safety. These requirements are based on the federal Occupational Safety and Health Administration (OSHA) excavation standard found in 29 Code of Federal Regulations (CFR) 1926, Subpart P.

Some company activities are likely to occur in states or localities that either currently have or will have requirements that differ from those contained within the federal standard. In such circumstances, the local health and safety representative will be responsible for ensuring that these requirements are included in either a site health and safety plan or a similar document and conveyed to all affected employees. If federal, state, or local regulations vary or conflict, the more protective requirements and practices will be followed.

2.0 TABLE OF CONTENTS

3.0 RESPONSIBILITY MATRIX

3.1 Procedure Responsibility

The Vice President of Health & Safety is responsible for the issuance, revision, and maintenance of this procedure.

3.2 Action/Approval Responsibilities

The Responsibility Matrix is Attachment 1.

4.0 DEFINITIONS

Accepted Engineering Practices
Those requirements or practices which are compatible with standards required by a registered professional engineer.

Angle of Repose
The greatest angle above the horizontal plane at which a material will lie without sliding.

Benching
A method of protecting employees from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels of steps, usually with vertical or near-vertical surfaces between levels.

Competent Person
An employee who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous or dangerous to employees and who has the authority to take prompt corrective measures to eliminate them.

Company
All wholly-owned subsidiaries of the IT Group, Inc.

Excavation
Any man-made cut, cavity, trench or depression in an earth surface, including its sides, walls, or faces, formed by earth removal.

Registered Professional Engineer
An individual currently registered as a professional engineer (preferably civil) in the state where work is to be performed.

Sheeting

Members of a shoring system that retain the earth in position and in turn are supported by other members of the shoring system.

Shield
A structure that is able to withstand the forces imposed on it by a cave-in and thereby protect employees within the structure. Shields can be permanent structures or can be designed to be portable and moved along as work progresses. Shields may be pre-manufactured or job-built in accordance with 1926.652(c)(3) or (c)(4). Shields used in trenches are usually referred to as "trench boxes" or "trench shields".

Shoring
Structure such as a metal hydraulic, mechanical, or timber shoring system that supports the sides of an excavation and which is designed to prevent cave-ins.

Sloping
A method of protecting employees from cave-ins by excavating to form sides of an excavation that are inclined away from the excavation so as to prevent cave-ins. The angle of incline required to prevent a cave-in varies with differences in such factors as the soil type, environmental conditions of exposure, and application of surcharge loads.

Support System
A structure such as underpinning, bracing, or shoring, which provides support to an adjacent structure, underground installation, or the sides of an excavation.

Tabulated Data
Tables and charts approved by a registered professional engineer and used to design and construct a protective system.

Trench
A narrow (in relation to its length) excavation made below the surface of the ground. In general, the depth is greater than the width at the bottom, but the width of a trench at the bottom is not greater than 15 feet.

Type A Soil
Cohesive soils with an unconfined compressive strength of 1.5 ton per square foot (tsf) (144kPa) or greater. Examples of cohesive soils are: clay, silty clay, sandy clay, clay loam and, in some cases, silty clay loam and sandy clay loam. Cemented soils such as caliche and hardpan are also considered Type A. However, soil is <u>NOT</u> Type A if:

- The soil is fissured;
- The soil is subject to vibration from heavy traffic, pile driving, or similar effects;
- The soil has been previously disturbed;
- The soil is part of a sloped, layered system where the layers dip into the excavation on a slope of four horizontal to one vertical (4H:1V) or greater; or

- The material is subjected to other factors that would require it to be classified as a less stable material.

Type B Soil
This classification refers to:

- Cohesive soil with an unconfined compressive strength greater than 0.5 tsf (48 kPa) but less than 1.5 tsf (144 kPa)
- Granular cohesionless soils including: angular gravel (similar to crushed rock), silt, silt loam, sandy loam, and, in some cases, silty clay loam and sandy clay loam.
- Previously disturbed soils except those which would otherwise be classified Type C soil;
- Soil that meets the unconfined compressive strength or cementation requirements for Type A, but is fissured or subjected to vibration;
- Dry rock that is not stable; or
- Material that is part of a sloped, layered system where the layers dip into the excavation on a slope less steep than four horizontal to one vertical (4H:1V), but only if the material would otherwise be classified as Type B.

Type C Soil
This classification refers to:

- Cohesive soil with an unconfined compressive strength of 0.5 tsf (48 kPa) or less;
- Granular soils including gravel, sand, and loamy sand;
- Submerged soil or soil from which water is freely seeping;
- Submerged rock that is not stable; or
- Material in a sloped, layered system where the layers dip into the excavation or a slope of four horizontal to one vertical (4H:1V) or steeper.

5.0 TEXT

5.1 Pre-Excavation Requirements

5.1.1 Underground Utilities. Prior to opening an excavation, the estimated location of underground utilities such as sewer, telephone, fuel, electric, water, or any other underground installation that may be reasonably expected to be encountered during the excavation work shall be determined.

Utility companies or a utility location service shall be contacted within the established pre-notification time, advised of the proposed work, and asked to deliniate the location of all underground utilities. Employees should be careful to protect and preserve the utility markings until they are no longer required for safe excavation. At least 3 feet of clearance between any underground utility and the cutting edge or point of powered excavation equipment will be maintained until the precise location of the utility is determined. Initial excavation within this 3 foot area will be conducted manually.

5.1.2 **Surface Encumbrances.** All surface encumbrances (trees, poles, boulders, etc.) that may create a hazard to employees shall be removed or supported.

5.1.3 **Vehicular Traffic.** Employees exposed to vehicular traffic shall be provided with, and shall wear, warning vests or other suitable garments marked with or made of reflectorized or high-visibility material. Traffic control devices (i.e., barricades, signs, cones, flagpersons, etc.) shall be specified and used in accordance with regulations applicable to the roadway or area in which excavation activities are occurring.

5.1.4 **Training.** Those who supervise the entry of personnel into an excavation must have completed a training course that included instruction in:

- Types of hazards associated with excavation operations;
- Safe work practices and techniques;
- A review of applicable Federal, state and local regulations; and
- A review of this procedure.

Employees who enter excavations are required to complete a site-specific training session to enable them to recognize unsafe conditions in and around the excavation. This training can be conducted during a tailgate safety meeting that emphasizes the specific excavation hazards that may be encountered.

Training documentation shall be maintained in the project file with a copy forwarded to the Knoxville Training Department.

As part of standard employee supervision process, training shall be complemented with on-the-job instruction and reinforcement of accepted practices to the extent necessary to assure compliance with this procedure and all other applicable regulations.

5.2 Excavation Work Practices

5.2.1 General. Each employee working within an excavation shall be protected from cave-ins by an adequate protective system designed in accordance with 29 CFR 1926 Subpart P, except when the excavation is made entirely in stable rock or when the excavation is less that 5 feet deep and examination of the ground by a competent person provides no indication of a potential cave-in. A competent person shall ensure that protective systems, when required, are installed and maintained per the design specifications.

No employees shall be permitted to enter an excavation unless it is absolutely essential to do so and all requirements of this procedure are met.

5.2.2 Supervision. Work in an excavation shall at all times be supervised by a competent person. This individual will remain outside of the excavation at all times, and will be responsible for identifying any unusual developments above ground which may warn of impending earth movement.

5.2.3 Soil Classification. Based on the results of tests described in Attachment 3, the competent person will classify each soil/rock deposit as stable rock, Type A, Type B, or Type C. When layers of soil/rock exist, the weakest layer will be classified; however, each layer may be classified individually when a more stable layer lies under a less stable layer. If the properties or conditions of a soil/rock deposit change in any way, re-evaluation will be required.

5.2.4 Access and Egress. Structural ramps that are used solely by employees as a means of access or egress from excavations shall be designed by a competent person. Structural ramps used for access or egress of equipment shall be designed by a competent person qualified in structural design, and shall be constructed in accordance with the design.

A stairway, ladder, ramp or other safe means of egress shall be located in trench excavations that are 4 or more feet in depth so as to require no more than 25 feet of lateral travel for employees.

5.2.5 Protective Systems. Protective systems shall be designed in accordance with 29 CFR 1926.652(b) or (c) and shall have the capacity to resist without failure all loads that are intended or could reasonably be expected to be applied or transmitted to the system.

5.2.6 Exposure to Falling Loads. No employees shall be permitted underneath loads handled by lifting or digging equipment. Employees shall be required to stand away from any vehicle being loaded or unloaded to avoid being struck by spillage or falling materials. Operators may remain in the cabs of vehicles being loaded or unloaded provided the vehicles are equipped with a cab shield and/or canopy adequate to protect the operator from shifting or falling materials.

5.2.7 **Warning System for Mobil Equipment.** When mobile equipment is operated adjacent to an excavation, and the operator does not have a clear and direct view of the edge of the excavation, a warning system shall be utilized such as barricades, hand or mechanical signals, or stop logs.

5.2.8 **Hazardous Atmospheres.** Where an oxygen deficient (less that 19.5% O_2) or hazardous atmosphere exists, or could reasonably be expected to exist, the excavation shall be tested before employees enter. Testing shall be conducted as often as necessary to ensure that the atmosphere remains safe. Some excavations may be considered confined spaces which require compliance with IT Procedure HS300.

Adequate precautions shall be taken to prevent employee exposure to oxygen deficient or hazardous atmospheres. As appropriate, ventilation and/or respiratory protective devices shall be used.

5.2.9 **Water Accumulation Hazards.** Employees shall not work in excavations in which there is accumulated water, or in excavations in which water is accumulating, unless adequate precautions have been taken to protect employees against the hazards posed by water accumulation. If water is controlled or prevented from accumulating by the use of water removal equipment, the process shall be monitored by a competent person to ensure proper operation.

If the excavation work interrupts the natural drainage of surface water (streams, run-off channels), diversion ditches, dikes, or other suitable means shall be used to prevent surface water from entering the excavation and to provide adequate drainage of the area adjacent to the excavation. Excavations subject to run-off from heavy rains shall be regularly inspected by a competent person.

5.2.10 **Stability of Adjacent Structures.** Structures adjoining an excavation shall be evaluated to assess their stability. Excavation below the level of the base or footing of any foundation or retaining wall that could reasonably be expected to pose a hazard to employees shall only be permitted when:

- A support system (underpinning) is provided to ensure the safety of employees and the stability of the structure;
- The excavation is in stable rock;
- A registered professional engineer has determined that the structure will be unaffected by the excavation; or
- A registered professional engineer has determined that such excavation will not pose a hazard to employees.

Sidewalks, pavements and other surface structures shall not be undermined unless a support system or another method of protection is provided to protect employees from the possible collapse of such structures.

5.2.11 **Protection from Loose Rock or Soil.** Employees shall be protected from loose rock or soil which could fall or roll from the excavation face or edge. Such protection could consist of scaling to remove loose materials, or the installation of protective barriers. All spoil shall be placed at least 2 feet from the edge of the excavation. It is strongly recommended that spoil be placed 4 or more feet from the excavation edge so as not to cover surface indicators of subsidence (such as fissures or cracks).

5.2.12 **Inspections.** The competent person shall make daily inspections of excavations, adjacent areas, and protective systems for evidence of conditions that could result in a cave-in, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. The inspection shall be made prior to start of work, and as needed throughout the shift. Inspections shall be made after each rainstorm or other hazard-increasing event and will be documented using Attachment (2).

Where the inspection finds evidence of any hazardous condition, exposed employees shall be immediately removed from the hazardous area until necessary precautions have been taken.

5.2.13 **Fall Protection.** Where employees or equipment are permitted to cross over excavations, walkways or bridges shall be provided. Standard guardrails shall be provided where walkways are 6 feet or more above lower levels.

Adequate barriers or other types of physical protection shall be provided at all remotely located excavations. All wells, pits, shafts, etc., shall be barricaded or covered and shall be backfilled as soon as possible.

6.0 EXCEPTION PROVISIONS

Variances and exceptions may be requested pursuant to the provisions of procedure HS013, Health and Safety Procedure Variances.

7.0 CROSS REFERENCES

HS013 Health and Safety Procedure Variances
HS050 Training Requirements
HS051 Tailgate Safety Meetings
HS300 Confined Spaces
29 CFR 1926 Subpart P - Excavations

8.0 ATTACHMENTS

1. Responsibility Matrix
2. Excavation Inspection
3. Soil Classification Worksheet
4. Selection of Protective Systems for Excavations 20 Feet or Less in Depth
5. Sloping Options
6. Shoring or Shielding Options

ATTACHMENT 1
EXCAVATION AND TRENCHING

Responsibility Matrix

Action	Procedure Section	*Responsible Party* Employee	Supervisor	Registered Professional Engineer	VP Health and Safety	Local H&S Representative	Competent Person
Incorporate state, local, or client-specific excavation requirements into project plans.	1.0					X	
Issue, revise, and maintain procedure	3.1				X		
Coordinate identification of underground utilities.	5.1.1		X				
Determine need for traffic control devices.	5.1.3		X				
Participate in excavation training.	5.1.4	X	X			X	X
Ensure that protective systems are installed and maintained.	5.2.1						X
Classify Soil Type	5.2.3						X
Design Structural Ramps	5.2.4						X
Selection and design of protective system(s)	5.2.5			X			
Determine stability of adjacent structures.	5.2.10			X			
Inspecting excavation for hazardous conditions	5.2.12	X	X				X

ATTACHMENT 2
EXCAVATION INSPECTION

THIS INSPECTION IS TO BE COMPLETED BY THE COMPETENT PERSON EACH DAY THAT EMPLOYEES WILL BE ENTERING AN EXCAVATION.

Project Name: ______________________ Project No.: ______________________

Date: ______________ Time: ______________ Competent Person: ______________________

Soil Classification (see Soil Classification Worksheet): ______________________

Excavation Depth: ______________________ Excavation Width: ______________________

Type of Protective System Used: ______________________

	✓ YES	NO	N/A
1. GENERAL:			
Surface encumbrances removed or supported			
Employees protected from loose rock or soil that could pose a hazard by falling or rolling into the excavation.			
Hard hats, steel-toed boots, and safety glasses worn by all employees.			
Spoils, materials, and equipment set back at least 2 feet from the edge of the excavation.			
Walkways over excavations 6 feet or more above lower levels are equipped with standard guardrails.			
Warning vest or other highly visible clothing provided and worn by all employees exposed to public vehicular traffic.			
Employees required to stand away from vehicles being loaded or unloaded.			
Warning system established and utilized when mobile equipment is operating near excavation edge.			
Employees prohibited from going under suspended loads.			
2. UTILITIES:			
Utility companies contacted and/or utility locations delineated.			
Underground installations protected, supported, or removed while excavation is open.			
3. MEANS OF ACCESS AND EGRESS:			
Lateral travel to means of egress no greater that 25 feet in trench excavations 4 feet or more in depth.			
Ladders used in excavations secured and extended 3 feet above the edge of the trench.			
Structural ramps used by employees designed by a competent person.			
Structural ramps used for equipment designed by a registered professional engineer.			

	YES	NO	N/A
4. WET CONDITIONS:			
Precautions taken to protect from the accumulation of water.			
Water removal equipment monitored by a competent person.			
Surface water or runoff diverted or controlled to prevent accumulation in the excavation.			
Inspections made after every rainstorm or other hazard-increasing occurrence.			
5. HAZARDOUS ATMOSPHERE:			
Atmosphere within the excavation tested where there is a reasonable possibility of an oxygen deficient, combustible, or otherwise hazardous atmosphere.			
Adequate precautions taken to protect employee from exposure to a hazardous atmosphere.			
Testing conducted to ensure that the atmosphere remains safe.			
Emergency equipment, such as breathing apparatus, safety harness and line, and basket stretcher readily available where hazardous atmosphere does exist.			
6. SUPPORT SYSTEMS:			
Materials and/or equipment for support systems selected based on soil analysis, trench depth, and expected loads.			
Materials and equipment used for protective systems inspected and in good condition.			
Damaged materials and equipment used for protective systems inspected by a Registered Professional Engineer after repairs and before being placed back into service.			
Protective systems installed without exposing employees to the hazards of cave-ins, collapses, or from being struck by materials or equipment.			
Members of support systems securely fastened to prevent failure.			
Support systems provided to insure stability of adjacent structures, buildings, roadways, sidewalks, walls, etc.			
Excavations below the level of the base or footings approved by a registered professional engineer.			
Removal of support systems progresses from the bottom, and members are released slowly as to note any indication of possible failure.			
Excavation of material to a level of greater that 2 feet below the bottom of the support system and only if the system is designed to support the loads calculated for the full depth.			
Shield system placed to prevent lateral movement.			
Employees are prohibited from remaining in shield system during vertical movement.			
7. REMARKS:			

ATTACHMENT 3
SOILS CLASSIFICATION WORKSHEET

The following worksheet outlines the visual and manual tests that the competent person must perform at least once, and each time soil conditions change. At least one visual and one manual test must be performed; however, performing several tests is recommended so that the condition of the excavation is thoroughly examined.

Project Name:______________________ Project Number:______________________

Date:______________________ Time:______________________

Where was the sample taken from?______________________

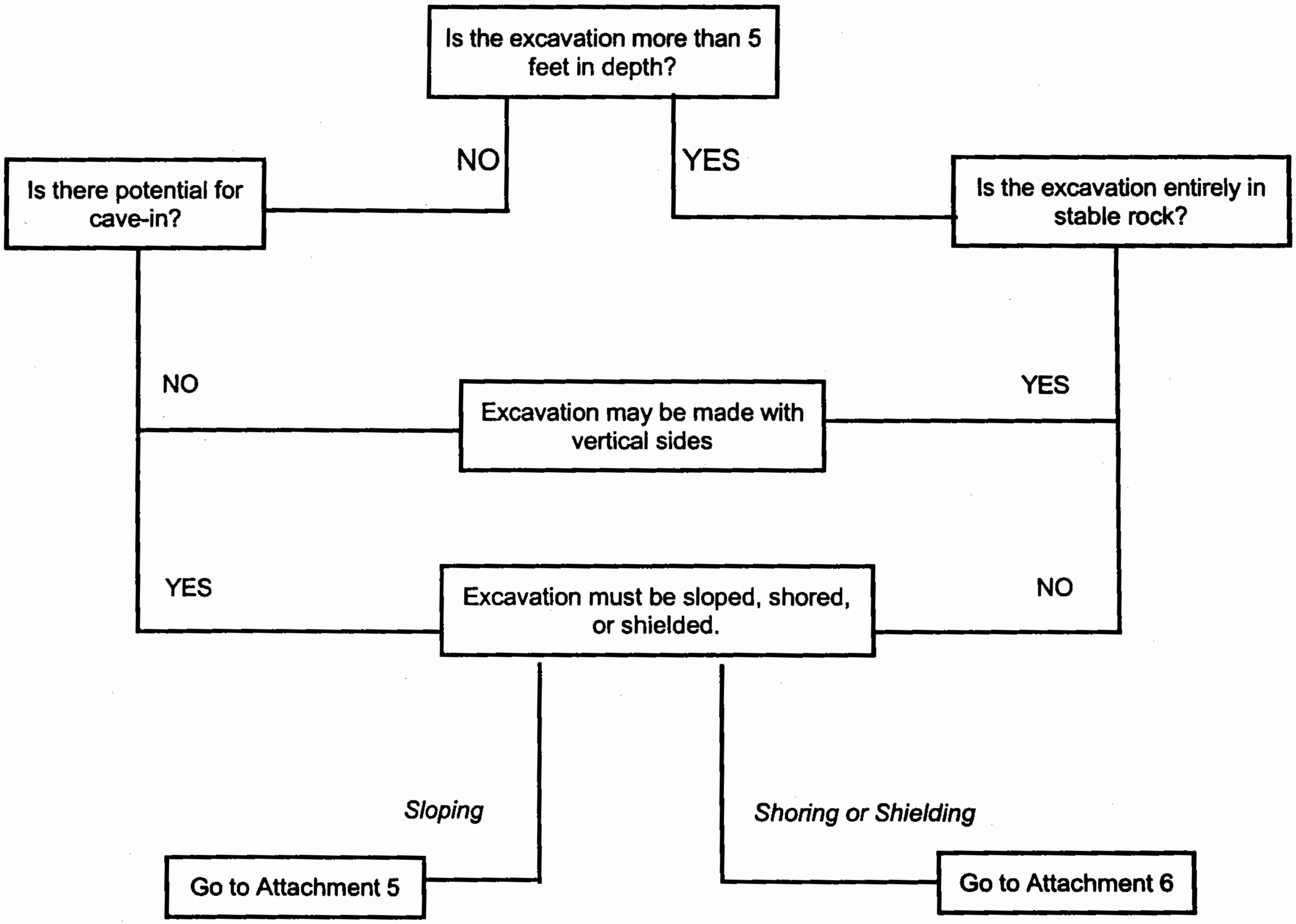
I.	**VISUAL TESTS:** *One or more visual tests are required for each classification and each time conditions change.*		
1.	Estimate range of particle sizes:	a. primarily fine-grained = cohesive material b. primarily coarse-grained = granular material	
2.	Observe excavated soil:	a. clumps = cohesive material b. breaks up easily = granular material	
3.	Observe sides and adjacent surface area of opened excavation:	a. crack like openings = fissured material b. soil spalls off vertical sides = possible fissured material	
4.	Previous excavation activities:	a. previously disturbed soil	b. not previously disturbed soil
5.	Observe opened side of excavation:	a. layered systems c. estimate degree of slope of layers:	b. layers sloped towards excavation __________
6.	Water condition:	a. evidence of surface water c. depth of water table :	b. water seeping from sides __________
7.	Vibration present:	a. area adjacent to excavation	b. area within excavation

II.	**MANUAL TESTS-** *One or more manual tests are required for classification and each time soil conditions change.*	
1.	Plastically- soil is cohesive if following is true:	a. mold soil samples into a small ball b. roll ball into thread ⅛" diameter c. pick up 2" length of ⅛" thread by one end without breaking
2.	Dry Soil Strength:	a. crumbles on its own or with moderate pressure = granular b. falls into clumps which break into smaller clumps that are only broken with difficulty = clay with gravel, sand, or silt. c. breaks into clumps which do not break into smaller clumps and can only be broken with difficulty with no visual indication of fissures = unfissured.
3.	Thumb penetration test: *(These tests are to be run on a large clump of material as soon as it is excavated.)*	a. can be easily indented by the thumb but penetrated by thumb only with great effort =Type A b. easily penetrated several inches by thumb and molded by light finger pressure = Type C
4.	Unconfined Compressive Strength: *(Saturated Soil Needed)*	a. Pocket Penetrometer reading (take 10 readings and average) 0 - 0.5 = Type C, 0.5 - 1.5 = Type B, 1.5 - 2.0 = Type A b. Shear Vane reading X2: 0 - 0.5 = Type C, 0.5 - 1.5 = Type B,1.5 - 2.0 = Type A
5.	Drying Test: *(A dry soil sample 1" thick X 6' diameter is needed)*	a. develops cracks = fissured material b. dries without cracks and breaks by hand with considerable force significant cohesive content = unfissured cohesive material. c. sample breaks easily by hand = fissured cohesive or granular material d. easily pulverize dry clumps by hand or by stepping on them = granular e. don't pulverize easily = fissured cohesive.

SOIL CLASSIFICATION: Type A Type B Type C Stable Rock Other ______________

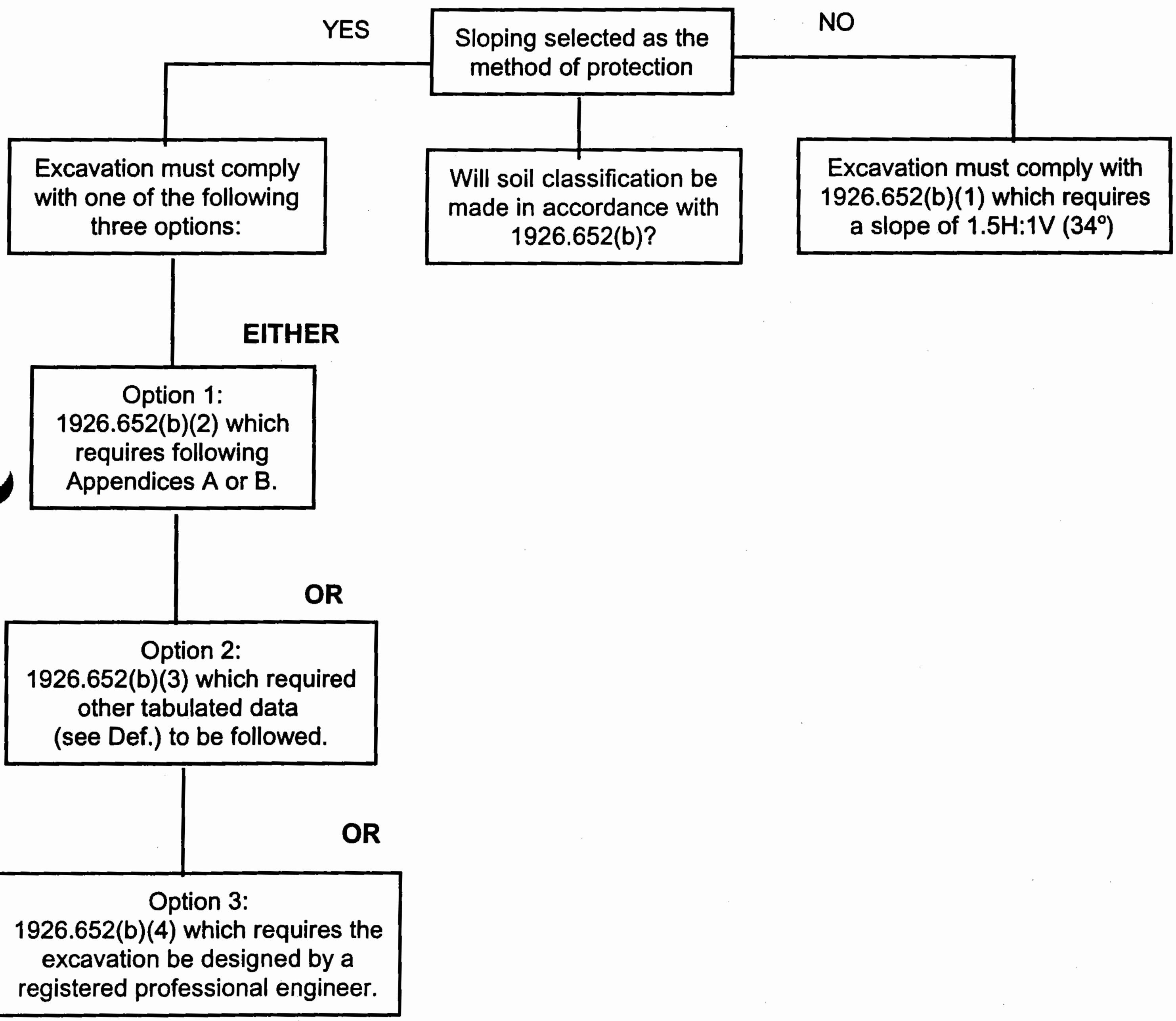
COMPETENT PERSON: ______________ ______________ ______________
Print Name Signature Date

ATTACHMENT 4
SELECTION OF PROTECTIVE SYSTEMS FOR EXCAVATIONS 20 FEET OR LESS IN DEPTH



For excavations greater than 20 feet in depth, design by a registered professional engineer in compliance with 1926.652 (b) and (c) is required.

ATTACHMENT 5
SLOPING OPTIONS



ATTACHMENT 6
SHORING OR SHIELDING OPTIONS

Shoring or shielding selected as the method of protection.

Soil Classification is required. The excavation must comply with one of the four options below.

EITHER

Option 1:
1926.652(c)(1) which requires Appendices A and C to be followed (timber shoring).

OR

Option 2:
1926.652(c)(2) which requires manufacturer's data to be followed (trench jacks, etc.)

OR

Option 3:
1926.652(c)(3) which requires tabulated data (see Def.) to be followed.

OR

Option 4:
1926.652(c)(4) which requires the excavation be designed by a registered professional engineer.

PROCEDURE

Subject: HEAT STRESS

1.0 PURPOSE AND SUMMARY

This procedure establishes the guidelines to protect employees from the effects of heat related illness. It describes the four major types of heat-induced illnesses, methods of prevention, types of treatment, and includes discussions on the monitoring of heat stress situations.

Some clients may have monitoring requirements that differ from those contained in this procedure. In such circumstances, the more protective monitoring requirements will be followed.

2.0 TABLE OF CONTENTS

3.0 RESPONSIBILITY MATRIX

3.1 Procedure Responsibility

The Vice President, Health and Safety is responsible for the issuance, revision, and maintenance of this procedure.

3.2 Action/Approval Responsibilities

The Responsibility Matrix is Attachment 1.

4.0 DEFINITIONS

Acclimatization - Series of physiological and psychological adjustments that occur in an employee during initial exposures to hot environmental conditions.

Company - All wholly-owned subsidiaries of The IT Group, Inc.

Maximum Heart Rate - Amount of work (beats) per minute a healthy person's heart can be expected to safely deliver. Maximum heart rate (MHR) is calculated by subtracting an employee's age from 200.

5.0 TEXT

Adverse climatic conditions are important considerations in planning and conducting site operations. High ambient temperature can result in health effects ranging from transient heat fatigue, physical discomfort, reduced efficiency, personal illness, increased accident probability, etc., to serious illness or death. Heat stress is of particular concern when chemical protective garments are worn, since these garments prevent evaporative body cooling. Wearing personal protective equipment places employees at considerable risk of developing heat stress.

Heat stress is caused by a number of interacting factors, including environmental conditions, clothing, workload, and the individual characteristics of the worker. Because heat stress is probably one of the most common (and potentially serious) illnesses, regular monitoring and other preventive precautions are vital.

5.1 Signs, Symptoms, and Treatment

5.1.1 Heat Rash

Heat rash can be caused by continuous exposure to hot and humid air and skin abrasion from sweat soaked clothing.

Signs and Symptoms: The condition is characterized by a localized red skin rash and reduced sweating. Aside from being a nuisance, the ability to tolerate heat is reduced.

Treatment: Keep skin hygienically clean and allow it to dry thoroughly after using chemical protective clothing.

5.1.2 Heat Cramps

Heat cramps are caused by profuse perspiration with inadequate electrolytic fluid replacement. This often robs the larger muscle groups (stomach and quadriceps) of blood which can cause painful muscle spasms and pain.

Signs and Symptoms: Muscle spasms and pain in the extremities and abdomen.

Treatment: Remove employee to a cool place and give sips of water or an electrolytic drink. Watch for signs of heat exhaustion or stroke.

5.1.3 Heat Exhaustion

Heat exhaustion is a mild form of shock caused by increased stress on various organs to meet increased demand to cool the body. Onset is gradual and symptoms should subside within one hour.

Signs and Symptoms: Weak pulse; shallow breathing; pale, cool, moist skin; profuse sweating; dizziness; fatigue.

Treatment: Remove employee to a cool place and remove as much clothing as possible. Give sips of water or electrolytic solution and fan the person continually to remove heat by convection. CAUTION: Do not allow the affected person to become chilled — treat for shock if necessary.

5.1.4 Heat Stroke

Heat stroke is the most severe form of heat stress; the body must be cooled immediately to prevent severe injury and/or death. **THIS IS A MEDICAL EMERGENCY!**

Signs and Symptoms: Red, hot, dry skin; body temperature of 105 degrees Fahrenheit (°F) or higher; no perspiration; nausea; dizziness and confusion; strong, rapid pulse.

Treatment: Heat stroke is a true medical emergency. Transportation of the victim to a medical facility must not be delayed. Prior to transport, remove as much clothing as possible and wrap the victim in a sheet soaked with water. Fan vigorously while transporting to help reduce body temperature. Apply cold packs, if available; place under the arms, around the neck, or any other place where they can cool large surface blood vessels. If transportation to a medical facility is delayed, reduce body temperature by immersing victim in a cool water bath (however, be careful not to over-chill the victim once body temperature is reduced below 102°F). If this is not possible, keep victim wrapped in a sheet and continuously douse with water and fan.

5.2 Prevention

The implementation of preventative measures is the most effective way to limit the effects of heat-related illnesses. During periods of high heat, adequate liquids must be provided to replace lost body fluids. Replacement fluids can be a 0.1 percent salt water solution, a commercial mix such as Gatorade, or a combination of these with fresh water. The replacement fluid temperature should be kept cool, 50°F to 60°F, and should be placed close to the work area. Employees must be encouraged to drink more than the amount required to satisfy thirst. Employees should also be encouraged to salt their foods more heavily during hot times of the year.

Cooling devices such as vortex tubes or cooling vests can be worn beneath impermeable clothing. If cooling devices are worn, only physiological monitoring will be used to determine work activity.

All workers are to rest when any symptoms of heat stress are noticed. Rest breaks are to be taken in a cool, shaded rest area. Employees shall remove chemical protective garments during rest periods and will not be assigned other tasks.

All employees shall be informed of the importance of adequate rest and proper diet in the prevention of heat stress and the harmful effects of excessive alcohol and caffeine consumption.

5.3 Monitoring

The initiation of heat stress monitoring will be required when employees are working in environments exceeding 90°F ambient air temperature. If employees are wearing impermeable clothing, this monitoring will begin at 78°F. There are two general types of monitoring that the health and safety representative can designate to be used: wet bulb globe temperature (WBGT) and physiological. Attachment 2 will be used to record the results of heat stress monitoring.

5.3.1 Wet Bulb Globe Temperature

The WBGT index is the simplest and most suitable technique to measure the environmental factors which most nearly correlate with core body temperature and other physiological responses to heat. When WBGT exceeds 25.9°C (78°F), the work regiment in Table 1 and Figure 1 of the section "Heat Stress" in the latest edition of the American Conference of Governmental Industrial Hygiene (ACGIH) Threshold Limit Value (TLV) Booklet should be followed.

5.3.2 Physiological

Physiological monitoring can be used in lieu of or in addition to WBGT. It is anticipated that this monitoring can be self-performed once the health and safety representative demonstrates appropriate techniques to affected employees. Since individuals vary in their susceptibility to heat, this type of monitoring has its advantages. The two parameters that are to be monitored at the beginning of each rest period are:

- Heart Rate - Each individual will count his/her radial (wrist) pulse as early as possible during each rest period. If the heart rate of any individual exceeds 75 percent of their calculated maximum heart rate (MHR = 200 - age) at the beginning of the rest period, then the work cycle will be decreased by one-third. The rest period will remain the same. An individual is not permitted to return to work until his/her sustained heart rate is below 75 percent of their calculated maximum heart rate.

- Temperature - Each individual will measure his/her temperature with a thermometer for one minute as early as possible in the first rest period. If the temperature exceeds 99.6°F at the beginning of the rest period, then the work cycle will be decreased by one-third. The rest period will remain the same.

- An individual is not permitted to return to work if his/her temperature exceeds 100.4°F

5.4 Training

Employees potentially exposed to heat stress conditions will be instructed on the contents of this procedure. This training can be conducted during daily tailgate safety meetings.

6.0 EXCEPTION PROVISIONS

Variances and exceptions may be requested pursuant to the provisions of Procedure HS013, Health and Safety Procedure Variances

7.0 CROSS REFERENCES

HS013 Health and Safety Procedure Variances
HS051 Tailgate Safety Meetings

8.0 ATTACHMENTS

1. Responsibility Matrix
2. Heat Stress Monitoring Record

ATTACHMENT 1
HEAT STRESS

Responsibility Matrix

Action	Procedure Section	*Responsible Party*		
		Vice President, Health and Safety	**Project Supervisor**	**Health and Safety Representative**
Issuance, Revision, and Maintenance of Procedure	3.1	X		
Conduct Monitoring	5.3			X
Inform Employees About Procedure	5.4		X	X

ATTACHMENT 2

HEAT STRESS MONITORING RECORD

Project/Location ______________________________ Date ________________

Employee Name	Initial Reading Time	First Work Period Time		Second Work Period Time		Third Work Period Time		Fourth Work Period Time		Fifth Work Period Time		Sixth Work Period Time	
	WBGT (°F)	WBGT (°F)		WBGT (°F)		WBGT (°F)		WBGT (°F)		WBGT (°F)		WBGT (°F)	
	Air Temp. (°F)	Air Temp. (°F)		Air Temp. (°F)		Air Temp. (°F)		Air Temp. (°F)		Air Temp. (°F)		Air Temp. (°F)	
	Initial Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.
	Initial H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.
	Initial Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.
	Initial H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.
	Initial Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.
	Initial H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.
	Initial Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.	Initial Temp.	Final Temp.
	Initial H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.	Initial H.R.	Final H.R.

PROCEDURE

Subject: HEARING CONSERVATION PROGRAM

1.0 PURPOSE AND SUMMARY

The purpose of this procedure is to establish guidelines for the company hearing conservation program. Regulatory requirements mandate that the company administer a hearing conservation program whenever employee sound exposures equal or exceed an 8-hour time-weighted average (TWA) sound level of 85 decibels (dB).

Evidence is well established that worker exposure to sound of sufficient intensity and duration can result in hearing damage. This procedure prescribes the control measures required to prevent employee exposure to excessive sound levels and includes provisions for:

- Monitoring of the workplace to determine employee exposures.
- An audiometric testing program which includes baseline and annual audiograms.
- An employee training and information program.
- Description of various control measures that can be used to decrease exposures.
- Providing hearing protection to all affected employees when administrative or engineering controls fail to reduce sound levels to below the action level.
- Recordkeeping requirements.

2.0 TABLE OF CONTENTS

3.0 RESPONSIBILITY MATRIX

3.1 Procedure Responsibility

The Vice President, Health and Safety is responsible for the issuance, revision, and maintenance of this procedure.

3.2 Action/Approval Responsibilities

The Responsibility Matrix is Attachment 1.

4.0 DEFINITIONS

Action Level - An 8-hour TWA of 85 dB or a dose of 50 percent.

Company - All wholly-owned subsidiaries of The IT Group, Inc.

Standard Threshold Shift (STS) - Change in hearing threshold relative to the baseline audiogram of 10 dB or more at 2,000, 3,000, and 4,000 hertz (Hz) in either ear.

5.0 TEXT

5.1 General

The company hearing conservation program will be implemented and protection against the effects of sound exposure will be provided whenever sound levels exceed the action level.

5.2 Monitoring

Monitoring of employee exposures to sound will be conducted whenever it is anticipated that exposure may exceed the action level. This monitoring will be conducted by a qualified individual who, through professional credentials, training, or experience, has the necessary qualifications to specify and use the type of monitoring equipment (area or personal) that will best represent employee exposures. This monitoring will be repeated whenever changes in the work environment lead to the possibility of additional exposures or inadequacy of selected hearing protection. Employees will be provided the opportunity to observe monitoring and will be notified when the results exceed the action level.

Sound level monitoring instrumentation will be operated on the A-weighted scale in slow response mode. Employee sound exposures will be computed in accordance with Attachment 2 and without regard to any attenuation provided by the use of hearing protection.

5.3 Audiometric Testing

Audiometric testing will be provided to all employees exposed at or above the action level. Testing will be in accordance with Procedure HS100, Medical Policies and Procedures.

5.3.1 Baseline Audiogram. Audiometric test results obtained from the pre-hire medical examination will be used as the baseline audiogram. Testing to establish a baseline audiogram shall be preceded by at least 14 hours without exposure to workplace sound. Employees will also be notified of the need to avoid high levels of non-occupational sound exposure during this 14-hour period.

5.3.2 Annual Audiograms. Annual audiograms will be conducted for all employees exposed at or above the action level during the preceding year. Each annual audiogram will be compared to that employee's baseline audiogram to determine if the audiogram is valid and if a STS has occurred.

5.4 Employee Training and Information

All employees who are exposed to sound levels above the action level are required to participate in a formal training program. This program will be presented by a health and safety representative and include, as a minimum, the following information:

- The effects of sound on hearing.
- The purpose of hearing protection; the advantages, disadvantages, and attenuation of various types; and instructions on selection, fitting, use, and care.
- The specific nature of operations which could result in exposure to excessive sound levels.
- The purpose of audiometric testing and an explanation of the test procedures.
- The engineering controls and administrative practices associated with the employee's job assignment.

This training program will be repeated annually. Participating employees are required to complete the Hearing Protection Training Completion Record (Attachment 3). This record will be maintained by the company Training Department in Knoxville. In addition, tailgate safety meetings will be periodically used to instruct employees on the need for hearing protection in designated areas.

The project/location manager will make available to affected employees or their authorized representatives a copy of 29 Code of Federal Regulations (CFR) 1910.95 and will also post a copy in the workplace.

5.5 Control Measures

A straightforward method of controlling sound exposure is to examine the problem in terms of its three basic elements including:

- Sound arises from a source;
- Travels over a path; and
- Affects a receiver or listener.

The solution to a given sound problem might require alteration or modification of any or all of these three basic elements including:

- Modifying the source to reduce its sound output;
- Altering or controlling the transmission path to reduce the sound level reaching the listener; or
- Providing the receiver with hearing protection (but only if the sound source or path cannot be controlled).

5.5.1 Sound Control at the Source. Perhaps the best method for controlling sound at its source is the initial equipment selection process. The following summarizes those features that the buyer should look for and steps to be taken in selecting equipment:

- Low-sound certification.
- Advertisement of "quiet" operation, evidence of sound control design.
- Evidence of "lower" and "slower" operating characteristics.
- Conductance of side-by-side sound tests of equipment.
- Request an "on-site" or "in operation" inspection of mechanical equipment before purchase.

Most mechanical devices are complex sound generators. Though it is impractical to discuss all possible solutions to all sound problems, some general control measures and methods have been provided below:

- Reduce impact or impulse sound by reducing the weight, size, or height of fall of impacting mass.

- Reduce speed in machines and flow velocities and pressure in fluid conveyance systems.

- Balance rotating parts to control machinery sound and vibration of fans, fly wheels, pulleys, cams, shafts, etc.

- Reduce frictional resistance between rotating, sliding, or moving parts by frequent lubrication and proper alignment; static and dynamic balancing of rotating parts; and/or correction of eccentricity or "out-of-roundness" of wheels, gears, rollers, pulleys, etc.

- Reduce resistance in air or fluid systems by use of low flow velocities, smooth surfaces of duct or pipe systems, and long-radius turns and flared sections in pipes, etc., to reduce turbulence.

- Isolate vibration elements in machinery; install motors, pumps, etc., on most massive part of machine; use belt or roller drives in place of gear trains; use flexible hoses and wiring instead of rigid piping and stiff wiring; etc.

- Apply vibration damping materials such as liquid mastics; pads of rubber, felt, foam, or fibrous blankets; or sheet metal viscoelastic laminates or composites to vibrating machine surface.

- Reduce sound leakage from the interior of machines such as compressors by sealing or covering all openings or applying acoustical materials to machine interiors.

5.5.2 Sound Control in the Transmission Path. Another effective way to limit employee exposure to sound is through the use of transmission path controls. These controls may include, but are not necessarily limited to:

- Separation of the sound source and receiver.

- Use of sound absorbing materials on ceiling, floor, or wall surfaces.

- Use of sound barriers and deflectors in the sound path.

- Use of acoustical lining on inside surfaces of passageways, ducts, pipe chases, or electrical channels.

- Use of mufflers or silencers on all gasoline or diesel engines, regardless of size, and particularly on equipment when large quantities of high-pressure, high-velocity gases, liquids, steam, or air are discharged.

- Use vibration isolators and flexible couplers where the sound transmission path is structural in character.

5.5.3 **Protection for the Receiver.** When engineering controls fail to reduce sound levels to below the action level, hearing protection will be provided. Hearing protection will be provided at no cost to employees and will be replaced as necessary.

Supervisors will ensure that hearing protection is worn by all employees who are exposed at or above the action level. Employees will be given the opportunity to select their hearing protection from a variety of suitable protection devices that attenuate their exposure to the action level or below. Attenuations are determined by subtracting 7 dB from the noise reduction rating (NRR) of the protector and subtracting the remainder from the TWA sound level.

5.6 Recordkeeping

The company will maintain records of all audiometric test records required by this procedure and retain them for at least the following periods:

- Sound exposure measurement records will be retained for two (2) years.

- Audiometric test records will be retained for the duration of the affected employee's employment.

All records required by this procedure will be provided upon request to employees, former employees, representatives designated by the individual employee, and any authorized government representative.

6.0 EXCEPTION PROVISIONS

Variances and exceptions may be requested pursuant to the provisions of Procedure HS013, Health and Safety Procedure Variances.

7.0 CROSS REFERENCES

HS013 Health and Safety Procedure Variances
HS100 Medical Policies and Procedures

8.0 ATTACHMENTS

1. Responsibility Matrix
2. Sound Exposure Computation
3. Hearing Protection Training Completion Record

ATTACHMENT 1
HEARING CONSERVATION PROGRAM

Responsibility Matrix

Action	Procedure Section	*Responsible Party*		
		Health and Safety Representative	Project/Location Manager	Vice President, Health and Safety
Issue, Revise, and Maintain Procedure	3.1			X
Monitor Employee Exposures	5.2	X		
Provide Training	5.4	X		
Make Available/Post 29 CFR 1910.95	5.4		X	

ATTACHMENT 2

SOUND EXPOSURE COMPUTATION

Computation of Employee Sound Exposure

A. Sound dose is computed using Table 1 as follows:

When the sound level is constant over the entire work shift, the sound dose (D), in percent, is given by:

$$D = 100\ C/T$$

Where C is the total length of the work day, in hours, and T is given in Table 1.

B. When the work shift sound exposure is composed of two or more periods of sound at different levels, the total sound dose over the work day is given by:

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

Where C_n indicates the total time of exposure at a specific sound level and T_n indicates the reference duration for that level as given by Table 1.

C. The eight-hour TWA sound level, in decibels, may be computed from the dose, in percent, by means of the formula:

$$TWA = 16.61\ \log_{10}(D/100) + 90$$

For an eight-hour work shift with the sound level constant over the entire shift, the TWA is equal to the measured sound level.

Conversion Between "Dose" and "8-Hour TWA" Sound Level

Sound exposure is usually measured with an audio dosimeter which gives a readout in terms of "dose." Dosimeter readings can be converted to an 8-hour TWA sound level.

In order to convert the reading of a dosimeter into TWA, use Table 2. This table applies to dosimeters that are set to calculate dose or percent exposure according to the relationships in Table 1. So, for example, a dose of 91 percent over an 8-hour day results in a TWA of 89.3 decibels and a dose of 50 percent corresponds to a TWA of 85 decibels.

If the dose as read on the dosimeter is less than or greater than the values found in Table 2, the TWA may be calculated by using the formula:

$$TWA = 16.61\ \log_{10}(D/100) + 90$$

Where TWA equals 8-hour TWA sound level and D equals accumulated dose in percent exposure.

Table 1
Permissible Sound Exposure

A-Weighted Sound Level (decibels)	Permitted Duration Per Workday (T) (hours)	A-Weighted Sound Level (decibels)	Permitted Duration Per Workday (T) (hours)
80	32.0	106	0.87
81	27.9	107	0.76
82	24.3	108	0.66
83	21.1	109	0.57
84	18.4	110	0.50
85	16.0	111	0.44
86	13.9	112	0.38
87	12.1	113	0.33
88	10.6	114	0.29
89	9.2	115	0.25
90	8.0	116	0.22
91	7.0	117	0.19
92	6.1	118	0.16
93	5.3	119	0.14
94	4.6	120	0.125
95	4.0	121	0.11
96	3.5	122	0.095
97	3.0	123	0.082
98	2.6	124	0.072
99	2.3	125	0.063
100	2.0	126	0.054
101	1.7	127	0.047
102	1.5	128	0.041
103	1.3	129	0.036
104	1.1	130	0.031
105	1.0		

Table 2
Conversion From "Percent Sound Exposure" or "Dose" To "8-Hour TWA Sound Level"

Dose or Percent Sound Exposure (D)	TWA	Dose or Percent Sound Exposure (D)	TWA	Dose or Percent Sound Exposure (D)	TWA	Dose or Percent Sound Exposure (D)	TWA
10	73.4	104	90.3	260	96.9	640	103.4
15	76.3	105	90.4	270	97.2	650	103.5
20	78.4	106	90.4	280	97.4	660	103.6
25	80.0	107	90.5	290	97.7	670	103.7
30	81.3	108	90.6	300	97.9	680	103.8
35	82.4	109	90.6	310	98.2	690	103.9
40	83.4	110	90.7	320	98.4	700	104.0
45	84.2	111	90.8	330	98.6	710	104.1
50	85.0	112	90.8	340	98.8	720	104.2
55	85.7	113	90.9	350	99.0	730	104.3
60	86.3	114	90.9	360	99.2	740	104.4
65	86.9	115	91.1	370	99.4	750	104.5
70	87.4	116	91.1	380	99.6	760	104.6
75	87.9	117	91.1	390	99.8	770	104.7
80	88.4	118	91.2	400	100.0	780	104.8
81	88.5	119	91.3	410	100.2	790	104.9
82	88.6	120	91.3	420	100.4	800	105.0
83	88.7	125	91.6	430	100.5	810	105.1
84	88.7	130	91.9	440	100.7	820	105.2
85	88.8	135	92.2	450	100.8	830	105.3
86	88.9	140	92.4	460	101.0	840	105.4
87	89.0	145	92.7	470	101.2	850	105.4
88	89.1	150	92.9	480	101.3	860	105.5
89	89.2	155	93.2	490	101.5	870	105.6
90	89.2	160	93.2	500	101.6	880	105.7
91	89.3	165	93.6	510	101.8	890	105.8
92	89.4	170	93.8	520	101.9	900	105.8
93	89.5	175	94.0	530	102.0	910	105.9
94	89.6	180	94.2	540	102.2	920	106.0
95	89.6	185	94.4	550	102.3	930	106.1
96	89.7	190	94.6	560	102.4	940	106.2
97	89.8	195	94.8	570	102.6	950	106.2
98	89.9	200	95.0	580	102.7	960	106.3
99	89.9	210	95.4	590	102.8	970	106.4
100	90.0	220	95.7	600	102.9	980	106.5
101	90.1	230	96.0	610	103.0	990	106.5
102	90.1	240	96.3	620	103.2	999	106.6
103	90.2	250	96.6	630	103.3		

ATTACHMENT 3

HEARING PROTECTION TRAINING COMPLETION RECORD

INITIAL

1. I have been informed about the health hazards associated with exposure to excessive sound levels and its potential effect on hearing. ☐

2. I have been informed about the types of work that may result in exposure to excessive sound levels, and the necessary protective steps to prevent excessive exposure, including engineering controls and administrative practices. ☐

3. I understand the purpose for, proper use, and limitations of hearing protection devices, and I have received instructions on selection, fitting, use, and care of such devices. ☐

4. I have been informed about the purpose of audiometric testing and an explanation of the test procedures. ☐

5. Copies of the applicable regulations governing occupational exposure to excessive sound have been made available to me. ☐

PRINT NAME: ____________________________________

SIGNATURE: ____________________________________

EMPLOYEE NUMBER: ____________________________

DATE: ____

Please File Completed Forms and Forward a Copy to the Knoxville Training Department

PROCEDURE

Subject: RESPIRATORY PROTECTION PROGRAM

1.0 PURPOSE AND SUMMARY

The purpose of this procedure is to prescribe the requirements of the company Respiratory Protection Program (RPP). This procedure provides information and guidance on the proper selection, medical evaluation, training, use, and care of respiratory protective equipment and complies with the requirements of 29 CFR 1910.134 (1998).

All operations which require the use of respiratory protection are subject to the provisions of this procedure.

2.0 TABLE OF CONTENTS

PROCEDURE

Subject: PERSONAL PROTECTIVE EQUIPMENT

1.0 PURPOSE AND SUMMARY

This procedure stipulates that IT will provide the personal protective equipment necessary for associates to perform their work safely, as established by the Health & Safety Department. Special purchasing programs for prescription safety glasses and safety shoes are also described. Head, eye, body, and foot protection are discussed in this procedure. Respiratory and hearing protection are cross referenced to the appropriate IT procedures.

2.0 TABLE OF CONTENTS

3.0 RESPONSIBILITY MATRIX

3.1 Procedure Responsibility

TheVice President of Health & Safety, is responsible for the issuance, revision, and maintenance of this procedure.

3.2 Action/Approval Responsibilities

The Responsibility Matrix is Attachment 1.

4.0 DEFINITIONS

(Not Applicable.)

5.0 TEXT

IT Corporation will provide suitable personal protective equipment as required for the nature of the job being performed, such as, but not limited to, boots, protective clothing, respirators, face shields, safety eyewear, respirator ophthalmic hanger devices, hard hats, and gloves. This personal protective equipment will be specified by the Health & Safety Department prior to use, subject to an assessment of the hazards to which associates will be potentially exposed. Documentation shall be in the project-specific Health and Safety Plan (HASP) or equivalent document.

Associates shall use HS-approved protective equipment on any task where there is potential exposure to: physical hazards such as equipment operation, objects dropping from above, or flying particles; or exposure to toxic or irritating gases, fumes, vapors, liquids, or other materials which might cause respiratory distress or skin irritation.

Associates shall be trained in the proper use, maintenance, and limitations of protective equipment. Safety equipment shall be replaced when it is damaged, contaminated, or has worn out. Training requirements are summarized in IT Procedure HS050.

Associates shall wear hard hats, eye protection, and steel-toed foot protection (chemical resistant when required) at all IT job sites (excluding field offices) and industrial facilities, unless HASP/site rules provide exemption. It is the responsibility of all associates to report to any work site prepared to work in Level D PPE. All other protective equipment is the responsibility of the project.

5.1 Eye Protection

All associates engaged in or working in areas adjacent to eye-hazardous activities or operations shall wear appropriate eye protection.

- Safety glasses are required for impact protection, and shall meet ANSI Standard Z87.1 requirements.
- Chemical goggles are required for protection against chemical splash.
- Face shields are required for face protection from chemical splash and are not a substitute for eye protection.
- Full-face respirators can provide eye and face protection in lieu of safety glasses, goggles, or face shields.

5.1.1 Prescription Eye Protection. IT will provide prescription safety glasses (meeting ANSI Standard Z87.1) for field/shop/lab personnel, and computer glasses for computer users, as required by their individual vision status and job. Glasses will be provided every two years unless damaged on-the-job, or the associate exhibits a significant change of prescription.

Lenses shall be clear polycarbonate or plastic. Special tints or dark lenses can be obtained for special applications (e.g., extended outdoor work) with prior written approval from the Health & Safety Department.

Associates requiring corrective lenses inside of respirator face-pieces will be provided with safety lenses and frames sized for respirators and the respirator insert, in addition to conventional prescription safety glasses.

Associates will arrange and pay for the eye examination through the company-provided vision care program. The company will pay for fitting services and the safety glasses.

The company has established a national contract with a protective eyewear provider. Associates should contact the local HS representative (with current lens prescription), who will coordinate with the local purchasing representative to order eyewear. Associates choosing to use another provider will be reimbursed up to $65 for safety or computer glasses, after the Health & Safety Department has verified that the glasses meet the ANSI Standard requirements.

5.2 Foot Protection

Basic foot protection is required for all IT job sites and industrial locations. Specialized footwear shall be provided as required by the nature of the work. Special foot protection may include, but is not limited to, chemically resistant, thermally shielded, metatarsal guards, etc.

5.2.1 Leather Safety Shoes. Safety shoes may be used in place of chemical resistant footwear when an associate will be working in a clean or uncontaminated work areas. Generally, when the associate desires to use safety footwear other than standard chemical resistant footwear provided by IT, IT considers it the responsibility of the associate to provide such footwear and ensure that it meets ANSI Standard Z41. IT supervision will enforce the use of appropriate protective footwear per the requirements of the site-specific Health and Safety Plan. Where state or local regulations require (i.e., California), IT will provide all necessary safety equipment.

Associates can purchase safety shoes through national purchasing agreements established by IT. Under the limited circumstances where IT will provide safety shoes, such purchases must be approved by the project or appropriate department/local manager. After the Health & Safety Department has verified that the safety shoes meet ANSI requirements, the associate will be reimbursed for the actual purchase price of the shoes up to a maximum of $80.00.

Athletic-style safety shoes ("safety sneakers") are <u>prohibited</u> for all field operations due to the difficulties created by these styles in supervising proper use of protective footwear. Associates in fixed laboratory operations

may wear athletic-style safety shoes with the prior approval of the Lab Director or HS Coordinator.

5.3 Head Protection

Hard hats meeting ANSI Z89.1 shall be provided to protect associates from impact, penetration, falling objects, and/or limited electrical shock and burn, as appropriate for work site hazards.

5.4 Respiratory Protection

Respirators shall be provided, in accordance with IT Procedure HS601, Respiratory Protection Program.

5.5 Hearing Protection

Hearing protection shall be provided, in accordance with IT Procedure HS402, Hearing Conservation Program.

5.6 Body Protection

Protective clothing, gloves, boots, and other protective equipment shall be provided as appropriate for the hazards associated with the tasks being performed.

5.7 Providing Personal Protective Equipment to Non-IT Personnel

The following personal protective equipment may be provided to non-IT personnel:

- Hard hats
- Chemical goggles
- Safety glasses (non-prescription)
- Face shields
- Chemical resistant boots
- Chemical resistant gloves
- Hearing protectors
- Disposable chemical resistant personal protective clothing

5.8 Management Duties

It is the responsibility of the Health & Safety Department to specify safety equipment requirements for each job.

It is the responsibility of project managers or location managers to provide adequate quantities of safety equipment required for their job(s) or project(s).

It is the responsibility of supervisors to verify that required safety equipment is properly used.

6.0 EXCEPTION PROVISIONS

Variances and exceptions shall be permitted pursuant to the provisions of IT Procedure HS013, "Health & Safety Procedure Variances".

7.0 CROSS REFERENCES

HS050 Training Requirements
HS402 Hearing Conservation Program
HS601 Respiratory Protection Program
ANSI Standard Z41, *Personal Protection - Protective Footwear*
ANSI Standard Z87.0, *Practice for Occupational and Educational Eye and Face Protection*
ANSI Standard Z89.1, *Protective Headwear for Industrial Workers*

8.0 ATTACHMENTS

1. Responsibility Matrix

ATTACHMENT 1
PERSONAL PROTECTIVE EQUIPMENT

Responsibility Matrix

Action	**Procedure Section**	*Responsible Party*			
		Vice President, HS	**Local HS Department**	**Project/ Location Managers**	**Supervisors**
Issue, revise, and maintain this procedure.	3.1	X			
Approve all personal protective equipment prior to use.	5.0		X		
Coordinate reimbursement to associate for PPE purchases.	5.1.1, 5.2.1		X		
Provide adequate quantities of safety equipment as required.	5.8			X	
Verify that required safety equipment is properly used.	5.8				X

3.0 RESPONSIBILITY MATRIX

3.1 Procedure Responsibility

The Vice President, Health and Safety is responsible for the issuance, revision, and maintenance of this procedure.

3.2 Action/Approval Responsibilities

Program responsibilities are detailed throughout this procedure. The Responsibility Matrix summarizes these items and can be found as Attachment 1.

4.0 DEFINITIONS

Action Level (AL) - Airborne contaminant concentration which is one-half of the Permissible Exposure Guideline (PEG).

Air Purifying Respirator (APR) - Negative pressure respirator (also referred to as a cartridge respirator) which filters contaminated air through chemical or mechanical filter elements. APRs include: cartridge, canister, gas masks, and single-use respirators (single-use respirators are not approved for use by the company).

Approved Respirator - Any respirator, identified by manufacturer and model, that has been approved by NIOSH 42 CFR Part 84 and has been incorporated into the List of Approved Respiratory Protective Equipment (Attachment 2).

Assigned Protection Factor (APF) - A term that is reserved in the OSHA Standard 1910.134 (January, 1998). Attachment 3 provided PFs for the respiratory protective equipment based upon type of device and method of fit testing. The company will continue to use the PFs established by NIOSH until OSHA issues their definition of APF.

Company - All wholly-owned subsidiaries of The IT Group, Inc.

Contractor Personnel - A group of persons hired to perform a specific activity based on their expertise and ability to operate independent of direct supervision. Contractor personnel are supervised by their management group which reports to an employee of the company for project direction.

End-of-Service-Life Indicator (ESLI) - A system that warns the respirator user of the approach of the end of adequate respiratory protection, for example, that the sorbent is approaching saturation or is no longer effective.

Emergency - Emergency means any occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment that may or does result in an uncontrolled significant release of an airborne contaminant.

Exposure Limit - Several published airborne contaminant concentration values exist which are used in establishing acceptable personnel exposures to contaminants. OSHA publishes the Permissible Exposure Limit (PEL), NIOSH publishes the Recommended Exposure Limit (REL), and the ACGIH publishes the Threshold Limit Value (TLV). All of these exposure limits are based on an 8-hour work shift, 40-hour work week, and 40-year work life. The values may vary from contaminant to contaminant as well as between publishing bodies.

Field Office - Any office or satellite office performing field activities which may require the use of respiratory protection.

Filtering Facepiece (Dust Mask) - A negative pressure particulate respirator with a filter as an integral part of the facepiece or with the entire facepiece composed of the filtering medium.

Fit Factor (FF) - This term means a quantitative estimate of the fit of a particular respirator to a specific individual and typically estimates the ratio of the concentration of a substance in ambient air to its concentration inside the respirator when worn. The FF incorporates a safety factor of 10 because protection factors in the workplace tend to be much lower than the fit factors achieved during fit testing. Acceptable fit factors are 100 for a tight-fitting half facepiece and 500 for a tight-fitting full facepiece respirators.

HASP - Health and Safety Plan.

Health and Safety Representative - A member of the company Health and Safety Functional Resource Group who, through credentials, training, or experience, has the necessary qualifications and authority to specify respiratory protection and evaluate respiratory protection program elements.

Immediately Dangerous to Life or Health (IDLH) - An atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere.

Labor Pool Personnel - Temporary personnel hired for a given expertise or ability. Labor pool personnel report directly to an employee of the company.

Nuisance Level - Level of airborne contaminants which is below one-half the action level for that contaminant and presents no other health or safety hazard.

Permissible Exposure Guideline (PEG) - This term designates a specific exposure limit and is based on the best available information. The PEG will be the lower (more protective) of the values for the PEL and TLV. However, the REL shall take precedence for Hazardous Waste Operations (subject to 29 CFR 1910.120 or 1926.65) if no PEL exists, or for contaminants where no PEL or TLV exists. If there is no PEL, TLV, or REL, a Health and Safety Representative shall determine an appropriate permissible exposure guideline.

Permissible Exposure Limit (PEL) - An occupational exposure index promulgated by OSHA which carries the force of law. This value represents the allowable concentration to which it is believed an employee may be exposed to 8 hours a day, 40 days a week, for a 40-year working life without experiencing adverse health effects.

Positive Pressure Respirator - A respirator in which the pressure inside the respirator exceeds the ambient air pressure outside the respirator.

Powered Air Purifying Respirator (PAPR) - A positive pressure APR which incorporates a fan an battery pack unit. The system pulls contaminated air through the filter elements before delivery to the facepiece under positive pressure. Air pressure in the mask must remain above ambient pressure.

Qualitative Fit Test - A procedure for assuring that the respirator provides adequate protection based on a pass/fail fit test that relies on the individual's response to the test agent. Standard fit test protocol will utilize the irritant smoke methods as described in Attachment 4.

Quantitative Fit Test - A fit test that provides an assessment of the adequacy of respirator fit by numerically measuring the amount of leakage into the respirator.

Respiratory Protection Program Coordinator (RPP Coordinator) - A person designated by the Health and Safety Representative to administer and supervise the respiratory program at a local facility or project location. This person will have the necessary training or credentials to execute this task.

Recommended Exposure Limit (REL) - An occupational exposure index published by NIOSH which is a recommended guideline for employee protection. This value represents the allowable concentration to which it is believed an employee may be exposed to 10 hours a day, 40 hours a week, for a 40-year working life without experiencing health effects.

Supplied Air Respirator (SAR) - Positive pressure respirator which supplies an independent source of breathing air to the user. Two types of SARs are available: self-contained breathing apparatus (SCBA) and airline.

Threshold Limit Value (TLV) - An occupational exposure index published by ACGIH which is recognized as an industry guideline and represents the concentration to which it is believed that nearly all employees may be exposed to 8 hours a day, 40 hours a week without experiencing adverse health effects.

5.0 TEXT

The company will employ engineering controls (e.g., enclosure, ventilation, material substitution, etc.) as the primary method to limit employee exposure. However, for those situations where engineering and administrative controls are ineffective at controlling employee exposure, the use of respiratory protective equipment may be required.

This RPP provides specific requirements for selection, assignment, training, and medical evaluation for persons expected to wear respiratory protection.

5.1 Assignment of Equipment to Contractor/Labor Pool Personnel

Contractor personnel shall provide their own respiratory protective equipment and shall also confirm meeting all other requirements of their own RPP and that of the company's RPP (i.e., medical clearance, training, etc.).

The company may provide the following respiratory protective equipment to Contractor Personnel:

- Disposable equipment such as filter elements.

- Hardware for airline systems (up to, but not including, the airline and facepiece) which employees are sharing.

The company will not provide the following respiratory protective equipment to Contractor Personnel:

- APR or PAPR facepieces.
- SCBAs, SAR respirators, or airline.

The company may provide respiratory protective equipment to Labor Pool Personnel if the following have been established:

- The labor pool personnel have successfully completed training as required by 29 CFR 1910.134 and other applicable regulations.

- The labor pool personnel have been fit tested in relation to projected exposure levels and contaminants to be encountered.

- The labor pool personnel have been medically approved to wear respirators.

- All other RPP requirements have been met.

5.2 Approval, Selection, and Purchase of Respiratory Protective Equipment

The following requirements are designed to guide correct selection of respiratory protective equipment.

5.2.1 Approval. The Vice President, Health and Safety has approved respirators manufactured by Survivair as the primary respirators for use by employees. For employees who cannot achieve a satisfactory fit or comfort factor in Survivair respirator, Mine Safety Appliance (MSA) respirators will be selected. The list of approved model respirators is included in Attachment 2. Contractor personnel may select any respiratory protective equipment that has received approval from NIOSH.

5.2.2 Selection. The Health and Safety Representative shall base the selection of respiratory protective equipment upon an assessment of potential respiratory hazards that may be encountered. This assessment may utilize a variety of written information such as the NIOSH Pocket Guide to Chemical Hazards, Material Safety Data Sheets, analytical data, air monitoring results, or other applicable information. The selection process shall incorporate the following guidelines:

- Respiratory protection is to be selected by Health and Safety Representatives only. Full facepiece respirators are the usual preference because of superior protection factor and the face/eye protection afforded. Half facepiece respirators can only be used in situations where less than one-half the PEG is expected. The type of respirator selected will be documented in the Project HASP.

- Selection of the appropriate respiratory protective equipment shall include factors such as the chemical state and physical form of the chemical contaminant, atmospheric concentration during routine and emergency events, potential physical hazards, expected job task requirements, and the performance of the respirator in providing the appropriate level of protection against these hazards.

- Consideration shall be given to the nature of the hazardous operation, location of the hazardous area relative to nonhazardous breathing air supply, duration of wear, activities to be performed, and characteristics and function of the respiratory protective equipment to be worn.

- Selected respirators (i.e., Survivair or MSA) shall be NIOSH certified and used in compliance with the conditions of its certification when employees are exposed to toxic materials or other hazardous atmospheres.

- Respirators must provide adequate face and eye protection for the expected task.

- If an APR or PAPR is used, the respirator shall be equipped with an end-of-service life-indicator (ESLI) certified by NIOSH for the contaminant. If an ESLI is not available for the contaminant, a cartridge element change schedule shall be implemented which is based on objective information or data that will ensure that canisters and cartridges are changed before the end of their service life. This information will be described in the HASP.

- The PF for the respirator selected (Attachment 3) shall be used according to the following relationship with the PEG to establish justification for selection:

  PF x PEG > Maximum anticipated contaminant concentration

  If this equation is false, a respirator with a greater PF must be selected. Also review Attachment 3 to determine the required fit testing for the expected maximum anticipated contaminant concentration. The Health and Safety Representative may determine that a more conservative approach (e.g., 50 percent PF) may be needed. Decision to do so should be documented in the Project HASP.

- Manufacturer-established limitations of the APR filter elements relative to the contaminants of concern shall be used to establish further justification for the selected respirator should the APR's FF not disqualify its use (e.g., maximum anticipated contaminant concentration).

5.2.3 Purchase. The purchase request of respiratory protective equipment (including cartridges, airlines, compressed air) should be reviewed by a Health and Safety Representative to indicate that the ordered material meets established requirements. **Under no circumstances may anyone (purchasing, warehouse, project manager, etc.) purchase or provide other than the specific respiratory protection equipment selected by the Health and Safety Representative.**

5.3 Medical Evaluation

No employee shall be assigned to a task that requires the use of a respirator unless it has been determined that he/she is physically able to perform the work while using the required respirator. The medical evaluation must be conducted prior to fit testing and work requiring the use of respiratory equipment.

The medical evaluation shall be performed by a physician typically in conjunction with a physical examination meeting the requirements of 29 CFR 1910.120 (f) *Medical Surveillance*. The physician will be informed of the type of work expected of the employee, the types of respiratory protection and personal protective equipment required, and other information indicating the expected stresses of the task. The company medical director shall be given a copy of the company RPP and a copy of 1910.134 (e) *Medical Evaluation.*

The company medical director shall provide a written recommendation regarding the employee's ability to use respiratory protection. The company shall ensure that the company medical director supplies the employee with a copy of this recommendation.

Additional medical evaluations will be provided to the employee if:

- Any medical signs or symptoms due to respirator use are reported by the employee, supervisory, or health and safety personnel.
- A change in workplace conditions (e.g., physical work effort, protective clothing, temperature) that may result in a substantial increase in the physiological burden placed on an employee.

5.4 General Program Requirements

5.4.1 Responsibilities. The following information describes the responsibilities for the selection, use, and maintenance of respiratory protective equipment based upon job function:

Management

- Management shall take necessary and cost-effective measures to reduce, where possible, the need for respiratory protective equipment (e.g., enclosed cabs on heavy equipment to reduce airborne dust, operations performed upwind, etc.)
- Respiratory protective equipment shall be provided by management whenever it is determined that such equipment is necessary to protect the health of the employee or when requested by an employee and approved by the Health and Safety Representative.
- Management shall assign work tasks requiring the use of respiratory protective equipment to only those employees who are medically qualified to wear respiratory protective equipment.
- Management shall ensure that employees are trained in the use of respiratory protection prior to being assigned to an activity that requires its use.

- Management shall provide the means for the maintenance of respiratory protection as required.

Health and Safety Representative

- Health and Safety Representatives shall determine appropriate respiratory protection for each job. The decision logic for this selection shall be documented in the Project HASP.

- Health and Safety Representatives shall monitor compliance with the various aspects of this program, provide technical assistance regarding respirator selection and use, evaluate the effectiveness of the RPP, and support respirator training and fit testing at locations under their control.

- Health and Safety Representatives shall conduct regular audits to determine compliance with this procedure. This audit can include a review of maintenance, training, medical and air monitoring records, and review the status of this procedure with regard to current regulatory requirements.

- Health and Safety Representatives shall maintain or oversee maintenance of all other records required by this RPP and shall provide for the training and fit testing of personnel assigned respiratory protective equipment.

- Health and Safety Representatives shall appoint a RPP Coordinator for each location which uses or may have a need to use respiratory protection. The Health and Safety Representative must assure the RPP Coordinator has the necessary training to fulfill his/her responsibilities.

RPP Coordinator

- The RPP Coordinator shall be responsible for cleaning, maintenance, and storage of all respirators not routinely used or not individually assigned.

- The RPP Coordinator shall maintain respirator supplies, including spare parts; submit purchase requests for new equipment; and assure that sufficient quantities of cartridges are available for each field office/project.

- The RPP Coordinator shall assure that air supply and emergency respiratory protection is properly inspected and maintained.

- Respirators shall be repaired by either qualified personnel under the direction of the RPP Coordinator, or by contracted supplier.

- The RPP Coordinator shall maintain models and sizes of respirators available for selection and fitting.

- The RPP Coordinator shall conduct fit testing.

Training Department

- Records pertaining to training and fit testing will be maintained by the Training Department.

Employee

- The employee shall use the provided respiratory protective equipment when instructed to do so in accordance with training received.

- The employee shall clean, disinfect, and properly store the assigned respirator, unless other arrangements are made on a project level.

- The employee shall guard against damage to the assigned respirator.

- The employee shall inspect the respirator before each use and after cleaning.

- The employee shall report any malfunction of the respirator immediately to their supervisor and/or the RPP Coordinator.

- The employee shall report to their supervisor any change in their medical status that may impact their ability to wear a respirator safely.

5.4.2 **Use of Corrective Lens Eyewear.** In general, contact lenses are permitted to be worn when respiratory protection is used. Although in certain instances, client- or project-specific rules may not allow for their use.

If an employee chooses not to wear contact lenses, management shall assure that the appropriate frames or ophthalmic device attachments are obtained and provided at no cost to the employee.

5.4.3 **Obstruction of Face Seal.** Employees who wear respirators are required to be clean shaven to the extent that there is no obstruction between the wearer's skin and the facepiece. Trimmed mustaches and facial hair which does not interfere with the seal are allowable.

In addition, respirators shall not be worn when conditions prevent a good face-to-facepiece seal such as corrective lenses or goggles, or other personal protective equipment.

5.5 Instruction, Training, and Fit Test

5.5.1 Instruction and Training. The Training Department shall provide a standard respiratory protective equipment training program for use by qualified personnel such as the Health and Safety Representative or RPP Coordinator. The Training Department will support training at the project location if the project does not have the qualified personnel and/or the equipment to support its own program. As an alternative, the project location may use a respiratory manufacturer's training program if the program meets company requirements, a competent person conducts the training, adequate equipment is available for demonstration, and fit testing is conducted along guidelines established in this procedure. The Training Department must approve all alternative training methods.

The basic respirator training program shall include, as a minimum, the following:

- Training and annual retraining of employees in the selection, use, maintenance, and limitation of each respirator type used.
- Instruction on the nature of the respiratory hazards and potential health effects resulting from exposure.
- Opportunity for "hands on" experience with the respiratory protective equipment.
- Proper fitting, including demonstrations and practice in wearing, adjusting, and determining the fit of the respirator. A selection of respirators shall be available to determine the most comfortable respirator and the best fit.
- Instruction on how to test the face-to-facepiece seal.
- A familiarization period of wear in ambient air.
- For APRs, wearing the respirator in a test atmosphere (typically irritant smoke) for qualitative fit testing. The qualitative fit test shall follow the guidelines outlined in Section 5.5.2.
- Training to recognize and cope with emergency situations (including respirator failure)
- Training and fit testing shall be repeated annually, unless specific OSHA regulations require a more frequent time period (e.g., asbestos, lead operations). Each person receiving training shall complete the Respirator Fit Test Form (Attachment 5).

- Training records will be maintained by the Training Department and the location Health and Safety Representative. On-site records of training and fit testing will be maintained as required by specific regulation (e.g., asbestos work) (refer to Section 5.8).

- It is the responsibility of the RPP Coordinator to verify that all project personnel meet the requirements of this RPP.

5.5.2 **Fit Testing.** Prior to the use of any negative or positive pressure tight-fitting facepiece, the employee must be fit tested.

- All employees assigned to operations requiring the use of respiratory protective equipment shall have been fit tested within 12 months, or as required by specific regulations (e.g., asbestos, lead operations). Fit test and qualification cards (or a copy of the completed Attachment 5) must be available during operations.

- The employee shall be fit tested with the same size and model as they are expected to wear.

- Qualitative fit test (QLFT) shall be used when a protection factor of 10 or less is required for a negative pressure respirator.

- Quantitative fit test (QNFT) shall be used when a protection factor of greater than 10 is required for a negative pressure respirator. When executing the QNFT, the acceptable test result is 100 for tight fitting half-facepiece respirators and 500 for full-facepiece respirators.

- Fit testing for tight-fitting atmosphere supplying respirators and tight-fitting APRs shall be in a negative pressure mode regardless of the mode of operation that is used for respiratory protection.

- Assessment of comfort shall be made after allowing adequate time for this evaluation. This evaluation shall include reviewing the following points with the employee: positioning of the mask on nose, room for eye protection if required, room to talk, and positioning of the mask on the face and cheeks.

- The following criteria shall be used to help determine the adequacy of the respirator fit: chin properly placed, strap tension, fit across the nose bridge, and tendency to slip.

- If physical obstruction (e.g., facial hair, eyeglasses) interferes with the face-to-facepiece seal, then it shall be altered or removed so as to eliminate any interference and allow for a satisfactory fit. If the employee refuses to alter the physical obstruction, then they shall be denied a satisfactory fit report and referred to his/her supervisor for consideration.

- The fit test protocol (Attachment 4) shall be followed. The Health and Safety Representative and Training Department shall determine which fit test protocol shall be followed depending upon the situation.

5.6 Maintenance Program

Each RPP Coordinator is responsible for verifying the respirator maintenance program is implemented in an effective manner for the facility or project site, the working conditions, and the potential hazards involved. As a minimum, the following aspects must be implemented:

- Inspection
- Cleaning and sanitizing
- Repair
- Respirator storage
- Inspection and repair documentation, as required
- Compliance with manufacturer recommendations.

Detailed information regarding cleaning, inspection, maintenance, and storage is found in Attachment 7. The RPP Coordinator shall verify compliance with the maintenance program by periodic inspections and field audits.

5.6.1 Inspection

- All respiratory protective equipment systems shall be inspected by the wearer for defects and/or deterioration immediately prior to and after each use.

- Any defects shall be reported to their supervisor immediately and the respirator removed from use until it can be repaired or replaced.
- Respiratory protective equipment systems not used routinely (including all SCBAs and equipment designated only for emergency use) shall be inspected before and after each use and at least every 30 days. Cylinders shall be recharged whenever the pressure falls below 90 percent of the manufacturer's recommended pressure level. This inspection shall be documented by some method on the unit (i.e., tag). Records of inspections shall be kept through appropriate documentation. Attachment 6 provides an example of inspection documentation for SCBAs. At a minimum, these records will include: date, inspector, and any unusual

finding or condition. Any repairs or modifications shall be documented in detail.

- General field inspection shall include a check of the following: tightness of all connections, facepiece, valves, and any connecting tubes or filtering elements.

- Employees who are manufacturer-qualified repair technicians shall be used for all maintenance beyond field inspections, tests, and user-performed cleaning.

- Air supplied respiratory systems shall be inspected by a manufacturer's authorized representative at the manufacturer's recommended schedule. Manufacturers typically require an annual flow test and a complete overhaul every 5 to 7 years.

- **Specific inspection procedures are outlined in Attachment 7.**

5.6.2 **Cleaning and Sanitizing.** Employees maintaining their own respirators shall be thoroughly briefed on how to clean and disinfect them. On projects where employees clean their own respirator, the generally accepted procedure involves washing with detergent and warm water using a soft brush, submersion in sanitizing agent, thoroughly rinsing in clean water, drying in a clean place, and storage in sealed plastic bags or equivalent. Precautions to be taken to prevent damage from rough handling during this procedure are detailed in Attachment 7.

At locations where employees share respirators, a centralized cleaning and maintenance facility with specialized equipment and/or materials and personnel trained in respirator maintenance must be established. Cleaning and inspection is primarily the responsibility of the user.

5.6.3 **Repair.** The company will only use respiratory protective equipment that is physically sound.

- If defects are found during any inspection, two remedies are possible. If parts and trained personnel are available, repair and/or adjustment may be made immediately. If parts or trained repair people are unavailable, the device shall be removed from service until it can be repaired. Under no circumstances shall a device that is known to be defective remain in service.

- Replacement or repair shall be done by adequately trained personnel. For negative pressure respirators, the Health and Safety Representative or RPP Coordinator may train or supervise personnel in the replacement of items such as inhalation/exhalation valves, head harness, cartridge adapters, and lenses. For air-supplied respirators, field repairs are limited to replacement of head harness and lenses. All other work must be completed by a factory-certified repair person.

Repair shall only be made with parts designed for the respirator. Substitution of parts from a different brand or type invalidates the respirator's approval and is prohibited.

5.6.4 **Storage.** Respirators must be stored to protect against dust, sunlight, heat, extreme cold, excessive moisture, damaging chemicals, and mechanical damage.

- Respirators shall be stored in such a manner that the facepiece, exhalation valve, and straps are not distorted.

- Respirators shall be stored in sealable containers (e.g., ziplock bags) after cleaning and disinfecting.

- The storage location of emergency respiratory protection shall be readily accessible and prominently identified.

- Respirators shall be stored in an area free of contamination.

5.7 Field Use

The following guidelines for the use of respirators (or equivalent) shall be incorporated into the Project HASP as appropriate. Additional guidelines may be required based on working conditions and hazards involved. Each location where respiratory protective equipment is required or worn shall include in the Project HASP justification for the selected respiratory protective equipment systems worn as outlined in Section 5.2 of this procedure.

5.7.1 **General Requirements.** The following general requirements shall be followed whenever respiratory protection is used:

- Employees shall be allowed to leave the regulated area to readjust the facepiece or to wash their faces and to wipe clean the facepieces of their respirators in order to minimize potential skin irritation associated with respirator use.

- Respiratory protective equipment shall not be passed on from one person to another until it has been cleaned and sanitized, per program requirements.

- Respirators will be inspected, and a positive/negative pressure test performed prior to each use.

- Entry into oxygen-deficient (< 19.5 percent O_2) atmospheres, Immediately Dangerous to Life and Health (IDLH) atmospheres, or areas requiring EPA Level A protection is prohibited without the prior approval of the Vice President, Health and Safety or the CIH assigned to the business line.

- Head coverings such as Tyvek hoods shall not be allowed to pass between the face-to-facepiece seal.

- The harness straps of tight-fitting respirators shall not be positioned or worn over hard hats.

5.7.2 **Specific Requirements.** The following information details specific requirements by respirator class:

<u>Air Purifying Systems</u>

- When APRs are worn, new filter elements shall be installed at the beginning of operations. The filter elements shall be changed whenever the ESLI (color indicators) indicates that cartridge life has expired (e.g., mercury cartridges). When no ESLIs are available, filter replacement will be based on the calculations performed by the Health and Safety Representative. Additionally, the cartridges will be replaced if "breakthrough" is perceived or whenever an increase in breathing resistance is detected. In most cases, the cartridges will be replaced a minimum of once daily, usually at the end of the work shift.

<u>Powered Air Purifying Systems</u>

- When PAPRs are worn, employees shall change filter elements after each day's activities. The filter elements shall be changed whenever the ESLI (color indicators) indicates that cartridge life has expired (e.g., mercury cartridges). When no ESLIs are available, filter replacement will be based on the calculations performed by the Health and Safety Representative. Additionally, the cartridges will be replaced if "break-through" is perceived or when airflow through filter elements decreases to an unacceptable level as indicated by the manufacturer's test device.

Compressed Air

- Compressed air used for breathing shall meet at least the requirements of the specification for Grade D breathing air or better (D, E, or G; not A, K, or L) as described in the American National Standard Commodity Specification for Air, ANSI/CGA G-7.1-1989. Further information is provided in Attachment 7, Guide to Respiratory Protective Equipment Cleaning, Inspection, Maintenance, and Storage.

- Breathing air suppliers must provide certification of analysis stating conformance, as a minimum, to Grade D breathing air standards as previously referenced for each cylinder and/or air lot.

- Air delivered in bulk, e.g., tube trailers, shall have each tube or unit, or a representative number of tubes or units verified as to oxygen content prior to using that tube.

- Pure oxygen shall NOT be used at any time in open-circuit SCBAs or airline respirators.

- Breathing air cylinders shall be legibly identified with the word "AIR" by means of stenciling, stamping, or labeling as near to the valve end as practical.

- Breathing air cylinders may be stored on their sides provided the valve caps are in place.

Supplied Air Breathing Systems

- Airline couplings shall be incompatible with outlets for other gas systems to prevent inadvertent servicing of airline respirators with nonrespirable gases or oxygen.

- Standard airline couplings for breathing air systems are Foster quick connect fittings with locking dots. Hansen quick connect fitting may also be used, but must not be used where they can be inadvertently actuated and disconnected. For example, Hansen fittings could be used at the regulator connection, but not on the airline unless protected from disconnection by some other means.

- The hose line length shall not exceed 300 feet from the air bank regulator to the user.

- No more than three connections, excluding the connection to the regulator and final connection to the respirator, shall be between the breathing air cylinders and the user.

- Breathing air hose shall be protected from direct contact with chemical materials which may permeate the hose. Acceptable methods of protection include suspension of the hose from the surface or covering with a commercially available sleeve or visqueen. Breathing air hose which has become contaminated will be removed from service and disposed of properly.

- The breathing air regulator shall be adjusted to provide air pressure as per the manufacturer's recommendations. For Survivair units, this pressure shall be between 80 to 125 psi pressure.

- Cascade systems shall be equipped with low pressure warning alarms or similar warning devices to indicate air pressure in the manifold below 500 psi.

- When a cascade system is used to supply breathing air, a worker outside the Exclusion Zone shall be assigned as safety standby within audible range of the low pressure alarm.

- When a cascade system is used to recharge SCBA air cylinders, it shall be equipped with a high-pressure supply hose and coupling rated at a capacity of at least 3,000 psi. The supply hose and coupling shall be relatively short ($\leq$ 3 feet) and secured to prevent whipping when pressurized.

- Large supplied air cylinders shall be stored and handled to prevent damage to the cylinder or valve. Cylinders shall be stored upright with the protective valve cover in place and in such a way (e.g., supported with substantial rope or chain in the upper one-third of the cylinder, or in racks designed for the purpose) as to prevent the cylinder from falling. Cylinders shall not be dropped, dragged, rolled, or allowed to strike each other or to be struck violently. Cylinders shall never be exposed to temperatures exceeding 125°F. Cylinders with visible external damage, evidence of corrosion, or exposure to fire shall not be accepted or used.

- Only cylinders within current hydrostatic test periods shall be used. For fiber wrapped bottles designated by the DOT-E label, hydrostatic testing shall be completed every 3 years. Maximum service life for these cylinders is 15 years. Steel or aluminum cylinders shall be hydrostatically tested every 5 years. No maximum service life is established for steel or aluminum cylinders.

- SCBAs shall only be used in the positive pressure mode when in the Exclusion Zone.

- Standby SCBA equipment must be present when air supply systems are used in IDLH or potentially IDLH atmospheres.

Escape/Egress Units

- These respirators are intended for use in areas where escape with a short-term (5 minute) air supply is necessary. They may be used as adjuncts to airline respirators as a backup air supply, or as independent emergency devices in areas where respiratory protective equipment is not normally required.

- Appropriate training shall be accomplished and documented prior to assigning employees to tasks or locations subject to the use of these respirators.

- Escape/egress units (5-minute air supply) shall never be used as primary standby respirators for confined space entry.

- Escape/egress units shall never be used to enter, or continue working in, a hazardous atmosphere.

5.7.3 IDLH Atmospheres. For all IDLH atmospheres, the company shall ensure that:

- One employee or, when needed, more than one employee is located outside the IDLH atmosphere.

- Visual, voice, or signal line communication is maintained between the employee(s) in the IDLH atmosphere and the employee(s) located outside the IDLH atmosphere.

- The employee(s) located outside the IDLH atmosphere are trained and equipped to provide effective emergency rescue.

- The employer or designee is notified before the employee(s) located outside the IDLH atmosphere enter the IDLH atmosphere to provide emergency rescue.

- The employer or designee authorized to do so by the employer, once notified, provides necessary assistance appropriate to the situation.

- Employee(s) located outside the IDLH atmosphere are equipped with:

  - Pressure demand or other positive pressure SCBAs, or a pressure demand or other positive pressure supplied air respirator with escape/egress unit.

  - Appropriate retrieval equipment for removing the employee(s) who enter(s) these hazardous atmospheres where retrieval equipment would contribute to the rescue of the employee(s) and would not increase the overall risk resulting from entry. Equivalent means of rescue can be considered.

5.8 Recordkeeping
The following documents must be part of the site recordkeeping program:

- Employees' medical clearances for respirator use
- Respirator training and fit testing forms.

5.9 Program Evaluation
This RPP shall be reviewed annually at the direction of the Vice President, Health and Safety.

6.0 EXCEPTION PROVISIONS
Variances and exceptions may be requested pursuant to the provisions of Procedure HS013, Health and Safety Procedure Variances.

7.0 CROSS REFERENCES
Title 29, Code of Federal Regulations, Section 1910.134.

AIHA, ***Respiratory Protection, A Manual and Guideline***, 1980.

American National Standards Institute Practices for Respiratory Protection Z88.2-1992 (or most recent publication)

NIOSH, ***Certified Equipment List*** (most recent version)

Company Health and Safety Procedures:

- HS013 Health and Safety Procedure Variances
- HS040 Stop Work Authority
- HS050 Training Requirement
- HS052 Health and Safety Plans
- HS102 Management of Employee Exposure and Medical Records
- HS104 Employee Notification of Industrial Hygiene Monitoring Records
- HS300 Confined Spaces
- HS304 Compressed Gas Cylinders
- HS600 Personal Protective Equipment

8.0 ATTACHMENTS

1. Responsibility Matrix
2. List of Approved Respiratory Protective Equipment
3. Respirator Type, Protection Factor, and Fit Testing Method
4. Mandatory Respirator Fit Test Protocol
5. Respirator Fit Test Form
6. Emergency Respiratory Protective Equipment Monthly Inspection Checklist
7. Guide to Respiratory Protective Equipment Cleaning, Inspection, Maintenance, and Storage

ATTACHMENT 1
RESPIRATORY PROTECTION PROGRAM

Responsibility Matrix

Action	Procedure Section	*Responsible Party*					
		Employee	**Health and Safety Representative**	**Project/ Location Management**	**VP, Health and Safety**	**Training**	**RPP Coordinator**
Issue, Revise, and Maintain Procedure	3.1				X		
Assure Proper Selection of Respirators	5.2.2		X				
Review Purchase Requests for Respiratory Equipment	5.2.3		X				
Conduct Fit Testing	5.4		X				X
Assure Compliance with RPP	5.4		X	X			X
Assure Training	5.4		X	X			X
Audit Program Compliance	5.4		X		X		X
Assist/Approve Local Training Program	5.4					X	
Maintenance Program	5.6	X	X	X			X
Field Use	5.7	X	X	X			X
Recordkeeping	5.8	X	X			X	X
Program Evaluation	5.9				X		

ATTACHMENT 2

LIST OF APPROVED RESPIRATORY PROTECTIVE EQUIPMENT

AIR PURIFYING RESPIRATORS (APR)					
Respirator Class	**Respirator Type**	**Respiratory Performance**	**Manufacturer**	**Model Name**	**Model Number**
Standard APR	Half-Face	Negative Pressure	Survivair	Blue 1	2100-10 S 2200-10 M 2300-10 L
			MSA	Comfo II	479529 S 479428 M 479530 L
	Full-Face	Negative Pressure	Survivair	20/20	202062 S 202072 M 202082 L
			MSA	Ultra Twin	480263 S 480259 M 480267 L
Powered APR	Hood	Continuous Positive Pressure	Survivair	PAPR	5200-15
			MSA	Optimair 6	480251 S 480247 M 480255 L

SUPPLIED AIR RESPIRATORS (SAR)					
Respirator Class	**Respirator Type**	**Respiratory Performance**	**Manufacturer**	**Model Name**	**Model Number**
Airline SAR	Full-Face	Positive Pressure Demand	Survivair	Panther	P968455
			MSA	Premaire	497291
SCBA SAR	Full-Face	Positive Pressure Demand	Survivair	Cougar	P 9643310
			MSA	MMR WorkMask 2216	Varies on Components
Emergency	Escape/Egress Unit	Continuous Flow	Survivair	5 min. EEGA	9750870
			MSA	Custom Air V	484353

ATTACHMENT 3

RESPIRATOR TYPE, PROTECTION FACTOR, AND FIT TESTING METHOD

Respirator Type	Protection Factor	QLFT	QNFT
Half-Face, Negative Pressure (<100 Fit Factor)[1]	10	Yes	Yes
Full-Face, Negative Pressure (<100 Fit Factor) Used in Atmosphere up to 10 Times the PEG	10	Yes	Yes
Full-Face, Negative Pressure (>100 Fit Factor) Used in Atmospheres Over 10 Times the PEG[2]	50	No	Yes
PAPR	100	Yes	Yes
SCBA/SAR Used in Positive Pressure (Pressure Demand Mode)	10,000	Yes	Yes

Footnotes:

1. If quantitatively fit tested, the device must demonstrate a fit factor of at least 100.
2. If quantitatively fit tested, the device must demonstrate a fit factor of at least 500.

ATTACHMENT 4

MANDATORY RESPIRATOR FIT TEST PROTOCOL

OSHA-Accepted Fit Test Protocols

A. Fit Testing Procedures - General Requirements

The company shall conduct fit testing using the following procedures. The requirements in this attachment apply to all OSHA-accepted fit test methods, both QLFT and QNFT. There are several OSHA-accepted fit test protocols for QLFT. This procedure includes only the irritant smoke protocol since it requires less equipment and is more practical for field use.

1. The test subject shall be allowed to pick the most acceptable respirator from a sufficient number of respirator models and sizes so that the respirator is acceptable to, and correctly fits, the user.

2. Prior to the selection process, the test subject shall be shown how to put on a respirator, how it should be positioned on the face, how to set strap tension, and how to determine an acceptable fit. A mirror shall be available to assist the subject in evaluating the fit and positioning of the respirator. This instruction may not constitute the subject's formal training on respirator use, because it is only a review.

3. The test subject shall be informed that he/she is being asked to select the respirator that provides the most acceptable fit. Each respirator represents a different size and shape, and if fitted and used properly, will provide adequate protection.

4. The test subject shall be instructed to hold each chosen facepiece up to the face and eliminate those that obviously do not give an acceptable fit.

5. The more acceptable facepieces are noted in case the one selected proves unacceptable; the most comfortable mask is donned and worn at least five minutes to assess comfort. Assistance in assessing comfort can be given by discussing the points in the following Item A.6. If the test subject is not familiar with using a particular respirator, the test subject shall be directed to don the mask several times and to adjust the straps each time to become adept at setting proper tension on the straps.

6. Assessment of comfort shall include a review of the following points with the test subject and allowing the test subject adequate time to determine the comfort of the respirator:
   a. Position of the mask on the nose;
   b. Room for eye protection;
   c. Room to talk; and
   d. Position of mask on face and cheeks.

7. The following criteria shall be used to help determine the adequacy of the respirator fit:
   a. Chin properly placed;
   b. Adequate strap tension, not overly tightened;
   c. Fit across nose bridge;
   d. Respirator of proper size to span distance from nose to chin;

e. Tendency of respirator to slip; and
f. Self-observation in mirror to evaluate fit and respirator position.

8. The test subject shall conduct a user seal check, either the negative and positive pressure seal checks. Before conducting the negative and positive pressure checks, the subject shall be told to seat the mask on the face by moving the head from side-to side and up and down slowly while taking in a few slow deep breaths. Another facepiece shall be selected and retested if the test subject fails the user seal check tests.

9. The test shall not be conducted if there is any hair growth between the skin and the facepiece sealing surface, such as stubble beard growth, beard, mustache, or sideburns which cross the respirator sealing surface. Any type of apparel which interferes with a satisfactory fit shall be altered or removed.

10. If a test subject exhibits difficulty in breathing during the tests, he/she shall be referred to a physician or other licensed health care professional, as appropriate, to determine whether the test subject can wear a respirator while performing his/her duties.

11. If the employee finds the fit of the respirator unacceptable, the test subject shall be given the opportunity to select a different respirator and to be retested.

12. *Exercise Regimen*: Prior to the commencement of the fit test, the test subject shall be given a description of the fit test and the test subject's responsibilities during the test procedure. The description of the process shall include a description of the test exercises that the subject will be performing. The respirator to be tested shall be worn for at least 5 minutes before the start of the fit test.

13. The fit test shall be performed while the test subject is wearing any applicable safety equipment that may be worn during actual respirator use which could interfere with respirator fit.

14. *Test Exercises*: The following test exercises are to be performed for all fit testing methods prescribed in this attachment, except for the controlled negative pressure (CNP) method. A separate fit testing exercise regimen is contained in the CNP protocol.

    Each test exercise shall be performed for one minute, except for the grimace exercise which shall be performed for 15 seconds. The test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of respirator shall be tried. The respirator shall not be adjusted once the fit test exercises begin. Any adjustment voids the test, and the fit test must be repeated.

    The test subject shall perform exercises, in the test environment, in the following manner:

    a. *Normal Breathing*: In a normal standing position, without talking, the subject shall breathe normally.

    b. *Deep Breathing*: In a normal standing position, the subject shall breathe slowly and deeply, taking caution so as not to hyperventilate.

c. *Turning Head Side to Side*: Standing in place, the subject shall slowly turn his/her head from side to side between the extreme positions on each side. The head shall be held at each extreme momentarily so the subject can inhale at each side.

d. *Moving Head Up and Down*: Standing in place, the subject shall slowly move his/her head up and down. The subject shall be instructed to inhale in the up position (i.e., when looking toward the ceiling).

e. *Talking*: The subject shall talk out loud slowly and loud enough so as to be heard clearly by the test conductor. The subject can count backward from 100, recite a memorized poem or song or read from a prepared text such as the Rainbow Passage.

> Rainbow Passage:
>
> When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch, with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond reach, his friends say he is looking for the pot of gold at the end of the rainbow.

f. *Grimace*: The test subject shall grimace by smiling or frowning. (This applies only to QNFT testing; it is not performed for QLFT.)

g. *Bending Over*: The test subject shall bend at the waist as if he/she were to touch his/her toes. Jogging in place shall be substituted for this exercise in those test environments such as shroud type QNFT or QLFT units that do not permit bending over at the waist.

h. *Normal Breathing*: Same as Item A.14.a.

B. Qualitative Fit Test (QLFT) Protocols

1. General:

   a. The employer shall ensure that persons administering QLFT are able to perform tests properly, recognize invalid tests, and ensure that test equipment is in proper working order.

   b. The employer shall ensure that QLFT equipment is kept clean and well maintained so as to operate within the parameters for which it was designed.

2. Irritant Smoke (Stannic Chloride) Protocol: This qualitative fit test uses a person's response to the irritating chemicals released in the "smoke" produced by a stannic chloride ventilation smoke tube to detect leakage into the respirator.

   a. General Requirements and Precautions:

      1. The respirator to be tested shall be equipped with high efficiency particulate air (HEPA) or P100 series filter(s).

      2. Only stannic chloride smoke tubes shall be used for this protocol.

      3. No form of test enclosure or hood for the test subject shall be used.

      4. The smoke can be irritating to the eyes, lungs, and nasal passages. The test conductor shall take precautions to minimize the test subject's exposure to irritant smoke. Sensitivity varies, and certain individuals may respond to a greater degree to irritant smoke. Care shall be taken when performing the sensitivity screening checks that determine whether the test subject can detect irritant smoke to use only the minimum amount of smoke necessary to elicit a response from the test subject.

      5. The fit test shall be performed in an area with adequate ventilation to prevent exposure of the person conducting the fit test or the buildup of irritant smoke in the general atmosphere.

   b. Sensitivity Screening Check: The person to be tested must demonstrate his/her ability to detect a weak concentration of the irritant smoke.

      1. The test operator shall break both ends of a ventilation smoke tube containing stannic chloride, and attach one end of the smoke tube to a low flow air pump set to deliver 200 milliliters per minute, or an aspirator squeeze bulb. The test operator shall cover the other end of the smoke tube with a short piece of tubing to prevent potential injury from the jagged end of the smoke tube.

      2. The test operator shall advise the test subject that the smoke can be irritating to the eyes, lungs, and nasal passages and instruct the subject to keep his/her eyes closed while the test is performed.

      3. The test subject shall be allowed to smell a weak concentration of the irritant smoke before the respirator is donned to become familiar with its irritating

properties and to determine if he/she can detect the irritating properties of the smoke. The test operator shall carefully direct a small amount of the irritant smoke in the test subject's direction to determine that he/she can detect it.

c. Irritant Smoke Fit Test Procedure:

1. The person being fit tested shall don the respirator without assistance, and perform the required user seal check(s).

2. The test subject shall be instructed to keep his/her eyes closed.

3. The test operator shall direct the stream of irritant smoke from the smoke tube toward the face seal area of the test subject, using the low flow pump or the squeeze bulb. The test operator shall begin at least 12 inches from the facepiece and move the smoke stream around the whole perimeter of the mask. The operator shall gradually make two more passes around the perimeter of the mask, moving to within 6 inches of the respirator.

4. If the person being tested has not had an involuntary response and/or detected the irritant smoke, proceed with the test exercises.

5. The exercises identified in Item A.14 of this attachment shall be performed by the test subject while the respirator seal is being continually challenged by the smoke, directed around the perimeter of the respirator at a distance of six inches.

6. If the person being fit tested reports detecting the irritant smoke at any time, the test is failed. The person being retested must repeat the entire sensitivity check and fit test procedure.

7. Each test subject passing the irritant smoke test without evidence of a response (involuntary cough, irritation) shall be given a second sensitivity screening check, with the smoke from the same smoke tube used during the fit test, once the respirator has been removed, to determine whether he/she still reacts to the smoke. Failure to evoke a response shall void the fit test.

8. If a response is produced during this second sensitivity check, then the fit test is passed.

C. Quantitative Fit Test (QNFT) Protocols

The following quantitative fit testing procedures have been demonstrated to be acceptable: quantitative fit testing using a nonhazardous test aerosol (such as corn oil, polyethylene glycol 400 [PEG 400], di-2-ethyl hexyl sebacate [DEHS], or sodium chloride) generated in a test chamber, and employing instrumentation to quantify the fit of the respirator; quantitative fit testing using ambient aerosol as the test agent and appropriate instrumentation (condensation nuclei counter) to quantify the respirator fit; quantitative fit testing using controlled negative pressure and appropriate instrumentation to measure the volumetric leak rate of a facepiece to quantify the respirator fit.

1. General:

a. The employer shall ensure that persons administering QNFT are able to calibrate equipment and perform tests properly, recognize invalid tests, calculate fit factors properly, and ensure that test equipment is in proper working order.

b. The employer shall ensure that QNFT equipment is kept clean, and is maintained and calibrated according to the manufacturer's instructions so as to operate at the parameters for which it was designed.

2. Ambient Aerosol Condensation Nuclei Counter (CNC) Quantitative Fit Testing Protocol: The ambient aerosol CNC quantitative fit testing (Portacount™) protocol quantitatively fit tests respirators with the use of a probe. The probed respirator is only used for quantitative fit tests. A probed respirator has a special sampling device, installed on the respirator, that allows the probe to sample the air from inside the mask. A probed respirator is required for each make, style, model, and size that the employer uses and can be obtained from the respirator manufacturer or distributor. The CNC instrument manufacturer, TSI Inc., also provides probe attachments (TSI sampling adapters) that permit fit testing in an employee's own respirator. A minimum fit factor pass level of at least 100 is necessary for a half-mask respirator and a minimum fit factor pass level of at least 500 is required for a full facepiece negative pressure respirator. The entire screening and testing procedure shall be explained to the test subject prior to conducting the screening test.

a. Portacount™ Fit Test Requirements:

1. Check the respirator to make sure the sampling probe and line are properly attached to the facepiece and that the respirator is fitted with a particulate filter capable of preventing significant penetration by the ambient particles used for the fit test (e.g., NIOSH 42 CFR 84 Series 100, Series 99, or Series 95 particulate filter) per manufacturer's instruction.

2. Instruct the person to be tested to don the respirator for five minutes before the fit test starts. This purges the ambient particles trapped inside the respirator and permits the wearer to make certain the respirator is comfortable. This individual shall already have been trained on how to wear the respirator properly.

3. Check the following conditions for the adequacy of the respirator fit: chin properly placed; adequate strap tension, not overly tightened; fit across nose bridge; respirator of proper size to span distance from nose to chin; tendency of the respirator to slip; and self-observation in a mirror to evaluate fit and respirator position.

4. Have the person wearing the respirator do a user seal check. If leakage is detected, determine the cause. If leakage is from a poorly fitting facepiece, try another size of the same model respirator, or another model of respirator.

5. Follow the manufacturer's instructions for operating the Portacount™ and proceed with the test.

6. The test subject shall be instructed to perform the exercises in Item A.14 of this attachment.

7. After the test exercises, the test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of respirator shall be tried.

b. Portacount™ Test Instrument:

1. The Portacount™ will automatically stop and calculate the overall fit factor for the entire set of exercises. The overall fit factor is what counts. The Pass or Fail message will indicate whether or not the test was successful. If the test was a Pass, the fit test is over.

2. Since the pass or fail criterion of the Portacount™ is user programmable, the test operator shall ensure that the pass or fail criterion meet the requirements for minimum respirator performance in this attachment.

3. A record of the test needs to be kept on file, assuming the fit test was successful. The record must contain the test subject's name; overall fit factor; make, model, style, and size of respirator used; and date tested.

3. Controlled Negative Pressure (CNP) Quantitative Fit Testing Protocol - The CNP protocol provides an alternative to aerosol fit test methods. The CNP fit test method technology is based on exhausting air from a temporarily sealed respirator facepiece to generate and then maintain a constant negative pressure inside the facepiece. The rate of air exhaust is controlled so that a constant negative pressure is maintained in the respirator during the fit test. The level of pressure is selected to replicate the mean inspiratory pressure that causes leakage into the respirator under normal use conditions. With pressure held constant, air flow out of the respirator is equal to air flow into the respirator. Therefore, measurement of the exhaust stream that is required to hold the pressure in the temporarily sealed respirator constant yields a direct measure of leakage air flow into the respirator. The CNP fit test method measures leak rates through the facepiece as a method for determining the facepiece fit for negative pressure respirators. The CNP instrument manufacturer, Dynatech Nevada, also provides attachments (sampling manifolds) that replace the filter cartridges to permit fit testing in an employee's own respirator. To perform the test, the test subject closes his/her mouth and holds his/her breath, after which an air pump removes air from the respirator facepiece at a pre-selected constant pressure. The facepiece fit is expressed as the leak rate through the facepiece, expressed as milliliters per minute. The quality and validity of the CNP fit tests are determined by the degree to which the in-mask pressure tracks the test pressure during the system measurement time of approximately five seconds. Instantaneous feedback in the form of a real-time pressure trace of the in-mask pressure is provided and used to determine test validity and quality. A minimum fit factor pass level of 100 is necessary for a half-mask respirator and a minimum fit factor of at least 500 is required for a full facepiece respirator. The entire screening and testing procedure shall be explained to the test subject prior to conducting the screening test.

a. CNP Fit Test Requirements:

1. The instrument shall have a non-adjustable test pressure of 15.0 mm water pressure.

2. The CNP system defaults selected for test pressure shall be set at 15 mm of water (-0.58 inches of water) and the modeled inspiratory flow rate shall be 53.8 liters per minute for performing fit tests.

(Note: CNP systems have built-in capability to conduct fit testing that is specific to unique work rate, mask, and gender situations that might apply in a specific workplace. Use of system default values, which were selected to represent respirator wear with medium cartridge resistance at a low-moderate work rate, will allow inter-test comparison of the respirator fit.)

3. The individual who conducts the CNP fit testing shall be thoroughly trained to perform the test.

4. The respirator filter or cartridge needs to be replaced with the CNP test manifold. The inhalation valve downstream from the manifold either needs to be temporarily removed or propped open.

5. The test subject shall be trained to hold his/her breath for at least 20 seconds.

6. The test subject shall don the test respirator without any assistance from the individual who conducts the CNP fit test.

7. The QNFT protocol shall be followed according to Item C.1 of this attachment with an exception for the CNP test exercises.

b. CNP Test Exercises:

1. Normal Breathing: In a normal standing position, without talking, the subject shall breathe normally for 1 minute. After the normal breathing exercise, the subject needs to hold head straight ahead and hold his/her breath for 10 seconds during the test measurement.

2. Deep Breathing: In a normal standing position, the subject shall breathe slowly and deeply for 1 minute, being careful not to hyperventilate. After the deep breathing exercise, the subject shall hold his/her head straight ahead and hold his/her breath for 10 seconds during test measurement.

3. Turning Head Side to Side: Standing in place, the subject shall slowly turn his/her head from side to side between the extreme positions on each side for 1 minute. The head shall be held at each extreme momentarily so the subject can inhale at each side. After the turning head side to side exercise, the subject needs to hold head full left and hold his/her breath for 10 seconds during test measurement. Next, the subject needs to hold head full right and hold his/her breath for 10 seconds during test measurement.

4. Moving Head Up and Down: Standing in place, the subject shall slowly move his/her head up and down for 1 minute. The subject shall be instructed to inhale in the up position (i.e., when looking toward the ceiling). After the moving head up and down exercise, the subject shall hold his/her head full up and hold his/her breath for 10 seconds during test measurement. Next, the subject shall hold his/her head full down and hold his/her breath for 10 seconds during test measurement.

5. Talking: The subject shall talk out loud slowly and loud enough so as to be heard clearly by the test conductor. The subject can read from a prepared text such as the Rainbow Passage, count backward from 100, or recite a memorized poem or song for 1 minute. After the talking exercise, the subject shall hold his/her head straight ahead and hold his/her breath for 10 seconds during the test measurement.

6. Grimace: The test subject shall grimace by smiling or frowning for 15 seconds.

7. Bending Over: The test subject shall bend at the waist as if he/she were to touch his/her toes for 1 minute. Jogging in place shall be substituted for this exercise in those test environments such as shroud-type QNFT units that prohibit bending at the waist. After the bending over exercise, the subject shall hold his/her head straight ahead and hold his/her breath for 10 seconds during the test measurement.

8. Normal Breathing: The test subject shall remove and re-don the respirator within a one-minute period. Then, in a normal standing position, without

talking, the subject shall breathe normally for 1 minute. After the normal breathing exercise, the subject shall hold his/her head straight ahead and hold his/her breath for 10 seconds during the test measurement. After the test exercises, the test subject shall be questioned by the test conductor regarding the comfort of the respirator upon completion of the protocol. If it has become unacceptable, another model of a respirator shall be tried.

c. CNP Test Instrument:

1. The test instrument shall have an effective audio warning device when the test subject fails to hold his/her breath during the test. The test shall be terminated whenever the test subject failed to hold his/her breath. The test subject may be refitted and retested.

2. A record of the test shall be kept on file, assuming the fit test was successful. The record must contain the test subject's name; overall fit factor; make, model, style, and size of respirator used; and date tested.

ATTACHMENT 5
RESPIRATOR FIT TEST FORM

NAME (Please Print): ______________________ SIGNATURE: ______________________

SSN: ________-______-________ HOME DEPT: ________________ DATE: __________

CONDUCTED BY: ______________________ LOCATION: ______________________

FIT TEST PROTOCOL	TYPE OF RESPIRATOR (Circle Appropriate One)
QUANTITATIVE: Fit Factor ______________________	APR/HF APR/FF SCBA SAR/EGS PAPR OTHER
QUALITATIVE: Irritant Smoke: Other (specify):	Respirator Manufacturer: ______________ Model: ______________________ Size: ______________________

INITIAL:

1. I understand why respiratory protection is needed and where and when it should be used. ☐

2. I know how to use this respirator properly. ☐

3. I know how to clean and inspect this respirator. ☐

4. I understand the limitations and restrictions of this respirator. ☐

5. I wore this respirator in normal air and performed the user seal. ☐

6. I wore this respirator equipment in a test atmosphere. ☐

7. I understand that a good gas-tight face seal cannot be achieved with obstructions such as facial hair or glasses. ☐

8. I understand that corrective lenses compatible with the full facepiece are available by my manager. ☐

ATTACHMENT 6

EMERGENCY RESPIRATORY PROTECTIVE EQUIPMENT MONTHLY INSPECTION CHECKLIST

INSPECTED BY (Print):______________________________ DATE: ____________

BACKPACK#: ______________________________ AIR CYLINDER#: _____

			PASS	FAIL
A. Backpack and Harness Assembly	1. Straps	Inspect for complete set	☐	☐
		Inspect for damaged straps	☐	☐
	2. Buckles	Inspect for mating ends	☐	☐
		Check locking function	☐	☐
	3. Backplage and Cylinder Lock	Inspect backplage for cracks, missing screws/rivets	☐	☐
		Inspect cylinder hold down strap	☐	☐
		Inspect strap tightener	☐	☐
B. Cylinder and Cylinder Valve Assembly	1. Cylinder	Cylinder tight to backplate	☐	☐
		Current Hydrostatic Test	☐	☐
		Inspect cylinder for dents, gouges	☐	☐
		Is cylinder at least 90% filled?	☐	☐
	2. Head and Valve Assembly	Inspect cylinder valve lock for presence	☐	☐
		Inspect cylinder gauge for condition	☐	☐
		Proper function of cylinder valve lock	☐	☐
		Test for cylinder leakage	☐	☐
C. Regulator and High Pressure Hose	1. High Pressure Hose and Connector	Leakage in hose	☐	☐
		Leakage in hose to cylinder connector	☐	☐
	2. Regulator and Low Pressure Alarm	Read regulator gauge (at least 1,000 psi)	☐	☐
		Low pressure alarm sounds at 500 psi	☐	☐
		Test integrity of diaphragm	☐	☐
		Test for positive pressure	☐	☐
		Test bypass system	☐	☐
D. Facepiece and Corrugated Breathing Tube	1. Facepiece	Inspect harness for deterioration	☐	☐
		Inspect facepiece body for deterioration	☐	☐
		Inspect lens	☐	☐
		Inspect exhalation valve	☐	☐
	2. Breathing Tube and Connector	Inspect breathing tube for deterioration	☐	☐
		Inspect connector for threads and gasket	☐	☐
	3. Leak Test and Cleaning	Perform negative pressure test on facepiece/ breathing tube	☐	☐
		Clean and sanitize facepiece	☐	☐

Note: Any item marked "Fail" will place the equipment out of service until repaired or replaced.

ATTACHMENT 7

GUIDE TO RESPIRATORY PROTECTIVE EQUIPMENT: CLEANING, INSPECTION, MAINTENANCE, AND STORAGE

A program for the maintenance of respirators shall include the following:

- Cleaning and sanitizing
- Inspection for defects
- Maintenance and repair
- Storage
- Assurance of breathing air quality.

The following maintenance, inspection, and storage program is recommended.

1. **Cleaning and Sanitizing**
   Respirators issued to an individual shall be cleaned and sanitized regularly. Each respirator shall be cleaned and sanitized before being worn by different individuals. Respirators intended for emergency use shall be cleaned and sanitized after being used. The following shall be completed in addition to the manufacturer's instruction for cleaning:

   a. Remove, when necessary, the following components of respiratory inlet covering assemblies before cleaning and sanitizing:

      1. Filters, cartridges, canisters
      2. Speaking diaphragms
      3. Valve assemblies
      4. Any components recommended by the respirator manufacturer.

   b. Wash respiratory inlet covering assemblies in warm (43°C or 110°F maximum temperature) cleaner sanitizer solution. A stiff bristle (not wire) brush may be used to facilitate removal of dirt or other foreign material.

   c. Rinse the respirator inlet covering assemblies in clean, warm (43°C or 110°F maximum temperature) water.

   d. Drain all water, and air dry the respiratory inlet covering assemblies.

   e. Clean and sanitize all parts removed from the respiratory inlet covering assemblies as recommended by the manufacturers

   f. If necessary to remove foreign material, hand wipe respiratory inlet covering assemblies, all parts, and all gasket- and valve-sealing surfaces with damp, lint-free cloth.

   g. Inspect parts and replace any that are defective.

h. Reassemble parts on respirator inlet covering assemblies.

i. Visually inspect and, where possible, test parts and respirator assemblies for proper function.

j. Place assembled respirators in appropriate containers for storage.

Machines may be used to expedite the cleaning, sanitizing, rinsing, and drying of large numbers of respirators. Extreme care shall be taken to ensure against tumbling, agitation, or exposure to temperatures above those recommended by the manufacturer (normally 43°C or 100°F maximum), as these conditions are likely to result in damage to the respirators.

Ultrasonic cleaners, clothes washing machines, dishwashers, and clothes dryers have been specially adapted and successfully used for cleaning and drying respirators.

Cleaner sanitizers that effectively clean the respirator and contain a bactericidal agent are commercially available. The bactericidal agent frequently used is a quaternary ammonium compound. Strong cleaning and sanitizing agents and many solvents can damage rubber or elastomeric respirator parts. These materials must be used with caution.

Alternatively, respirators may be washed in a detergent solution and then sanitized by immersion in a sanitizing solution. Some sanitizing solutions that have proven effective are: (a) a hypochlorite (bleach) solution (50 parts per million chlorine), 2-minute immersion; (b) an aqueous iodine solution (50 parts per million of iodine), 2-minute immersion; or (c) a quaternary ammonium solution (200 parts per million of quaternary ammonium compounds in water with less than 500 parts per million total hardness), 2-minute immersion.

Inflammation of the skin of the respirator user (dermatitis) may occur if the quaternary ammonium compounds are not completely rinsed from the respirator. The hypochlorite and iodine solutions are unstable and break down with time; they may cause deterioration of rubber or other elastomeric parts and may be corrosive to metallic parts. Immersion times should not be extended beyond the mentioned time periods, and the sanitizers shall be thoroughly rinsed from the respirator parts.

Respirators may become contaminated with toxic materials. If the contamination is light, normal cleaning procedures should provide satisfactory decontamination; otherwise, separate decontamination steps may be required before cleaning.

2. **Inspection**

The user shall inspect the respirator immediately prior to each use to ensure that it is in proper working condition. After cleaning and sanitizing, each respirator shall be inspected to determine if it is in proper working condition, if it needs replacement parts or repairs, or if it should be discarded. Each respirator stored for emergency or rescue use shall be inspected at least monthly.

Respirator inspection shall include a check for tightness of connections; for the condition of the respiratory inlet covering, head harness, valves, connecting tubes, harness assemblies, hoses, filters, cartridges, canisters, end-of-service indicators, electrical components, and shelf-life date(s); and for the proper function of regulators, alarms, and other warning systems. Each rubber or other elastomeric part shall be inspected for pliability and signs of deterioration. Each air and oxygen cylinder shall be inspected to ensure that it is fully charged according to the manufacturer's instructions.

A record of inspection dates shall be kept for each respirator maintained for emergency or rescue use. Respirators that do not meet applicable inspection criteria shall be immediately removed from service (a temporary replacement assigned) and repaired or permanently replaced.

Inspection of hoop-wrapped air cylinders will follow the recommendations set forth in the Compressed Gas Association, Inc. publication CGA C-6.2-1988, "Guidelines for Visual Inspection & Requalification of Fiber Reinforced High Pressure Cylinders," and will be examined for the following five types of damage:

- Abrasion is damage caused by wearing, grinding, or rubbing away by friction. Abrasions less than 0.005 inch (0.127 mm) deep are acceptable and should have no adverse effects on the safety of the cylinder. Abrasions with isolated groups of fibers exposed or flat spots with a depth greater than 0.005 inch (0.127 mm) but less than 0.0075 inch (0.191 mm) are acceptable if the damage is repaired. Cylinders abraded in excess of 0.0075 inch (0.191 mm) should be taken out of service until professionally inspected.

- Cuts are damage inflicted by a sharp object. Cuts or scratches less than 0.005 inch (0.127 mm) deep are acceptable regardless of length, number, or direction. For cuts greater than 0.005 inch (0.127 mm) deep and up to a depth of 0.015 inch (0.038 mm) with a maximum 1- or 2-inch (25.4 mm or 50.8 mm) length transverse to the fiber direction, the cylinder should be removed from service until repaired. Cylinders with cuts greater than 0.015 inch (0.038 mm) with a maximum greater than 2 inches (50.8 mm) length transverse to the fiber direction or with bare metal showing through must be condemned.

- Impact damage is caused by a cylinder striking or being struck by another object. Impact damage is considered slight if a frosted area is noted in the impact area. These cylinders may be returned to service. Impact damage is severe if evidence of fiber cutting, delamination, and possible structural damage is apparent. Cylinders sustaining severe impact damage should be evaluated using the guidelines for cuts and structural damage.

- Structural damage is damage which causes a visual change in original cylinder configuration. This change can include any evidence of bulges, a cocked end fitting, concave areas on the domes or on the cylinder section, or, if by visual inspection of the cylinder interior, there is evidence of damage involving deformation of the liner. Structurally damaged cylinders must be immediately removed from service and condemned.

- Heat or fire damage to a cylinder is evident by discoloration, charring, or burning of the composite, labels, paint, or plastic components of the valve. Such damage would cause a cylinder to be removed from service and condemned. Note: If the cylinder is only soiled from smoke or other debris and is found to be intact underneath, it may be returned to service.

3. **Maintenance and Repair**
Replacement of parts or repairs shall be done only be persons trained in proper respirator maintenance and assembly. Replacement parts shall be only those designated for the specific respirator repaired. Reducing or admission valves, regulators, and alarms shall be adjusted or repaired by the respirator manufacturer or a technician trained by the manufacturer. Instrumentation for valve, regulator, and alarm adjustments and tests should be calibrated to a standard traceable to the National Institute of Standards and Technology (NIST), at a minimum of every 3 years.

4. **Storage**
Respirators shall be stored in a manner that will protect them against physical and chemical agents such as vibration, shocks, sunlight, heat, extreme cold, excessive moisture, or damaging chemicals. Respirators shall be stored to prevent distortion of rubber or other elastomeric parts. Respirators shall not be stored in such places as lockers and tool boxes, unless they are protected from contamination, distortion, and damage. Emergency and rescue respirators that are placed in the work areas shall be quickly accessible at all times, and the storage cabinet or container in which they are stored shall be clearly marked.

5. **Assurance of Breathing Air Quality**
Compressed gaseous air, compressed gaseous oxygen, liquid air, and liquid oxygen used for respiration shall be of high purity. Compressed gaseous air shall meet at least the requirements of the specification for Type I-Grade D breathing air, and liquid air shall meet at least the requirements for Type II-Grade B breathing air as described in ANSI/CGA G-7.1-1989.

The CGA designation for Grade D and Grade E breathing air is as follows:

- Grade D breathing air, as per ANSI/CGA G-7.1-1989, shall contain between 19.5 and 23.5 percent oxygen with the balance predominantly nitrogen, a maximum of 5 mg/m^3 oil (condensed), a maximum of 10 ppm carbon monoxide, no pronounced odor, and a maximum of 1,000 ppm carbon dioxide.

- Grade E breathing air, as per ANSI/CGA G-7.1-1989, shall contain between 20 and 22 percent oxygen with the balance predominantly nitrogen, a maximum of 5 mg/m^3 oil (condensed), a maximum of 10 ppm carbon monoxide, no pronounced odor, a maximum of 500 ppm carbon dioxide, and 25 ppm total hydrocarbon content (as methane).

- Note: The quality verification for oil is not required for synthesized air whose oxygen and nitrogen components are produced by air liquefaction. Carbon monoxide quality verification is not required for Grade D breathing air if synthesized air when nitrogen component was previously analyzed and meets National Foundry (NF) specification and when the oxygen component was produced by air liquefaction and meets United States Pharmacopeia (USP) specification.

Compressed gaseous air may contain low concentrations of oil introduced from equipment during processing or normal operation. If high-pressure oxygen passes through an oil- or grease-coated orifice, an explosion or fire may occur. Therefore, compressed gaseous oxygen shall not be used in supplied air respirators or in open-circuit type self-contained breathing apparatus that have previously used compressed air. Oxygen concentrations greater than 23.5 percent shall be used only in equipment designed for oxygen service or distribution.

The dew point of air used to recharge self-contained breathing apparatus shall be -65°F or lower (less than 25 ppm water vapor). The driest air obtainable (dew point of -100°F or lower) should be used for recharging SCBA cylinders to be used in environments with ambient temperatures below -25°F. The dew point of breathing air used with supplied air respirators should be lower than the lowest ambient temperature to which any regulator or control valve on the respirator or air-supplied system will be exposed.

Breathing air couplings shall be incompatible with outlets for nonrespirable plant air or other gas systems to prevent inadvertent servicing of supplied air respirators with nonrespirable gases. **It is recommended that Foster or Hansen fittings be reserved for breathing air systems.** Breathing air outlets shall be labeled.

Breathing air may be supplied to supplied air respirators from cylinders or air compressors. Cylinders shall be tested and maintained in accordance with applicable DOT specifications for shipping containers (49 CFR 173 and 178). Breathing gas containers shall be marked in accordance with ANSI/CGA C-4-1990. Specific test recommendations for purchased breathing air are given in the following table.

Method of Preparation	Analysis Recommended
Compression: Supplier does not fill cylinders with any other gases.	Check 10% of cylinders from each lot for ppm CO and odor.
Compression: Supplier fills cylinders with gases other than air.	Analyze all cylinders for percent oxygen. Check 10% of cylinders from each lot for ppm CO and odor.
Reconstitution.	Analyze all cylinders for percent oxygen. Check 10% of cylinders from each lot for ppm CO and odor.

A compressor shall be constructed so as to avoid entry of contaminated air. For all air compressors, including portable types, the air intake location shall be carefully selected, and monitored closely to ensure continued quality of air supply to the compressor. The system shall be equipped as necessary with a suitable in-line air-purifying sorbent bed and filter to further assure breathing air quality. Maintenance and replacement/refurbishment of compressor and associated air-purifying/filter media shall be performed periodically, by trained personnel following manufacturer's recommendations and instructions.

As part of acceptance testing, and prior to initial use, representative sampling of the compressor air output shall be performed to ensure that it complies with the requirements in Paragraph 1 of this section. To ensure a continued high-quality air supply, and to account for any distribution system contaminant input, a representative sample should be taken at distribution supply points. Samples should be collected on a periodic basis, as directed by the Program Coordinator. Specific test recommendations are given in the following table.

Type/Sample	Oil Lubricated	Non-Oil Lubricated	Combustion Engine Powered
Water Vapor	✓	✓	✓
Carbon Monoxide	✓		✓
Condensed Hydrocarbon	✓		✓
Carbon Dioxide			✓
Odor	✓	✓	✓

NOTES:

1. When using air compressors, intake location shall be carefully selected and monitored closely to ensure air supplied to the compressor is of adequate quality.

2. No frequency for periodic checks of air quality is specified, due to wide variation in equipment types, use, working environments, and operating experience.

3. Continuous monitoring of temperature and carbon monoxide are not required.

4. For non-oil lubricated compressors that operate at less than 35 psi, no sampling for water is required.

5. These requirements apply to systems designed for breathing air, other air-supply systems need to be evaluated on a case-by-case basis for the type and frequency of testing.

Further details on sources of compressed air and its safe use can be found in CGA G-7-1988.

PROCEDURE

Subject: MOTOR VEHICLE OPERATION: GENERAL REQUIREMENTS

1.0 PURPOSE AND SUMMARY

This procedure prescribes the general requirements for the operation of motor vehicles on company business. All operators of company owned, leased, and rented vehicles, as well as personal vehicles used on company business, are covered by this procedure. U.S. Department of Transportation (DOT) regulated personnel must also comply with the guidelines contained in Procedure HS810. Key elements of this procedure include:

- All employees who drive or may drive on company business must be familiar with the requirements of this procedure and certify their acceptance of the Company Rules for Motor Vehicle Operation (Attachment 2). In addition, the most current version of Attachment 2 must be signed annually during each employee's performance review.

- All new hire candidates shall complete the Pre-employment Driving Record Certification (Attachment 3). This certification will be evaluated via the established point system to determine driving privilege status.

- Employees must report all vehicular citations incurred while on company business to their supervisor. Once reported, the established evaluation criteria in Section 5.4 will be used to determine corrective actions.

- Employees utilizing vehicles while on company business are required to review this procedure and attend a company-designated driver training class.

- Requests for the re-instatement of denied or revoked driving privileges can be made to the appropriate business line health and safety manager.

2.0 TABLE OF CONTENTS

3.0 RESPONSIBILITY MATRIX

3.1 Procedure Responsibility

The Vice President, Health and Safety is responsible for the issuance, revision, and maintenance of this procedure.

3.2 Action/Approval Responsibilities

The Responsibility Matrix is Attachment 1.

4.0 DEFINITIONS

Chargeable Vehicle Accident - Any at-fault vehicle accident meeting any one of the following criteria:

- An individual other than an employee of the company is a party in the accident.
- Property owned by a person or entity other than the company is damaged.
- When only company employees, company owned or leased (not rented) vehicles, and property is involved and damage exceeds $1,000.00.

Company - All wholly-owned subsidiaries of The IT Group, Inc.

Motor Vehicle - Any passenger vehicle, including trucks, used upon the highway or in private facilities for transporting passengers and/or property. This includes personal vehicles operated on company business. For the purpose of this procedure, off-road vehicles, such as earthmoving equipment, forklifts, non-highway use trucks, etc., are not considered vehicles.

5.0 TEXT

5.1 Company Rules for Motor Vehicle Operation

All employees who will or may be required to operate a company owned, leased, or rented motor vehicle or a personal vehicle used on company business shall acknowledge acceptance of the Company Rules for Motor Vehicle Operation (Attachment 2) prior to such operation. The signed form shall be retained in the employee's personnel file. Each year during performance appraisals, covered employees shall be required to sign a copy of the most current Company Rules for Motor Vehicle Operation, which will then replace the previous copy in the personnel file.

5.2 Pre-employment Evaluation

The local Health and Safety Assistant shall distribute a copy of this procedure to all new hire candidates for the completion of Attachments 2 and 3. Information provided shall be evaluated via the point system in Section 5.3, and the hiring manager advised regarding any hiring or driving privilege restrictions that may apply. Hiring of persons with regular driving duties (e.g., field technicians and leadmen, sales persons, or others with assigned company motor vehicles) may only proceed after the information contained in Attachment 3 is evaluated.

Once Attachment 3 is completed, it is to be faxed to the Corporate Health and Safety Department at (412) 858-3976. The driving status of the prospective employee will be reported to the appropriate Human Resources Department in two to three working days. The local Health & Safety Assistant will notify the appropriate Human Resources manager when the attachments are not returned.

Discrepancies between the certified driving record report and Attachment 3 shall be reviewed with the prospective employee. Deliberate falsification of driving record information will disqualify prospective employees from being hired.

5.3 Pre-employment Driving Record Point System

The following point system will be used to evaluate the driving record of all new hire candidates that can reasonably be expected to operate a motor vehicle during their employment. For contested accidents or citations, conviction/settlement dates shall be used to determine point system applicability.

Pre-employment Driving Record Point System	
Description	**Assigned Point Value**
Overweight, loss of load, vehicular equipment infraction, etc.	1
Moving violation: speeding, failure to stop, failure to signal turn, etc.	2
At-fault accident	3
Major citation: reckless driving, hit and run, suspended license, speed contest, open container, etc.	6
Driving under the influence	8

If a new hire candidate has accumulated three (3) points or less in the last twelve (12) months or five (5) points or less in the last twenty-four (24) months, they will be given the privilege to drive motor vehicles on company business without restrictions.

If they accumulate four (4) to six (6) points in the last twelve (12) months or six (6) to eight (8) points in the last twenty-four (24) months, they will be placed on probation for a period of twelve (12) months. They will be afforded the privilege to drive motor vehicles on company business during this probationary period. Any company-related driving infractions (i.e., speeding tickets, at-fault accidents, citations, etc.) accumulated during this probationary period will result in termination of the privilege to drive a motor vehicle on company business.

If the new hire candidate has accumulated seven (7) to eleven (11) points in the last twelve (12) months or nine (9) to fifteen (15) points in the last twenty-four (24) months, they will not be eligible for company driving privileges. Employment can only be offered with the strict understanding of denial of the privilege to drive motor vehicles on company business. After the first twelve (12) months of employment, the employee can petition the Vice President, Health and Safety or his/her designee for reconsideration of driving privileges.

The accumulation of twelve (12) points or more in the last twelve (12) months or sixteen (16) points or more in the last twenty-four (24) months will preclude employment.

5.4 Employee Evaluation Criteria

All employees who may operate a motor vehicle on company business will become familiar with the requirements of this procedure, complete the currently-designated company driver training class, and complete Attachment 2 <u>prior</u> to such operation. The employee driving evaluation criteria is based upon infractions incurred while on company business. It is imperative that employees notify their supervisors within 24 hours of a work-related citation or accident. Once notified, the supervisor will ensure the completion of Attachment 4, forward it to the appropriate Human Resources Department, and initiate one of the following corrective actions.

5.4.1 Minor Citation

When an employee is given a minor citation (i.e., speeding ticket, moving violation, failure to signal turn, loss of load, etc.), the employee's supervisor will meet the with employee to discuss the corrective action that must be taken so that further violations do not occur. At a minimum, the supervisor shall require the employee to attend a recognized course in defensive driving on his/her own time. The cost of this training will be borne by the employee. The supervisor will provide written direction to the employee regarding the assigned corrective action(s). The supervisor will forward a copy to the appropriate Human Resources Department for inclusion in the employee's personnel file.

5.4.2 Major Citation

When an employee is given a major citation (i.e., reckless driving, suspended license, hit and run, speed contest, etc.), the supervisor will hold a meeting with the employee, at which time the supervisor will complete the company Disciplinary Action Form (Procedure HR207) thereby informing the employee that any additional infractions will lead to more severe disciplinary action. In addition, the employee will be required to attend a recognized defensive driving course on his/her own time and will be suspended from work for one day without pay. A copy of the Disciplinary Action Form shall be forwarded to the appropriate Human Resources Department for their information and inclusion in the employee's personnel file.

5.4.3 Failure to Notify

Should an employee fail to notify his/her supervisor of a work-related citation or accident within 24 hours of occurrence, his/her company driving privilege will be revoked. The supervisor will also take disciplinary action that is appropriate for the unreported event. If the unreported event is either an at-fault accident or driving under the influence case, the termination process will be initiated. All disciplinary actions shall be documented to the employee by the supervisor. This copy, and any written response by the employee, shall be forwarded to the appropriate Human Resources Department for their information and inclusion in the employee's personnel file.

5.4.4 At-Fault Accident

Whenever an employee operating a company owned/leased/rented vehicle or their personal vehicle on company business is involved in an at-fault vehicle accident, an Accident Review Board shall be convened and recommend the corrective action to be taken. At a minimum, the action shall include the completion of a recognized driver safety course on their time and at their expense. All disciplinary actions resulting from at-fault vehicle accidents will be reviewed for consistency by the appropriate Safety Council.

Depending upon the circumstances and severity of the accident, termination of the employee can be considered. As above, this must be approved by the appropriate Human Resources Department. All communication to the employee regarding the accident and resulting action shall be in writing with a copy to the appropriate Human Resources Department for their information and inclusion in the employee's personnel file.

5.4.5 Driving Under the Influence

Whenever an employee is convicted or pleads no contest to a company-related driving under the influence charge, he/she will be immediately terminated.

5.5 Training

All employees who will, or may reasonably be expected to, drive a company owned/ leased/rented vehicle shall review this procedure and complete the currently-designated company driver training class prior to such operation. This class is designed to be locally taught and must include the following elements: federal/state/local driving rules, company driving rules, emergency/accident procedures, defensive driving techniques, and specific guidelines on the vehicle(s) to be operated. Locations conducting this class shall provide the Knoxville Health and Safety Training Department with a copy of the course attendance sheet.

5.6 Reinstatement of Driving Privilege

Any employee who has had his/her privilege to drive a motor vehicle on company business revoked or denied, and who desires to reinstate this privilege, must apply to the business line health and safety manager for reinstatement. The business line health and safety manager shall specify a rehabilitation program (if applicable), an external safe driving course, and any other requirements which he/she deems appropriate. Once the employee completes the program, documentation of successful completion must be formally presented to the Vice President, Health and Safety, or his/her designee. If the documentation is accepted, the driving privilege may be reinstated.

Reinstatement of the driving privilege may occur one (1) time, at the discretion of the Vice President, Health and Safety or his/her designee. If employee driving performance leads to a subsequent revocation of this privilege, such <u>revocation shall be permanent</u>.

6.0 EXCEPTION PROVISIONS

Variances and exceptions may be requested pursuant to the provisions of Procedure HS013, Health and Safety Procedure Variances.

7.0 CROSS REFERENCES

HR207 Employee Disciplinary Action
HS013 Health and Safety Procedure Variances
HS020 Accident Prevention Program: Reporting, Investigation, and Review
HS810 Motor Vehicle Operation: Federal Motor Carrier Safety Regulations for Driver Qualifications

8.0 ATTACHMENTS

1. Responsibility Matrix
2. Company Rules for Motor Vehicle Operation
3. Pre-employment Driving Record Certification
4. Notification of Work-Related Citation

ATTACHMENT 1

MOTOR VEHICLE OPERATION: GENERAL REQUIREMENTS RESPONSIBILITY MATRIX

Action	Procedure Section	Responsible Party					
		Local Health & Safety Assistant	Business Line Health and Safety Manager	Supervisor	Accident Review Board	Corporate Health and Safety	Vice President, Health and Safety
Issue, Revise, and Maintain This Procedure	3.1						X
Ensure Employees Complete Attachment 2	5.1			X			
Distribute HS800 to New Hire Candidates for Completion of Attachments 2 and 3	5.2	X					
Request Evaluation of New Hire Driving Record	5.2	X					
Obtain Driving Record and Determine Driving Status	5.2					X	
Initiate Corrective Actions	5.4			X			
Ensure Completion and Distribution of Attachment 4	5.4			X			
Accident Review	5.4.4				X		
Ensure Drivers Meet Training Requirements	5.5			X			
Specify Program for Reinstatement of Driving Privilege	5.6		X				
Reinstatement of Driving Privilege	5.6						X

ATTACHMENT 2

COMPANY RULES FOR MOTOR VEHICLE OPERATION

1. Prior to motor vehicle operation, all motor vehicle operators are required to provide the company with current documentation of licensing for the motor vehicle(s) to be operated. Supervisors shall review and approve said documentation.

2. The motor vehicle operator is responsible for the vehicle, and for conducting a pre-trip inspection prior to use (including load, if applicable). No vehicle with any mechanical defect which endangers the safety of the driver, passengers, or the public shall be used.

3. All vehicles, other than automobiles, shall have small convex mirrors attached to the side mirrors.

4. The operator is responsible for complying with all state and local traffic laws, as well as customer regulations concerning motor vehicle operation.

5. The operator and all passengers shall use seat belts <u>at all times</u> when the vehicle is in motion.

6. No employee shall operate a motor vehicle when abnormally tired, temporarily disabled, or under the influence of alcohol or drugs.

7. No employee shall allow a company owned, leased, or rented motor vehicle to be operated by an unauthorized employee or non-employee.

8. All employees shall drive defensively at all times.

9. No employee shall drive beyond any barricades or into any area with designations such as "HAZARDOUS" or "DO NOT ENTER."

10. Use caution when driving through congested areas, or near where personnel and equipment are working.

11. Whenever possible, a spotter shall be used for backing all vehicles. This may be a fellow company employee, or a non-company employee who is willing to help.

12. Unless required, such as on a client's property, keys shall not be left in an unattended vehicle.

13. Employees shall not leave the driver's seat of a vehicle while the motor is running. Exemption: Vehicles equipped with a power take-off device with parking brake set and chocks in place.

14. No motorcycles are to be operated on company business.

15. Radar detectors are prohibited in all company owned, leased, or rented vehicles.

COMPANY RULES FOR MOTOR VEHICLE OPERATION

16. Analytical samples will be transported in accordance with 49 CFR regulations. Regulated hazardous substances shall not be transported in personal vehicles.

17. In case of an accident, the following steps shall be taken:

    A. Stop.
    B. Call for medical assistance in case of injuries.
    C. Notify police.
    D. Complete Vehicle Accident Report and submit to your supervisor as soon as possible.

18. Whenever a vehicle is stopped upon the traveled portion of a highway or the shoulder of a highway, for any cause other than necessary traffic stops, the driver shall, as soon as possible, place or activate the warning devices with which the vehicle is equipped.

19. Employee must notify the supervisor within one (1) working day regarding work related citations, accidents, and license expiration, suspension, or revocation.

20. Before operating any company vehicle, the operator shall briefly walk around the vehicle to inspect for unsafe conditions or obstructions, and to check that the load (if applicable) is properly secured.

21. No employee is authorized to operate a company vehicle (including rentals) after having been on duty for a period of 16 hours. No employee may drive for more than 12 hours in any single on-duty period. Once either of these criteria have been met, a period of 8 consecutive hours off duty is required before driving duties may be resumed. These are maximum, not minimum, requirements and employees may be unfit to drive after shorter on-duty periods. Commercial DOT drivers are subject to the more restrictive hours of service regulations described in Procedure HS810.

22. Project-assigned hourly employees are not permitted to operate company owned, leased, or rented vehicles after 10:00 p.m. without written authorization from their supervisor.

I have read and understand company Procedure HS800 and the company Rules for Motor Vehicle Operation, and agree to abide by all requirements.

__________________	__________________	__________
Employee's Name (Printed)	Employee's Signature	Date

ATTACHMENT 3

PRE-EMPLOYMENT DRIVING RECORD CERTIFICATION

DATE ____________ REQUESTOR ______________________ PHONE NO. ______________

CANDIDATE'S HOME DEPARTMENT NUMBER ______________________________________

	Assigned Point Value
Overweight, loss of load, vehicular equipment infraction, etc.	1
Moving violation: speeding, failure to stop, failure to signal turn, etc.	2
At-fault accident	3
Major citation: reckless driving, hit and run, suspended license, speed contest, open container, etc.	6
Driving under the influence	8

In the space provided below, please list all violations and accidents currently listed on your driving record by the state issuing your driver's license (include all states for which you have held a driver's license during the last two [2] years). Determine the number of points assigned from the table above, and write in column labeled "Points." Finally, write the sum total of all points where indicated.

Violations/Accidents	Driver License #/State	Date (mo/yr)	Points

Total Points ______

I hereby certify that the information provided is a complete and accurate statement of my driving record for the previous twenty-four (24) months. I authorize the company to obtain a copy of my driving record from the state of issuance of my license(s). I understand that falsification of data will disqualify me from being hired.

Driver's License No. ____________________________ State of Issuance ____________________

Expiration Date ______________________________ Date of Birth ______________________

______________________________________ S.S.N. ____________________________

New Hire Candidate Name (Printed)

______________________________________ ______________________________________

Signature Date

PLEASE FAX THIS FORM TO THE CORPORATE HEALTH AND SAFETY DEPARTMENT AT (412) 858-3976

ATTACHMENT 4

NOTIFICATION OF WORK-RELATED CITATION

This form is to be completed by employees incurring a work-related vehicular citation. Once complete, it is to be signed by the employee's supervisor and forwarded to the appropriate Human Resources Department for inclusion in the employee's personnel file.

Employee Name ______________________ Employee No. __________ Date ________

Nature of Citation ____

____

Location of Citation (City, State) ____

Date/Time Citation Received ____

Is Citation Being Contested? ☐ No ☐ Yes Details ____________________

____

____

Employee Signature ______________________________ Date __________

Corrective Action Being Taken ____

____

____

Supervisor Signature ______________________________ Date __________

APPENDIX C
SAFETY PLAN ACKNOWLEDGEMENT

WORKER ACKNOWLEDGEMENT TO HEALTH-AND-SAFETY PLAN

I HAVE READ THE SITE-SAFETY PLAN FOR THIS SITE AND FULLY UNDERSTAND ITS CONTENTS.

Name	Date

APPENDIX D
ACTIVITY HAZARD ANALYSES

ACTIVITY HAZARD ANALYSIS FOR SITE MOBILIZATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Site Mobilization	Slips, Trips, Falls	• Clear walkways work areas of equipment, tools, vegetation, excavated material and debris • Mark, identify, or barricade other obstructions		
	Spills	• Clean up spills before initiating maintenance • Review maintenance procedures for safety practices		
	Equipment failure	• Perform daily maintenance inspections on operating equipment		
	Electrical Shock	• De-energize or shut off utility lines at their source before work begins • Use double insulated or properly grounded electric power-operated tools • Provide an equipment-grounding conductor program or employ ground-fault circuit interrupters • Use qualified electricians to hook up electrical circuits • Inspect all extension cords daily for structural integrity, ground continuity, and damaged insulation • Cover or elevate electric wire or flexible cord passing through work areas to protect from damage • Keep all plugs and receptacles out of water • Use approved water-proof, weather-proof type if exposure to moisture is likely • Inspect all electrical power circuits prior to commencing work • Follow IT procedure HS315 – Control of Hazardous Energy Sources	Lockout/Tagout Devices	Voltage Meter or Tic Tracer

ACTIVITY HAZARD ANALYSIS FOR SITE MOBILIZATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Site Mobilization (continued)	Handling Heavy Objects	• Observe proper lifting techniques • Review proper lifting posture/techniques regularly at safety meetings • Obey sensible lifting limits (60 lb. Maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads • Avoid carrying heavy objects above shoulder level		
	Sharp Objects	• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Maintain all hand and power tools in a safe condition	Leather gloves	
	High Noise Levels	• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period) • Assess noise level with sound level meter if possibility exists to exceed 85 dB A TWA	Ear plugs	Sound Level Meter
	High/Low Ambient Temperature	• Monitor for Heat Stress in accordance with IT Health and Safety Procedures HS400 • Provide fluids to prevent worker dehydration		Meteorological Equipment

EQUIPMENT REQUIRED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
• Vehicles • Hand tools	• Daily equipment inspections as per manufacturers requirements • Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers)	• Review AHA with all task personnel • Review Site Specific Health and Safety Plan. • Review operations/safety manuals for all equipment utilized

Approved By Site Supervisor (Signature)

Date

ACTIVITY HAZARD ANALYSIS FOR SILT FENCE INSTALLATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Silt Fence Installation	Sharp Objects	• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Use shears, opposed to knives, to cut the silt fence.	Leather gloves	
	Slips, Trips, Falls	• Clear walkways, work areas of equipment, tools, vegetation and debris • Mark, identify, or barricade other obstructions		
	Handling Heavy Objects	• Observe proper lifting techniques • Obey sensible lifting limits (60 lb. Maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads		
	Eye Injuries	• Wear face shield, goggles when operating powered clearing / grubbing equipment	Goggles and face shield	
	Overexertion	• Use the right tool for the task at hand • Avoid actions/activities that produce overexertion		
	Horseplay	• Prohibit horseplay at all project sites • Review rules about horseplay with subcontractor • supervisors and workers • Remind workers not to respond/participate in horseplay • started by others		
	Allergic Reaction	• Review allergy hazards with work crew • Identify workers with allergies • Review work assignments PPE upgrades	Tyvek coveralls, duct tape bottom of coveralls to boots; latex gloves, if required	

ACTIVITY HAZARD ANALYSIS FOR SILT FENCE INSTALLATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Silt Fence Installation (continued)	Insect Stings	• Avoid hand mowing/clearing in dense brush areas, suspected Areas of stinging insects	Leather gloves	
	Contact with Poison Ivy	• Identify workers who are known to contract poison ivy • Wear PPE and tape joints to keep poison ivy irritants/ plant matter away from skin • Use protective creams and wash with poison ivy preventing soaps when working in suspected exposure area	Long sleeve shirts, Tyvek coveralls, Leather gloves	
	High/Low Ambient Temperature	• Monitor for Heat stress in accordance with IT's Health and Safety Procedures # HS400 • Provide fluids to prevent worker dehydration		Meteorological Equipment

EQUIPMENT REQUIRED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
• Silt Fence • Posts • Shovels	• Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers)	• Review AHA with all task personnel • Review SSHP • Review MSDS for Grout

Approved By Site Manager (Signature) Date

ACTIVITY HAZARD ANALYSIS FOR SOIL EXCAVATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Excavation of Soil	Underground/Overhead Utilities	• Identify all utilities at the site before work commences • Cease work immediately if unknown utility markers are uncovered • Use manual excavation within 3 feet of known utilities • Utility clearance shall conform with 29 CFR 1926.955 (high voltage >700 kv) 15 feet phase to ground clearance; 31 feet phase to phase clearance		
	Struck By/ Against Heavy Equipment	• Wear reflective warning vests when exposed to vehicular traffic • Isolate equipment swing areas • Make eye contact with operators before approaching equipment • Understand and review hand signals • Step away from equipment when bucket adjustments are made. • Do not attempt verbal communication in high noise Backgrounds • Park equipment in areas where operator can see clearly to dismount equipment • Report minor incidents to site supervisor		
	Sharp Objects	• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Maintain all hand and power tools in a safe condition • Keep guards in place during use • Observe work area and location of other personnel before lifting/moving objects with sharp edges	Leather gloves	

ACTIVITY HAZARD ANALYSIS FOR SOIL EXCAVATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Excavation of Soil (continued)	High Noise Levels	• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period) • Assess noise level with sound level meter if possibility exists that level may exceed 85dBA TWA	Ear plugs	Sound Level Meter
	Slips, Trips, Falls	• Clear, walkways of equipment, vegetation, excavated material, tools and debris • Mark, identify, or barricade other obstructions • Exit equipment slowly and maintain three point contact • Clean boot soles before climbing on equipment		
	Handling Heavy Objects	• Observe proper lifting techniques • Review proper lifting posture/techniques regularly at safety meetings • Obey sensible lifting limits (60 lb. Maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads • Avoid carrying heavy objects above shoulder level • Warm up muscles before engaging in manual lifting	Warning vests, hard hat, safety glasses, steel toe work boots	
	Inhalation and Contact with Hazardous Substances	• Provide workers proper skin, eye and respiratory protection based on the exposure hazards present • Review hazardous properties of site contaminants with workers before operations begin • Monitor breathing zone air to determine levels of contaminants • Dampen soil using light water spray to prevent fugitive dust emissions	Tyvek coveralls, latex inner gloves, nitrile outer gloves, neoprene or latex boots for spotter (See Section 6.0 HASP)	Miniram

ACTIVITY HAZARD ANALYSIS FOR SOIL EXCAVATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Excavation of soil (continued)	Excavation Wall Collapse	• Construct diversion ditches or dikes to prevent surface water from entering excavation • Provide good drainage of area adjacent to excavation • Store excavated material at least 2 feet from the edge of the excavation; prevent excessive loading of the excavation face		
	Walking on machine tracks	• Avoid walking on machine tracks whenever possible; clean tracks for safe walking/working surfaces • Observe track surfaces when walking, move cautiously on uneven, slippery surfaces • Avoid sudden awkward motions (pulling/jerking fuel hoses)		
	High/Low Ambient Temperature	• Monitor for Heat stress in accordance with IT Health and Safety Procedures HS400 • Provide fluids to prevent worker dehydration		Meteorological Equipment

ACTIVITY HAZARD ANALYSIS FOR SOIL EXCAVATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Manual Excavation	Struck/Struck By	• Use the right tool for the task at hand • Maintain personal balance when performing manual excavation • Concentrate on the work task being performed		
	Overexertion	• Use the right tool for the task at hand • Avoid actions/activities that produce overexertion		
	Horseplay	• Prohibit horseplay on all project sites • Review rules about horseplay with subcontract supervisors and workers • Remind workers not to respond/participate in horseplay started by others		

EQUIPMENT REQUIRED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
• Excavator • Shovels, probes • Miniram	• Daily equipment inspections as per manufacturers requirements • Excavation inspection/permit • Confined space permit (potential) • Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers)	• Review AHA with all task personnel • Review SSHP • Review operations/safety manuals for all equipment utilized • Review site specific chemical hazards

Approved By Site Manager (Signature) ______________________

Date ______________________

ACTIVITY HAZARD ANALYSIS FOR SOIL LOADOUT				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Soil Loadout	Struck By/ Against Heavy Equipment	• Wear reflective warning vests when exposed to vehicular traffic • Obey posted speed limits • Isolate equipment swing areas • Make eye contact with operators before approaching equipment • Understand and review hand signals • Exit equipment slowly and maintain three point contact • Report minor incidents to site supervision • Park equipment in areas where operator can see clearly to dismount equipment • Step away from equipment when bucket adjustments are made • Do not attempt verbal communication in high noise backgrounds • Follow hand signals of ground workers for equipment manipulation when placing/loading equipment into loader bucket.	Warning vests, Hard hat, Safety glasses, Steel toe work boots	
	Slips, Trips, Falls	• Clear walk ways, work areas of equipment, tools and debris • Mark, identify, or barricade other obstructions • Clean mud from boots before climbing on equipment		
	Sharp Objects	• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects • Maintain all hand and power tools in a safe condition • Keep guards in place during use	Leather gloves	

ACTIVITY HAZARD ANALYSIS FOR SOIL LOADOUT				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Soil Loadout (continued)	High Noise Levels	• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period) • Assess noise level with sound level meter if possibility exists that level may exceed 85dBA TWA	Ear plugs	Sound Level Meter
	Handling Heavy Objects	• Observe proper lifting techniques • Obey sensible lifting limits (60 lb. Maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads • Avid carrying heavy objects above shoulder level • Avoid actions/activities that contribute to overexertion • Warm up muscles before engaging in manual lifting activities • Review lifting posture/techniques regularly at safety meetings		
	Defective Vehicles	• Inspect all trucks before loading • Do not load soil or equipment into defective equipment		
	Roadways	• Ensure that the roadways on the route to the landfill or final destination are designed to handle the weight of the vehicles and allow HAZMAT materials		
	Horseplay	• Prohibit horseplay on all project sites • Review rules about horseplay with subcontractor supervisors and workers • Remind workers not to respond/participate in horseplay stared by others		

ACTIVITY HAZARD ANALYSIS FOR SOIL LOADOUT				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Soil Loadout (continued)	High/Low Ambient Temperature	• Monitor for Heat stress in accordance with IT Health and Safety Procedures # HS400 • Provide fluids to prevent worker dehydration		Meteorological Equipment

EQUIPMENT REQUIRED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
• Excavator • Trucks • Loader	• Daily equipment inspections as per manufacturers requirements • Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers)	• Review AHA with all task personnel • Review SSHP • Review operations/safety manuals for all equipment utilized • Review site specific chemical hazards

Approved By Site Manager (Signature)

Date

ACTIVITY HAZARD ANALYSIS FOR BACKFILLING

Task Breakdown	Potential Hazards	Critical Safety Practices	Personal Protective Clothing and Equipment	Monitoring Devices
Backfilling	Slips, Trips, Falls	• Clear walkways, work areas of equipment, tools, construction debris and other materials • Mark, identify, or barricade other obstructions		
	Handling Heavy Objects	• Observe proper lifting techniques • Obey sensible lifting limits (60 lb. maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads		
	Struck by/ Against Heavy Equipment, Flying Debris, Protruding Objects	• Wear reflective warning vests when exposed to vehicular traffic • Isolate equipment swing areas • Make eye contact with operators before approaching equipment • Barricade or enclose the work area • Restrict work area entry to authorized personnel only during construction activities • Wear hard hats, safety glasses with side shields, and steel-toe safety boots • Understand and review hand signals	Warning vests, Hard hat, Safety glasses, Steel toe work boots	
	High Noise Levels	• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period) • Assess noise level with sound level meter if possibility exists that level may exceed 85dBA TWA	Ear plugs	Sound Level Meter

ACTIVITY HAZARD ANALYSIS FOR BACKFILLING				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Backfilling (continued)	High/Low Ambient Temperature	• Monitor for Heat stress in accordance with IT Health and Safety Procedures HS400 • Provide fluids to prevent worker dehydration		Meteorological Equipment

EQUIPMENT REQUIRED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
• Excavator • Dozer • Dump trucks	• Daily equipment inspections as per manufacturers requirements • Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers)	• Review AHA with all task personnel • Review SSHP • Review operations/safety manuals for all equipment utilized

Approved By Site Supervisor (Signature)　　　　Date

ACTIVITY HAZARD ANALYSIS FOR EQUIPMENT DECONTAMINATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Equipment Decontamination	Slips, Trips, Falls	• Clear walkways, work areas of equipment, vegetation, tools and debris • Mark, identify, or barricade other obstructions • Clean heavy objects of oil/grease or other slippery contamination before attempting to lift/remove • Wear gloves with grip improving surfaces for handling large, slippery objects • Clean up spills or water accumulation in walkways		
	Struck by/Against Heavy Equipment, Protruding Objects	• Wear reflective warning vests when exposed to vehicular traffic • Isolate equipment swing areas • Make eye contact with operators before approaching equipment • Understand and review hand signals • Step away from equipment when bucket adjustments are made • Do not attempt verbal communication in high noise backgrounds	Warning vests hard hat safety glasses, goggles and face shield, steel toe work boots	
	Inhalation and Contact with Hazardous Substances, & Splashes	• Provide workers proper skin, eye and respiratory protection based on the exposure hazards present • Review hazardous properties of site contaminants with workers before operations begin • Wear hard hats, safety glasses with side shields, or goggles with splash shields and steel-toe safety boots	PVC rain suit or Tyvek coveralls, nitrile or latex gloves, neoprene or latex boots (See Section 6.0 HASP)	

ACTIVITY HAZARD ANALYSIS FOR EQUIPMENT DECONTAMINATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Equipment Decontamination (Continued)	Burns	• Wear proper gloves, face shield/safety goggles, shin and toe guards, and splash suits to protect workers from skin burns and injury when operating laser (high pressure washers) • Tape gloves to PPE sleeves to lessen the possibility of hat water entering gloves • Use hand tools to loosen connections and position body to avoid pressure discharge • Wear shin and toe guards to protect from burns, lacerations and similar injuries	Goggles and face shield, shin and toe guards	
	Handling Heavy Objects	• Observe proper lifting techniques • Obey sensible lifting limits (60 lb. maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads • Avoid actions/activities that contribute to overexertion • Warm up muscles before engaging in manual lifting activities • Review lifting posture/techniques regularly at safety meetings		

ACTIVITY HAZARD ANALYSIS FOR EQUIPMENT DECONTAMINATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Equipment Decontamination (Continued)	Sharp Objects/ Cuts and Punctures	• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges/objects or working with hand tools • Maintain all hand and power tools in a safe condition • Keep guards in place during use • Guard or pad metal edges of objects frequently used (access panels, etc.) or manipulated/bypassed during maintenance • Position heavy objects to avoid manipulation while cleaning • Get assistance and dry glove surfaces to improve grip during object manipulation while cleaning	Leather gloves	
	High Noise Levels	• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period) • Assess noise level with sound level meter if possibility exists that level may exceed 85dBA TWA	Ear plugs	Sound Level Meter
	Repetitive Strains	• Rotate job tasks on high vibration equipment • Report equipment that produces high vibration for inspection and maintenance • Wear vibration reducing gloves		
	Strains and Sprains	• Maintain a safe stance and body position operating pressurized equipment • Avoid rushing		
	High/Low Ambient Temperature	• Monitor for Heat stress in accordance with IT Health and Safety Procedures # HS400 • Provide fluids to prevent worker dehydration		Meteorological Equipment

ACTIVITY HAZARD ANALYSIS FOR EQUIPMENT DECONTAMINATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
EQUIPMENT TO BE USED		INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS	
• Pressure Sprayer		• Equipment inspections • Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers)	• Review SSHP • Review site-specific AHA with all task personnel • Review Health and Safety Procedure HS303 • Review site specific contamination • Review operation manuals for the pumps and related equipment	

Approved By Site Manager (Signature)

Date

ACTIVITY HAZARD ANALYSIS FOR SOIL SAMPLING				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Sampling	Handling Heavy Objects	• Observe proper lifting techniques • Obey sensible lifting limits (60 lb. maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads		
	Slips, Trips, Falls	• Clear walkways, work areas of equipment, tools, vegetation, excavated material, and debris • Mark, identify, or barricade other obstructions		
	Inhalation and Contact with Hazardous Substances	• Provide workers proper skin and eye protection based on the exposure hazards present • Review hazardous properties of site contaminants with workers before operations begin	Sample gloves	
	High Ambient Temperature	• Monitor for Heat stress in accordance with IT Health and Safety Procedures HS400 • Provide fluids to prevent worker dehydration		Meteorological Equipment

EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
• Sample containers • Coolers	• Excavation inspections/permits • Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers)	• Review SSHP • Review site-specific AHA with all task personnel • Review site specific chemical hazards

Approved By Site Manager (Signature)

Date

JOB SAFETY ANALYSIS FOR SITE RESTORATION				
Task Breakdown	**Potential Hazards**	**Critical Safety Practices**	**Personal Protective Clothing and Equipment**	**Monitoring Devices**
Site Restoration	Struck by/ Against Heavy Equipment, Protruding Objects	• Wear reflective warning vests when exposed to vehicular traffic • Avoid equipment swing areas • Make eye contact with operators before approaching equipment • Wear hard hats, safety glasses with side shields, or splash/face shields and goggles, and steel-toe safety boots at all times • Understand and review hand signals	Warning vests, Hard hat, Safety glasses, Steel toe work boots	
	Slips, Trips, Falls	• Clear, walkways of equipment, tools, debris, other materials • Mark, identify, or barricade other obstructions		
	High Noise Levels	• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period) • Assess noise level with sound level meter if possibility exists that level may exceed 85dBA TWA	Ear plugs	Sound Level Meter
	Handling Heavy Objects	• Observe proper lifting techniques • Obey sensible lifting limits (60 lb. per person for manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large, awkward loads		

JOB SAFETY ANALYSIS FOR SITE RESTORATION				
Task Breakdown	Potential Hazards	Critical Safety Practices	Personal Protective Clothing and Equipment	Monitoring Devices
Site Restoration (continued)	High/Low Ambient Temperature	• Monitor for Heat stress in accordance with IT Health and Safety Procedures # HS400 • Provide fluids to prevent worker dehydration	I	Meteorological Equipment

EQUIPMENT TO BE USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
• Bob Cat or Forklift for moving bulky loads • Grass Seed	• Equipment inspections • Inspection of all emergency equipment (i.e.: first aid kits, fire extinguishers)	• Review SSHP • Review site-specific JSA with all task personnel • Review operation manuals for the pumps and related equipment

Approved By Site Supervisor (Signature)

Date

APPENDIX E
ACCIDENT PREVENTION PLAN

APPENDIX E

ACCIDENT PREVENTION PLAN

1.0 SIGNATURE SHEET

Plan Preparer: Health and Safety Coordinator	Alison Harwood Alison Harwood, ASP (770) 663-1428 (office)
Approved by: Program Health and Safety Manager	Alison Harwood for Robert Brooks, CSP (732) 469-5599 (office)
Approved by: Project Manager	Taylor Sword (757) 363-7190 (office)

2.0 BACKGROUND INFORMATION

2.1 OHM REMEDIATION SERVICES CORPORATION, A SUBSIDIARY OF THE IT GROUP (OHM/IT)

Contract No. N62470-97-D-5000
Task Order 055

The principal tasks to be conducted are listed below:

- Site Mobilization
- Install Silt Fence/Erosion Control
- Soil Sampling
- Soil Excavation
- Soil Loadout
- Backfilling
- Equipment Decontamination
- Site Restoration

2.2 OHM/IT ACCIDENT EXPERIENCE

YEAR	EMR (Interstate)*	OSHA Recordable Incident Rate*
1999	0.53	3.3
1998	0.58	3.7
1997	0.54	2.5

* OHM/IT

2.3 HAZARDOUS ACTIVITIES REQUIRING ACTIVITY HAZARD ANALYSIS*

- Site Mobilization
- Install Silt Fence/Erosion Control
- Soil Sampling
- Soil Excavation
- Soil Loadout
- Backfilling
- Equipment Decontamination
- Site Restoration

*OHM/IT's Activity Hazard Analyses are also referred to as Job Safety Analyses (JSAs) and are located in the Site Specific Health and Safety Plan Appendix D.

3.0 STATEMENT OF SAFETY AN HEALTH POLICY

3.1 CORPORATE POLICY STATEMENT (ATTACHED)

PROCEDURE

Subject: SAFETY

1.0 PURPOSE AND SUMMARY

It is the policy of International Technology Corporation to provide a safe and healthful workplace for all employees, subcontractors, and consultants in compliance with governmental requirements. Additionally, the requirements of our clients shall take precedence provided that their requirements exceed those of IT Corporation and governmental regulations.

<u>We believe in two fundamental principles of safety: all accidents, injuries and occupational illnesses are preventable; and if an operation cannot be done safely, we will not do it</u>. To put these principles into practice, every associate will receive the appropriate training, equipment, and other resources necessary to complete assigned tasks in a safe and efficient manner.

Safety, industrial hygiene and loss prevention are the direct responsibility of all members of management, who must create an environment in which everyone shares a concern for their own safety and the safety of their associates. Safety shall take precedence over expediency or short cuts. It is a condition of employment that all employees work safely and follow established safety rules and procedures. No individual(s) may pose a direct threat to the health and safety of other individuals in the workplace.

Managers must conduct their businesses in compliance with governmental safety regulations and company procedures. All International Technology Corporation health and safety procedures shall be implemented for all IT employees on all projects where IT Corporation is the subcontractor, or a joint venture partner. If IT Corporation is the prime contractor, IT procedures shall be applied to all IT and subcontractor personnel.

<u>The implementation of effective safety and health practices is a key measure of managerial performance</u>. Management, with the assistance of the internal health and safety professional staff, will conduct audits to assess the effectiveness of the safety program(s) in place, and to identify areas for improvement. All deficiencies shall be corrected promptly.

All injuries, occupational illnesses, vehicle accidents, and incidents with potential for injury or loss will be investigated. Appropriate corrective measures will be taken to prevent recurrence, and to continually improve the safety of our workplace.

4.0 RESPONSIBILITIES AND LINES OF AUTHORITIES

Safety responsibilities, accountability and lines of authority are discussed in Section 2.0 of the HASP. The Project Manager (PM), Site Supervisor (SS), Certified Industrial Hygienist (CIH), Health and Safety Manager (HSM), Health and Safety Coordinator (HSC), and Site Safety Officer (SSO) are responsible for formulating and enforcing health and safety requirements, and implementing the Site Specific Health and Safety Plan (HASP).

5.0 SUBCONTRACTORS AND SUPPLIERS

5.1 NO SUBCONTRACTORS ARE ANTICIPATED FOR THE SITE ACTIVITIE

6.0 TRAINING

6.1 SAFETY INDOCTRINATION SUBJECTS:

Outlines of the site safety orientation for OHM/IT / sub-contract personnel and visitors are provided in Section 10.0 of the HASP.

6.2 MANDATORY TRAINING AND CERTIFICATIONS

Mandatory training and certifications are discussed in Section 10.0 of the HASP. All personnel entering the exclusion zone will be trained in the provisions of this Accident Prevention Plan and be required to sign the Accident Prevention Plan.

Site-specific training for SWMU 8 will include a review of potential site contaminants, Hazard Communication as per 29 CFR 1910.1200/1926.59, site physical and environmental hazards, emergency response and evacuation procedures, and emergency telephone numbers will be held at the site location by the SS and SSO before any site work activities begin. Although all OHM/IT workers receive confined space training during initial 40 hour health and safety training, site specific training, including rescue procedures, will be conducted before any confined space entry is performed.

6.3 EMERGENCY RESPONSE TRAINING

All OHM/IT personnel who have completed 40 hour HAZWOPER Training are qualified as emergency responders per 29 CFR 1910.120/1926.65 (e)(3)(iv). Site Specific Emergency Response Procedures will be reviewed with all site personnel as a part of site indoctrination.

6.4 SUPERVISORY AND EMPLOYEE SAFETY MEETINGS

The OHM/IT SS and SSO will conduct daily safety meetings at the start of each work shift for on-site personnel and will require subcontractors to follow similar meeting procedures or participate in the OHM/IT daily safety meetings. Daily safety meetings will comply with HS051 (see IT Health and Safety Procedures Manual).

7.0 SAFETY AND HEALTH INSPECTIONS

7.1 SAFETY INSPECTIONS

The OHM/IT Project Manager and Site Supervisors/ Superintendents are required to conduct bi-monthly inspections of their sites using the Project Safety Inspection Report according to HS021 (see IT Health and Safety Procedures Manual). SSOs are responsible for conducting and preparing reports of daily safety inspections of work processes, site conditions, equipment conditions and submitting them to SS. The SSO will discuss any necessary corrective actions with the SS and review new procedures. Copies of these reports are maintained on file at the project locations.

The OHM/IT Health and Safety Manager (HSM) or his designated representative will periodically conduct site visits and perform Site Safety Assessments. These reports are kept on file at the Somerset, New Jersey, Office and are tracked in a database for each OHM/IT Project Manager and Supervisor/ Superintendent, including the number of action items noted during the visit and written confirmation of the corrective actions for each item. These responses are compiled and provided to program management for review.

7.2 EXTERNAL INSPECTIONS/CERTIFICATIONS

OHM/IT does not anticipate, but may consider the use of outside sources, to provide safety inspections on an as necessary basis.

As required, OHM/IT safety equipment will comply with appropriate OSHA (Occupational Safety and Health Administration), NIOSH (National Institute for Occupational Safety and Health), ANSI (American National Standards Institute), ASTM (American Society for Testing and Materials), and US Coast Guard or other recognized certification organizations.

8.0 SAFETY AND HEALTH EXPECTATIONS, INCENTIVE PROGRAMS, AND COMPLIANCE

8.1 COMPANY SAFETY PROGRAM GOALS

OHM/IT considers safety the highest priority during work at a site containing potentially hazardous materials and has established a goal of **zero incidents** for all projects. All projects will be conducted in a manner which minimizes the probability of near misses, equipment/property damage or injury. OHM/IT will establish programs to recognize people and projects that demonstrate excellence in safety performance. OHM/IT will use safety observation programs to identify and correct unsafe acts and conditions. Safety awareness programs will be used to provide continuous training and development of good safety practices. OHM/IT site supervision will investigate all incidents to determine root causes and institute corrective actions to prevent recurrence. OHM/IT will provide and enforce safety rules to protect employees, subcontractors, clients and the public.

8.2 OHM/IT SAFETY INCENTIVE PROGRAMS:

A copy of the OHM/IT Safety Incentive Award Program is provided at the project. The OHM/IT Project Manager will develop a site-specific program for approval by the HSM and the Business Line Lead within 10 days of project mobilization.

8.3 OHM/IT EMPLOYEE SAFETY RESPONSIBILITY REQUIREMENTS

Each employee is responsible for personal safety as well as the safety of others in the area and is expected to participate fully in the ***Safety Improvement Process***, particularly the Safety Observation Program. The employee will use all equipment provided in a safe and responsible manner as directed by the SS. All OHM/IT personnel will follow the policies set forth in the IT Group Health and Safety Procedures HS001-999. Site personnel concerned with any aspect of health and safety shall bring it to the attention of the SS/SSO. If not satisfied, they should contact the HSM or HSC. All project personnel have the authority to stop work if in their judgement serious injury could result from continued activity. The SS and the SSO shall be notified immediately if this becomes necessary. To protect the health and safety of all personnel, employees that knowingly disregard safety policies/procedures may be subject to disciplinary actions up to and including termination. OHM/IT Employee Safety Responsibility is fully detailed in HS010 Employee Safety and Health Work Rules (see IT Health and Safety Procedures Manual).

8.4 MANAGERS AND SUPERVISORS SAFETY ACCOUNTABILITY

It is the duty of the first line supervisor to motivate employees to adhere to OHM/IT's safety policy in each work situation. A first line supervisor for these purposes is defined as that person designated to give immediate on-site supervision to personnel involved in a task.

All supervisors shall have complete knowledge of the safe procedure for all jobs and tasks under their supervision or when in doubt, shall seek assistance prior to initiating a task. This is the only acceptable manner in which to perform the task. If the task cannot be accomplished safely, it will not be attempted.

Supervisors will:

- Explain the safety procedure involved with a task to each employee and check frequently to see that the employee understands and works as instructed.
- Allocate sufficient time for the training and coaching of all employees to insure that everyone knows the correct procedure for safely accomplishing required tasks.
- Prevent new employees from performing any tasks until required training is completed.
- Immediately correct unsafe conditions, which involved OHM/IT employees or contractors.
- Ensure that the employees are outfitted with and wear personal protective equipment as specified by this APP, site-specific health and safety plan, other OHM/IT procedures or as directed by the SSO, HSC, CIH or HSM.
- Set a good safety example.
- Obtain the cooperation of employees and contractors.
- Provide a safe work environment for employees and contractors.
- Confirm contractor safety performance records have been verified prior to contract award and monitor contractor performance during operations.
- Report all accidents, near misses and property damage in accordance with the Incident Management and Reporting Procedure.
- Establish a safety culture, using the elements of the OHM/IT Safety Improvement process, which promotes awareness, encourages participation and recognizes excellence.

9.0 ACCIDENT REPORTING

9.1 EXPOSURE DATA (MAN-HOURS WORKED)

The Vice President of Health and Safety tracks and maintains incident records as to Federal reporting requirements (OSHA 200 Log). Incident rates are reported monthly to the Vice President of Health and Safety. Incident Rates and Workers Compensation losses are tracked for each business line.

9.2 ACCIDENT INVESTIGATIONS, REPORTS AND LOGS

The site supervisor conducts Accident/incident investigations. A report is completed by the site supervisor and is required to be reviewed and signed by the site safety officer and the Project Manager. The report must be submitted to the HSM within 24 hours. All incident reporting forms are provided in HS020.

9.3 IMMEDIATE NOTIFICATION OF MAJOR INCIDENTS

OHM/IT will immediately notify the client of any major incident, including injury, fire, equipment/ property damage and environmental incident. A full report will be provided within 24 hours. The following procedure will be followed in response to any major personal injury.

9.3.1 Response

The nearest workers will immediately assist a person who shows signs of medical distress or who is involved in an accident. The work crew supervisor will be summoned.

The work crew supervisor will immediately make radio contact with the site supervisor to alert him of a medical emergency situation. The work crew supervisor will advise the following information:

- Location of the victim at the work site
- Nature of the emergency
- Whether the victim is conscious
- Specific conditions contributing to the injury, if known

The following actions will then be taken depending on the severity of the incident:

- **Life-Threatening Incident** — If an apparent life-threatening condition exists, the crew supervisor will inform the emergency coordinator by radio, and the local Emergency Response Services (EMS) will be immediately called. An on-site person will be appointed who will meet the EMS and have him/her quickly taken to the victim. OHM/IT personnel will evacuate any injury within the EZ to a clean area for treatment by (EMS) personnel. No one will be able to enter the EZ without showing proof of training, medical surveillance and site orientation.

- **<u>Non Life-Threatening Incident</u>** — If it is determined that no threat to life is present, the Site Safety Officer will direct the injured person through decontamination procedures (see below) appropriate to the nature of the illness or accident. Appropriate first aid or medical attention will then be administered.

  *NOTE: The area surrounding an accident site must not be disturbed until the Site Safety Officer has cleared the scene.

Any personnel requiring emergency medical attention will be evacuated from exclusion and contamination reduction zones if doing so would not endanger the life of the injured person or otherwise aggravates the injury. Personnel will not enter the area to attempt a rescue if their own lives would be threatened. The decision whether or not to decontaminate a victim prior to evacuation is based on the type and severity of the illness or injury and the nature of the contaminant. For some emergency victims, immediate decontamination may be an essential part of life-saving first aid. For others, decontamination may aggravate the injury or delay life-saving first aid. Decontamination will be performed if it does not interfere with essential treatment.

If decontamination can be performed, observe the following procedures:

- Wash external clothing and cut it away.

If decontamination cannot be performed, observe the following procedures:

- Wrap the victim in blankets or plastic to reduce contamination of other personnel.

- Alert emergency and off-site medical personnel to potential contamination; instruct them about specific decontamination procedures.

- Send site personnel familiar with the incident and chemical safety information, e.g. MSDS, with the affected person.

10.0 MEDICAL SUPPORT

On-site Medical Support/Off-site Medical Arrangements are provided in Section 9.0 of the HASP.

11.0 PERSONAL PROTECTIVE EQUIPMENT

11.1 HAZARD ASSESSMENT PROCEDURES/WRITTEN CERTIFICATIONS FOR PERSONAL PROTECTIVE EQUIPMENT

Protection levels provided in the HASP will be established for the site work activities based on the levels of site contaminants and the scope of work. Once on-site, results of air monitoring and visual inspection of the work activities may indicate the need for changes in these PPE level(s). Any significant change in the PPE level will be approved by the SSO in consultation with the HSC, CIH and/or HSM. Personal Protective Equipment (PPE) selection criteria are outlined in HS 600 and HS601 (see IT Health and Safety Procedures Manual).

All personnel using respiratory protection will be cleared by a physician for use of a respirator and will be fit-tested to assure they can achieve an acceptable fit. Physician clearance and results of fit testing will be documented as required by HS100.

12.0 PLANS REQUIRED BY THE SAFETY MANUAL

12.1 HAZARD COMMUNICATION PROGRAM

The Site-Specific Hazard Communication Program is included Section 4.2 of the HASP. IT Hazard Communication Program complies with 29 CFR 1926.59/1910.1200 and is outlined in HS060 (see IT Health and Safety Procedures Manual).

12.2 EMERGENCY RESPONSE PLANS

The Site-Specific Emergency Response and Contingency Plan is included in Section 8.0 of the HASP.

12.3 LAYOUT PLANS

Site Layout Plans (indicating work zones) are attached. Work zones are defined in Section 5.0 of the HASP.

12.4 RESPIRATORY PROTECTION PLAN

The primary objective of respiratory protection is to prevent employee exposure to atmospheric contamination. When engineering measures to control contamination are not feasible, or while they are being implemented, personal respiratory protective devices will be used.

The criteria for determining respirator need have been evaluated based on the site contaminants. Air monitoring will be conducted to confirm that respiratory protection levels are adequate (see Section 8.0 HASP). All respirator users will be OSHA trained in proper respirator use and maintenance. The SS and SSO will observe workers during respirator use for signs of stress. The SS, CIH, HSM, and SSO will also evaluate the implementation of the HASP, periodically, to determine its continued effectiveness with regard to respiratory protection. All persons assigned to use respirators will have medical clearance to do so.

12.5 LEAD ABATEMENT PLAN

Not Applicable

12.6 ASBESTOS ABATEMENT PLAN

Not Applicable

12.7 ABRASIVE BLASTING

Not Applicable

12.8 CONFINED SPACE

Confined Space Entry Procedures are outlined in IT Procedure HS300 (see IT Health and Safety Procedures Manual).

12.9 HAZARDOUS ENERGY CONTROL PLAN

Lockout/Tagout Procedures are outlined in HS315. (See IT Health and Safety Procedures Manual).

12.10 CRITICAL LIFT PROCEDURES

Not Applicable

12.11 CONTINGENCY PLAN FOR SEVERE WEATHER

Contingency plans for severe weather are included in Section 9.0 of HASP. A site Specific Hurricane Preparedness Plan is located in Appendix F of the HASP.

12.12 ACCESS AND HAUL ROAD PLAN

Not Applicable

12.13 DEMOLITION PLAN

Not Applicable

12.14 EMERGENCY RESCUE (TUNNELING)

Not Applicable

12.15 UNDERGROUND CONSTRUCTION FIRE PREVENTION AND PROTECTION PLAN

Not Applicable

12.16 COMPRESSED AIR PLAN

Not Applicable

12.17 FORM WORK AND SHORING ERECTION AND REMOVAL PLANS

Not Applicable

12.18 LIFT SLAB PLANS

Not Applicable

12.19 SSHP

The OHM/IT Site Specific Health and Safety Plan is included with this submission.

12.20 BLASTING PLAN

Not Applicable

12.21 DIVING PLAN

Not Applicable

12.22 ALCOHOL AND DRUG ABUSE PREVENTION PLAN

OHM/IT substance abuse procedures are outlined in IT HS101 - Drug, and Alcohol Testing.

13.0 CONTRACTOR INFORMATION TO MEET THE REQUIREMENTS OF THE MAJOR SECTIONS OF EM 385-1-1

In addition to this Accident Prevention Plan, OHM/IT has prepared a Site-Specific Health and Safety Plan to meet the major requirements of USACE Manual 385-1-1. Additional procedures for major requirements are provided in the IT Group Health and Safety Procedures Manual HS001-999.

APPENDIX F
HURRICANE PREPAREDNESS PLAN

IT CORPORATION
A Member of The IT Group

HURRICANE PREPAREDNESS PLAN FOR THE EXCAVATION AND DISPOSAL OF CONTAMINATED SOILS AT SWMU 8, WEST ANNEX SANDBLAST AREA NAVAL AMPHIBIOUS BASE LITTLE CREEK VIRGINIA BEACH, VIRGINIA

Prepared for:

Department of the Navy
Contract No. N62470-97-D-5000
Task Order 55

Prepared by:

OHM Remediation Services Corp.
(A member of The IT Group)

Alison Harwood

Alison Harwood, ASP
Health and Safety Coordinator III

Reviewed and Approved by:

Alison Harwood for

Robert A. Brooks, CSP
Program Health and Safety Manager

July, 2000
Project 806397
Revision 0

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1.0 INTRODUCTION

PURPOSE

This procedure outlines the general responsibilities and actions to be taken in preparation for and response to a hurricane or hurricane warnings at the Naval Amphibious Base (NAB) Little Creek, Virginai Beach, Virginai. All personnel should understand that predicting the occurrence and path of a hurricane is difficult, however the risk can be minimized and controlled by following the procedures in this plan.

SCOPE

This procedure is applicable to all contractor personnel, including IT's subcontractors, temporary construction facilities, and remediation equipment present at the NAB Little Creek project sites.

DISCUSSION

This procedure provides information on how to protect personnel and property in the event of a hurricane. In the Virginia Beach area, attention must be paid to all hurricanes, since there is no way to determine with 100 percent accuracy whether a hurricane will actually hit the area until a few hours before landfall.

The following table demonstrates that the accuracy of forecasting where a hurricane landfall will occur is very low more than 24 hours in advance of a storm.

Hours Before Landfall	Maximum Probability Values
72 Hours	10 Percent
48 Hours	13-18 Percent
36 Hours	20-25 Percent
24 Hours	35-45 Percent
12 Hours	60-70 Percent

2.0 DEFINITIONS

The following definitions apply to various terms used in this document.

Conditions of Readiness (CORS):

Condition V - Destructive winds are possible at NAB Little Creek within 96 hours. Normal daily jobsite cleanup and good housekeeping practices.

Condition IV - Destructive winds are possible at NAB Little Creek within 72 hours. Normal daily jobsite cleanup and good housekeeping practices. Collect and store in piles or containers, scrap lumber, waste material, and rubbish for removal and disposal at the end of each workday. Maintain the construction site, including storage areas, free of accumulation of debris. Stack form lumber in neat piles less than 4 feet high. Remove all trash debris and other objects, which could become missile hazards. Contact client representative for Condition requirements, updates, and completion of required actions.

Condition III - Destructive winds are possible at NAB Little Creek within 48 hours. Maintain Condition IV requirements. Begin securing the jobsite for and taking those actions necessary for Condition I, which cannot be completed within 18 hours. Cease all routine activities, which might interfere with securing operations. Begin collecting and stowing all gear and portable equipment. Make preparations for securing buildings. Review requirements pertaining to Condition II and continue action as necessary to attain Condition III readiness. Contact the weather station on base for weather and COR updates and completion of required actions.

Condition II - Destructive winds are possible at NAB Little Creek within 24 hours. Curtail or cease routine activities until securing operations are complete. Reinforce or remove form work and scaffolding. Secure machinery, tools, equipment and materials, or remove from job site. Expend every effort to clear all missile hazards and loose equipment from the jobsite. Contact client representative for weather and COR updates and completion of required actions.

Condition I - Destructive winds are possible at NAB Little Creek within 12 hours. Perform and complete all remaining actions required for lower conditions of readiness. Secure the jobsite and leave the government premises.

Destructive Winds - Generally winds reaching or exceeding the force of a tropical storm ($\geq$ 39 mph or 34 knots). Winds from any storm system (tropical or otherwise) that are determined to have the potential to cause property damage or personal injury which would warrant NAB Little Creek to initiate a Condition IV alert.

Hurricane Watch - An announcement for specific areas where a hurricane or an incipient hurricane poses a possible threat to a coastal area, generally within 36 hours.

Hurricane Warning - A warning that sustained winds of 74 MPH (64 knots) or higher, associated with a hurricane are expected in a specified coastal area in 24 hours or less.

Hurricane - A tropical cyclone in which the maximum sustained surface wind is 64 knots (74 MPH) or greater.

Missile Hazard - Any object that may become airborne during high winds.

Severe Weather - Any storm of tropical or non-tropical origin that has the capacity to produce destructive winds

Storm Surge - An abnormal rise in sea level accompanying a hurricane or other intense storm, and whose height is the difference between the observed level of the sea surface and the level that would have occurred in the absence of the storm.

Storm Tide - The actual sea level resulting from the astronomical tide combined with the storm surge. This term is used interchangeably with "Hurricane Tide."

Tropical Depression - A tropical low-pressure system in which the maximum sustained surface wind is 33 knots (38 MPH) or less.

Tropical Storm - A tropical low pressure system in which the maximum surface wind ranges from 34 to 63 knots (39 to 73 MPH) inclusive. This is the strength at which the National Hurricane Center applies a name to the storm.

Tropical Storm Watch - Tropical storm conditions pose a threat to a coastal area generally within 36 hours.

Tropical Storm Warning - A warning for tropical storm conditions with sustained winds within the range of 39 to 73 MPH, which are expected in a specified coastal area within 24 hours or less.

3.0 RESPONSIBILITY

Project Manager – P.Taylor Sword

The Project Manager (PM) is responsible for ensuring that all adequate measures have been taken to prepare for hurricanes and to protect IT site personnel and property in the event of a hurricane. The PM will ensure that ample resources are available to implement this plan and that all personnel are aware of this plan and their responsibilities.

Site Supervisor/Site Health and Safety Officer – Ware Warburton

The Site Supervisor/Site Health and Safety Officer (SS/SSO) will communicate all hurricane information to site personnel, and keep the site personnel continually informed of the measures to be taken. The SS?SSO is responsible for the coordination and direction of site equipment shutdown and will oversee the preparation of site facilities for any imminent storm. The SS/SSO will oversee the coordination of both pre- and post-storm operations and will ensure that the proper material, equipment, and supplies are utilized to implement this procedure. Additionally, the SS/SSO will monitor weather information, including the National Weather Service probability values for landfall. The SS/SSO will maintain the necessary emergency supplies, and will periodically tour the site to ensure that proper steps are being taken to protect site personnel and property. The SS/SSO will develop the emergency contact list will be maintained in a site dedicated vehicle.

Note: When personnel identified in Section 3.0 leave the site, they are responsible for notifying the Project Manager of a designated back-up person. The back-up person will be instructed in their responsibilities in the event of a hurricane.

4.0 NORMAL OPERATIONS PROCEEDS

To prevent migration of contamination from personnel and equipment, work areas will be clearly specified as designated below prior to beginning operations. Each work area will be classified in accordance with NIOSH/OSHA/USCG/EPA'S document *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*. Each work area will be clearly identified using signs or physical barriers. The following work zones will be established according to SOP 5-3.

- Exclusion Zone
- Contamination Reduction Zone
- Support Zone

A log of all personnel visiting, entering or working on the site shall be maintained in a site dedicated vehicle. No visitor will be allowed in the EZ without showing proof of training and medical certification, per 29 CFR 1910.120(e), (f). Visitors will attend a site orientation given by the SSO and sign the HASP.

The following are standard safe work practices that apply to all site personnel and will be discussed in the safety briefing prior to initiating work on the site:

- Eating, drinking, chewing gum or tobacco, smoking is prohibited in the EZ/CRZs.

- Hands and face must be washed upon leaving the EZ and before eating, drinking, chewing gum, tobacco or smoking.

- A buddy system will be used. Hand signals will be established to maintain communication.

- During site operations, each worker will consider himself as a safety backup to his partner. Off-site personnel provide emergency assistance.

- Visual contact will be maintained between buddies on site when performing hazardous duties.

- No personnel will be admitted to the site without the proper safety equipment, training, and medical surveillance certification.

- All personnel must comply with established safety procedures. Any staff member who does not comply with safety policy, as established by the SSO or the SS, will be immediately dismissed from the site.

- Proper decontamination procedures must be followed before leaving the site.

- All employees and visitors must sign in and out of the site.

5.0 EMERGENCY OPERATING PROCEEDS

Condition V - Early Preparedness

The SSO will notify the PM and SS when a tropical storm has been named and/or any severe weather has the potential to produce destructive winds at NAB Little Creek within 96 hours. This will initiate Condition of Readiness (COR) Condition V. This phase will continue until:

The storm or condition is downgraded
The storm track poses no threat to the site
Condition IV begins

During Condition V, the progress of the storm will be monitored and tracked. The client will be contacted at least twice daily for Condition Requirements updates and to inform him of completion of required actions for Condition V.

See Appendix A for the Hurricane Preparedness Responsibility Punch List - Condition V.

Condition IV - (Destructive winds are possible within 72 Hours)

This COR starts when IT is notified by the client representative that severe weather is within 72 hours of posing a threat to the project location. The SS/SSO will ensure that the following steps are taken:

Monitor the storm and inform the PM and SS/SSO of its progress
Check PPE supplies and equipment to determine if any shipments are required or if pending shipments should be advanced or postponed

During Condition IV, the progress of the storm will be continuously monitored and tracked. The SS/SSO will instruct site personnel to begin general cleanup of all loose materials, which may pose a hazard during high winds or rain. This will include removal of all debris, trash, and other debris that may become missile hazards. All form lumber will be stacked in neat piles less than 4 feet high. The client representative will be contacted at least twice daily for Condition Requirements updates and to inform him of completion of required actions for Condition IV.

The SS/SSO will keep all site personnel advised of the status of the storm and site preparation activities. Due to the urgency and amount of work involved in preparing for a threatening storm, all construction operations which might interfere with securing operations, such as starting a major excavation, will cease.

The SS/SSO will ensure that the following steps are taken:

Fill fuel tanks in all equipment on-site
Secure stockpiled material on-site.
Review requirements for Condition II with all crew members.
Maintain condition IV requirements.

See Appendix A for the Hurricane Preparedness Responsibility Checklist - Condition IV.

Condition III - Tropical Storm Warning (Destructive winds are possible Within 48 Hours)

This COR starts when severe weather places the project site under a tropical storm warning. Condition III activities will also start if a threatening tropical storm is upgraded to a hurricane, or a severe storm approaching Marine Corps Auxiliary Landing Field has generated destructive winds in other locations. The PM and the SS/SSO will determine when to cease all operations based upon current weather conditions and/or as directed by the client representative. If the storm or Condition is downgraded, the PM, SS/SSO will meet with the client to decide if a downgrade of the COR is appropriate. Actions for Condition III will be maintained and the following shall also be completed:

Machinery, tools, equipment, and materials will be secured or removed form the site.
Take actions to secure jobsite necessary for Condition I that cannot be completed within 18 hours.

See Appendix A for the Hurricane Preparedness Responsibility Checklist - Condition III.

Condition II - Destructive Winds are anticipated <u>within 24 hours</u>.

Condition II begins when destructive winds are anticipated within 24 hours and/or as directed by the NAB Little Creek. The PM and the SS/SSO will determine when to demobilize from the site based upon weather conditions. During this phase:

The SS/SSO will:

Secure machinery, tools, equipment and materials or remove them from the jobsite.
Conduct a roll call of personnel on-site
Notify personnel, on leave, of schedule changes
Personnel needing to leave the project to attend to personal matters will notify their SS/SSO immediately.
All visitors from the site are evacuated
Make a final site walk-through to determine that the site is secure and clear all missile hazards from the jobsite
Inform the Project Manager that all personnel are being released from the site

Project Foreman will ensure that the following steps are taken:

Heavy equipment will be secured according to the manufacturer's recommendations
All small field equipment will be secured

If the storm or Condition is downgraded, the PM, and the SS/SSO will meet to decide if a downgrade of the phase is necessary.

See Appendix A for the Hurricane Preparedness Responsibility Checklist - Condition II.

Condition I - Destructive winds are anticipated within 12 hours.

Complete all remaining actions required for lower conditions of readiness.
Secure jobsite access and evacuate to safe refuge.

See Appendix A for the Hurricane Preparedness Responsibility Checklist - Condition I.

Resume Site Operations

The PM will contact the client representative to determine when site operations will resume. Although the hurricane/severe weather has passed, hazards may still exist because of water damage, other hazardous conditions, dangers from electric shock, poisonous snakes, etc.

The SS/SSO will conduct a damage survey with the PM and SS/SSO. Photographs of the storm damage at the site will be taken by the SS/SSO. They will develop a prioritized recovery plan from the survey findings. Subsequently, all site personnel will be notified when it is safe to return to work. Required personnel and subcontractor expertise will be mobilized to the site to repair any damaged equipment.

See Appendix A for the Hurricane Preparedness Responsibility Checklist - Resume Site Operations.

6.0 DEBRIEFING

Following the return to work of site personnel, the Site Supervisor will conduct a debriefing with site personnel. The debriefing will accomplish the following objectives:

Finalize a recovery plan
Review the Hurricane Plan for effectiveness
Suggest and agree on improvements to the plan
Incorporate plan changes

When completed, the PM and SS/SSO will meet with site personnel to discuss any corrective actions or changes in this plan.

7.0 REFERENCES

The following references and sources of information may be consulted for additional guidance on hurricane preparedness and response.

Disaster Planning Guide for Business and Industry, Federal Emergency Management Administration (FEMA).

U.S. Department of Commerce; National Oceanic and Atmospheric Administration (NOAA)

ATTACHEMENT A
HURRICANE PREPAREDNESS RESPONSIBILITY CHECKLISTS

HURRICANE PREPAREDNESS CHECKLIST
Itemized Equipment Checklist, Condition III.

Equipment	Secure in Place	Remove from Project Site

HURRICANE PREPAREDNESS CHECKLIST

Condition V

Date/Time Entered Condition V:______________________________

Severe Weather/Tropical Storm: ______________________________

Action Items

- ☐ Project Manager Notified
- ☐ Track of Storm Poses No Threat
- ☐ Storm or Condition is Downgraded
- ☐ Upgrade to Condition IV

Storm Location

Date/Time:_____________________ Date/Time:_____________________

Location/Coordinates:________________ Location/Coordinates:________________

Date/Time:_____________________ Date/Time:_____________________

Location/Coordinates:________________ Location/Coordinates:________________

Condition V Action Items Complete: _______________________

Date: ______________

HURRICANE PREPAREDNESS CHECKLIST

Condition IV (Landfall within 72 hours)

Date/Time Entered Condition IV: ______________________________

Action Items:

☐ Notify Project Manager

☐ Notify Project Superintendent

☐ Notify Site Personnel

☐ Assemble Shift personnel to begin preparation

☐ Track storm on hurricane tracking map (Attachment C) (if applicable)

The Project Foremen will ensure the following steps are taken:

☐ Secure all heavy equipment located at the site in accordance with manufacturer's specifications. All equipment will be moved to a secured site location.

☐ All equipment fuel tanks will be filled.

☐ All subcontractors with equipment or supplies on-site will be notified to begin removal procedures

Condition IV Action Items Complete: ______________________________
Date: ______________

HURRICANE PREPAREDNESS CHECKLIST

Condition III (Landfall within 48 hours)

Date/Time Entered Condition III: ______________________________

Action Items:

- ☐ Provide the status of the storm to site personnel on an hourly basis
- ☐ Take actions to secure job-site necessary for Condition I that cannot be accomplished in 18 hours
- ☐ Recheck all items on checklist IV to ensure they are complete (i.e.: gas tanks are still filled)

See itemized equipment checklist (itemized list of equipment to be secured/removed and COR for action)

Condition III Action Items Complete: ______________________________
Date: _____________

HURRICANE PREPAREDNESS CHECKLIST

Condition II

Date/Time Entered Condition II: ______________________________

Action Items:

- ☐ Evacuate all visitors from the site
- ☐ Conduct a role call of site personnel
- ☐ Check the status all incoming shipments of supplies and equipment
- ☐ Remove all unnecessary vehicles from the site
- ☐ Secure heavy equipment in accordance with manufacturer's specification
- ☐ Secure all valuable records and equipment
- ☐ Release personnel from the site
- ☐ Recheck all items on checklist IV and III to ensure they are complete (i.e.: gas tanks are still filled)

Condition II Action Items Complete: ______________________________
Date: ______________

HURRICANE PREPAREDNESS CHECKLIST

Condition I

Date/Time Entered Condition I: ______________________________

Action Items:

- ☐ Complete all action items for lower conditions of readiness
- ☐ Secure job-site access and evacuate to safe refuge

Condition I Action Items Complete: ______________________________
Date: ______________

ATTACHMENT B
EMERGENCY PHONE NUMBERS

SEE SECTION 8 OF THE SITE-SPECIFIC HEALTH AND SAFETY PLAN.

EMERGENCY TELEPHONE NUMBERS	
Local Agencies -- All services, Little Creek, VA NAB Little Creek Fire and Police Department	 757-462-4444 757-363-4444
Hospital Sentara Bayside Hospital 800 Independence Blvd., Virginia Beach, VA *Directions:* From NAB Little Creek, exit the base at Independence Blvd., follow Independence Blvd. (Gate 5 and D Street), follow Independence, the hospital will be on the left.	(757)-363-6137
Regional Poison Control Center	800-552-6337
State Agencies DEQ TRO	 757-518-2000
Federal Agencies EPA Region Branch Response Center, Philadelphia, PA Agency for Toxic Substances and Disease Registry National Response Center	 215-597-9800 (404) 639-0615 (24 hr.) 800-424-8802
LANTDIV Representative-Bob Schirmer	(757) 322-4751
ROICC-	( )
OHM/IT Personnel Project Manager – Taylor Sword Site Supervisor/Site Health and Safety Officer – John Dormi Health and Safety Coordinator – Alison Harwood Program Health & Safety Manger - Bob Brooks	 (757) 363-7190 ext. 246 (office) (252) 444-8302 (office) (770) 663-1428 (office) (678) 575-0385 (cellular) (732) 469-5599 (office)
OHM/IT Corporation (24 hour)	800-537-9540

ATTACHMENT C
HURRICANE TRACKING MAP

HURRICANE PREPAREDNESS CHECKLIST

Resume Site Operations

Date/Time Resume Site Operations: ______________________________

Action Items:

- ☐ Conduct a damage survey
- ☐ Notify all site personnel when to return to work
- ☐ Develop a prioritized recovery plan
- ☐ Inspect electrical equipment before re-energizing to detect and repair damage
- ☐ Provide bottled water for drinking until normal drinking water is deemed safe to drink
- ☐ Remove storm debris from site
- ☐ Notify client representative of the resumption of site activities

Resume Site Operations Action Items Complete: ______________________________
Date: ____________

APPENDIX B

Erosion Sediment and Control Plan

EROSION AND SEDIMENTATION CONTROL PLAN

This plant describes erosion and sedimentation controls to be implemented during removal activities at SWMU, NAB Little Creek.

1.0 PROJECT ACTIVITIES

This section contains information about remedial activities that will require erosion and sedimentation control. Descriptions of all remediation activities can be found in the Work Plan. Construction activities that may impact runoff requiring erosion and sedimentation controls include the following:

- Site preparation
- Soil staging
- Catch basins
- Site restoration

1.1 Site Preparation

The first task associated with site preparation is the installation of silt fence around the proposed excavation. Silt fence will also be placed as necessary to accommodate site conditions at the direction of the site supervisor and/or project manager. The silt fence will be maintained throughout the course of the project.

1.2 Soil Staging

Dry soil will be directly loaded into trucks for offsite disposal. The loading will be done on existing paved areas which will be swept clean at the end of each day. This will prevent dust, tracking, and runoff during storm events. For soil staging and direct loading no special erosion control measures other than those previously mentioned will be used. During the progress of the project the soil loading areas will be monitored, and in the case of identified erosional concerns further implementation of erosion control devices (silt fence(s), hay bales or berming) will be constructed as necessary.

1.3 Catch Basins

All storm water runoff catch basins located in the immediate work zone and as chosen by the superintendent will be fully covered with haybales. The haybales will be kept in place by driving wood stakes through the haybales and between the metal crating of the catch basins. The haybales will act as a filter preventing sediment from entering the catch basins.

1.4 Site Restoration

Upon completion of removal tasks associated with this project, the site will be restored to its original conditions. Disturbed areas will be revegetated and paved as necessary to establish pre-construction conditions. Removal of the silt fence will be the final task associated with restoration activities and will only be done after vegetative cover is reestablished.

2.0 MAINTENANCE PROGRAM

This section describes the maintenance programs for the erosion and sedimentation control measures at the site. Maintenance of the erosion and sedimentation controls during the project will be performed by OHM. All controls will be inspected daily, as well as after each storm event, and any breaches will be corrected immediately.

APPENDIX C

Field Sampling Plan

SAMPLING AND ANALYSIS PLAN
FOR
ABM REMOVAL
LITTLE CREEK, VIRGINIA BEACH, VA

Prepared for:

DEPARTMENT OF THE NAVY
Contract No. N62470-97-D-5000
Atlantic Division
Naval Facilities Engineering Command
6500 Hampton Boulevard
Building A (South East Wing) 3rd Floor
Norfolk, VA 23508

Prepared by:

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William L. Hughes for

Dorothy S. Small
Program Chemist
LANTDIV Program

Roland J. Moreau

Roland Moreau, P.E.
Program Manager

July 20, 2000
Task Order No. 0055
OHM Project No. 806397

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1.0 INTRODUCTION

This Sampling and Analysis Plan (SAP) presents, in specific terms, the policies, organization, functions, and Quality Assurance/Quality Control (QA/QC) requirements designed to achieve the data quality goals for the Abrasive Blast Material (ABM) Removal Little Creek. This work will be performed under Task Order No. 0055 of Contract Number N62470-97-D-5000 for the Navy Atlantic Division (LANTDIV) at Naval Amphibious Base (NAB) Little Creek, Virginia Beach, Virginia.

This SAP integrates the required components of a generic quality assurance project plan (QAPP) and a field-sampling plan (FSP). This document shall be implemented by the Project Manager, Project QC Manager, Project Chemist, Field Chemist/Scientist, and Sample Technicians. Any field changes shall be approved by the Navy's Technical Representative (NTR), OHM Project Manager, and OHM Project Chemist. These changes shall be documented by the Field Chemist/Scientist and distributed to the appropriate persons as amendments to the SAP.

2.0 PROJECT MANAGEMENT

2.1 Project Objective and Scope of Work

The scope of work for Task Order No. 0055 is to remove ABM, backfill and restore the site. The objectives of the field analytical activities are as follows:

- Sample and analyze ABM for waste characterization.
- Sample and analyze the material that will be used for clean fill. The analysis performed will determine the suitability of the material to be used as clean fill.

The waste characterization of the ABM will determine the appropriate handling of the material. ***Table 2.1*** lists the RCRA guidelines for hazardous wastes. ***Table 2.2*** lists the Clean Fill analytical requirements.

2.2 Project Task Descriptions

The following tasks will be performed in support of the remedial actions at NAB Little Creek:

- Collection and off-site analysis of ABM soils at removal Site to determine proper waste disposal.
- Collection and analysis of as many as two sources of back fill and top soil, to determine that the soil is suitable for use as clean fill.

2.3 Project Organization

The project manager is the primary focal point for control of the project activities. The project manager will be supported by the QA Management team, which will provide reviews, guidance, and technical advice on project execution issues. Members of this staff will be on an "as-needed" basis to assist in smooth project execution. The project manager will be supported by the project team consisting of a supervisory, health and safety, technical, and QA/QC staff to ensure that the project is safely executed in compliance with applicable laws, regulations, statutes, and industry codes. Individuals of the project team are responsible for fulfilling appropriate portions of the project QA program, in accordance with assignments made by the project manager. The project manager is responsible for satisfactory completion of the project QA program. The project manager may assign specific responsibilities to the deputy project manager and other members of the project staff.

Table 2.1 RCRA Hazardous Waste Regulatory Limits	
Analyte	**RCRA Regulatory Limits**
TCLP METALS(MG/L)	
Arsenic	5.0
Barium	100.0
Cadmium	1.0
Chromium	5.0
Lead	5.0
Mercury	0.2
Selenium	1.0
Silver	5.0
TCLP PESTICIDES METHOD 8081A (mg/L)	
Lindane	0.4
Heptachlor and Heptachlor Epoxide	0.008
Endrin	0.02
Methoxychlor	10.0
Chlordane	0.03
Toxaphene	0.5
TCLP VOLATILES METHOD 8260B (mg/L)	
Benzene	0.5
Carbon Tetrachloride	0.5
Chlorobenzene	100.0
Chloroform	6.0
1,2-Dichloroethane	0.5
1,1-Dichloroethene	0.7
Methyl Ethyl Ketone	200.0
Tetrachloroethene	0.7
Trichloroethene	0.5
Vinyl Chloride	0.2
PCBS METHOD 8082(μg/Kg)	
Aroclor 1016	50000
Aroclor 1221	50000
Aroclor 1232	50000
Aroclor 1242	50000
Aroclor 1248	50000
Aroclor 1254	50000
Aroclor 1260	50000

ND denotes Non-detect

* Detection limits vary depending on the % moisture. The first DL is the first sample, the second DL is the second sample.

Table 2-2
Criteria for Clean Fill Soil

Analyte/Parameter	EPA Method	Level (mg/L)
TPH (DRO & GRO)	5035/8015B	<50 mg/kg
TOX	9020B	<100 mg/kg
BTEX	8021B	<10 mg/kg
Pentachlorophenol	8270A	<16.0 mg/kg
TCLP Arsenic	1311/6010B	<5.0
TCLP Barium	1311/6010B	<100.0
TCLP Benzene	1311/8260B	<0.5
TCLP Cadmium	1311/6010B	<1.0
TCLP Carbon Tetrachloride	1311/8260B	<0.5
TCLP Chlordane	1311/8081A	<0.03
TCLP Chlorobenzene	1311/8260B	<100.0
TCLP Chloroform	1311/8260B	<6.0
TCLP Chromium	1311/6010B	<5.0
TCLP o-Cresol	1311/8270C	<200.0
TCLP m-Cresol	1311/8270C	<200.0
TCLP p-Cresol	1311/8270C	<200.0
TCLP Cresol	1311/8270C	<200.0
TCLP 2,4-D	1311/8151A	<10.0
TCLP 1,4-Dichlorobenzene	1311/8270C	<7.5
TCLP 1,2-Dichloroethane	1311/8260B	<0.5
TCLP 1,1-Dichloroethylene	1311/8260B	<0.7
TCLP 2,4-Dinitrotoluene	1311/8270C	<0.13
TCLP Endrin	1311/8081A	<0.02
TCLP Heptachlor and its epoxide	1311/8081A	<0.008
TCLP Hexachlorobenzene	1311/8270C	<0.13
TCLP Hexachlorobutadiene	1311/8270C	<0.5
TCLP Hexachloroethane	1311/8270C	<3.0
TCLP Lead	1311/6010B	<5.0
TCLP Lindane	1311/8081A	<0.4
TCLP Mercury	1311/7470A	<0.2
TCLP Methoxychlor	1311/8081A	<10.0
TCLP Methyl Ethyl Ketone	1311/8260B	<200.0
TCLP Nitrobenzene	1311/8270C	<2.0
TCLP Pentachlorophenol	1311/8270C	<100.0
TCLP Pyridine	1311/8270C	<5.0

Table 2-2 Criteria for Clean Fill Soil		
Analyte/Parameter	**EPA Method**	**Level (mg/L)**
TCLP Selenium	1311/6010B	<1.0
TCLP Silver	1311/6010B	<5.0
TCLP Tetrachloroethylene	1311/8260B	<0.7
TCLP Toxaphene	1311/8081A	<0.5
TCLP Trichloroethylene	1311/8260B	<0.5
TCLP 2,4,5-Trichlorophenol	1311/8270C	<400.0
TCLP 2,4,6-Trichlorophenol	1311/8270C	<2.0
TCLP 2,4,5-TP (Silvex)	1311/8151A	<1.0
TCLP Vinyl Chloride	1311/8260B	<0.2

An organizational chart of the project team is presented in the work plan. The responsibilities of the key members in the project organization are:

Project Manager – Taylor Sword
The project manager is responsible for the overall direction of this project executed under his supervision. He provides the managerial administrative skills to ensure that resource allocations, planning, execution, and reporting meet contract requirements. He is ultimately accountable for all work activities undertaken on this project. The global quality-related responsibilities of the project manager can include, but are not limited to, the following:

- Organization of the project staff and assignment of responsibilities.
- Understanding of contract and scope of work for a specific project.Communication to the project staff regarding client requirements and QA practices.
- Identification, documentation, and notification to the client and project staff and QA personnel of changes in the scope of work, project documentation and activities.
- Supervision of preparation and approval of project-specific procedures, work plans, and QA project plans.
- Approval of project design bases, design parameters, drawings, and reports.
- Approval of project remedial action/construction methodologies.
- Dissemination of project-related information from the client such as design bases, input parameters, and drawings.
- Liaison for communications with the client and subcontractors. Liaison between the project staff and other internal groups.

- Decision of whether or not drawings require independent review.
- Investigation of nonconformances, notification of QA personnel, and implementation of corrective actions.
- Determination of the effect of nonconformances on the project and the appropriateness for reporting such items to the client, and providing appropriate documentation for reporting.
- Determination that changes, revisions, and rework are subject to the same QC requirements as the original work.
- Serve as final reviewer prior to release of project information.
- Approve and sign outgoing correspondence.
- Custodian of all project related documents.

The project manager may assign some of these responsibilities to the Site Supervisor, who will remain on site throughout the project field activities.

Site Supervisor – Ware Warburton
The site supervisor is responsible for the day-to-day management of this specific delivery order. He will ensure sufficient resource allocations to maintain project schedule and budget. He will provide daily feedback to the project manager on project progress, issues requiring resolution, etc. The quality-related responsibilities of the site supervisor include, but are not limited to, the following:

- Notification to the project manager if the project cannot be completed with regard to quality, schedule, or cost.
- Oversight and control of subcontractor services.
- Liaison for communications with OHM project staff and other internal groups as well as with the NTR and on-site inspector.
- Supervision of day-to-day site activities in accordance with project and program requirements.
- Preparing the Contractor Production Report.
- Preparing the Quality Control Reports.
- Initiating corrective actions for non-conformance identified on-site.

Program Chemist – Dorothy S. Small

The program chemist is responsible for implementing the project chemical QA program. She is responsible for informing the project manager of any site-specific QA issues. Her responsibilities include, but are not limited to, the following listing. The program chemist is also responsible for procuring a certified laboratory based on the requirements needed for the project.

- Reviewing subcontractor's QA Manuals and/or Laboratory Quality Management Plans (LQMPs) and if possible, performing audits on the labs.
- Certifying the level of QA that has been achieved during the generation of analytical data.
- Initiating and overseeing all audit functions.
- Stopping work if quality objectives are not being met.
- Initiating investigations for non-conformances, identifying appropriate corrective actions, and performing follow-up audits to ensure that the corrective actions were successful.
- Selection of qualified laboratories and control of laboratory services requests.
- Assist coordination of laboratory with field sample shipments.
- Management of laboratory data in conjunction with the project and field chemist.
- Liaison between the field and the laboratories when changes are required in the SAP and Purchase Orders.

Project Chemist – Micheal Lacy

The project chemist is responsible for implementing the project plans and ensuring that the quality assurance and data quality objectives are being met for the project. He/She is also responsible for informing the chemical QA officer of any site-specific problems and for coordinating QA efforts with the contracted laboratory. His/Her specific responsibilities include, but are not limited to, the following:

- Determining if the project and data quality objectives are being met.
- Evaluating chemical data for technical validity and ensuring adherence to published guidelines.
- Analyzing and interpreting all subcontracted technical and laboratory results.
- Implementing QA/QC procedures.
- Assuring the continuity of chain-of-custody (COC) evidence.

- Working with the QC engineer to compile and submit required QA Reports (QARs).
- Compiling, revising, updating, and submitting SAPs.
- Implementing corrective actions as required by the QC engineer or chemical QC officer.
- Ongoing QA/QC training of new and current personnel.
- Reviewing laboratory invoices for completeness and accuracy.
- Implement the SAP and designated QA/QC procedures.
- Perform on-site screening and analyses of samples, if needed.
- Fill out sample tracking forms and related analytical and QC forms and logbooks.
- Ensuring that the laboratory supplies the sample containers, shipping supplies, COC records, and the required QC samples (i.e., trip blanks).
- Carrying out all sampling in accordance with approved procedures and methodologies as defined in the SAP.
- Generating field blanks, equipment rinsate blanks, and acquiring field duplicate samples as required by the SAP.
- Completing sampling logbooks, sampling forms, labels, custody seals, and COC forms and other paperwork as required by the SAP.
- Packaging and Shipping of samples to appropriate laboratories.

2.4 DATA QUALITY OBJECTIVES FOR MEASUREMENT DATA

Data generated from those tasks described in Section 2.2 will be used to make the decisions on proper disposal and use of clean fill. Project-specific quality objectives are listed in ***Appendix A, Table A-2***. These include the quantitation, project action, accuracy, precision, and completeness limits by which the data will be evaluated.

An A_2LA, Naval Facilities Engineering Service Center (NFESC)-certified or US Army Corps of Engineers-Missouri River Division (USACE-MRD)-approved laboratory will be used for all sample analyses. The laboratory will also be Virginia approved. A copy of the laboratory's QA Manual, statement of qualifications, and appropriate certificates of approval are kept on file in the Virginia Beach office and are available upon request from the NTR, LANTDIV, or other regulatory agencies. A copy of the approved Sampling and Analysis Plan will be forwarded to the laboratory selected to perform chemical analysis of the samples.

All off-site samples will meet OHM's minimum requirement for the QA/QC as specified in OHM QP-650. A copy of QP-650 is included in ***Appendix D***. On-site air measurements will be non-definitive field screening analysis. If disposal analysis is required no duplicates or rinsate blanks will be collected. All sampling and analytical activities will be in accordance with federal, state, and local regulations. A summary of the field QC sampling requirements is shown in ***Table A-1***, "Sampling Summary" in ***Appendix A***.

Data evaluation will be performed by the project chemist on all data before it is used. Third party data validation will not be performed on the final data. Data evaluation results will be provided in the project closeout report.

3.0 SAMPLING

3.1 SAMPLING METHODS AND PROCEDURES

The following sections describe sampling locations, frequencies, sample matrices, and measurements of parameters of interest. ***Table A-1*** "Sampling Summary" in ***Appendix A*** presents a summary of these items.

3.1.1 Sampling of the ABM material

The site will be sampled prior to excavation. The area will be marked according the drawings provided. The site will be grided in 50-ft x 50-ft grids. Each grid will be quartered. Each quartered grid will be sampled in the middle, and the center of the 50-ft x 50-ft grid will be sampled, thus generating 5 grab samples per 50-ft grid. The grab subsamples will be composited from each grid and then composited to yield 1 composite/500 yd^3. ***Figure 3-1*** shows the grid layout and the grids to be composited to generate each final composite. The subsamples from each grid will be split, one jar labeled with the grid ID and one scoop of ABM used for the composite. The grid sample will be retained, in the event that a result from a composite requires additional determination of the location of hazardous TCLP lead levels. The composite samples will be analyzed for TCLP metals, TCLP SVOCs, TCLP Pesticides, and IRC. The composite sample will be collected using the following procedure:

1) At the five (5) sampling points within each grid, dig down 1 to 2 inches and collect a grab from each of the resulting holes using a stainless steel spoon.
2) Place the grab samples into a stainless steel bowl.
3) Homogenize the five (5) grab samples by the quartering techniques using the stainless steel spoon. Fills one 4-oz jar and label. Retain the balance to composite with the other grids to generate one composite/500 yd^3 as shown in Figure 3-1.
4) Continue to the next grid following the same procedure combining the contents of each bowl from each grid that will be used in the final composite.
5) Fill the appropriate sample jars approximately ¾ full with the composite sample.
6) Close the jar, label, and package the sample for shipment to the lab.

A grab will be taken for TCLP VOCs following the procedure:

1) At one (1) random sample point in the grids, dig down approximately 1-2 inches using a stainless steel shovel or auger.
2) Collect a grab sample from the resulting hole using a stainless steel spoon.
3) Fill a 4 oz glass jar immediately to the top.
4) Tap the jar and fill with more of the ABM sample to ensure no headspace.
5) Close the jar, label, and package the sample for shipment to the lab.

The ABM samples will be sent to an off-site laboratory for Toxic Characteristic Leachate Procedure (TCLP), and IRC. If any results exceed the levels listed in ***Table 2.1*** for Hazardous Wastes, the material represented by the sample will be considered hazardous. Contaminated materials will then sent to an appropriate disposal facility, and disposed at an off-site facility. ABM that is below the levels listed in ***Table 2.1*** can be disposed at facility as described in the Disposal plan.

Disposable sampling equipment will be used to eliminate the need to containerize any water. Field sampling personnel will wear disposable sampling gloves during sampling and will change gloves between sample locations to minimize the potential for cross-contamination. Other PPE may be required for sampling as per the SSHP. Contact with the sample should be avoided to minimize the potential for cross-contamination.

3.2 SAMPLE IDENTIFICATION

The samples collected on-site will be provided with a unique sample designation. The number will serve to identify the site, location, and specific sample identification number. The sample designation format will be as follows:

XXXXX-SM-NNN

where:
XXXXX = Project Number
SM = Sample matrix or type (C= composite, DB= debris, DW= drummed water)
NNN = Sequential number starting at 001 (Sequence number in Sample Log Book)

Sample location information will be included in the sample description area of the COC. Sample sequential numbers are not to be duplicated. Duplicate samples will be sent to the off-site laboratory blind. The latest OHM COC has been designed so that the cross-reference of the duplicate to the original sample can be included on the last page of the COC that does not go to the laboratory.

3.3 SAMPLE PRESERVATION AND HOLDING TIMES

Samples collected for off-site analyses will be sent to the laboratory within 24 hours after collection to ensure that the most reliable and accurate answers will be obtained as a result of the analysis. The holding time begins from the date and time of collection in the field.

All environmental and treatment system samples, except for aqueous samples for metals, will be preserved to a temperature of 4°±2°C prior to shipment to the analytical laboratory, using ice or refrigeration. This temperature should be maintained during shipment by placing ice in leak-proof containers, and placing it above and below the sample containers. Other sample preservation requirements and holding times applicable to the sample matrix and analyses are listed in ***Appendix A, Table A-1***.

3.4 QUALITY CONTROL SAMPLES

There will not be field quality control samples, since all analysis is for disposal purposes.

3.5 DECONTAMINATION

All sampling equipment (hand augers, spoons, stainless steel/glass mixing bowls, etc.) will be decontaminated before sampling commences, between each sample location, and prior to leaving the site. The procedures for decontamination of equipment according to NEESA 20.2-047B are as follows:

1) Remove gross contamination by scraping or brushing.
2) Clean with tap water and phosphate-free laboratory detergent (liquinox), using a stiff brush to remove all surface contaminants.
3) Rinse thoroughly with tap water.
4) Rinse with 1:1 nitric acid (HNO3) metals grade (metal samples only).
5) Rinse thoroughly with tap water.
6) Rinse thoroughly with deionized/distilled water.
7) Rinse twice with reagent grade isopropanol or methanol.
8) Rinse thoroughly with organic-free water and allow to air dry. (Do not rinse with deionized/distilled water. If organic-free water is not available, allow equipment to air dry.)

9) Wrap equipment with aluminum foil prior to storage or transportation to sample locations.

Decontamination fluids will be collected in properly labeled 55-gallon drums, and staged in a secure area until final disposal unless other arrangements are made.

3.6 Cross-Contamination Minimization

Cross-contamination is the introduction of contaminants into the sample through the sampling and/or sample-handling procedures. It can cause an otherwise representative sample to become non-representative. The most important means of minimizing cross-contamination are as follows:

- Sampling expendables, i.e., sample gloves, pipettes, string, dip jars, etc., must not be reused. Used expendables should be labeled so they are not confused with non-contaminated trash
- Minimum contact should be made between the sampler and the sample medium. For example, a sampler should not touch the sample during while loading the sample in the container.
- Sample collection activities should proceed progressively from the least contaminated area to the most contaminated area.
- Sampling equipment should be constructed of Teflon, stainless steel, or glass that has been properly precleaned for collecting samples. Equipment constructed of plastic or PVC should not be used to collect samples for trace organic analyses.
- Any tools used in sampling must be carefully decontaminated prior to first use and after each use.
- Activities that could contaminate samples are prohibited in the sample handling and preparation area. These activities and the possible contaminants include:

Activity	*Possible Contaminants*
Smoking	Poly Aromatic Hydrocarbons
Spraying for insects	Pesticides, oils, solvents
Spraying for weeds	Herbicides, oils, solvents
Refueling	BTEX, hydrocarbons
Painting and paint stripping	Solvents

3.7 SAMPLE LOG BOOK

It is necessary for the sampling crew to maintain daily field notes. Items that must be included are sampling protocol, any changes to the procedures, meetings, instructions, safety precautions, personnel protection, and activities pertaining to the samples. The person taking notes must be knowledgeable enough about these activities to know which details are important.

- Repetition of information recorded in other permanent logs should be avoided, but enough should be recorded to present a clear and accurate picture of technical activities. At a later date, should a question arise concerning a specific event or a procedure used, it will be answered from these notes. The following information should be logged into the logbooks and/or database:

- Date and time of sampling

- Sample ID number, locations of the grab subsamples that are part of the composite, type, matrices, volumes, sample descriptions, type and number of sample containers, names and signatures of individuals performing sampling tasks, COC and air bill numbers, preservatives, and date samples were sent

- Name of laboratories and contacts to which the samples were sent, turn around time (TAT) requested, and data results, when possible

- Termination of a sample point or parameter and reasons

- Unusual appearance or odor of a sample

- Measurements, volume of flow, temperature, and weather conditions

- Additional samples and reasons for collecting them

- Levels of protection used (with justification)

- Meetings and telephone conversations held with LANTDIV, NTR, regulatory agencies, project manager, or supervisor

- Details concerning any samples split with another agency
- Details of QC samples collected

These notes must be dated and signed (each page) for validity. All logbooks will be bound and pre-numbered. All log book entries will be made with indelible ink and legibly written. The language will be factual and objective. No erasures will be permitted. If an incorrect entry is made, the error will be crossed out with a single strike mark, initialed, and dated. When audits are performed, the auditor's remarks and decisions must also appear in these notes. These audits should be followed up by written report submitted by the auditor, including opinions and conclusions. A copy of this report should be placed in the project file and one copy kept in the sampling file for easy reference. This information will also be entered in to the database program that been prepared for the site. It will be entered daily by the field chemist or sample technician. This person will be the point of contact for all sampling and analytical information. Report outputs from the database are an acceptable substitute for the sample logbook.

3.8 SAMPLE LABELS

Any samples placed into a sample container will be identified by a sample label. Sample label will identify the following information:

1) PROJECT NUMBER
2) DATE - Month, day, year
3) TIME - Military time
4) SAMPLE NUMBER - See Section 3.2 for designations
5) SAMPLE DESCRIPTION
6) SAMPLER - Sampler's name
7) PRESERVATIVES
8) ANALYSIS REQUIRED - See ***Appendix A, Table A-1***

The information described above should be printed neatly using an indelible marker. After the sample is taken and the label is securely attached, the sample is logged into the sample logbook. An example of a sample label is presented in ***Appendix B***.

3.9 CUSTODY SEALS

Custody seals are narrow strips of adhesive tape of glass fiber used to demonstrate that no tampering has occurred. They may be used on sampling equipment, sample transport containers, and individual sample containers. They should be signed and dated by the sampler and placed from one side, across the top, and to the other side of the sample container or across the openings of the sample transport containers. An example custody seal is presented in ***Appendix B***.

3.10 CHAIN-OF-CUSTODY PROCEDURES

In order to generate legally defensible data of the samples collected throughout the project, the possession of samples must be traceable from the time the samples are collected until they are introduced as evidence in legal proceedings. To maintain and document sample possession, COC procedures are followed as described below:

A sample is under your custody if:

1) It is in your actual possession, or
2) It is in your view, after being in your physical possession, or
3) It was in your physical possession and then you locked it up to prevent tampering, or
4) It is in a designated secure area

An example of a COC form is presented in ***Appendix B***. The following information is required on the COC:

1) Project Name
2) Project Location - City and State in which the project site is located
3) Project Number
4) Project Contact - OHM employee responsible for overseeing the sampling operation. This person should be the individual to whom questions are to be directed or verbal results are given (Project Manager, Site supervisor, or Project Chemist)
5) Site Telephone Number - The telephone number of on-site office trailer or number where person responsible for samples can be contacted.
6) Sample Date - Month, Day, Year
7) Sample Time - Military time
8) Sample Identification - Sample number and location
9) Sample Type - Designation of sample as grab or composite

10) Sample Description - Sample matrix, and a brief description of the sampling location
11) Sample Preservation - Preservatives used
12) Analytical Parameters Requested - Analytical parameter, method numbers, and specific compounds of interest, if applicable.
13) Air bill Number
14) Laboratory - Laboratory where samples are to be sent
15) Laboratory Phone - Telephone number of laboratory
16) Laboratory Contact - Contact person for laboratory
17) Relinquished By - Signature of sender (OHM)
18) Date Relinquished - Date samples were relinquished
19) Accepted By - Signature of acceptor
20) Date Received - Date samples were accepted
21) Turnaround Time - Turnaround times requested or date the results are required from the lab
22) Sampler's Signature - Signature of sampler

The COC will be sealed in a ziploc bag and taped in place on the underside of the top of the sample transport container (cooler).

3.11 PACKAGING, HANDLING, AND SHIPMENT OF SAMPLES

Samples will be packaged as to minimize shifting of the samples during shipment. An absorbent, such as vermiculite or kitty litter, will be placed at the bottom of the shipment container in order to absorb any liquids in the event of sample breakage. All samples will be individually placed into appropriately sized ziploc bags and sealed.

Samples, which must be kept at 4°±2°C, will be shipped on ice in insulated containers. Ice will be placed in a container such as a ziploc bag and sealed so that water will not fill the shipping container as the ice melts. The ice will be double bagged to insure the ice does not leak. Aqueous samples for metals analysis, except hexavalent chromium, shall not be shipped or stored under refrigeration.

Samples will be shipped via an overnight shipping agency to the appropriate laboratory. IATA regulations will be followed, as they are more applicable to OHM's method of sample shipment. Instructions for filling out shipment documentation are included in ***Appendix B***. These instructions are for shipping samples with unknown or limited hazards. All information will be entered as directed. No changes or substitutions to these instructions will be made irrespective of their significance. A copy of the OHM sample-shipping label is included in ***Appendix B***.

4.0 DATA ACQUISTION

4.1 ANALYTICAL METHOD REQUIREMENTS

Analytical requirements for this project are listed in ***Appendix A, Table A-1***. All samples will be analyzed according to USEPA SW-846 Test Methods for Evaluating Solid Waste, Physical/Chemical Methods whenever possible. Alternative methods of analysis from other sources (ASTM, NIOSH, Standard Methods, etc) may also be used.

4.2 QUALITY CONTROL REQUIREMENTS

Project Quality Control (QC) requirements for precision, accuracy, completeness, and quantitation limits are listed in ***Appendix A, Table A-2***. QC procedures and acceptance limits must be met as specified in the individual methods. In addition, the laboratory must meet the specification and requirements as described in the NFESC, 1996 document.

4.3 INSTRUMENT TESTING, INSPECTION, AND MAINTENANCE

Proper maintenance is critical to the performance of minimization of downtime of all equipment, whether it be for measurement or support. Inspection will be performed, at a minimum, prior to use of the instruments. Preventive maintenance will be performed as recommended by the manufacturer of the respective equipment. All routine maintenance and major repairs performed on field screening or analytical equipment will be recorded in bound maintenance logbooks that have been specifically designated for that instrument. Equipment that fails calibration or becomes inoperable during use will be removed from service and segregated to prevent inadvertent use, or will be tagged to indicate that it is out of calibration. Such equipment will be repaired and recalibrated or completely replaced.

5.0 DATA MANAGEMENT

Data management is the system by which data is reduced, reviewed, validated, reported, distributed, and finally archived. The criteria in this system are designed to meet the project objectives.

5.1 LABORATORY DATA REDUCTION

Data reduction includes the identifications and calculations necessary to convert the raw instrument readings to the final reported compounds and their respective concentrations.

Responsibilities of Analyst
Each analyst is responsible for converting raw data into reportable values. These specific duties include:

- Proper identification of the analyte
- Generation of calculations
- Checking associated calibrations to ensure support of data
- Associated QA/QC checks are supportive of data
- Associated documentation is complete and accurate in respective log books
- Associated chromatograms and strip chart recordings are labeled with data, instrument number, run parameters and analyst

5.2 LABORATORY DATA VALIDATION

All data generated for the project within the laboratory will be extensively checked for accuracy and completeness. The data validation process consists of data generation, reduction, and three levels of review.

The analyst who generates the raw data has the prime responsibility for the correctness and completeness of the data. All data generated and reduced will follow protocols specified in the laboratory SOP. Each analyst reviews the quality of his work based on an established set of guidelines. The guidelines are:

- Sample preparation information is correct and complete
- Analysis information is correct and complete

- The appropriate Standard Operating Procedures have been followed
- Analytical results are correct and complete
- Analysis is performed within prescribed holding times.
- QC samples are within established control limits
- Blanks are within appropriate QC limits
- Special sample preparation and analytical requirements have been met
- Documentation is complete

The section supervisor or data review specialist performs the next level of review. The review is structured to ensure that:

- Calibration data are scientifically sound, appropriate to method, and completely documented.
- QC results are within established limits.
- Reporting units are consistent with the method and the matrix.
- Quantitative results are correct.
- Data results are consistent with information on the COC.
- Documentation is complete.
- The data is ready for incorporation into a final report.
- The data package is complete and ready for data archive.

The second level of review is structured to ensure all calibration data and QC sample results are reviewed and all of the analytical results from 10 percent of the samples are checked back to the bench sheet. If no problems are found with the data package, the review is complete. If problems exist, an additional 10 percent is reviewed, the process continues until no errors are found or the package has been reviewed in its entirety.

The final level of review by the laboratory comes from the program administrator or laboratory QA Officer. He/she reviews the report to ensure that the data meets the overall objectives of the project.

Once the data has been validated, it is ready for report production. The report will contain:

- Description of sample types
- Tests performed, problems encountered during testing
- Dates sampled
- Date received
- Date extracted
- Date analyzed
- Analytical results
- Reportable limits
- QC information: percent recovery, relative percent difference, control limits, blanks analyses, matrix spikes, and other additional special QC information
- Qualifiers for data falling outside of QC limits
- Methodology
- Name of the analyst
- Signature of laboratory representative
- Dual column confirmation results
- Calibrations (when requested)
- Instrument performance checks (when requested)
- QC Batch number

The report from the laboratory will be paginated and will also include a copy of the original COC for the samples analyzed.

5.3 Project Data Review

Project Chemist Data Review Responsibilities

The project chemist is responsible for initial review of the data from the laboratory. This review includes:

- Verifying that all requested data are reported
- Verifying that samples are analyzed according to the contract specified method
- Verifying that all analytes requested are reported
- Verifying that holding times are not exceeded
- Verifying that matrix spike, matrix spike duplicate, and surrogate recoveries fall within the laboratory's acceptable criteria
- Reviewing blank data for contamination
- Reviewing field quality control results for inconsistencies
- Verifying that the data generated meet the project Data Quality Objectives.

The project chemist is responsible for informing the Project Manager and Project Chemical QA/QC Officer of any laboratory and/or sampling deficiencies or issues. These issues and subsequent decisions will be documented on the data evaluation report produced by the Project Chemist for each data package.

Project QC Engineer Data Review Responsibilities
The Project QC Engineer is responsible for interfacing with the project chemist, project manager, and the laboratory's QA Officer to resolve any QA/QC issues affecting the data. He/she is also responsible for finalizing any QA/QC issues with the laboratory and/or the project chemist. This includes obtaining a corrective action from the parties involved.

5.4 DATA REPORTING

The preliminary data will be faxed to the project chemist. This data may or may not have undergone the full laboratory review process and may contain errors and discrepancies. Prior to the use of data results for any decisions, the data will be reviewed by the project chemist and assessed against the project goals and data quality objectives. A copy of the preliminary data, including review comments from the project chemist will be submitted to the site and/or the project manager.

The hard and final copy data will be evaluated by the project chemist and assessed against the project goals and data quality objectives. Any errors, discrepancies, and nonconformances will be brought to the laboratory's and project manager's attention.

When QA issues have been satisfactorily settled and data evaluation has been completed, the project manager may release the data to the client and/or regulating agencies.

5.5 DATA STORAGE AND ARCHIVE

After OHM has completed its work for the project, all documents generated will be assembled in the project file. The laboratory files will be maintained in the PMO office. These files are maintained in a centralized data management manner to ensure proper maintenance of the data. The Program Chemist is responsible for the maintenance of the data for LANTDIV projects. The project manager/supervisor will also have a second copy. The Project Manager is responsible for ensuring the collection, assembly, and inventory of all documents relative to the project at the time the objectives are met. These files then become accountable. Any records leaving the file must be signed out.

When a contractor has completed the project objectives, all file documents are reviewed and submitted to the central file. The project file contains the following document classes:

A. Project logbooks

B. Drum logs and other forms

C. Sample identification documents

D. COC records

E. Analytical logbooks, laboratory data, calculations, graphs, etc.

F. Correspondence

   - Inter-office
   - Client
   - Regulating agencies
   - Record of confidential material

G. Report notes, calculations, drafts

H. References, literature

I. Sample (on-hand) inventory

J. Check-out logs

K. Litigation documents

L. Miscellaneous – photographs, maps, drawings, etc.

Once deposited in the file, documents must be checked out. The final report is usually generated by use of computer. A back-up copy of the report on diskette is filed along with the project file. The original report remains in the hard drive of the computer until such a time is required to download it on a diskette. This diskette is also archived. All information under the corresponding project number is maintained in the archive system for five years. All archives are accessed by the archive file master list, which is maintained in a separate location from the archives.

6.0 DATA ASSESSMENT PROCEDURES

Reliability in analytical determination is maintained through strict adherence to quality control procedures. Procedures are designed to control both the accuracy and precision of analytical results. For the validation of the data, a known method spike is routinely analyzed to ensure the accuracy of results. The procedure is to run the standard QA/QC and sample analysis with each lot of samples sent to the laboratory. If more than ten individual analyses are made, additional standards will be analyzed at a rate of one standard per ten analyses. Some procedures call for the use of either a surrogate spike or the standard addition of a known quantity of the analyte to a split of the sample being analyzed.

Control charts will be prepared using an estimate of the spike recovery obtained from the literature or determined by repeated analyses run in the laboratory. Each time the analyst runs a method spike, the results is entered on the control table. If a standard addition technique is used, a plot of instrument response versus added analyte concentration is made in order to determine analyte concentration in the original sample. These are further explained in the laboratory's QAM.

Replicate analyses will be performed on at least 10 percent of the samples processed by the laboratory. A record of the precision of most analyses is kept by calculating and plotting the industrial statistic I (which is equivalent to the coefficient of variation). Blanks are also run with each batch of samples or individual sample analyzed regardless of the level of certification of the data.

The purpose of spikes, blanks, and replicates is to provide a sound scientific basis from which the degree of certification of the resultant data can be objectively concluded. These are not management decisions, but follow naturally from the results of the above QC procedures.

6.1 ACCURACY

Data accuracy is a reflection of the efficiency of the analytical procedure. It is determined by use of spiked samples and standard reference materials or laboratory control samples performed at the rate of one set every 20 samples. A control chart is generated using historical laboratory data where warning and control limits are established to assess data accuracy.

The accuracy (check standards) samples will have concentration values of the mid-standard. During analysis, a minimum of 10 percent of samples are accuracy samples. The accuracy samples are staggered through the analysis, not placed one after another. After a minimum of seven accuracy samples are analyzed, the percent recovery is calculated for each sample.

The accuracy criteria is determined by calculating the standard deviation of seven or more percent recovery values and setting the upper and lower control limits using the following equations:

$$\text{Upper control limit} = p + 3\ SD$$
$$\text{Lower control limit} = p - 3SD$$

Where:

p = Average percent recovery
SD = Standard deviation

After the standard deviation, for the seven or more samples has been calculated, the accuracy control limits are generated and are then used to determine if the analysis is out of control. This is done by checking the results against the control limits. If any values are above the upper control limit or below the lower control limit, all sample results after the last qualifying accuracy sample must be repeated or discarded. If seven consecutive values fall below the lower control limit, new limits are calculated using the new accuracy check values. If the values fall between the upper and lower limits, then conditions are reported as "within limits."

6.1.1 Recovery Control

Recovery control is necessary to determine if the sample matrix is interfering with the constituent being analyzed. A minimum 5 percent of samples will be recovery check samples (matrix spikes). Samples involving different types of matrices will have at least one recovery check sample for each matrix.

Control limits will be determined for each matrix, determining the deviation for seven or more percent recovery values.

6.2 PRECISION

Duplicate and replicate samples analyzed by the laboratory assess the precision of the sampling effort. Control limits for duplicate/replicate RPDs are listed in ***Appendix A, Table A-2***. Once a sufficient amount of replicate data becomes available, field precision control charts are constructed similar to the laboratory precision charts. For any given concentration, the mean and the standard deviation(s) of the replicates are calculated. Data from each sample set are pooled with the previous sample sets to generate control and warning limits for the next set. Control and warning limits for water samples are set at ± 2s and ± 3s, respectively. Control limits for solid samples are more liberally established due to matrix heterogeneity. Data outside any control limit are subject to QA review.

Precision is based upon the results of the relative percent differences as calculated from the percent recoveries of the matrix spike and duplicate samples. The control limits for precision is based on historical laboratory data.

MS and MSD samples on a per batch or a minimum frequency of 5 percent are analyzed to assess precision. Duplicate results are compared and the relative percent difference (RPD) is then determined. The RPD will be entered into the laboratory's data system and will be used to define the precision of the analysis. Minimum limits are listed in ***Appendix A, Table A-2***.

6.3 COMPLETENESS

The field supervisor must ensure all sites are sampled for all the specified analyses, that sufficient sample volume has been provided to complete those analyses, and that all of the QA samples have been included with each sample set. The goal for completeness for each sample set shipped to the laboratory is 100 percent. Minimum limits are listed ***in Appendix A, Table A-2***.

Completeness is expressed as the percentage of the amount of valid data obtained to the amount of data expected. For a set of data to be considered complete, it must include all QC data verifying its accuracy and precision.

If samples analyzed do not meet all QC requirements in terms of accuracy and precision for any specific parameter, the sample preparation and analysis will be repeated pending adequate volume.

6.4 CRITERIA FOR REJECTION OF OUTLYING MEASUREMENTS

There are many statistical tests for rejection of outlying data points obtained from a set of measurements from a single population. A test recommended in "Statistical Manual of the Associate of Official Analytical Chemists," 2nd Edition, W. J. Youden and E. H. Steiner, 1975, pg. 86, is the Dixon Test. This test is not dependent on the distribution of the data and can be used for as few as three measurements. A more complete description for this broadly applicable test can be found in the referenced text.

Another reference is the USEPA National Functional Guidelines for Data Validation of Organics and Inorganics. Also, specific programs may have quality objectives with criteria for rejection of outlying measurements.

6.5 METHOD DETECTION LIMITS AND PRACTICAL QUANTITATION LIMITS

Method detection limits (MDLs) must be established by the laboratory. This should, at a minimum, be established on a yearly basis. MDL is the minimum concentration of a substance that can be identified, measured, and reported with 99% confidence that the analyte concentration is greater than zero.

Practical quantitation limit (PQL) is the lowest level that can be reliably determined within specified limits of precision and accuracy during routine laboratory operating conditions. The PQLs are generally 5-10 times the MDL. The PQL is the most applicable limit of reporting for this program.

6.6 LABORATORY AND FIELD CONTAMINATION

It is not unusual to find the following analytes at trace levels in the samples:

- Methylene chloride
- Acetone
- Freon (1,1,2-trichlorotrifluorethane)
- Bis(2-ethylhexyl)phthalate
- Hexane
- Isopropanol
- 2-Butanone

These are common solvents used in the field and in the laboratory.

In order to fully evaluate data containing trace levels of these contaminants, one must have data from trip blanks, field blanks, equipment blanks, and all applicable laboratory blanks for that batch of samples.
The determination on the use of the data will be made during the Data Validation process.

7.0 *PERFORMANCE AND SYSTEM AUDITS*

Audit is defined as systematic check to determine the quality of operation of field and laboratory activities. It is comprised of the following:

- Performance audit
- System audits

These include a detailed review of each operating component of the network. Auditing will ultimately assist in determining if each element within a system is functioning appropriately per the QA program requirements.

7.1 FIELD PERFORMANCE AUDITS

Field performance audits are performed on an ongoing basis during the project as field data is generated, reduced, and analyzed. All numerical analyses, including manual calculations are documented. All records of numerical analysis are legible, of reproduction quality, and supporting to complete permit logical reconstruction by a qualified individual other than the originator.

Other indicators of the level of field performance are the analytical results of the blank, duplicate, and replicate samples. Each blank analysis is an indirect audit of effectiveness of measures taken in the field to ensure sample integrity. The results of the field duplicate and replicate analysis is an indirect audit of the ability of each field team to collect representative sample portions of each matrix type.

7.2 FIELD SYSTEM AUDITS

System audits of site activities are accomplished by an inspection of all field activities by the Project Chemical QC Officer. This audit is composed of comparisons between current field practices and standard procedures. The following is a list of criteria to be used in the evaluation of field activities:

- Overall level of organization and professionalism
- All activities conducted in accordance with work plan
- All procedures and analyses conducted according to procedures outlined in this document
- Sample collection techniques versus the site sampling and analysis plan

- Level of activity and sample documentation
- Working order of instruments and equipment
- Level of QC conducted by each field team
- Contingency plans in case of equipment failure or other event preventing the planned activity from proceeding
- Decontamination procedures
- Level of efficiency which each team conducts planned activities at the site
- Sample packaging and shipment

After the audit, any deficiencies are discussed with the field staff, and corrections are identified. If any of these deficiencies might affect the integrity of the samples being collected, the QA Officer informs the field staff immediately, so corrections can be made. The field performance audit will be conducted at the start of the project, one before the end of the project, and as directed by the project manager. OHM will also submit to all requests by regulatory agencies, or other clients for external field systems audits.

7.3 LABORATORY PERFORMANCE AUDIT

The laboratory performance audit verifies the ability of the laboratory to correctly identify and quantitate compounds in blind check samples submitted by an auditing agency. If the laboratory participates in Performance Evaluation (PE) programs such as USEPA WS/WP studies, AIHA, PAT studies, etc., results from these studies will be generally acceptable by OHM. However, during the course of the project, it may be necessary for the Project QA/QC Officer to send PE samples to the laboratory to evaluate specific parameters.

The contracted laboratories will undergo performance audits throughout the project consisting of field QC samples. Occasionally PE samples will be supplied by the client or external organizations which will be spiked with the same analytical parameters that are being investigated on site. External laboratory performance audits by auditing agencies such as the USEPA, USACE-MRD, DOD, NFESC, etc. are not routinely scheduled. However OHM and its subcontracted laboratories will submit to any external audit upon request by the USEPA or the client.

7.4 LABORATORY SYSTEM AUDITS

The laboratory system audit is a review of analytical laboratory operations to verify that the facility has the necessary equipment, staff, and procedures in place to generate acceptable data. It is also to determine that each element within an activity is functioning appropriately and within the guidelines of applicable methodology, approved procedures, and the site QAPP. An on-site inspection is routinely performed by the laboratory's QA Manager and may also be frequently performed by the OHM Project Chemical QA/QC Officer. If the laboratory participates in certification programs, audits performed by the certifying agencies may satisfy the criteria of systems audits for the project.

If the laboratory is in question, a system audit can be directed by the client and performed by OHM or the client's representative. Any recommendations made will be considered for implementation and any corrective actions will be taken to correct any deficiencies found. Project-specific audit reports will be placed in the project files and laboratory audit reports will be kept by the laboratory for future reference.

8.0 CORRECTIVE ACTION

This Corrective actions may be necessary as a result of the following QA activities:

- Field and laboratory performance audits
- Field and laboratory system audits
- Inter-laboratory comparison studies
- Calibration data fall out of specified limits
- Failure to adhere to the CQMP
- Failure to adhere to the site
- Failure to adhere to standard operating procedures and methods
- Data completeness below required limits
- Control limits are exceeded for QC samples

If, during system and performance audits, deficiencies or problems are discovered, corrective action will be initiated immediately. The appropriate field and laboratory personnel will be notified immediately and an investigative process will be implemented immediately to find solutions to these issues. The investigative process will consist, but is not limited to, the following:

- Determining when the problem occurred
- Determining which systems were affected by the problem
- Determining the cause of the problem
- Determining a corrective action to eliminate the problem
- Assigning the responsibility for implementing the corrective action
- Implementing the corrective action
- Evaluating the effectiveness of the corrective action
- Investigating alternative corrective actions if the original action was not sufficient in eliminating the problem
- Documenting that the corrective action has eliminated the problem

The Project Chemical QC Officer has the authority to require that all site activities threatened by the problem be stopped or limited until the corrective action has been implemented and satisfactorily verified to eliminate the problem.

Corrective actions may include, but is not limited to:

- Modifications to procedures
- Recalibration of instruments
- Replacement of solvents, reagents, and/or standards
- Additional training of personnel
- Reassignment of personnel

8.1 Corrective Action Report

A Corrective Action Report (CAR) is necessary documentation of the investigative process. Depending on the issues, the CAR may be generated by the laboratory or the field personnel. Copies of the CAR will be given to the Project QC Officer and Project Manager, who will distribute it to the client. A copy of the CAR will be placed in the project files for future reference.

The CAR should include, but is not limited to:

- A description of the problem, deficiency, or issue
- Proposed resolutions
- Resulting actions
- Effectiveness of the resolutions
- Personnel responsible for implementation of the corrective actions
- Personnel responsible for monitoring the effectiveness of the actions.

8.2 Quality Assurance Report

The Project Manager, Project QC Officer, and Project Chemist will converse on a regular basis to review possible and potential problem areas and to ensure that all QA/QC procedures are being carried out. It is important that all data abnormalities be investigated to ensure that they are not a result of operator or instrument deviation but are a true reflection of the methodology or task function. The project final report will contain a separate section that covers the data quality and validity. At a minimum, the following information will be included in the report:

- Assessment of measurement data precision, accuracy, and completeness
- System and performance audit results
- Significant QA problems and corrective actions implemented
- Copies of documentation such as memos, reports, etc.

The Project QC Officer will be responsible for preparing this report weekly or daily, as well as monthly written QA reports to OHM QA management. The Regional QA/QC Director will be responsible for reviewing and approving these monthly reports. Verbal reports will be made on a more frequent basis. All reports will be made available to the Project Manager, client, and regulating agencies. If no project audits were performed and no significant QA/QC problems occurred, a letter stating these facts will be submitted to the referenced parties in lieu of a QA Report.

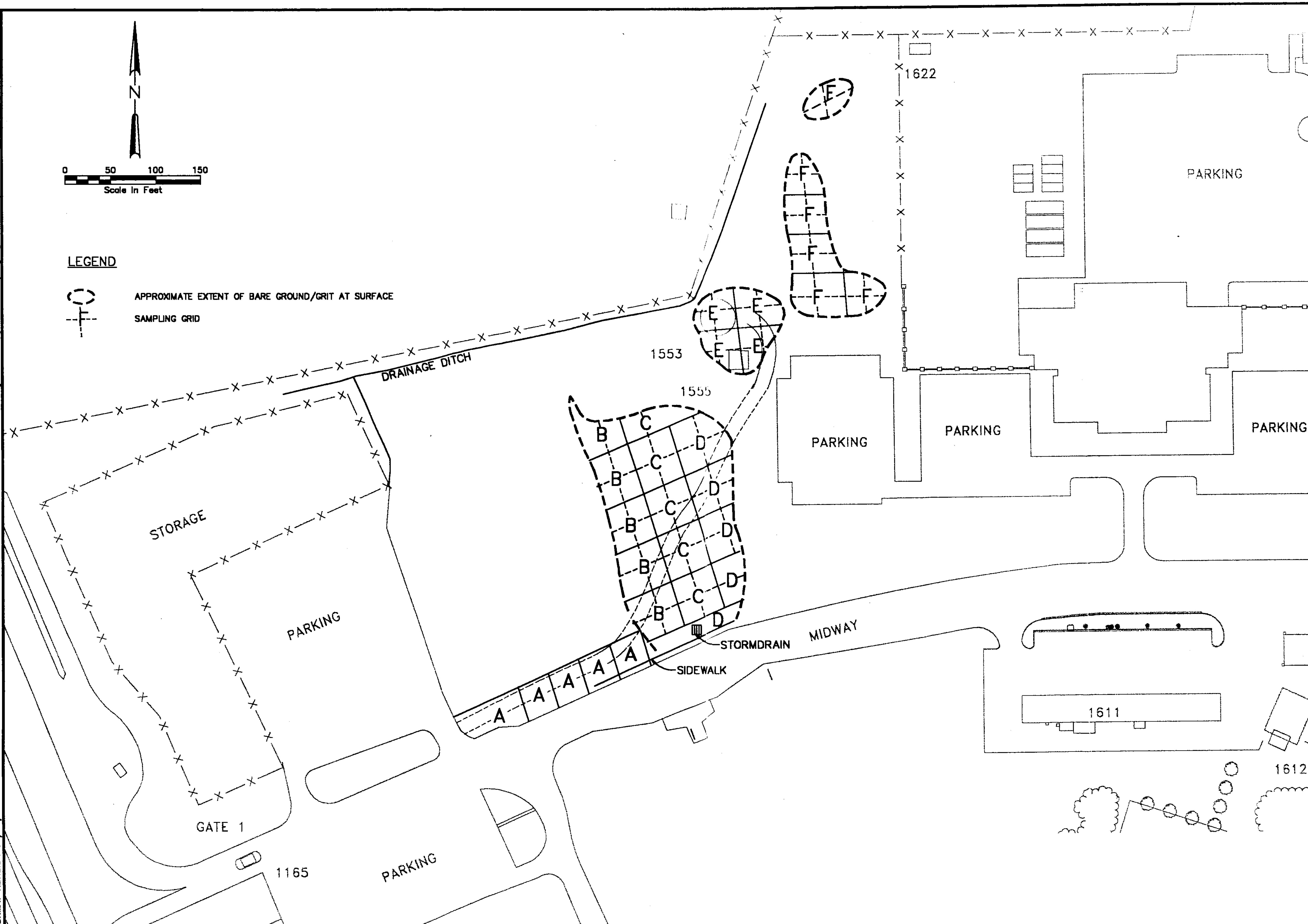


IMAGE	X-REF	OFFICE	DRAWING NUMBER
---	---	Virginia Beach, VA	806397-B1.DWG

PLOT DATE: /2000
FORMAT REVISION 07/12/2000

OHM Remediation Services Corp.
PROJECT NO. 806397

DESIGNED BY	BH/DS	07/25/00	CHECKED BY	BH
DRAWN BY	TFR	07/25/00	APPROVED BY	-

REV	DATE	BY	CHK'D	APP'VD	DESCRIPTION/ISSUE
					SAMPLING GRID

REVISIONS

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
ATLANTIC DIVISION
NAVAL STATION NORFOLK, VIRGINIA
NAVAL AMPHIBIOUS BASE LITTLE CREEK, VIRGINIA

ABM REMOVAL
SOLID WASTE MANAGEMENT UNIT 8

SAMPLING GRID DRAWING

SCALE: AS SHOWN
SIZE: B
TASK ORDER NO. 55
CONSTR. CONTRACT NO.
NAVFAC DRAWING NO.
SHEET I.D. 3.1 – SAP

APPENDIX A

Table A-1 Sampling Summary
Table A-2 Project Quality Control Objectives

ABM Removal Little Creek
Project No. 806397
TO 055

SAP
Version 1.0
7/31/00

TABLE A-1
SAMPLING AND ANALYTICAL SUMMARY

Sample Task	Sample Point	Matrix	Sampling Frequency	Approx Sample No	Sampling Method	Sampling Equipment	TAT[1]	QC Level	Required Analysis	Analytical Method	Holding Time	Sample Preservtn[3]	Containers
Disposal Sampling and Off-Site Analysis													
Characterization of	Areas 1,2, 3, and 4	ABM	One composite/500 yd3	6	Grab for Volatiles	SS Auger, SS Spoon,	14 days	OHM Minimum	TCLP Volatiles	1311/8260 B	14 days	Cool to 4°C	(1) 4 oz Glass
Excavation Area ABM					5 pt. Compositeper grid/ composite grids as denoted in Drawing 3.1	SS Bowl			TCLP Semivolatiles, Pesticides, Herbicides, metals, IRC	1311/8270C, 8181, 8151, 6010/7000, Chapter 7	See Note 2	Cool to 4°C	(4) 4 oz Glass
Clean Fill Sampling and Off-Site Analysis													
Characterization of	Source of Fill	Soil	One composite/source	2	Grab for Volatiles	SS Auger, SS Spoon,	14 days	OHM Minimum	TCLP Volatiles	1311/8260 B	14 days	Cool to 4°C	(1) 4 oz Glass
Clean Fill and Top Soil					5 pt. Composite	SS Bowl			TCLP Semivolatiles, Pesticides, Herbicides, metals, TPH, BTEX, TOX, IRC	1311/8270C, 8181, 8151, 6010/7000, 8015, 8021, 9020, Chapter 7	See Note 2	Cool to 4°C	(4) 4 oz Glass

Notes:
1) Cal days prelim; fin data due 7 cal days from TAT
2) TCLP:VOA--14d TCLP ex, 14d an; SVOA--14d TCLP ex, 7d ex, 4d an; Hg--28d TCLP ex, 28d an; Met--180d TCLP ex, 180d an

TABLE A-2
PROJECT QUALITY CONTROL OBJECTIVES

Method No	Analyte / Component	Project Action Limits	Minimum PQL	Accuracy Limits MS/MSD Recoveries	Precision Limits MS/MSD Deviation	Accuracy Limits LCS Recoveries	Precision Limits Field Dup Deviation	Completeness Limits
		TCLP	TCLP	TCLP	TCLP	TCLP	TCLP	TCLP
TCLP Volatiles		(mg/L)	(mg/L)	(%)	(%)	(%)	(%)	(%)
8260B	1,1-Dichloroethylene	0.7	0.1	50-150	<50	70-130	<50	90
8260B	1,2-Dichloroethane	0.5	0.1	50-150	<50	70-130	<50	90
8260B	Benzene	0.5	0.1	50-150	<50	70-130	<50	90
8260B	Carbon Tetrachloride	0.5	0.1	50-150	<50	70-130	<50	90
8260B	Chlorobenzene	100	20	50-150	<50	70-130	<50	90
8260B	Chloroform	6	1	50-150	<50	70-130	<50	90
8260B	Methyl Ethyl Ketone	200	20	50-150	<50	70-130	<50	90
8260B	Tetrachloroethylene	0.7	0.7	50-150	<50	70-130	<50	90
8260B	Trichloroethylene	0.5	0.1	50-150	<50	70-130	<50	90
8260B	Vinyl Chloride	0.2	0.05	50-150	<50	70-130	<50	90
TCLP Semi-Volatiles		(mg/L)	(mg/L)	(%)	(%)	(%)	(%)	(%)
8270C	1,4-Dichlorobenzene	7.5	1	50-150	<50	70-130	<50	90
8270C	2,4,5-Trichlorophenol	400	80	50-150	<50	70-130	<50	90
8270C	2,4,6-Trichlorophenol	2	0.4	50-150	<50	70-130	<50	90
8270C	2,4-Dinitrotoluene	0.13	0.02	50-150	<50	70-130	<50	90
8270C	Cresol	200	40	50-150	<50	70-130	<50	90
8270C	Hexachlorobenzene	0.13	0.02	50-150	<50	70-130	<50	90
8270C	Hexachloroethane	3	0.5	50-150	<50	70-130	<50	90
8270C	Hexachlorobutadiene	0.5	0.4	50-150	<50	70-130	<50	90
8270C	Nitrobenzene	2	0.4	50-150	<50	70-130	<50	90
8270C	Pentachlorophenol	100	80	50-150	<50	70-130	<50	90
8270C	Pyridine	5	1	50-150	<50	70-130	<50	90
TCLP Pesticides		(mg/L)	(mg/L)	(%)	(%)	(%)	(%)	(%)
8081A	Endrin	0.02	0.004	50-150	<50	70-130	<50	90
8081A	Lindane	0.4	0.08	50-150	<50	70-130	<50	90
8081A	Methoxychlor	10	1	50-150	<50	70-130	<50	90
8081A	Toxaphene	0.5	0.1	50-150	<50	70-130	<50	90
8081A	Chlordane	0.03	0.005	50-150	<50	70-130	<50	90
8081A	Heptachlor and its Hydroxide	0.008	0.001	50-150	<50	70-130	<50	90

TABLE A-2
PROJECT QUALITY CONTROL OBJECTIVES

Method No	Analyte / Component	Project Action Limits TCLP	Minimum PQL TCLP	Accuracy Limits MS/MSD Recoveries TCLP	Precision Limits MS/MSD Deviation TCLP	Accuracy Limits LCS Recoveries TCLP	Precision Limits Field Dup Deviation TCLP	Completeness Limits TCLP
TCLP Herbicides		(mg/L)	(mg/L)	(%)	(%)	(%)	(%)	(%)
8151A	2,4-D	10	2	50-150	<50	70-130	<50	90
8151A	2,4,5-TP	1	0.2	50-150	<50	70-130	<50	90
TCLP Metals		(mg/L)	(mg/L)	(%)	(%)	(%)	(%)	(%)
6010B	Arsenic	5	1	50-150	<50	70-130	<50	90
6010B	Barium	100	20	50-150	<50	70-130	<50	90
6010B	Cadmium	1	0.2	50-150	<50	70-130	<50	90
6010B	Chromium	5	1	50-150	<50	70-130	<50	90
6010B	Lead	5	1	50-150	<50	70-130	<50	90
7470	Mercury	0.2	0.04	50-150	<50	70-130	<50	90
6010B	Selenium	1	0.2	50-150	<50	70-130	<50	90
6010B	Silver	5	1	50-150	<50	70-130	<50	90
Characteristics		(mg/kg)	(mg/kg)	(%)	(%)	(%)	(%)	(%)
7.3	Reactive Sulfide	500	50	N/A	<50	N/A	<50	90
7.3	Reactive Cyanide	250	25	N/A	<50	N/A	<50	90
1010	Ignitability (Pensky Martens)	< 60 C or <140°F	40 C or 100°F	N/A	<50	N/A	<50	90
1020A	Ignitability (Setaflash)	< 60 C or <140°F	40 C or 100°F	N/A	<50	N/A	<50	90
1030	Ignitability of Solids	< 60 C or <140°F	40 C or 100°F	N/A	<50	N/A	<50	90
9040	pH (Corrosivity)	≤2 ; ≥12.5	N/A	N/A	<50	N/A	<50	90

APPENDIX B

Custody Seal
Chain-Of-Custody Label
OHM Shipping Label
Shipping Instructions for Sending Samples to the Laboratory

Client ______________________

Sample ID ______________________

Location ______________________

Analysis ______________________

Preservative ______________________

Collection Date/Time ______________________

Collected By ______________________

CUSTODY SEAL

Person Collecting Sample ______________________ Sample No. ____________
(signature)

Date Collected ______________________ Time Collected ____________

Custody Seal

Sample Label

OHM Remediation Services Corp.

OHM Remediation Services Corp
Subsidiary of OHM Corporation
U.S. Route 224 East * Findlay, Ohio 45840 * (419) 423-3526

CHAIN-OF-CUSTODY RECORD

205391

1 2 3 16 17 22
4 5 6 18 19 23
7 8 9 20 24
10 11 12 21 25
13 14 15 24

Item	Sample Identifier (26)	Matrix (27)	Date (28)	Time (29)	Preserved (30)	# of Cont. (31)	QC Level (32)	T.A. (33)	Analysis								Comments (35)
1																	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

36 37
38 39 40 41

Distribution: White - Laboratory (To be returned with Analytical Report), Goldenrod - Project File, Yellow - Project Data Manager

45

Project Information Section
For Project Personnel Only
Do Not Submit to Laboratory

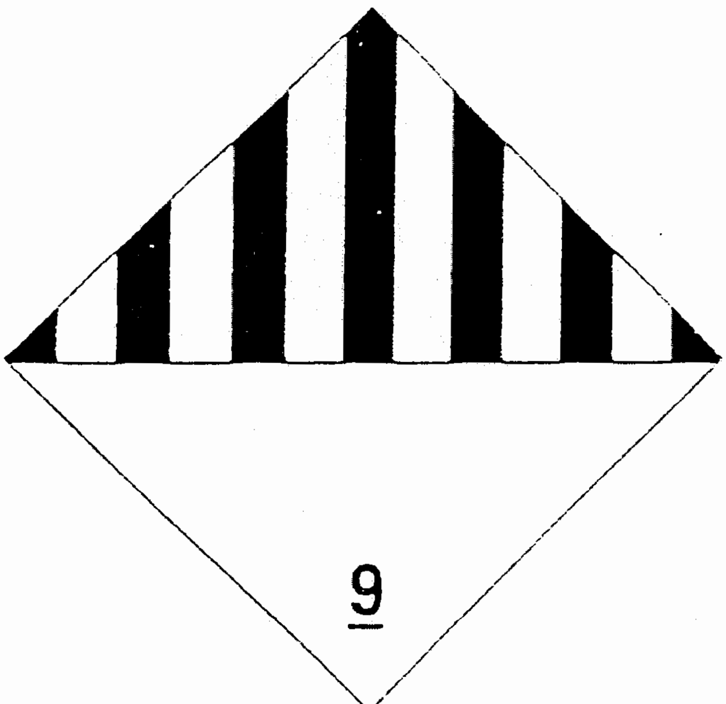
Sample Point Location (42)	Sample Type (43)			
	G	C	F	QC

Comments (44)

Sample Type: G - Grab, C - Composite, F - Field Sample, QC - Quality Control Sample

CHAIN OF CUSTODY RECORD

OHM Corporation



OHM Corporation

From:

Phone:

To:

Phone:

Other Regulated Substances, ID# 8027

Class 9 Shipping Label

OHM Remediation Services Corp.

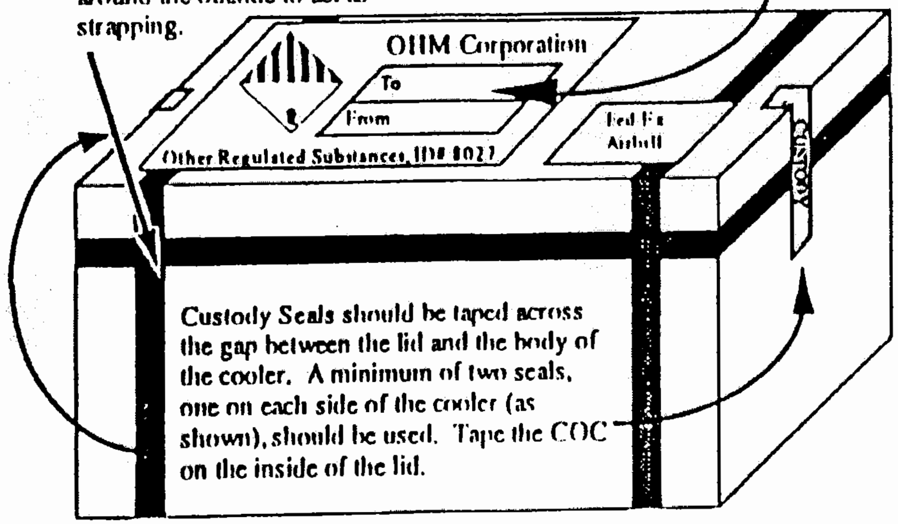
OHM Remediation Services Corp

Shipping Instructions: Sending Samples to the Lab

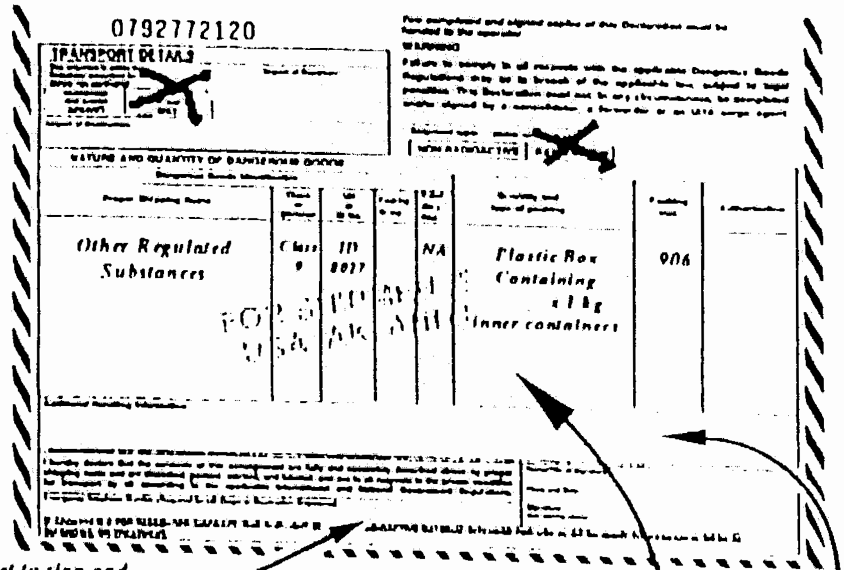
NOTE: These procedures are ONLY for shipping unknown environmental samples such as sludge, soil, or water samples for laboratory analysis and [illegible]; Materials which are known to be explosive, compressed gases, flammable, oxidizers, poisons, radioactive, or corrosive cannot be shipped by this method. Call the Regional T&D Coordinator for help in that case. Drum or tank materials must be shipped as per the Regional T&D Coordinator's Instructions.

Cooler lid is taped closed and additional tape should be used around the outside to act as strapping.

OHM custom sample shipping label



Lower Portion of Fed Ex DANGEROUS GOODS airbill



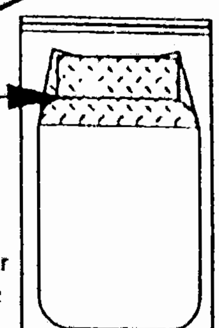
Don't forget to sign and include the 24-hr Emergency Response Phone number. Check with the Regional T&D Coordinator for this number

Fill in the blank with the number of containers

___ x 1 kg for quart jars
___ x 500 g for 8 oz jars
___ x 40 g for VOA vials

Fill in the Additional Handling space with:

"Samples from OHM Job # _______ see attached chain of custody. In case of emergency refer to ICAO Emergency Response Guidance for Aircraft Incidents Involving Dangerous Goods drill #9A"



Lids are taped to prevent leaks or loosening. Entire jar is sealed in a zip lock baggie

1) Samples must be shipped in "Strong outer packaging". Fed Ex stated that a rigid plastic cooler like we are currently using would be acceptable.

2) Use one of OHM's custom sample shipping labels. The To/From address portion of the label should be filled out completely including phone numbers. This label should be placed on last and cannot be covered by tape, the Fed-Ex airbill or anything else. This label should go on the TOP of the cooler.

3) Inner packages cannot exceed 1 gallon each, and the entire shipment (cooler & samples) cannot exceed 66 lb.

4) Coolers must be packed with absorbent material (vermiculite or kitty litter) which will absorb any spills or leaks, not react with the sample contents, and which will minimize the chance that inner containers will break. The coolers should also be fastened shut securely using tape or strapping. See the SAP for special instructions.

5) Inner containers should have their lids securly closed and packed in a ziplock baggie to prevent leaks

6) The materials must be shipped using a Federal Express Hazardous Materials Airbill. Use the example above or call the Hazardous Materials group at Federal Express at (800) GO-FEDEX for more instructions on filling out this form.

7) The COC must be filled out completely, placed in a gallon zip-lock baggie, and taped to the inside lid of the cooler. A copy of the COC should be placed behind the airbill in the pouch on the outside of the cooler.

READ THE DIRECTIONS ON THE AIRBILL SO YOU UNDERSTAND WHAT YOU ARE FILLING OUT. Fill out the Fed-Ex airbill completely. Don't forget to sign the bottom and include the Emergency Response phone number. Changing even one thing from the example above may mean that Fed Ex will refuse to accept the shipment. This procedure has been checked out with Fed-Ex several times. If a driver refuses to pick it up make sure you have filled out the airbill right and followed ALL the instructions before you complain.

APPENDIX C

SOP – QP-650

OHM Corporation

QUALITY POLICY AND PROCEDURE APPROVAL AND REVISION RECORD

Document # QP-650	Title : Standard Analytical Data Deliverable Requirements

APPROVAL

Name	Title	Signature	Date
Guy Gallello	Midwest Region FAS Manger		
Emma Popek	Western Region FAS Manager		
Mike Quinlan	Eastern Region FAS Manager		
Terry Whitt	Southern FAS Manager		

REVISION RECORD

Ltr.	Date	Change Description	Initials						
1	8/4/94	issue	-	-	-	-	-	-	-
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									

OHM Corporation

STANDARD OPERATING PROCEDURE

Title : Standard Analytical Data Deliverable Requirements **Document #:** QP-650

1.0 PURPOSE

The purpose of this procedure is to set forth guidelines for the standardization of hard copy analytical data packages provided to OHM by Analytical Laboratories. This procedure defines the specific deliverable requirement to be included when a minimum data packages, standard data packages and maximum data packages is requested by OHM employees.

2.0 SCOPE

These procedures applies to all purchases of analytical services and the analytical data packages provided to OHM by all analytical laboratories.

3.0 RELATED DOCUMENTS

HAZWRAP, July 1990. Quality Control Requirements for Field Methods DOE/HWP69/R1.

HAZWRAP, July 1988. Requirements for Quality Assurance of Analytical Data, DOE/HWP-65, Rev. 0, July 1988.

USEPA , Test Methods for Evaluating Solid Waste Physical/Chemical Methods SW-846

United States Environmental Protection Agency, 1984. User's Guide to the Contract Laboratory Program, Office of Emergency and Remedial Response, Washington, D.C.

4.0 GENERAL INFORMATION

In the past OHM has experienced that Each analytical laboratory has a different report format that they call their standard deliverable package. Many times the laboratory's standard deliverable package does not include all of the information required to meet our client's expectations in performing data assessment and data validation of the analytical deliverable. When the additional information has been requested from the laboratories often additional charges are levied. In order to better service our client and to assure each and every laboratory bidding on a given set of samples understands precisely what is required to be included within each analytical report, the following procedures have been developed.

5.0 DEFINITIONS

Accuracy - A measure of how close a measured value is to a known true value.

Aliquot - A measured portion of a sample taken for analysis.

Analytical Batch - Batch size is determined the analytical method and project specific quality assurance requirements. Batch size is usually set at 20 or less samples of the same matrix being analyzed for the same parameters at the same time. All samples in a batch are prepared and analyzed together with a basic set of QC samples. Specific project requirements are listed in the Quality Assurance Project Plan (QAPP).

Background Correction - A technique usually employed relative to metals analysis which compensates for variable background contribution to the instrument signal in the determination of trace elements

Blank - An artificial sample designed to monitor the introduction of artifacts into the measurement process.

Calibration - The systematic determination of the relationship of the response of the measurement system to the concentration of a analyte of interest

Chain-of-Custody - A form used to track the custody of the samples from the time they are taken until the time they are analyzed.

Continuing Calibration - Subsequent checks on the instrument calibration performed throughout the analysis of samples.

Data Assessment - A systematic review of the analytical data to assure all method specific requirement were performed.

Data Quality Objectives - The established quality of the data required to support specific decisions or regulatory actions. DQOs must take into account sampling considerations as well as analytical protocols.

Data Validation - A systematic effort to review data for identification of errors for the purpose of flagging suspected values to assure the validity of the data for the user.

Deliverables - Analytical Report Package provide by the analytical laboratory which includes the analytical data and a specified set of supporting documentation.

Hold Times - The time stipulated in the method or regulations which is allowed to elapse from the time of sampling to the time of extraction and/or analysis. Samples analyzed after the hold times are of questionable usefulness.

ICP - Inductively coupled argon plasma (also referred to ICAP). An instrument used for metals analysis.

Internal Standard - A compound added to every standard, blank, matrix spike, matrix spike duplicate, sample and/or sample extract at a known concentration, prior to analysis. Internal standards are used as the basis for quantification of the target compounds.

Initial Calibration - Instrument calibration performed before any samples are analyzed.

Laboratory Control Sample - An artificial sample usually prepared in the laboratory, which either contains all or some of the compounds of interest. The sample is processed through the entire procedure including sample preparation and analysis. This sample is used to verify that the method is being performed properly. One laboratory control sample should be analyzed with each analytical batch.

Matrix Spike - An Aliquot of a sample that has been spiked with a known quantity of specified compounds of interest. The matrix spike is used to measure the accuracy of the analytical system.

Matrix Spike Duplicate - A second aliquot of the same sample used for the matrix spike spiked the same way as the matrix spike. The matrix spike duplicate is used to measure the precision of the analytical system..

Maximum Deliverable Package - Specific requirement set forth in this document to be provided to OHM by the Analytical Laboratory when a Maximum Deliverable Package is requested.

Minimum Deliverable Package - Specific requirement set forth in this document to be provided to OHM by the Analytical Laboratory when a Minimum Deliverable Package is requested.

Precision - a measure of the analytical method's ability to reproduce analytical results.

Preparation Logs - An official laboratory record of the sample preparation procedures used in processing a sample prior to analysis.

Standard Deliverable Package -Specific requirement set forth in this document to be provided to OHM by the Analytical Laboratory when a Standard Deliverable Package is requested.

Surrogate - An organic compound that is similar to the analytes of interest in chemical composition, extraction and chromatography, but are not normally found in environmental samples. These compounds are spiked into quality control samples, calibration and check standards and samples prior to analysis.

Tentatively Identified Compounds (TICs) - Compounds detected in samples that are not target compounds. Usually TICs consist of up to 30 peaks identified that are greater than 10 percent of the peak areas or heights of the nearest internal standard are subjected to mass spectral library searches for tentative identification.

Tuning - A technique used in gas chromatography/mass spectrometry procedures to verify that the instrument is properly calibrated to produce reliable mass spectral information.

6.0 RESPONSIBILITIES

Regional Field Analytical Manager -. Responsible for the management of the Regional Field Analytical Department. Responsible for distributing these requirements to all subcontract laboratories used within there region.

7.0 PROCEDURE

7.1 All laboratories providing analytical services to OHM will be provided with a copy of these specification for minimum, standard and maximum data deliverable packages.

7.2 The desired data deliverable package will be selected at the time of procuring the analytical services. All price quotations must include providing OHM with the requested deliverable package.

7.3 All Data packages received must meet the requested requirements as specified in the Data Deliverables Package Requirements.

8.0 ATTACHMENTS

ATTACHMENT 8.1
DATA DELIVERABLE PACKAGE REQUIREMENTS TABLE

Method	Deliverable Requirement	Equivalent EPA Form	OHM Minimum Level	OHM Standard Level	OHM Maximum Level
Metals	Case Narrative		X	X	X
	Corrective Action Report		X	X	X
	Cross-reference of OHM Sample Numbers, Lab IDs, and analytical QC batches		X	X	X
	Chain-of-Custody Form, Cooler Receipt form		X	X	X
	Data Summary for Each Sample (See Note 1)	I-IN	X	X	X
	Blank Spike or Lab Control Sample (LCS) results (including concentration spiked, percent recovered, percent recovery acceptance limits)	VII-IN	X	X	X
	Matrix Spike (MS) Report (including concentration spiked, percent recovered, percent recovery acceptance limits)	V (PART 1)IN	X	X	X
	Post-digestion Spike Recovery for ICP	V (PART 2)IN	X	X	X
	Duplicate Sample Report		X	X	X
	Blank Results	III-IN	X	X	X
	Initial Calibration Data	III-IN		X	X
	Continuing Calibration Data	II (PART I)-IN		X	X
	ICP Interference Check Sample Report	II (PART I)-IN		X	X
	Standard Addition Results	IV-IN		X	X
	ICP Serial Dilution Results	VIII-IN			X
	Copies of Preparation Logs	IX-IN			X
	Copies of Analysis Run Logs	XIII-IN		X	X
	Copies of Standard Preparation Logs	XIV-IN			X
	Raw Data and Instrument Printouts				X
	Percent Moisture		X	X	X
	PH				X (Note 2)
Organics by	Case Narrative		X	X	X
GC or HPLC	Corrective Action Report		X	X	X
	Cross-reference of OHM Sample Numbers, Lab IDs, and analytical QC batches	IV	X	X	X
	Chain-of-Custody Form, Cooler Receipt form		X	X	X
	Data Summary for each blank and sample (See Note 1)	I	X	X	X
	Blank Spike or Lab Control Sample (LCS) results (including concentration spiked, percent recovered, percent recovery		X	X	X

Method	Deliverable Requirement	Equivalent EPA Form	OHM Minimum Level	OHM Standard Level	OHM Maximum Level
	acceptance limits)				
	Surrogate Recovery Report (including concentration spiked, percent recovered, and percent recovery acceptance limits)	II	X	X	X
	Matrix Spike/Matrix Spike Duplicate (MS/MSD) Report (including concentration spiked, percent recovered, percent recovery acceptance limits, relative percent difference (RPD), and RPD acceptance limits)	III	X	X	X
	Initial Calibration Data for each column (indicate which column was used for quantitation)	VI		X	X
	Continuing Calibration Data (indicate which column was used for quantitation)	VII		X	X
	Chromatograms for each sample (and reruns), confirmation runs, blank, spike, duplicate, and standards			X (Note 4)	X
	Raw Quantitation Report (area vs. retention time)				X
	Copies of Sample Preparation Bench Sheets			X	X
	Copies of Standard Preparation Logs				X
	Copies of Run Logs	VIII			X
Organics	Case Narrative		X		X
by GC/MS	Corrective Action Report		X		X
	Cross-reference of OHM sample numbers, Lab IDs, and analytical QC batches	IV			X
	Chain-of-Custody Form, Cooler Receipt Form		X		X
	Data Summary for each blank and sample (See Note 1)	I	X		X
	Tentatively Identified Compounds (TICs) for each sample (ten peaks)	I,TIC			X
	Blank Spike or Lab Control Sample (LCS) results (including concentration spiked, percent recovered, percent recovery acceptance limits)		X		X
	Surrogate Recovery Report (including concentration spiked, percent recovered, and percent recovery acceptance limits)	II	X		X
	Matrix Spike/Matrix Spike Duplicate (MS/MSD) Report (including concentration spiked, percent recovered, percent recovery acceptance limits, relative percent difference (RPD), and RPD acceptance limits)	III	X		X
	Instrument Performance Check (Tuning) Report	V			X
	Initial Calibration Data (including acceptance limits)	VI			X
	Continuing Calibration Data (including acceptance limits)	VII			X
	Internal Standard Areas and Retention Times Reports (including acceptance limits and out-of-control flags)	VIII			X
	Reconstructed Ion Chromatogram for each sample and rerun, blank, spike, duplicate,				

Method	Deliverable Requirement	Equivalent EPA Form	OHM Minimum Level	OHM Standard Level	OHM Maximum Level
	and standard				
	Raw Quantitation Report				
	Raw and background subtracted mass spectra for each target analyte found				
	Mass spectra of TICs with library spectra of 5 best-fit matches				
	Copies of Sample Preparation Bench Sheets				X
	Copies of Standard Preparation Logs				
	Copies of Run Logs				
	Percent Moisture		X		X
	PH				X (See Note 3)
Inorganic	Corrective Action Report		X	X	X
Chemistry	Cross-reference of OHM sample numbers, Lab IDs, and analytical QC batches		X	X	X
(Note 2)	Chain-of-Custody Form, Cooler Receipt form		X	X	X
	Data Summary for each blank and sample (See Note 1)		X	X	X
	Blank Spike or Lab Control Sample (LCS) results (including concentration spiked, percent recovered, percent recovery acceptance limits)		X	X	X
	Matrix Spike/Matrix Spike Duplicate (MS/MSD) Report (including concentration spiked, percent recovered, percent recovery acceptance limits)		X	X	X
	Duplicate Sample Report		X	X	X
	Calibration Reports Initial and Continuing			X	X
	Copies of Sample Preparation logs				X
	Raw Data and Instrument Printouts				X
	Percent Moisture		X	X	X

Notes:

1. Must include: OHM sample ID, Lab ID, date/time sampled, date received, extracted/analyzed, Practical Quantitation Limit, Method Detection Limit, Dilution Factor, comments, approval signature/date.
2. For water samples only.
3. Must include: OHM sample ID, Lab ID, date/time sampled, date received, extracted/analyzed, Practical Quantitation Limit, Method Detection Limit, Dilution Factor, comments, approval signature/date.
4. For petroleum fuels analyses chromatograms for samples with positive results only.

APPENDIX D

Construction Quality Control Plan

OHM Remediation
Services Corp.
A Subsidiary of The IT Group

QUALITY CONTROL PLAN

FOR

REMOVAL OF ABRASIVE BLAST MATERIAL
SWMU 8 – NAB LITTLE CREEK
VIRGINIA BEACH, VIRGINIA

Prepared for:
DEPARTMENT OF THE NAVY
Contract No. N62470-97-D-5000
Task Order No. 0055

Prepared by:
IT/OHM Remediation Services Corporation
200 Horizon Boulevard
Trenton, NJ 08691-1904

P. Taylor Sword, C.P.G.
Project Manager

Charles W. Hunter
Program QC Manager

Roland Moreau, P.E.
Program Manager

Project No. 806397
Date: July 19, 2000

TABLE OF CONTENTS

STATEMENT OF PROGRAM

IT/OHM Remediation Services Corporation (IT/OHM), a subsidiary of IT Corporation, will provide and maintain an effective Quality Control (QC) Program. This program will be performed in accordance with the approved Program Quality Control Plan (PQCP) developed specifically to be responsive to the contract specification, Contract NO. N62470-97-D-5000, Atlantic Division, Naval Facilities Engineering Command and to the Task Order (TO) specification(s) made applicable to each project, task or work activity. IT/OHM will perform the inspections and tests required to ensure that materials, workmanship, and construction conform to drawings, specifications, and contract requirements.

Note to Employees

Quality Control should not be considered a person or an organization of personnel, but a concept to perform in such a manner that the end product of our efforts meet established criterion, the customer's needs. The Quality Control individual or group cannot inspect quality into the final product, but only inspect and document the results of our efforts. The only person that can build quality into the product are the individuals performing the task of producing the end product.

It should be noted by all employees that the documentation requirements of IT/IT/OHM procedures, plans, and the task order specifications are considered equally as important as the end product itself. When it is stated that the documentation will be approved prior to the start of work, this is exactly what is intended. To eliminate problems in this area requires careful planning and execution by everyone.

We would do well to remember that our livelihood depends on how well we satisfy our customer. To accomplish this requires teamwork and attention to detail by all employees and contractors.

I. QUALITY CONTROL ORGANIZATION

The QC organization is depicted in the Organizational Chart, Figure I-l.

II. IDENTIFICATION OF PERSONNEL ASSIGNED TO THE QC ORGANIZATION

Figure II-I provides the resume of the Site QC Manager / Representative. The resumes of any additional QC staff members will be submitted to the CO for approval prior to assignment. This action will be performed in accordance with the contract specification Section C, Part 6.5.

III. APPOINTMENT LETTERS

The Site QC Manager / Representative appointment letter is provided as Figure III-1. Similar letters will be provided when necessary to describe the duties and authorities of personnel assigned to the position of Altemate or Assistant QC Manager.

IV. OUTSIDE ORGANIZATIONS

A list for identifying outside organizations such as architectural and consulting engineering firms, and subcontractors employed by IT/OHM for work under this task order is provided in Exhibit IV-1. This list will provide each firm's name and address and a description of the services each firm.. This list will be completed, maintained current and will be available for review.

V. INITIAL SUBMITTAL REGISTER & REVIEWER

V.1 Submittal Register

A sample Submittal Register is provided as Exhibit V-1. Submittal Registers will be prepared as necessary based on project size and complexity, or as required by individual TO.

V.2 Personnel Authorized to Review and Certify Submittals

Personnel authorized to review and certify submittals other than the Site QC Manager / Representative are identified on Exhibit V-2. Any additional personnel assigned to perform submittal review and certification must be approved by the CO, prior to performance.

VI. TESTING LABORATORY ACCREDITATION

Testing laboratory accreditation requirements are addressed in the contract specification Section C Part 6.12.

VII. TESTING PLAN & LOG PREPARATION

A Testing Plan and Log, Exhibit VI-1, will be prepared for this TO and shall be maintained current..

VIII. QUALITY CONTROL INSPECTION PLAN

The Quality Control Inspection Plan, Exhibit VII-1, lists each specification section and definable feature of work with provisions for recording the corresponding checklist/report for each phase of the three phase control process. As each control phase is satisfactorily preformed, the Site QC

Manager/ Representative will record the corresponding checklist/report number.

Note: A definable feature of work is a task which is separate and district from other tasks and requires separate control procedures.

This list has been prepared and maintained in accordance with the contract specification Section C, Part 6.7 and will be agreed upon during the Coordination and Mutual Understanding Meeting. The list will be keyed to the construction schedule. Each preparatory, initial and follow-up phase checklist/report will reflect the construction activity number derived from the construction schedule, and will reference the procedures followed for each control phase.

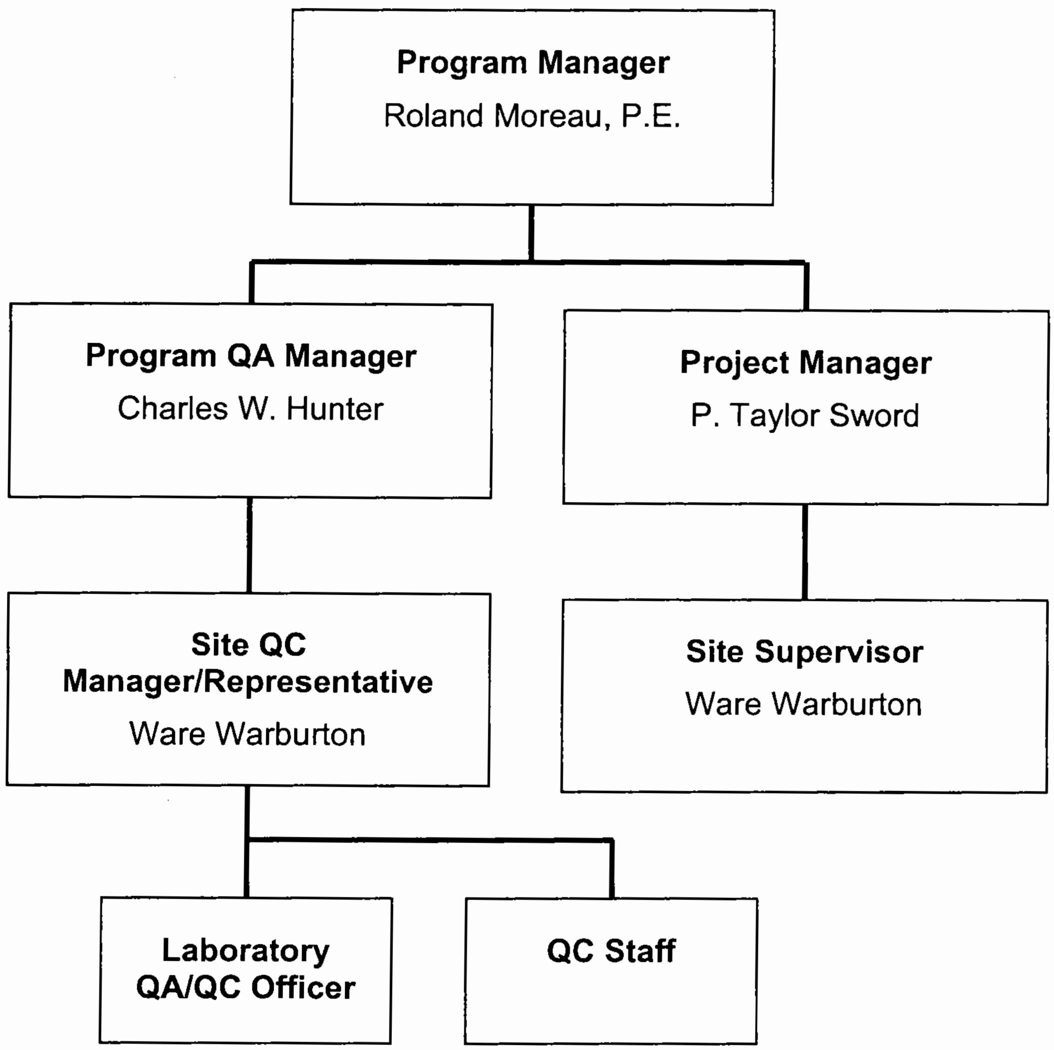
In the event there is a change in the project, a LANTDIV RAC field form must be completed and approved prior to the implementation of the change. This form must be completed and approved by OHM/IT and the ROICC. A LANTDIV RAC field form, Exhibit VII-2, documents the change. The impact to budget and/or schedules and approval.

IX. PERSONNEL MATRIX

The Site QC Manager/Representative will prepare and maintain the personnel matrix,

Exhibit VIII- I, showing each section of the TO specification with identification of who will review and approve submittals, who will perform and document the three phases of control, and who will perform and document testing. This matrix should be completed as much as possible prior to and during site mobilization. The matrix will be maintained current by the Site QC Manager / Representative and will be available for review.

Figure I-1
QC Organizational Chart
IT/OHM Remediation Services Corporation
Task Order No. 0055



Edmond W. Warburton

Professional Qualifications

Mr. Warburton joined OHM in 1994, having over 12 years of technical and mechanical experience. As a site supervisor, he is responsible for on-site oversight of personnel and equipment, procurement of equipment and materials, project health and safety compliance, budgeting, scheduling, and client liaison.

Education

- A.S., Mechanical Engineering, Thomas Nelson Community College, Hampton, Virginia; 1986

Additional Training:

- OSHA 40-hour Training; 1997
- OSHA 8-hour Refresher Training; Annually
- First Aid and CPR, American Red Cross; 1992
- USACE Construction Quality Management Certified; 1997

Experience and Background

1994 - Present
Site Supervisor, OHM Remediation Services Corp.

Mr. Warburton supervises on-site multi-disciplinary personnel and subcontractors. He directs the utilization of heavy equipment and field construction activities at chemical and hazardous waste remediation sites. He is responsible for preparation and adherence to the remedial-site plan documentation, financial documentation, cost tracking, WorkPlans, Spill Prevention Plans, and Health and Safety Plans. He also takes on the responsibilities of the Site QC Manager on select projects and ensures that all aspects of hazardous waste remediation adhere to the quality control program specifications; the USACE Three Step Quality Process; and engineering requirements. Examples of his OHM experience include:

- Superintendent for OHM at Norfolk Naval Base, Norfolk, Virginia. Supervised OHM and subcontractor personnel during the construction of three product recovery systems. Introduced Down Hole Heaters. The heaters thin the thick oils, allowing for easier pumping and transfer with an average product recovery of over 2,000 gallons per month. Construction consisted of mechanical and electrical installations including motors, pumps, pneumatics, hydraulics, instrumentation, piping, and overhead high voltage lines. This project was performed in Level D safety protection under OHM's LANTDIV RAC (CPAF) program, on schedule, and within budget guidelines.

- Superintendent at the Yorktown Naval Weapons Station, Yorktown, Virginia. This project involved the excavation and debris removal at three sites, consisting of asbestos contamination, creosote timber, metal debris, lead, and old munitions. During this project, Mr. Warburton identified a separate area contaminated with TNT and prepared a work plan and cost proposal for the Navy. The additional work was efficiently performed concurrently with the three other sites. This project was performed in Level D/C PPE under OHM's LANTDIV RAC (CPAF) program, on schedule, and under budget.

Mr. Warburton served as superintendent for OHM at Yorktown Naval Weapons Station, Yorktown, Virginia. Supervised OHM multidisciplinary personnel during the exploration and removal of over 1000 sea mines and depth charges; remediation of three fire training pits; and excavation, decomissioning, and removal of a UST containing residual fuels and solvents from a Rocket Plant. This project was performed in Level D and C safety protection under OHM's LANTDIV RAC (CPAF) program, under schedule and under budget guidelines.

Mr. Warburton served as the site supervisor for an OHM project at the Bypass Road Landfill, Naval Weapons Station, Lackey, Virginia. This project, performed under OHM's contract with the U.S. Navy's LANTDIV, involves the excavation of an area that was contaminated with TNT. Mr. Warburton supervised the surface debris removal phase, which included writing the cost plan and the work plan, purchasing, resourcing, and equipment maintenance.

Mr. Warburton supervised the construction of temporary holding facilities for dewatering at a bioremediation project in Craney Island, Virginia. This project was performed under OHM's LANTDIV RAC program.

Mr. Warburton supervised the construction of a clay cap over a landfill for a confidential client in South Carolina.

Mr. Warburton supervised work on a lead-contaminated pugmill for a bearing company in Petersburg, Virginia.

Mr. Warburton's crew was responsible for assembling, lining, calibrating, and maintaining the pugmill. The crew also excavated the area around the pugmill and treated the excavated dirt. The crew also dewatered the entire area, since it was a lagoon, and set up a dewatering facility on site. Mr. Warburton supervised all on-site operations.

Mr. Warburton supervised a landfill capping project for the U.S. Army Corps of Engineers (USACE) at Ft. Eustis in Newport News, Virginia. The project involved bringing elevations to specified grades, and covering the landfill using a heavy velum cap. The crew also installed a J-drain and filter fabrics above the velum, and placed topsoil above the velum.

1993 - 1994
Project Superintendent, Laidlaw Environmental Services, Inc.

Served as Project Superintendent for Laidlaw Environmental Services, Inc., managing the remediation of lead-contaminated soil and water for a bearing company in Petersburg, Virginia. Mr. Warburton provided oversight for assembling, calibrating, and maintaining the pugmill that treated 30,000 yds of contaminated soil. Mr. Warburton also supervised the set up and management of a dewatering facility on site, since total excavation was ten feet below the water table.

Also served as Project Superintendent managing three landfill capping projects for the U.S. Army Corps of Engineers (USACE) at Ft. Eustis in Newport News, Virginia. The project involved the simultaneous correction of three areas (a 65 acre site, a 25 acre site, and a 18 acre site) by lowering and raising elevations to specified grades and covering the landfill with clay. He also supervised installation of HDPE liner, J-drain, and a filter fabric, and final placement of topsoil over the filter fabrics.

1991 - 1992
Site Supervisor, Lee Mechanical Company, Inc.

Managed crews in all aspects of mechanical installation of air purifying systems and equipment.

1989 - 1991
Site Supervisor, Frucon

Served as a Site Supervisor for Frucon, managing crews in all aspects of mechanical installations, including motors, pumps, fans, pneumatics, hydraulics instrumentation, piping and duct work.

1986 - 1989
Site Supervisor, Heavy Earth Moving/Grading Co.
Owner and manager of a heavy earth moving and grading company.

1979 -1986
Mechanical Engineer/Designer, Philip Morris-York Engineering Center

Served as a Mechanical Engineer/Designer with Philip Morris-York Engineering Center with the Research and Development Department.

OHM Remediation Services Corp.
A Subsidiary of The IT Group

Figure III-1
Letter of Appointment

November 2, 2000

Mr. Edmond (Ware) W. Warburton
IT/OHM Remediation Services Corporation
5700 Thurston Avenue, Suite 116B
Virginia Beach, VA 23455-3302

RE: Site QC Manager
Contract N62470-97-D-5000
Task Order 0055, Removal of Abrasive Blast Material
SWMU 8, NAB Little Creek, Virginia Beach, VA

Dear Ware:

This letter will serve as your appointment as the Site Quality Control Manager on the referenced project and will also clarify your duties and authority in this position. In this position, you will be authorized to use available resources to satisfy all applicable requirements of the Program and Task Order Quality Control Plan.

This authorization specifically gives you the authority to direct removal and replacement or correction of nonconforming materials or work and stop work authority when continuation would be unsafe to personnel, harmful to the environment, or result in a significant degradation of quality.

You will be expected to work closely with the Project Manager and other project personnel, but you will not be directly responsible to anyone but myself for resolution of quality issues when working in the capacity of Quality Control Manager.

If you have any question in this matter, please call me at (609) 584-6840.

Sincerely,

Roland S. Moreau

Roland Moreau, P.E
Program Manager
LANTDIV RAC Program

EXHIBIT IV-1
APPROVED CONSULTANT & SUBCONTRACTOR LIST

COMPANY NAME & ADDRESS:	DESCRIPTION OF SERVICES PROVIDED:
TBD	TBD

EXHIBIT V-1
SUBMITTAL REGISTER

Delivery Order | Project Number:

Contract No. N62470-97-D-5000 | Project Title | Location: | Contractor: OHM Remediation Services Corp.

		SD No and Type of Submittal						Contractor Action			Approving Authority Action				Contractor	
Submittal No.	Spec Section No.	Material or Product	Spec Para No.	Classification Approval by Contracting Officer	Government or A/E Reviewer	Transmittal Control No.	Planned Submittal Date	Action Code	Date of Action	Date Forward to Approved Authority/ Date Recvd. from Contractor	Date Forwarded to Other Reviewer	Date Recvd. from Other Reviewer	Action Code	Date of Action	Mailed to Contractor/Recvd. from Approved Authority	Remarks
(a)	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)

Action Codes: (others may be prescribed by Transmittal Form)

NR = Not Reviewed — AN = Approved as Noted

A = Approved — RR = Disapproved, Revise and Submit

EXHIBIT V-2
LIST OF PERSONNEL AUTHORIZED TO REVIEW & CERTIFY SUBMITTALS

SPECIFICATION SECTION:	SUBMITTAL TYPE:	AUTHORIZED PERSONNEL:
N/A	All	P. Taylor Sword
	Analytical/Test Data	Dorothy Small

EXHIBIT VI-1
TESTING PLAN AND LOG

CONTRACT NUMBER N62470-97-D-5000			PROJECT TITLE AND LOCATION Removal of Abrasive Blast Material, SWMU, 8 NAB Little Creek, Virginia Beach, VA								Contractor IT/OHM	
Specification Section and Paragraph Number	Item of Work	Test Required	ACCREDITED/ APPROVED LAB		Sampled By	Tested By:	Location of Test		Frequency	Date Complete	Date Forwarded to Contractor Office	Remarks
			Yes	No			On-Site	Off-Site				

EXHIBI[illegible]-1
QUALITY CONTROL INSPECTION PLAN
Removal of Abrasive Blast Material, SWMU 8, NAB Little Creek, Virginia Beach, VA
Task Order No. 0055

Specification Section	Definable Feature of Work	Activity Number*	Control Check Verification		
			Preparatory Phase Checklist/Report No.	Initial Phase Checklist/Report No.	Follow-up Phase Checklist/Report No.
N/A	**Site Preparation** • Establish temporary facilities (storage/laydown areas) • Delineate work areas • Install fencing • Establish erosion & sediment controls • Utility clearance • Spill prevention measures • Establish decontamination measures **Waste Characterization** • Sampling & analysis **Excavate ABM soils** **Backfill** • Place clean fill material • Compaction • Seed **T&D Haz and Non-Haz ABM Soils** **Site Restoration** • Restore to original condition				

* Include schedule date, if a CPM network is invoked.

EXHIBIT VIII-1
PERSONNEL MATRIX

SPECIFICATION SECTION:	SUBMITTAL REVIEWED BY:	THREE PHASE PERFORMED BY:	TESTING PERFORMING BY:
N/A	Site QC Manager	Site QC Manager	TBD

EXHIBIT VII-II
LANTDIV RAC FIELD FORM

I. PURPOSE

The purpose of the Field Form is to provide a standardized document that communicates approval, modification, or rejection of Technical Direction (TD), Requests for Information (RFI), Variance Requests (VR), and Overtime Authorization (OTA) by the authorized project and program representatives. The Field Form is a communication vehicle and individually may not be justification for a contract modification. Other factors will be reviewed to determine whether a contract modification is required (ex: adequacy of current funds, other scope deletion). Refer to contract specific guidelines for determining cost versus scope growth including the application of fee.

II. COMPLETING THE FORM

All lines on the form are to be completed. If particular information is not applicable, write N/A on the line.

Lines that should never say N/A are: Date of Request, Cost Code, Field Form No., Change Title, Reason for Change, ROM Estimate, Schedule Impact, Contractor Signature, and ROICC Signature. It is the responsibility of both the Navy and the contractor to ensure that sufficient explanation is provided so that the work proceeds as required. If sufficient room is not available on this form, additional pages should be attached.

All parties listed on the distribution must be copied on all executed field forms! Only Technical Direction forms should be forwarded to the Contracting Officer. All field forms, whether accepted or rejected must be logged in accordance with contract specific reporting requirements. Numbering will be sequential starting with 001 for each type of field form request as follows:

Example) Contract No.: 1234-56-78910
Task Order No.: 12345
Title/Location: Norfolk, VA
Form No.: (TD)001

If the next field form for this same project is a variance request, the field form number would be (VR)001. The next Technical Direction would be (TD)002, and so on.

III. SUBMITTAL PROCESS/DISTRIBUTION

Contractor completes the field form as soon as request/changed condition is identified.

Completed field form is routed to ROICC and RPM/EIC for approval.

Copies of **ALL** initiated field forms must also be distributed to the COTR and Contractor Specific Project and Program Representatives. As previously stated, only Technical Direction forms are distributed to the Contracting Officer.

The approved/modified/rejected field form is returned to the contractor for appropriate action(s). If a modification to the delivery order/task order is required, the field form information should be used as the basis for the request.

EXHIBIT VII-II

LANTDIV RAC FIELD FORM

DISTRIBUTION:

_____ CONTRACTING OFFICER/SPECIALIST (TD'S)
_____ ROICC
_____ RPM
_____ COTR:
OTHER: ______________________________
____
____
FILE: ______________________

Contract No. ______________
Task Order No. ______________
Title/Location ______________

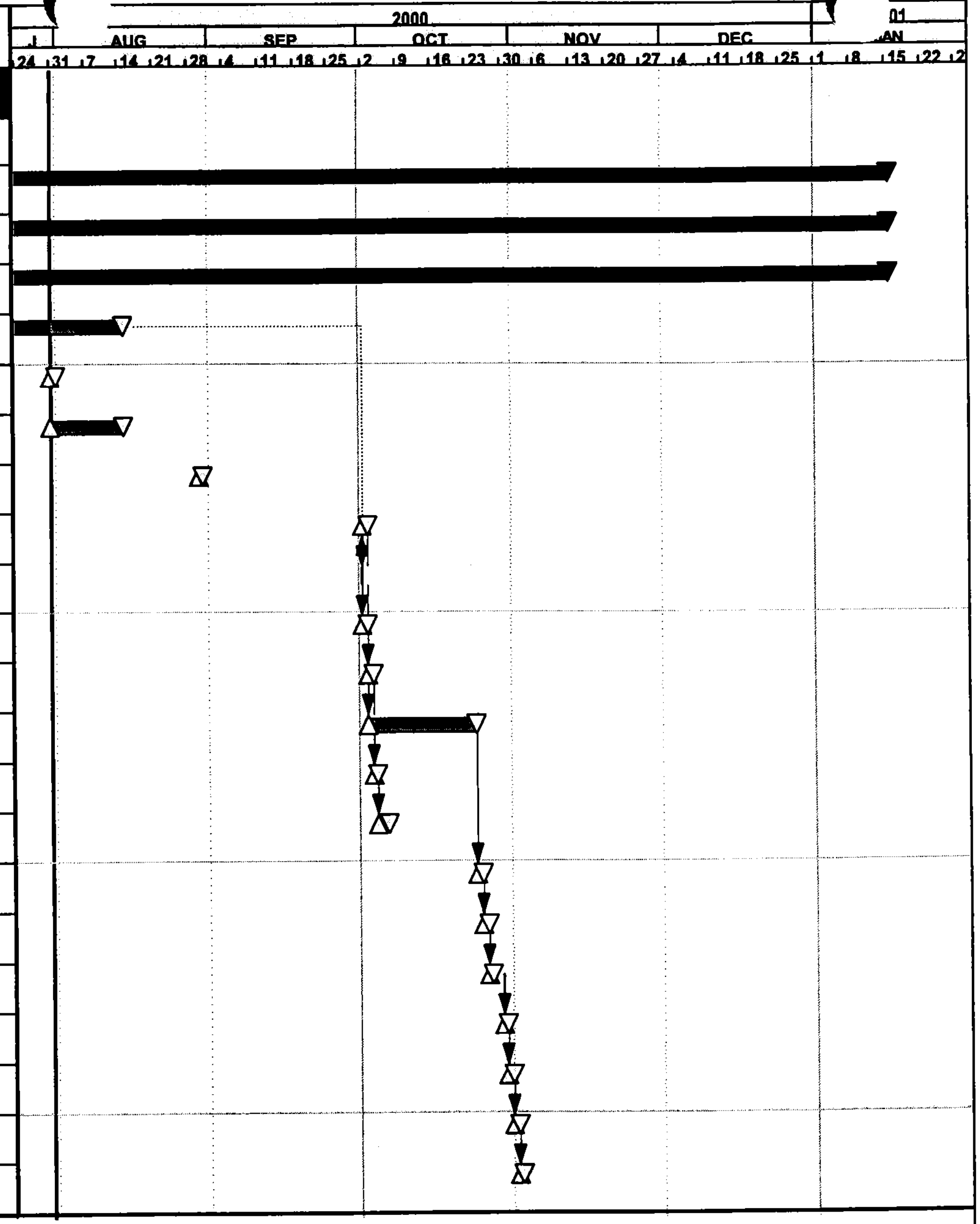
Form No.		**Date:**	**Respond *NLT:**
Initiated By:	☐ **Navy**	☐ **Contractor**	☐ **Other**
☐ **Technical Direction**	☐ **RFI**	☐ **Variance Request**	☐ **Overtime Authorization**
Description (Include location & attachments if necessary):			
Attachment ☐			
Drawing Ref:		Spec. Ref.	
Explanation/Recommendation:			
☐ **Scope Increase** ☐ **Scope Decrease** ☐ **No Change in Scope**		**Cost impact, fee excluded:** ☐ None ☐ Cost Increase ☐ Cost Decrease Rough Order of Magnitude: $	
WBS Codes Affected: New ☐ Existing ☐		**Schedule Impact** (assume response by *NLT date) ☐ None ☐ Increase in Time ☐ Decrease in Time Approximate Calendar Days:	
Contractor:	SIGNATURE	Date	
Site Representative:			
Project Manager:			
Reviewer Comments, incl RFI Response:			
Navy:	SIGNATURE	Date	
ROICC:			
RPM/EIC			
☐ Task Order Modification to Follow (contract action)		☐ No Task Order Modification Required	

APPENDIX E

Project Schedule

TO #55/806397 - ABM Removal LCNAB

Activity ID	Activity Description	Orig Dur	INST	%	Early Start	Early Finish
01003010	Prep. Estimate	45	100.00	100	01APR00A	01JUN00A
99001000	Supervision/Management	163*	2.00	2	01JUN00A	15JAN01
99003000	Office Management	163*	10.00	10	01JUN00A	15JAN01
99015000	Health & Safety	163*	0.00	0	01JUN00A	15JAN01
01003000	Prepare Submittals/Plans	30	40.00	40	02JUN00A	14AUG00
66666666	2000 Restructuring Accrual	1	0.00	0	31JUL00	31JUL00
99005000	Purchasing/Procurement	11	0.00	0	31JUL00*	14AUG00
99008000	Outside Equipment	1	0.00	0	30AUG00*	30AUG00
01000010	Precon Site Visit	1	0.00	0	02OCT00	02OCT00
01003001	CH2MHill EECA	0	0.00	0	02OCT00*	
02006000	Waste Char. Sampling	1	0.00	0	02OCT00	02OCT00
01001000	Mobe Const. Equip	1	0.00	0	03OCT00	03OCT00
02014000	Off Site Lab Analysis	16	0.00	0	03OCT00	24OCT00
01002000	Mobe Personnel	1	0.00	0	04OCT00	04OCT00
01004000	Site Preparation	2	0.00	0	05OCT00	06OCT00
03003000	Excavate/Loadout Soils	1	0.00	0	25OCT00	25OCT00
19020000	Trans./Disposal	1	0.00	0	26OCT00	26OCT00
20004000	Site Restoration	1	0.00	0	27OCT00	27OCT00
21003000	Final Site Clean-up	1	0.00	0	30OCT00	30OCT00
21004000	Demobe Const. Equip	1	0.00	0	31OCT00	31OCT00
21005000	Demobe Personnel	1	0.00	0	01NOV00	01NOV00
21006000	Post Const. Submittals	1	0.00	0	02NOV00	02NOV00



Project Start	01AUG98
Project Finish	15JAN01
Data Date	31JUL00
Run Date	14AUG00

Early Bar
Progress Bar
Critical Activity

055X

Sheet 1 of 1

The IT Group
Task Order #55
Project No. 806397

the IT group

APPENDIX F

Confirmational Sampling and Analysis Plan

SIGNATURE PAGE

Final

Sampling and Analysis Plan

For

Removal Action at SWMU 8/144

Naval Amphibious Base Little Creek

Virginia Beach, Virginia

Navy CLEAN II Program

Contract Number N62470-95-D-6007

Contract Task Order Number 0159

Prepared by

CH2M HILL

November 2000

Approved by: John Tuil /for: Date: 11/7/00

Scott MacEwen
Activity Manager

Approved by: Paul Landi for Date: 11/07/2000

Donna Caldwell, P.G.
Project Manager

Final

Sampling and Analysis Plan For Removal Action at SWMU 8/144

Naval Amphibious Base Little Creek Virginia Beach, Virginia

Prepared for

Department of the Navy
Atlantic Division
Naval Facilities Engineering Command

Contract Task Order 0159

November 2000

Under the

LANTDIV CLEAN II Program
Contract N62470-95-D-6007

Prepared by

CH2MHILL

Virginia Beach, Virginia

Table of Contents

Figures

Acronyms and Abbreviations

ABM	Abrasive Blast Material
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
CLEAN	Navy Comprehensive Long Term Environmental Action Navy
CLP	Contract Laboratory Program
COC	Chain of Custody
CTO	Contract Task Order
DEQ	Department of Environmental Quality
DQO	Data Quality Objectives
EPA	Environmental Protection Agency
FSP	Field Sampling Plan
GPS	Global Positioning System
HASP	Health and Safety Plan
IDWP	Investigation Derived Waste Plan
IR	Installation Restoration
IRP	Installation Restoration Program
MS/MSD	Matrix Spike/Matrix Spike Duplicate
NAVFACENGCOM	Naval Facilities Engineering Command
NFA	No Further Action
PAH	Polynuclear aromatic hydrocarbon
PCB	Polychlorinated biphenyls
PWC	Public Works Center
QAPP	Quality Assurance Project Plan
RA	Risk Assessment
RBC	Risk Based Concentration
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RRRS	Relative Risk Ranking System
SI	Site Investigation
SOP	Standard Operating Procedure
SPSA	Southeastern Public Service Authority
SVOC	Semi-volatile Organic Compounds
SWMU	Solid Waste Management Unit

Acronyms and Abbreviations (Continued)

TAL	Target Analyte List
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
TOX	Total Organic Halogen
TPH	Total Petroleum Hydrocarbons
VOC	Volatile Organic Compounds
WP	Work Plan

Distribution List

Matt Louth/CH2M HILL
Bruce Beach/EPA
Mary Cook/EPA
Taylor Sword/IT Corporation
Bob Schirmer/LANTDIV
Dawn Hayes/LANTDIV
Stephanie McManus/ NAB Little Creek
Stock Dinsmore/ NAB Little Creek
Randy Sawyer/Navy Regional IR
Robert Weld/VDEQ

1.0 Introduction

This work plan describes the activities that will be conducted as part of confirmation sampling related to a Removal Action at SWMU 8/144 West Annex Sandblast Area at the Naval Amphibious Base (NAB) Little Creek, Virginia Beach, Virginia. The plan is prepared under the Naval Facilities Engineering Command (NAVFACENGCOM) LANTDIV Navy Contract N62470-95-D-6007, Navy Comprehensive Long Term Environmental Action Navy (CLEAN), District III, Contract Task Order – 0159.

The West Annex Sandblast Area (SWMU 8) was formerly referred to as SWMU 144 in the 1989 Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA). Additionally, Installation Restoration (IR) Site 2 Sandblast Areas also included SWMU 8. Reference to this SWMU as IR Site 2 and SWMU 144 has been discontinued.

The general background and physical setting of NAB Little Creek in addition to information detailing the history of SWMU 8 and previous site investigations are described in Sections 2 and 3 of the Master Project Plans (CH2M HILL, March 1999). Master Project Plans also provides detailed descriptions of field procedures. A facility map of NAB Little Creek is provided as Figure 1 - 1.

A removal action has been developed to remove abrasive blast material (ABM) associated with previous sandblast activities at SWMU 8. ABM consists of sand-blast grit and paint chips derived from sand blast activities for the removal of paint from ships, and is also commonly referred to as "black beauty."

A description of previous investigations conducted at the West Annex Sandblast Area is addressed in greater detail in Section 2 of this work plan. Sampling conducted in January, March, and May 2000 demonstrated elevated levels of several contaminants within the limits of SWMU 8 where ABM is present at the ground surface. The adjacent and underlying soil fraction contained relatively low levels of lead contamination (less than 400 mg/kg, the EPA Region III guidance criteria for lead in residential settings). This work plan describes the field activities proposed for implementation of confirmatory sampling following the removal of ABM at SWMU 8. The post-removal action activities described in this plan have been developed to evaluate the effectiveness of the Removal Action through confirmatory soil sampling and analysis to confirm residual soil meets the requirements described as Alternative 2 in the Engineering Evaluation/Cost Estimate (EE/CA) prepared by CH2M HILL in June 2000. Alternative 2 consists of excavating the ABM and ABM/soil (approximately 2,200 cubic yards) to meet EPA Region III residential cleanup criteria guidance of 400 mg/kg for lead. Data collected as part of this removal action confirmation sampling effort will also be used in a subsequent Remedial Investigation to be conducted at SWMU 8.

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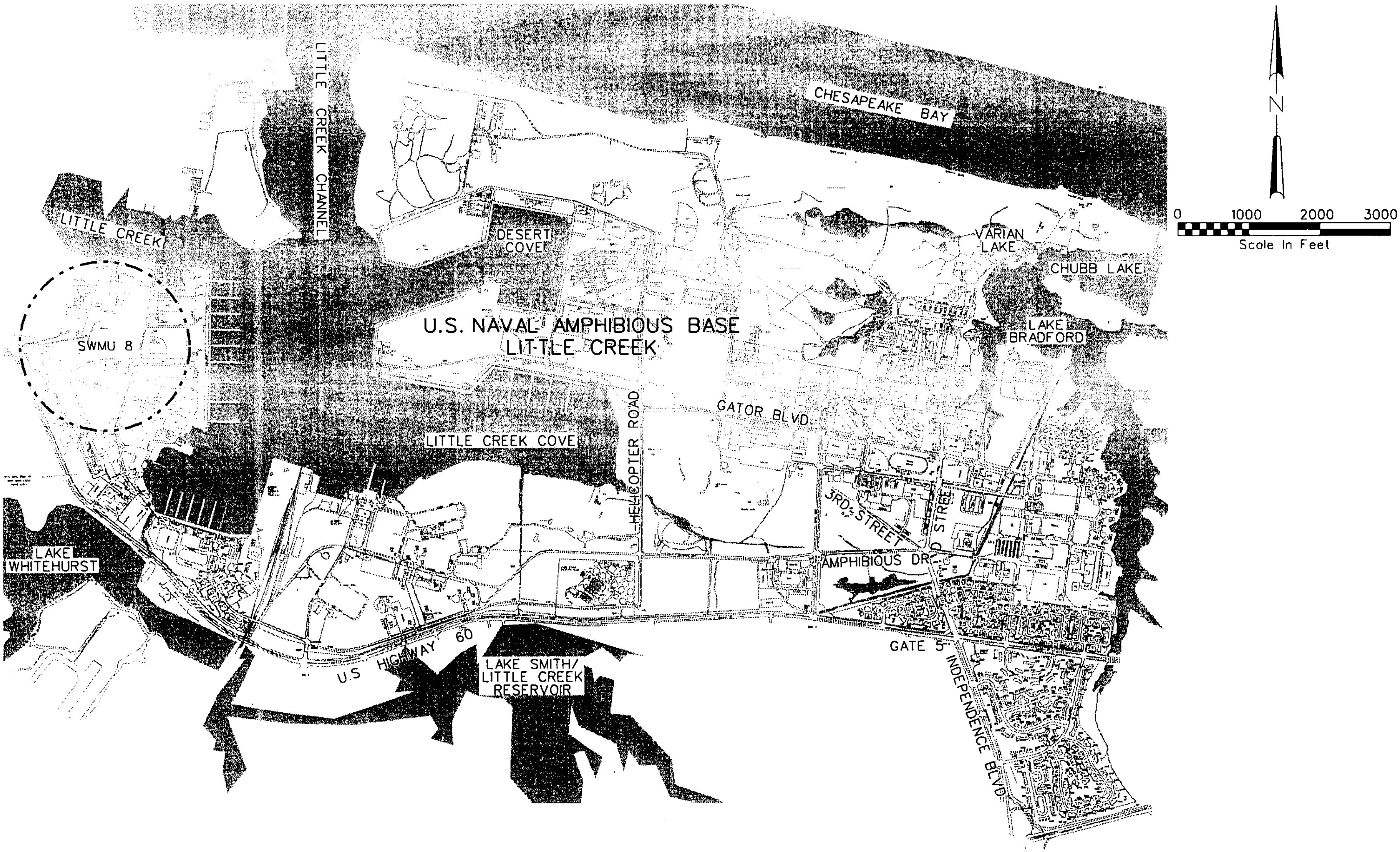

Figure 1-1
SITE FACILITY MAP
NAB LITTLE CREEK
VIRGINIA BEACH, VIRGINIA

SOURCE: BASE MAP PROVIDED BY LANTDIV

CH2MHILL

This sampling and analysis plan is organized into the following Sections. Section 2 presents the environmental history of the SWMU; Section 3 presents the technical approach for meeting project objectives; Section 4 presents general information regarding project management and staff organization; and Section 5 presents the schedule for the completion of these tasks.

2.0 Site Environmental History

Environmental Characterization and Remediation activities at NAB Little Creek are being conducted under the United States Department of Defense Installation Restoration Program (IRP). The IRP at NAB Little Creek is being conducted in accordance with applicable federal and state environmental regulations and requirements. In addition, the Navy solicits involvement and comments from the US Environmental Protection Agency (EPA) and the Virginia Department of Environmental Quality (DEQ) through a Partnering process and regulatory document review.

A brief description and information on previous and ongoing investigations pertaining to SWMU 8 is presented below. A site map for SWMU 8 is presented as Figure 2-1.

2.1 SWMU 8– West Annex Sandblast Area

A vacant lot in the vicinity of the northwestern boundary of NAB Little Creek near the intersection of Midway Road and Amphibious Drive was previously used for sandblasting activities to remove paint from boats. As boats were hauled into the area for sandblasting, residue accumulated on the ground. Between 1949 and 1954, sandblasting and residue storage occurred in areas north of Midway Road, south of Guadalcanal Road, and east of Amphibious Drive. An estimated 5,125 cubic yards of residue was stored in the area between 1949 and 1954, and an additional 3,525 cubic yards were stored between 1954 and 1971. A reconnaissance of the area in 1999 noted ABM in the area surrounding water tower 1558 from the surface to a depth of 5 inches.

During a site reconnaissance on January 21, 2000 in the area where blast material is exposed at the surface, three surface grab samples of pure ABM were collected for characterization analysis. These samples are identified as LW08-01-SS-00, LW08-02-SS-00, and LW08-03-SS-00. Blast grit sample LW08-01-SS-00 was collected underneath Water Tower 1553, blast grit sample LW08-02-SS-00 was collected in the central part of the site where ABM is exposed, and blast grit sample LW08-03-SS-00 was collected in the non-grassy area where ABM is exposed near Midway Road in the vicinity of a storm drain. Each surface grab sample of ABM was collected from 0 to 4 inches and was biased for the presence of paint chips to obtain a "worst case" characterization of the ABM. All three samples were immediately placed on ice for preservation and transportation to the laboratory for analysis of full Toxicity Characteristic Leaching Procedure (TCLP), target analyte list (TAL) metals, pesticides, and polynuclear aromatic hydrocarbons (PAHs).

Analytical results for TCLP lead on the ABM samples in January show that only lead (5.42 mg/L) exceeded TCLP criteria (5 mg/L) and this occurred in only one sample (LW08-01-SS-00). All remaining TCLP parameters, including reactivity, corrosivity, and ignitability were below TCLP criteria for defining a hazardous waste. TCLP results are summarized in Table 2-1.

Samples of ABM were also submitted for analysis of total metals, pesticides, and PAHs. Table 2-2 summarizes the analytical results, which were compared to residential

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EXCAVATION DEPTH (IN.)	AREA (FT^2)	EXCAVATION VOLUME (YD^3)
2	32,550	200
6	72,750	1,350
10	7,950	250
	TOTAL	1,800

0 50 100 150
Scale In Feet

LEGEND

●	HAND AUGER BORING LOCATION
↓	SHOVEL LOCATION USED TO IDENTIFY EXTENT OF GRIT
( )	APPROXIMATE EXTENT OF BARE GROUND/GRIT AT SURFACE
6	THICKNESS OF BLAST GRIT OR BLAST GRIT/SOIL MIXTURE (LW08-01 THROUGH LW08-36) (INCHES FROM GROUND SURFACE)
SG	BLAST GRIT AT GROUND SURFACE ONLY
ND	BLAST GRIT NOT DETECTED
LW08-01-SS-00	SURFACE BLAST GRIT SAMPLE
10"	DEPTH OF ABM/SOIL TO BE REMOVED
- - -	APPROXIMATE LIMITS OF EXCAVATION

NOTE:
SWMU 8 ORIGINALLY CONTAINED THREE SEPARATE AREAS IN THE SAME VICINITY. SITE INVESTIGATIONS AND TEST DATA HAVE SHOWN THE AREA OF CONCERN TO BE THE LIMITS OF EXCAVATION DEPICTED ON THIS MAP.

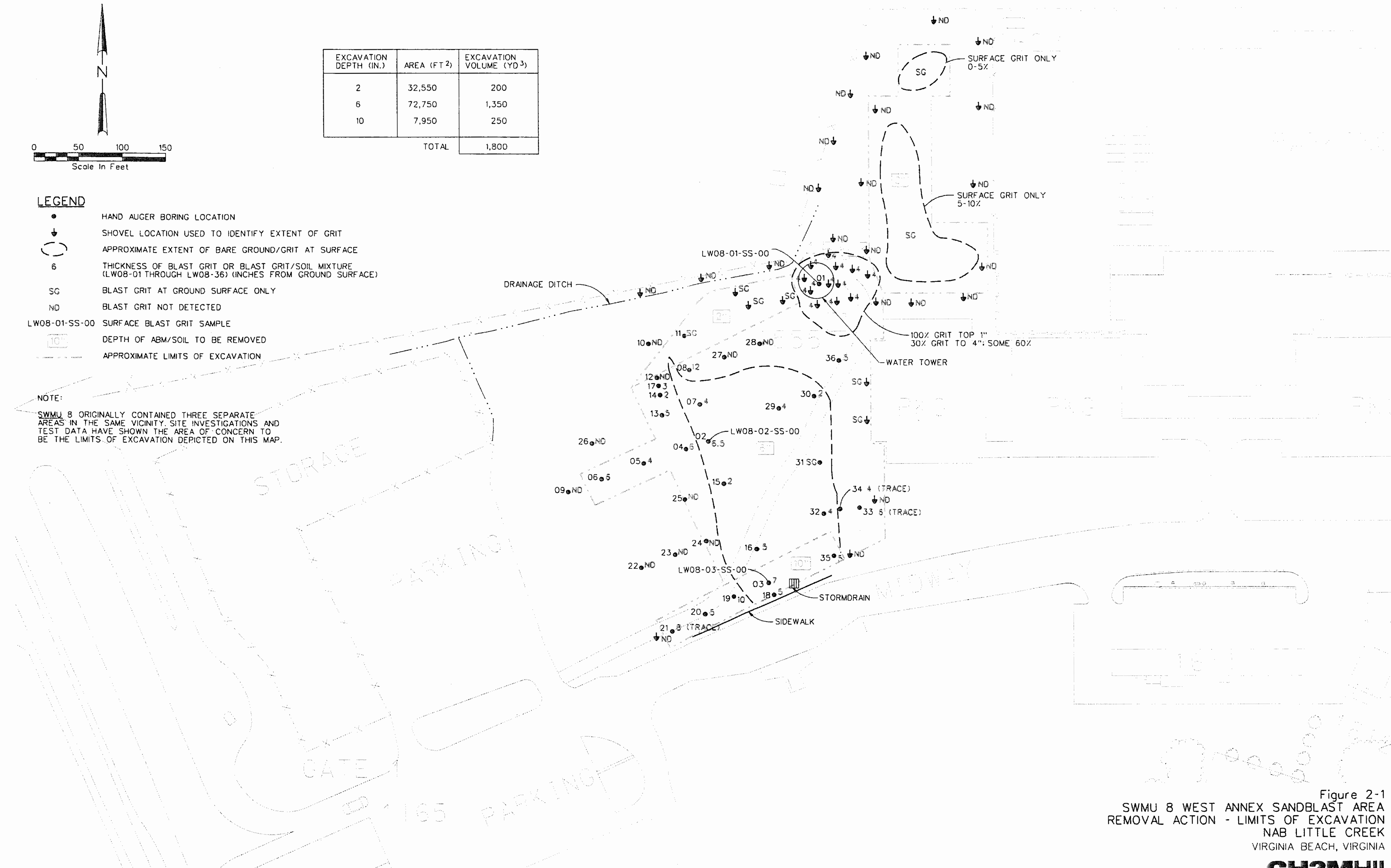

Figure 2-1
SWMU 8 WEST ANNEX SANDBLAST AREA
REMOVAL ACTION - LIMITS OF EXCAVATION
NAB LITTLE CREEK
VIRGINIA BEACH, VIRGINIA

CH2MHILL

TABLE 2-1
SWMU 8 West Annex Sandblast Area
Blast Grit TCLP Sample Results
January 21, 2000

Constituents	**LW08-01-SS-00**	**LW08-02-SS-00**	**LW08-03-SS-00**	**TCLP Limits mg/L**
TLCP METALS (mg/L)				
Arsenic	ND	0.155	0.084	5
Barium	0.520	0.337	0.259	100
Cadmium	ND	ND	ND	1
Chromium	ND	ND	ND	5
Lead	**5.42**	1.18	0.469	5
Mercury	ND	ND	ND	0.2
Selenium	ND	ND	ND	1
Silver	ND	ND	ND	5
TCLP-SEMIVOLATILE (ug/L)	**LW08-01-SS-00**	**LW08-02-SS-00**	**LW08-03-SS-00**	**TCLP Limits (mg/L)**
1,4-Dichlorobenzene	ND	ND	ND	7.5
2,4,5-Trichlorophenol	ND	ND	ND	400
2,4,6-Trichlorophenol	ND	ND	ND	2
2,4-Dinitrotoluene	ND	ND	ND	0.13
2-Methylphenol	ND	ND	ND	
3+4-Methylphenol	ND	ND	ND	
Hexachlorobenzene	ND	ND	ND	0.13
Hexachlorobutadiene	ND	ND	ND	0.5
Hexachloroethane	ND	ND	ND	3
Nitrobenzene	ND	ND	ND	2
Pentachlorophenol	ND	ND	ND	100
Pyridine	ND	ND	ND	5
TCPL RCI	**LW08-01-SS-00**	**LW08-02-SS-00**	**LW08-03-SS-00**	**TCLP Limits (mg/L)**
CORROSIVITY pH	5.90	6.28	5.80	<2.5; >12
IGNITABILITY	ND	ND	ND	
REACTIVE CYANIDE(COLOROMETRIC)	ND	ND	ND	200
REACTIVE SULFIDE	ND	0.95	ND	500

TABLE 2-2
SWMU 8 West Annex Sandblast Area
Blast Grit Sample Results
NAB Little Creek
January 21, 2000

Constituents **Depth** **TOTAL METALS (mg/kg)**	**LW08-01-SS-00**	**LW08-02-SS-00**	**LW08-03-SS-00**	**Soil RBC Residential mg/kg**	**Soil RBC Industrial mg/kg**
Aluminum	1080 *	9080 *	9520 *	7800	2000000
Antimony	10.5 N	41.1 N	43.9 N	31	8
Arsenic	**0.56** U	**11**	**16**	0.43	3.82
Barium	125	331	327	5500	140000
Beryllium	0.18 B	10.00	9.60	160	4100
Cadmium	0.55 B	0.37 B	0.86	39	1000
Calcium	203 B	5420	5390		
Chromium	177	142	47.4	235	6132
Cobalt	3 B	106	69.3	4693	122640
Copper	42.1	3430	1090	3129	81760
Iron	5250.0	50900.0	55900.0	23464	613200
Lead	**1820** E	**1550** E	**1070** E	400 guidance	
Magnesium	220 B	2930	3140		
Manganese	56.9	695	714	1564	40880
Mercury	0.11 U	0.11 U	0.11 U		
Nickel	7.7	433	55.7	1564	40880
Potassium	398.0 B	1810.0	2430.0		
Selenium	0.67 UN	2.9 N	3.1 N	391	10220
Silver	3.3	0.67 B	0.17 U	391	10220
Sodium	1640.0	10200.0	9290.0		
Thallium	0.37 U	0.38 U	0.35 U	5	143
Vanadium	2.6 B	24.1	20.6	548	14308
Zinc	1640 E*	9130 E*	8900 E*	23464	613200
Cyanide	0.11 U	ND	ND	1564	40880
PESTICIDES (ug/kg)	**LW08-01-SS-00**	**LWO8-02-SS-00**	**LW08-03-SS-00**	**RBC Res mg/kg**	**RBC Ind mg/kg**
4,4'-DDT	11.00	2.40 JP	2.20 JP	1.9	170
4,4-DDE	ND	1.50 J	ND	1.9	170
4,4-DDD	ND	0.890 JP	ND	2.7	240
SEMIVOLATILES (ug/kg)	**LW08-01-SS-00**	**LW08-02-SS-00**	**LW08-03-SS-00**	**RBC Res mg/kg**	**RBC Ind mg/kg**
Phenanthrene	1100	ND	ND		
Anthracene	200 J	ND	ND	23,000	61,000
Carbazole	190 J	ND	ND	32	290
Fluoranthene	4900 D	ND	ND	31,000	82,000
Pyrene	5600 D	ND	ND	2,300	61000
bis (2-Ethylhexyl) phthalate	45000 D	310 J	320 J	46	410
Benzo (a) anthracene	**2700**	ND	ND	0.87	7.8
Chyrsene	2400	ND	ND	87	780
Benzo (b) fluoranthene	**2700**	ND	ND	0.87	7.8
Benzo (k) fluoranthene	1400	ND	ND	8.7	78
Benzo (a) pyrene	**1700**	ND	ND	0.087	0.78
Indeno (1,2,3-cd) pyrene	**1300**	ND	ND	0.87	7.8
Dibenz (a,h) anthracene	**510**	ND	ND	0.087	0.78
Benzo (g, h, I) perylene	250 J	ND	ND		

Note: bold values exceed Residentiual RBCs
N- spiked sample recovery was not within control limits
J- estimated below the contract required quantitation limit
E- organics exceeded calibration range; E inorganic is estimated because of interference
B- for inorganics only below the contract required detection limit but above the instrument detection limit
D- from diluted run
* duplicate analysis was not within the control limits

and industrial risk based concentrations (RBCs) developed by EPA Region III. A value of 400 mg/kg (RBC guidance for residential areas) was the criteria used for comparison to total lead results. Results for total metals show that lead and arsenic exceed residential RBCs.

On March 15, 2000 a preliminary field investigation was conducted at SWMU 8 West Annex Sandblast Area to delineate the extent of ABM in areas where blast material is visibly present at the ground surface. Shallow 1-foot-deep borings were constructed using a hand auger, and in some areas a shovel, to expose the shallow subsurface soil. The borings were logged for the presence/absence of ABM and for lithology of the surface soil material. Each location was marked with a pin flag and labeled with boring identification number. Borings were identified as LW08-01 through LW08-36. In the vicinity of Water Tower 1553, along the northern boundary fence line, and in non-grassy areas northeast of the water tower, a shovel was used to expose surface soil in numerous locations, which were not individually labeled but are identified on Figure 2-1. Findings of this preliminary field investigation were presented in a Technical Memorandum *Preliminary Delineation of Abrasive Blast Material SWMU 8 West Annex Sandblast Area,* April 2000. The Technical Memorandum was presented to the NAB Little Creek Partnering team and the results incorporated into the EE/CA.

A Site Investigation at SWMU 8 was conducted in late May of 2000 as part of the Federal Facilities Agreement Site Screening Process. The Site Investigation consisted of the installation of four monitoring wells (LW08 – MW01 to LW08 – MW04 – surface and subsurface samples were obtained at each monitoring well location) and 18 additional direct push (DPT) soil sample locations at SWMU 8. Both surface (0-0.5 ft) and subsurface (1-3 ft) soil samples were obtained at each DPT sample location. Samples obtained from the monitoring well installations were sampled for VOCs, SVOCs, Pesticides/PCBs, and metals. Results of the Site Investigation were presented in a Site Investigation Report submitted in October 2000. These data will also be incorporated into a Remedial Investigation for SWMU 8. Based on the January 2000 preliminary field investigation to identify the extent of blast grit at SWMU 8, approximately 2,200 cubic yards of ABM and soil material are estimated for removal at the site. As described in the EE/CA, this estimate is based on excavating the areas shown on Figure 2-1, which comprises approximately 120,000 square feet.

3.0 Objectives and Technical Approach

The objective of the confirmatory sampling following the removal action at SWMU 8 is to:

- Evaluate the absence/presence of residual soil and ABM contamination to confirm that the removal action clean up goal was achieved
- Provide additional data for use in a Remedial Investigation and quantitative risk assessment of SWMU 8

The tasks to be implemented for the investigation of SWMU 8 include project planning, field investigation, sample analysis and validation, data evaluation, and preparation of a confirmation sampling and analysis technical memorandum. Site data will be evaluated to confirm that remediation goals are met through a comparison with EPA Region III risk-based criteria and facility-wide background data.

To simplify the process of developing site specific project plans, a Master Work Plan (WP), Master Field Sampling Plan (FSP), Master Quality Assurance Project Plan (QAPP), Master Investigation-Derived Waste Plan (IDWP), and Master Health and Safety Plan (HASP) have been prepared for Installation Restoration Program (IRP) activities to be performed at NAB Little Creek (Master Project Plans, Volumes I and II, Naval Amphibious Base Little Creek, Virginia Beach, Virginia, August 2000). The Master Project Plans provide the details for sampling and analysis protocols to be followed and general types of activities to be accomplished for implementation of field activities at NAB Little Creek. Preparation of site specific plans is simplified through reference to the Master Plan documents.

Checklists that supplement the detailed protocols and Standard Operating Procedures (SOP) presented in the Master Work Plan documents are presented in Appendix A, and provide information specific to sampling the selected SWMU for the Removal Action confirmatory sampling of surface soils. The work plan checklists (FSP, QAPP, HASP, and IDWP) are based on the existing Master Work Plans (including other supporting documentation and additions/deviations from the Master Plan). Information regarding the site history of NAB Little Creek, facility background, previous investigations, and hydrology and geology are presented in the Master Work Plan.

3.1 Field Work Support

Fieldwork support includes coordinating subcontractors, mobilization, and field preparation activities. As part of the initial field mobilization to NAB Little Creek, CH2M HILL will coordinate with subcontractors for the removal action, analytical laboratory, and data validation services for analysis of the confirmation samples.

3.2 Removal Action at SWMU 8—West Annex Sandblast Yard

Soil and ABM testing for waste characterization and disposal will be performed by the Remedial Action Contractor (RAC) prior to the removal action according to the *Work Plan Removal of Abrasive Blast Material, Solid Waste Management Unit 8, Naval Amphibious Base Little Creek, Virginia Beach, Virginia,* prepared by IT Corporation, July 2000. RAC testing includes verification from the borrow source of "clean" fill used to backfill excavation. During the removal action and prior to backfilling, CH2M HILL will conduct soil screening and confirmation sampling and analysis.

The objectives of the confirmatory sampling activities at SWMU 8 are to determine the effectiveness of the removal of ABM at the site. Proposed field activities include:

- Field screening of residual soils to estimate lead concentrations during removal using Niton Model 700 XRF capable of onsite soil evaluation as described by EPA method 6200 for estimating lead concentrations
- Collection of four samples for quick-turn-around (48-hour) analysis for total lead for confirmation of XRF field screening results
- Confirmatory soil sampling in a general grid pattern to verify the removal of ABM to EPA Region III guidance criteria of 400 mg/kg for lead in soil at an approximate frequency of one per 10,000 square feet for TAL metals and PAHs
- Collection and analysis of approximately 20% of the confirmation soil samples for full TAL metals and Target Compound List (TCL) organic analyses

3.2.1 Soil Screening

Soil screening will be performed in the field during the removal action to aid in determining the extent of soil removal and to qualitatively assess the effectiveness of the removal of lead contaminated soil. Screening will consist of field measurements of lead concentration using a Niton Model 702 XRF, which utilizes X-ray fluorescence technology. Field screening frequency is estimated to be one per 2,500 to 5,000 square feet, or as deemed necessary by the CH2M HILL field representative. The Niton Model 702 XRF is a hand held instrument that can provide "real time" lead concentration screening measurements in soil. In addition to field screening measurements, four soil samples will be obtained for off-site laboratory analysis of lead. These samples will be analyzed with a quick turnaround (48-hour) to provide confirmation information on the XRF sample results. The target clean up goal is equivalent to EPA Region III residential RBCs for lead of 400 ppm. The Niton Model 702 XRF instrument is capable of providing resolution to 40 ppm.

XRF field screening will be conducted in accordance with EPA Method 6200, *Field Portable X-Ray Fluorescence Spectrometry for the Determination of Elemental Concentrations in Soil and Sediment*. The Field Portable X-Ray Fluorescence (FPXRF) technology uses a sealed radioisotope source to irradiate samples with X-rays that results in the rearrangement of electrons for identification of metal concentrations.

Field samples for measurement of lead concentration can be insitu or retained in plastic sample cups. Samples may be analyzed insitu in about one minute down to a concentration of approximately 40 ppm. In addition to point measurements, samples may be composited over an area (approximately 2,500 to 5,000 square feet) prior to taking readings to better approximate the average concentration in a given area. A quantity of 3 to 5 grams of soil is required to perform the x-situ test; however, only about 0.3 grams of the typical XRF soil sample (approximately 1 mm depth in a 25 mm diameter XRF sampling cup) produce the major part of the instrument response. Minimal sample preparation is needed to obtain XRF measurements. These include drying (samples should be relatively dry due to minimal depth of excavation), passing 2 mm sieve, and mixing. Equipment used to mix samples will be decontaminated between sample locations, and new plastic cups will be used for each reading. Information on the Niton 700 series and Method 6200 is presented in Appendix B.

Since the XRF contains a small radioactive source, proper documentation will be provided to NAB Little Creek including licenses and certifications to operate the piece of equipment. An Activity Hazard Analysis form will also be completed prior to mobilizing this equipment to the facility.

3.2.2 Confirmation Soil Sampling

Confirmation sampling will be performed within all areas requiring excavation for total metals and PAHs. Frequency of sampling will be at approximately one per 10,000 square foot for a total of 15 samples. Confirmatory soil samples will be collected from a grid network (approximately 100 ft by 100 ft). A random sampling approach will be employed for the sample location within each grid. Three samples (approximately 20%) will also be obtained for full TAL/TCL analysis. Because these data may be used for risk assessment in a subsequent RI phase, grab samples will be collected. Sample locations will be marked and identified using Global Positioning System (GPS). Coordinates will be recorded for entry into the NAB Little Creek Geographic Information System (GIS).

Soil samples will be obtained in accordance with the Master Project Plans for NAB Little Creek for surface soil sampling. Surface soil sampling is appropriate since the excavation depth will be less than one foot within the entire area. All samples will be immediately placed on ice for preservation and transportation to the subcontracted laboratory. Following approval of the work plan, a pre-qualified laboratory under the Navy CLEAN contract will be procured and identified in the project instructions and included on the project checklists.

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Figure 3-1
SWMU 8 WEST ANNEX SANDBLAST AREA
PROPOSED CONFIRMATION SAMPLE LOCATIONS
NAB LITTLE CREEK
VIRGINIA BEACH, VIRGINIA

CH2MHILL

A summary of proposed soil analyses is presented in Table 3-1.

TABLE 3-1
SWMU 8 West Annex Sandblast Area
Removal Action Confirmatory Soil Samples
Naval Amphibious Base Little Creek, Virginia Beach, Virginia

Parameter	Method	No. of Samples	Trip Blanks	Equipment Rinsate Blanks	Field Blanks	Field Duplicates	Matrix Spike/ Duplicate	Total Number of Samples
TCL Semi-volatile Organics	CLP OLM04	3	NA	1	NA	NA	NA	4
TCL Pesticides/ PCBs	CLP OLM04	3	NA	1	NA	NA	NA	4
TCL Volatile Organics	CLP OLM04	3	1	1	NA	NA	NA	5
TAL Metals	CLP ILMO4	15	NA	2	1	1	1	20
PAHs	SW846 8310	15	NA	2	1	1	1	20
Total Lead 48-hour turn-around analyses	CLP ILMO4	4	NA	NA	NA	NA	NA	4

Notes:

NA = Not Applicable

CLP = Contract Laboratory Program (most recent version)

TCL = Target Compound List

TAL = Target Analyte List

OLMO4 = Laboratory procedure (latest version will be used by analytical laboratory)

Equipment Rinsate blanks one per matrix per day;

Field Blanks – one per day if equipment blank is not taken

Field Duplicates – one per every ten samples per matrix/medium per day

Matrix Spike/Matrix Spike Duplicates – One per 20 samples per matrix (not required for low-concentration analyses by CLP OLC02)

3.3 Sample Designation

Sampling locations and sampled media collected during the Removal Action confirmation sampling at SWMU 8 will be assigned unique designations to allow the sampling information and analytical data to be entered into a database management system. The database management system will be incorporated into a Geographic Information System (GIS). The following sections describe the sample designation specifications.

3.3.1 Specifications for Field Location Data

Field station data consists of information assigned to a physical location in the field where a sample is collected. For example, a soil sample will require a name that will uniquely identify it with respect to other sampling locations. The station name provides for a key in the database to which any samples collected from that location would be linked, to form a relational database.

A listing of the location identification numbers will be maintained by the field team leader, who will be responsible for enforcing the use of the standardized numbering system during all field activities. Each station will be designated by an alphanumeric code that will identify the station location by facility, site type, site number, location type, and sequential location number. For this removal action, confirmation samples will be identified with a sequential sample number beginning with 900 to distinguish this event. The schema that will be used to identify field station data is documented in Section 3 of the Master Field Sampling Plan.

3.3.2 Specifications for Analytical Data

Analytical data will be generated through sampling of soil at NAB Little Creek. Each analytical sample collected will be assigned a unique sample identifier. The schema used as a guide for labeling analytical samples in the field is documented below. The format that will be used for electronic deliverables from the analytical laboratory and the data validator is documented below.

3.3.2.1 Sample Identification Schema

A standardized numbering system will be used to identify all samples collected during soil sampling activities. The numbering system will provide a tracking procedure to ensure accurate data retrieval of all samples taken. A listing of the sample identification numbers will be maintained by the field team leader, who will be responsible for enforcing the use of the standardized numbering system during all sampling activities. Samples will be sequentially numbered and identified in accordance with Section 3 of the Master Field Sampling Plan. Specific sample designations include the following abbreviations:

L – NAB Little Creek

W – Solid Waste Management Unit (SWMU 8)

SS – Surface Soil & Sample Number

9 – Removal action confirmation sampling event and sample number

00 – Sample Depth (0 to 1 ft bgs)

Example Sample Identification Schema: LW08 – SS901 - 00

The following number of samples will be obtained during the confirmation-sampling event:

- Four samples for total lead, 48-hour turnaround
- Fifteen samples for TAL metals and PAHs
- Three samples for "full suite" of TAL metals and TCL organics

Each sample will be designated by an alphanumeric code that will identify the facility, site, matrix sampled, and contain a sequential sample number. QA/QC samples will have a unique sample designation. Ann West of CH2M HILL will serve as the project QA Officer/Manager. The general guide for sample identification is documented in Section 3 of the Master Field Sampling Plan.

3.3.2.2 Electronic Deliverable File Format

This effort will include checking the data from the laboratory and converting it into an electronic format that can be readily incorporated into the GIS Data Management system for NAB Little Creek. An offsite laboratory will analyze the SWMU 8 removal action confirmation samples and tabulate the results in an electronic format specified by CH2M HILL. The data validator will add data validation qualifiers to the table of analytical results. In addition to hard copy data package deliverable, CH2M HILL will receive an electronic file from the data validator in a table format that will facilitate downloading into a database. A summary of analytical data electronic deliverable format is presented in Table 3-2.

TABLE 3-2
Electronic Data Deliverable Format

Field Name	Field Type	Description
Sample_ID	A20	The CH2M HILL sample ID (taken from the Chain of Custody)
Sample_Analysis	A5	The analysis performed on the sample. We classify our samples into six main groups: VOA, SVOA, METAL, PEST/PCB, WCHEM, TCLPV, TCLPS, TCLPP, and TCLPM.
Date_Analyzed	D10	The date the sample was analyzed.
Date_Received	D10	The date the sample was received in the lab.
Date_Collected	D10	The date the sample was collected.
Lab_Sample_ID	A15	The lab sample ID.
Dilution_Factor	N	The dilution factor used, if applicable.
SDG_Number	A6	The SDG number.
CAS_Number	A6-A2-A1	CAS Number of the compound being analyzed (For pH, use PH; for TOC, use TOC; for TOX, use TOX).
Chem_Name	A50	The compound being analyzed.
Ana_Value	N	The analytical result.
Std_Qual	A5	The lab qualifiers, if any (e.g., U, UJ, B)
DV_Qual	A5	The data validation qualifier (e.g., J, R
Units	A10	The unit of the result (e.g., MG/L)
Detect_Limit	N	The detection limit for the compound.
Method	A15	Analytical method used to analyze the sample fraction.

3.4 Sample Analysis and Validation

This task involves efforts related to the sample management and data validation. CH2M HILL will be responsible for tracking sample analysis and obtaining results from the laboratory. The analytical data generated during the field activities and subsequent laboratory analyses will be validated by an independent data validation subcontractor according to EPA standard procedures. Validation will be performed on all confirmation samples obtained, including total lead, TCL organics, and TAL metals. The data validation process is expected to take 14 days once the data has been provided to the validator. Laboratory analyses of samples will be performed according to data quality objectives (DQOs) discussed in the Master Quality Assurance Project Plan. The results will be used for human health and ecological risk screening assessments and will require the highest level of DQOs.

Quality control samples to be collected during the removal action confirmation sampling are shown on Table 3 - 1. A detailed discussion of quality control procedures for field investigations at NAB Little Creek is presented in the Master Quality Assurance Project Plan.

3.4.1 Sample Analysis

All soil analyses will be conducted at a contracted laboratory that fulfills all requirements of the U.S. Navy's QA/QC Program Manual and EPA's Contract Laboratory Program (CLP). A signed certificate of analysis will be provided with each laboratory data package, along with a certificate of compliance certifying that all work was performed in accordance with the applicable federal, state, and local regulations. All analyses will be performed following the highest level of Navy quality control guidance.

Analytical results will be validated using EPA Region III guidance. All analytical results for chemicals of concern will be validated before the project staff performs data interpretations. The data validation will be performed by a qualified independent subcontractor. Data that should be qualified will be flagged with the appropriate symbol.

3.4.1.1 Field Quality Control Procedures

Quality control duplicate samples and blanks are used to provide a measure of the internal consistency of the samples and to provide an estimate of the components of variance and the bias in the analytical process. Field quality control procedures are detailed in the Master Quality Assurance Project Plan.

3.4.1.2 Blanks

Blanks provide a measure of cross-contamination sources, decontamination efficiency, and other potential errors that can be introduced from sources other than the sample. ASTM Type II water will be used for blanks. Four types of blanks can be generated during sampling activities: trip blanks, field blanks, equipment rinsate blanks, and temperature blanks.

One field blank will be collected per 20 samples or one per day, unless one or more equipment blanks are also collected during the removal action sampling activities. Field blanks are used to determine if there is any influence from ambient conditions in the sampling area location imparted to the sample, and to determine the chemical quality of water used for such procedures as decontamination and blank collection. More may be needed if windy and/or dusty field conditions occur.

One equipment blank per sample medium will be obtained for each day of sampling. Equipment blanks will give an indication of the efficiency of decontamination procedures.

One laboratory prepared trip blank will be included in each cooler containing VOC samples. Trip blanks will indicate if there is contamination during shipment to the field, from storage in the field, or from shipment from the field to the analytical laboratory.

EPA has recently requested that a temperature blank be included in each cooler containing samples for CLP analyses so that the laboratory can record the temperature without disturbing the samples. The temperature blank will be labeled, but will not be given a sample number nor will be listed as a sample on the chain of custody (COC) form.

3.4.1.3 Duplicates

Field duplicate samples will be collected at a frequency of 1 per 10 field samples per matrix. The location from which the duplicates are taken will be randomly selected. Each duplicate sample will be split evenly into two sample containers and submitted for analysis as two independent samples.

3.4.1.4 Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Matrix spike/matrix spike duplicate (MS/MSD) samples will be collected at a frequency of 1 for every 20 field samples collected. Analytical results of these samples indicate the impact the matrix has on extracting the analyte for analysis. MS/MSD samples give an indication of the laboratory's analysis accuracy and precision within the sample matrix. Data validators will use these results to evaluate the accuracy of the analytical data.

3.4.2 Data Validation

Analytical results will be validated by CH2M HILL subcontractors approved by the Navy. Data validators will use EPA Region III guidance. Data that should be qualified will be flagged appropriately. Results for QA/QC samples will be reviewed and the data will be qualified further, if necessary. Finally, the data set as a whole will be examined for consistency, anomalous results, and reasonableness.

3.5 Data Evaluation

Analytical and lithologic data will be evaluated to characterize site soil quality and assess the effectiveness of removal of ABM across SWMU 8. Graphic and tabular presentations that facilitate a better understanding of the quality of soil left in place will be prepared.

Data collected will be reviewed for comparison of site data to background and EPA Region III RBCs to establish post-removal conditions at SWMU 8. The comparison of background and site data will be used to identify potential release-related constituents of concern and for risk management relative to human health and environmental receptors.

3.6 Confirmation Sampling Report

A confirmation sampling interim letter report will be prepared that addresses the post removal action site conditions at SWMU 8 (West Annex Sandblast Area). The letter report will present the results of previous investigations and contain analytical data relating to the residual soils beneath the limits of excavation. The results of the sampling will also be documented in a Remedial Investigation (RI) Report to be completed in 2001.

4.0 Project Management and Staffing

The CH2M HILL Project Manager designated for the oversight of this project is Ms. Donna Caldwell. Mr. Scott MacEwen, who serves as Activity Manager for NAB Little Creek, will support Ms. Caldwell. Ms. Caldwell will be responsible for such activities as technical support and oversight, budget and schedule review and tracking, preparation and review of invoices, personnel resources planning and allocation, and coordination with LANTDIV, NAB Little Creek, and subcontractors.

Qualified CH2M HILL staff members will perform the site investigations field program. CH2M HILL will notify LANTDIV and NAB Little Creek which CH2M HILL personnel will mobilize to the site prior to initiating field activities.

5.0 Project Schedule

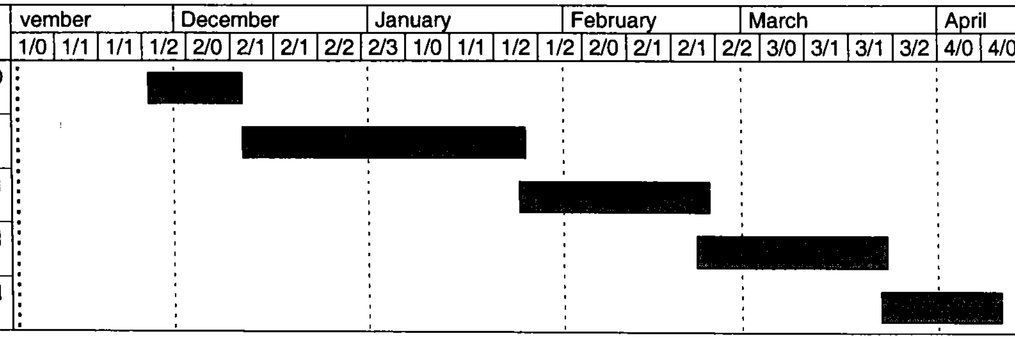
The project schedule will be developed by the Remedial Action Construction (RAC) contractor for the removal action. The IT Group will conduct the removal action with an estimated schedule for excavation in Fall, 2000. CH2MHILL will conduct confirmation sampling in accordance with this work plan with the schedule established by the RAC contractor. It is estimated the removal action can be completed within 2 weeks. CH2MHILL will work closely with the RAC contractor to ensure minimal "downtime" associated with confirmation sampling during excavation and prior to backfilling. Table 5-1 presents project milestones and estimated duration assuming a start date of November 6, 2000

TABLE 5-1
Project Schedule Removal Action Confirmation Sampling SWMU 8
Naval Amphibious Base Little Creek

Task	Duration	Start	Finish
SWMUs 8 Removal Action and Confirmation Sampling	14 days	11/27/2000	12/11/2000
Laboratory Analysis and Data Validation	45 days	12/11/2000	01/25/2001
Preparation of Letter Report	29 days	01/25/2001	02/23/2001
Partnering Team Review	31 days	02/23/2001	03/26/2001
Final Letter Report	15 days	03/26/2001	04/10/2001

NAB LITTLE CREEK
SWMU 8 SAMPLING AND ANALYSIS PLAN

ID		Task Name	Duration	Start	Finish
1		SWMU 8 Removal Action and Confirmation	15 days	Mon 11/27/00	Mon 12/11/00
2		Laboratory Analysis and Data Validation	45 days	Tue 12/12/00	Thu 01/25/01
3		Preparation of Letter Report	30 days	Thu 01/25/01	Fri 02/23/01
4		Partnering Team Review	30 days	Thu 02/22/01	Fri 03/23/01
5		Final Letter Report	15 days	Fri 03/23/01	Tue 04/10/01



Project: scheduleestimate
Date: Mon 11/06/00

Task
Split
Progress
Milestone
Summary
Rolled Up Task
Rolled Up Split
Rolled Up Milestone
Rolled Up Progress
External Tasks
Project Summary

6.0 References

ATEC Environmental Consultants. Correspondence. *Environmental Subsurface Investigation at LANTDIV Blast and Paint Facility*, August, 1989.

A.T. Kearny, 1989 (Kearny, 1989). *RCRA Facility Assessment* (RFA).

Baker Environmental Inc., January 1996 (Baker, 1996). *Relative Risk Ranking System Data Collection Sampling and Analysis Report.*

CH2M HILL , August 2000. *Master Project Plans, Volumes I and II, Naval Amphibious Base Little Creek, Virginia Beach, Virginia.* Prepared for the Department of the Navy, Naval Engineering Command, Atlantic Division, Norfolk, Virginia.

Naval Amphibious Base Little Creek, *SWMU/IR Summary for Naval Amphibious Base Little Creek*, August 1999.

Appendix A
Sampling and Analysis Plan Checklists

SWMU 8 Removal Action Confirmation Sampling - Derived Waste Plan Checklist

This checklist supplements the Master IDW Plan with site-specific information. Once completed for a specific project, it provides necessary IDW information for each investigation. It is to be taken into the field with the Master IDW Plan.

Site: SWMU 8 (West Annex Sandblasting Area) No soil IDW is expected from surface soil confirmation sampling

1. IDW Media:
   - ______Soil cuttings
   - ______Well development or purge water
   - X_____Decontamination residual soil and wastewater
   - X_____PPE or disposable equipment
   - X_____Other Excavated Materials (responsibility of contractor)__

2. Expected Regulatory Status:
   - ______Hazardous
   - X_____Solid Waste
   - X_____Unknown - Decontamination Water
   - X_____Other Waste management activities regulated by OSHA Hazwoper standard (1910.120)

3. Site Location: Excavation limited to area shown in Sampling and Analysis Plan. (See Figure 2-1 in SWMU 8 Sampling and Analysis Plan)

4. Nature of Contaminants Expected:
   - ______Petroleum contamination
   - X_____Polyaromatic hydrocarbon
   - X_____Pesticides
   - ______Herbicides
   - ______PCBs
   - X_____Metals
   - ______Other –

5. Volume of IDW Expected:
   - ______Drums
   - ______Cubic Yards
   - ______Tons
   - X______1 Trash Bag Solid Waste PPE
   - X______ 5 Gallons of Decontamination Water

6. Compositing Strategy for Sample Collection: No IDW sampling is planned. IDW is limited to Solid Waste PPE and Decontamination Water.

7. IDW Storage

X_____As per Master IDW Plan ______Other Plastic Bags (Solid Waste)

5 Gallon bucket (Decon Water)

8. Waste Disposal

X_____As per Master IDW Plan ______Other On site dumpster (Solid Waste)

Quality Assurance Project Plan Checklist

This checklist supplements the Master QAPP with site-specific information. Once completed for a specific project, it provides necessary quality assurance information for each investigation. It is to be taken into the field with the Master QAPP.

Site: SWMU 8 (West Annex Sandblast Yard)

1. List sampling tasks: Confirmation sampling of field screening for lead by removal action contractor (with Niton Model 700 XRF) including lead (48-hr turnaround), TAL metals and PAHs (19 sample locations) and four samples for TAL metals and TCL organics.

2. List data quality objectives: The objectives of the SWMU 8 removal action confirmation sampling include:

   a. Provide confirmation analytical data to evaluate effectiveness of removal action as compared to EPA Region III residential screening criteria for lead.

   b. Completion of a qualitative risk screening assessment from data collected during the investigations. The highest level of DOQ will be used.

3. Organization:

LANTDIV Navy Technical Representative	Bob Schirmer/ LANTDIV
USEPA Remedial Project Manager	Bruce Beach / USEPA
VDEQ Federal Facilities Project Manager	Robert Weld / VDEQ
CH2M HILL Activity Manager	Scott MacEwen /CH2M HILL WDC
Quality Control Senior Review	Ann West /CH2M HILL WDC
Technical Project Manager	Donna Caldwell / CH2M HILL HRO
Field Team Leader	Paul Landin/ CH2M HILL VBO

4. Table of samples with analyses to be performed and associated QC samples (attached):

   See SWMU 8 Sampling and Analysis Plan – Table 3-1

5. Analytical Quantitation Limits:

   X_____As per Table 8-2 of Master QAPP ______Other (attached)

6. QA/QC Acceptance Criteria (e.g., precision, accuracy)

   X_____As per Table 4-1 of Master QAPP ______Other (attached)

7. Data reduction, validation, and reporting.

X_____As per Section 9 of Master QAPP ______Other (attached) CLP data validation and reporting in accordance with EPA Region III Guidance

8. Internal QC Procedures (field and laboratory):

X_____As per Section 10 of Master QAPP ______Other (attached)

9. Corrective Action:

X_____As per Section 14 of Master QAPP ______Other (attached)

10. Other deviations from Master QAPP - None

Site-Specific Field Sampling Plan Checklist

This checklist supplements the Master Field Sampling Plan with site-specific information. Once completed for a specific project, it provides necessary field sampling information for each investigation. It is to be taken into the field with the Master FSP.

Site: SWMU 7 (Small Boats Sandblast Yard) and SWMU 8 (West Annex Sandblasting Area)

1. Tasks to be performed:

______Geophysical surveys
______Soil gas surveys
______Sediment Sampling
X_____Surface soil sampling
______Soil boring installation
______Subsurface soil sampling
______Monitoring well installation and development
______Monitoring well abandonment
______Groundwater sampling
______In-situ groundwater sampling
______Aquifer testing
______Hydrogeologic measurements
______Biota sampling
______Trenching
X_____Land surveying
______Investigation derived waste sampling
X_____Decontamination
______Other____________________

2. Field measurements to be taken:

______temperature
______pH
______dissolved oxygen
______turbidity
______specific conductance
______organic vapor monitoring
______geophysical parameters (list):
______electromagnetic induction
______ground-penetrating radar
X_____surveying
______magnetometry
X_____global positioning system
______soil gas parameters (list):
______combustible gases
______water-level measurements
______pumping rate
X_____other: dust monitoring

3. Sampling program (nomenclature, etc.):

X_____As per Section 3.1 of Master FSP X_____Other: Section 3.3.1.2 of Sampling and Analysis Plan

4. Map of boring, sampling locations with proposed excavation area (attach to checklist): See SWMU 8 Sampling and Analysis Work Plan.

5. Table of field samples to be collected: See SWMU 8 Sampling and Analysis Plan.

6. Applicable SOPs (Volume 2 of Master Project Plans) or references to specific pages in Master FSP:

- Shallow Soil Sampling

- Homogenization of Soil and Sediment Samples
- Chain-of-Custody
- Packaging and Shipping Procedures
- Equipment & Field Rinse Blank Preparation
- Decontamination of Personnel and Equipment
- Decontamination of Drilling Rigs and Equipment
- Disposal of Fluids and Solids

6. Site-specific procedures or updates to protocols established in the Master FSP:

Described in the Site Investigation Work Plan.

Site-Specific Health and Safety Plan

This checklist must be used in conjunction with the Master HASP. This checklist is intended for use by CH2M HILL employees only. All CH2M HILL employees performing tasks under this checklist must read and sign both this checklist and the Master HASP and agree to abide by their provisions (see EMPLOYEE SIGNOFF attached to the checklist.

Site: SWMU 8 (West Annex Sandblasting Yard)

Location(s): Sampling Location Maps attached (SWMU 8 Sampling and Analysis Plan)

This document shall be maintained on site with the Master Health and Safety Plan. It will include as attachments from the Work Plan a site map and the site characterization and objectives for this site.

The procedures described in the Master Health and Safety Plan will be followed unless otherwise specified in this Site-Specific Health and Safety Plan.

1. HAZWOPER-Regulated Tasks

______Test pit and excavation
______Soil boring installation
______Geoprobe boring
______Geophysical surveys
______Hand augering
______Subsurface soil sampling
X______Surface soil sampling
______Soil gas surveys
______Sediment sampling
______Monitoring well/drive point installation
______Monitoring well abandonment
______Groundwater sampling
______Aquifer testing
______Hydrologic measurements
______Surface water sampling
______Biota sampling
______Investigation-derived waste (drum) sampling and disposal
X______Observation of loading of material for offsite disposal
X______Oversight of remediation and construction
______Other______________________

2. Hazards of Concern: (Check as many as are applicable. Refer to Section 3 of Master H&S Plan for control measures):

______Heat stress
______Cold stress
X______Buried utilities, drums, tanks
______Inadequate illumination
______Drilling
X______Heavy equipment
______Working near water
______Flying debris
______Gas cylinders
X______Noise
X______Slip, trip, or fall hazards
X______Back injury
______Confined space entry
X______Trenches, excavations
______Protruding objects
X______Vehicle traffic
______Ladders, scaffolds
______Fire
______Working on water
X______Snakes or insects
______Poison ivy, oak, sumac
X______Ticks

______Radiological   X_____Other airborne particulates

3. Contaminants of Concern (List if known. Refer to Table 3.8 of the Master HASP)

PAHs ______ Metals ______ Pesticides ______

______ ______ ______

4. Personnel (List CH2M HILL field team members and telephone numbers):

Field team leader(s)	Donna Caldwell	757-873-1442
Site safety coordinator(s)	Donna Caldwell	757-873-1442
Field team members	Paul Landin	757-460-3734

5. Contractors/Subcontractors

X_____Procedures as per Master HASP

X_____Other Removal action contractor and subcontractor have not been identified at the writing of this HASP checklist.

Name: To be added ______ ______

Contact: To be added ______ ______

Telephone: To be added______ ______

6. Level of personal protective equipment (PPE) required:___D______
Refer to Table 5.1 of Master HASP, CH2M HILL SOPs HS-07 and HS-08, and Respiratory Protection, Section 2 of the Site Safety Notebook.

7. Air monitoring instruments to be used (refer to Master HSP for action levels):

______OVM 10.6   ______FID

______CGI   X_____Dust monitor

______O_2 ______PID

8. Decontamination procedures:

______As per Section 7 of Master HASP

X_____Other As described in the SWMU 8 Work Plan.

9. List any other deviations or variations from the Master HASP: None

10. Emergency Response (Check that all names and numbers are correct on page 37 of Master HASP and attach corrected page to this checklist).

11. Map to hospital (Highlight route to hospital from site and attach to this checklist). Exit Site to Gate 1, left on Shore Drive to Gate 5. See attached map to Bayside Medical Plaza.

12. Emergency Contacts (Check that all names and numbers are correct on page 37 of Master HASP and attach corrected page to this checklist).

13. Approval. This prepared site-specific checklist must be approved by John Longo/NJO or authorized representative.

    Name John Longo/NJO   Title: Health and Safety Manager Date:

14. Employee Signoff. All CH2M HILL employees working at the site must sign the attached Employee Signoff for the checklist as well as for the Master HASP.

________________________________Site

HASP Checklist Employee Signoff

The employees listed below have been given a copy of both this health and safety plan checklist and the Master HSP, have read and understood them, and agree to abide by their provisions.

EMPLOYEE NAME	EMPLOYEE SIGNATURE AND DATE

HOSPITAL LOCATION MAP

HOSPITAL DIRECTIONS:
Exit the base at Gate 1. Turn left onto Shore Drive (Hwy 60). Turn right onto Independence Blvd. Hospital is on the left side of the road.

HOSPITAL INFORMATION:

Name: Bayside Hospital
Address: 800 Independence Blvd.
City, State: Virginia Beach, VA

Phone: (757) 363-6137

Appendix B
XRF Niton 700 Series

NITON

SAMPLE HANDLING STRATEGIES FOR ACCURATE LEAD-IN-SOIL MEASUREMENTS IN THE FIELD AND LABORATORY

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ABSTRACT

The inhomogenous lead-in-soil matrix can present serious obstacles to accurate sample collection and handling. In typical lead-in-soil measurement, particle size related errors in sampling and sample handling often exceed all other sources of error. The magnitude of error can vary widely depending on the particulate nature of the lead contaminant and the effectiveness of control measures. Large particle contaminants, such as lead bearing paint chips, pose a much greater challenge to accurate sample handling than do small particle contaminants, such as air dispersed industrial emissions. A sample handling protocol demonstrated to give reliable, valid data in small particle situations may prove entirely inadequate for large particle cases.

This paper focuses on the importance of fundamental error, a statistical consequence of particulate sampling. We discuss in quantitative terms the significance of fundamental error on the measurement of paint chip contaminated soils near a 400 ppm action level. On the basis of error estimates, we recommend that sample handling protocols control particle related errors by ensuring adequate sample size and sample definition, and by accomplishing sufficient particle size reduction and homogenization before subsampling. We discuss particle related errors and their effect on laboratory, field, and in-situ analytical methods. We recommend that quality assurance protocols aim to determine the overall measurement quality by evaluating error at all stages from sampling and sample handling through analysis.

SAMPLING DESIGN AND GEOSTATISTICS

The prerequisite of a well-designed study is a clear statement of the study's objectives for data quantity, quality, reliability, speed, and cost. The planner develops objectives with careful attention to the data's ultimate utility and the available resources of people, technology, and money. The quality assurance and quality control procedures. By contrast, sampling and sample handling errors are not usually well-characterized, well-understood, or well-controlled. Sampling programs frequently neglect to implement quality assurance measures. To control overall error, one must control sampling and sample handling errors as well as analytical errors.

THE PARTICULATE NATURE OF SOIL

Soil particles range widely in size from clay (less than 0.0039 mm diameter) to silt (0.0039 mm to 0.0625 mm) to sand (0.0625 mm to 2.0000 mm). Particles larger than 2 mm in diameter are classified as gravel.[5] Natural soils are mixtures of different particle types and sizes.

By general agreement and tradition, particles larger than 2 mm in diameter should be removed (by U.S. number 10 sieve) from a soil sample before analysis. The excluded particles are large enough to be examined and classified by eye or by magnifying glass. Contaminants can also be particulate. Lead-bearing particles in soil can vary in size from sub-micron aerosol deposits (less than 0.001 mm diameter) to lead paint chips and lead shot (up to the maximum 2 mm diameter). Generally, the largest particles create the greatest challenge in sample handing.

Particulate Sampling Theory

A theory of particulate sampling was developed by geologist Pierre Gy to improve the quality of data gathered in support of mineral exploration and mining.[6,7] The theory has since been adopted by environmental scientists. The theory recognises two major categories of sampling error: sampling bias and fundamental error. Both types of error are measureable and controllable.

In general, a sample is intended to represent the a particular sampling unit, or volume of material. The sampling unit may be a particular plot of land (e.g. a certain 10 foot by 10 foot square), to a particular depth (e.g. surface to 4 inches). Or a child's sand box. Or a rail car load of ore. A single sample represents the entire sampling unit.

The sampling methodology is considered unbiased and correct if all of the particles in the sampling unit have exactly the same probability of being selected for inclusion in a random sample. The perfectly unbiased methodology is a practical impossibility. To reduce sampling bias, we must recognise the difficulties presented by the sampling unit. It may exhibit grouping or segregation of particles. Denser particles may have settled toward the bottom. New contaminants may have recently settled onto the unit, and may not be mixed into the volume. The contaminants may be heavily concentrated on one side of the unit, or concentrated in "clumps".

One method for sampling from a plot of land is to go to the center of the unit and shovel out the requisite amount of sample. However, we can reduce bias substantially by using a core sampling probe to control the depth and profile of the sample. More importantly, we can take soil from several different parts of the unit and mix it together as a composite to "increase sample support". By increasing sample support, we create a composite sample which more accurately reflects the average contaminant concentration of the unit than that of any single point sample. The composite sample reduces bias and improves accuracy over single point sampling without the expense of additional analysis.

FUNDAMENTAL ERROR IN SAMPLING

sample size of 100 grams, typical for lead-in-soil sampling. At an action level of 400 ppm, or 0.04%, we would have an expected shot count per sample of 100 grams times 0.04% divided by 0.045 shot per gram, or 0.89 shot per sample. So soil contaminated with an average of 400 ppm lead may have an average of less than one contaminant particle (shot) per 100 grams. This result is actually even worse than the single particle example that gave a 100% error. The relative error is greater than 100% due to fundamental error alone. Other errors only add to the fundamental error.

The only way to reduce fundamental error in sampling is to take a larger sample size. In this example, to reduce fundamental error to a manageable 10% (or 40 ppm), we must increase sample size by a factor of 112, which would amount to more than 11 kilograms (24 pounds)! What laboratory would be willing to process such a sample in its entirety?

A Single Chip

Paint on older buildings often has a lead loading of 20 mg/cm^2 or more. Imagine that a single chip of such paint the size of your thumbnail (2 cm^2) falls into in a 100 gram soil sample. The chip contains 40 mg, or 0.040 grams of lead, nearly the same amount of lead as in a 2 mm shot. Take 0.040 grams and divide by 100 grams and multiply by 1,000,000 to get 400 ppm. Your single paint chip raised the lead concentration of an entire 100 gram sample by 400 ppm. If the soil has a background level lead content of 20 ppm without the chip, then the chip raises it to 420 ppm, and above the 400 ppm action level.

Now imagine you are kneeling down next to a house to take a soil sample. You see the paint chip. Take it, or leave it? According to HUD's Soil Sampling Protocol,[9] "If paint chips are present, they should not be avoided and should be included in the sample." (item C.5) Later, under the heading "Laboratory Analytical Procedure", the same protocol states "Samples are to be sieved once with a number 10 sieve with a mesh size of 2 millimeters." (item E.3) So far, so good. It continues "Visible paint chips are disaggregated by forcing the paint chips and other large particles through the sieve by a rubbing motion." Disaster. Whether the sample passes or fails depends entirely on whether you take the chip. Or whether you notice the chip. What if the chip is just below the surface, invisible? Go back to the same spot and sample again, and again. You may never obtain the same result again.

The author suggests a different approach. Leaded paint chips are always a potential hazard; the hazard increases over long periods of time as chips decompose into the soil. To knowingly include large chips of leaded paint in a soil sample accomplishes nothing; the result is foregone. If you do not already know the lead content of the paint chips, do have the paint chips analysed, but separately. As for the soil itself, pass it through the 2 mm mesh, but without trying to break up the paint chips. Include only the soil that passes through the mesh. If you find paint chips that do not pass through, study them carefully; find out where they came from; test them for lead content; but do not include them in the soil sample.

FUNDAMENTAL ERROR IN THE LABORATORY

Now imagine you are the lab technician. You have the soil sample, 100 grams, dried and sieved through the 2 mm screen. You see little paint chips in the sample, all of them just small enough to pass through the sieve, about 2 mm on a side. If they are leaded like the thumbnail sized chip, how many chips will it take to exceed the action level? How much fundamental error should you expect?

error from subsampling (14.3%) is actually slightly worse than what we calculated for the fundamental error from the original sampling (14.1%). Remember that the errors combine together (by adding the variances) to form an overall error that is worse than any of the several individual components. In the case of a sampling error of 14.1% and a subsampling error of 14.3%, the total error is 20.1%.

Realistic scenarios of subsampling could be even worse than those described. The lead content of dry paint film can be as high as 50%, far greater than 15%. Also, laboratories typically grind samples to a U.S. number 35 sieve (0.500 mm) rather than number 60 (0.250 mm) before subsampling. Larger particles translate to larger errors. With 50% lead content and 0.500 mm particles, the 0.3 g sub-sampling error could be as high as 74%!

One way to reduce subsampling error is to simply subsample and digest a larger amount. The ASTM method for sample digestion of soils for lead analysis[11], which is based on USEPA SW-846 Method 3050, calls for a 1.0 g subsample, more than three times larger than the 0.3 g subsample we calculated. In taking the larger subsample, the fundamental error from subsampling should be reduced by nearly half. But the method fails to deliver better performance, because it relaxes the grinding requirement from number 60 mesh (0.250 mm) to number 35 (0.500 mm). Doubling the particle diameter increases the volume of the spherical particle by a factor of 8, more than compensating the larger subsample. The fundamental subsampling error grows to 22.1%, and the total fundamental error becomes 26.2%.

Besides increasing subsample size, the laboratory can improve subsampling error by grinding the sample to a smaller particle size. Grinding to a 0.125 mm particle diameter, the laboratory reduces the fundamental error of the 0.3 g subsample from 14.3% to 5.1%. But grinding 100 grams of soil to such small particle size by hand methods (e.g. mortar and pestle) can be tedious and difficult. A method for speeding the particle size reduction without greatly increasing fundamental error is to grind and subsample in stages. If you grind the 100 g sample to 0.250 mm and subsample not 0.3 g, but 5 g, the fundamental error will be only 3.5% If you then grind the 5 g subsample to 0.125 mm and sub-subsample 0.3 g, the fundamental error will be 5.1%. Combining the subsampling and sub-subsampling errors, you have an overall error of 6.2%. By reducing only 5 g of the 100 g sample to the smallest particle size, you avoid much of the effort of grinding and sieving the whole sample.

Other errors related to subsampling include bias and homogenization errors. An accurate subsample must be unbiased; every particle should have an equal probability of being subsampled. If the ground, sieved sample is not properly homogenized, there can be substantial segregation of particles by composition, shape, size, and or density. Some types of particles (e.g. magnetic or electrostatic particles) tend to group or clump together. An improper method for homogenizing a sample can actually create segregation. Agitation or shaking a sample with particles of different size, shape, or density will likely cause stratification. With agitation, denser, smaller and rounder particles tend to drop to the bottom, while less dense, larger and flatter particles tend to rise to the top. Finely ground samples do not stratify as readily as the raw, unground sample.

One way to avoid homogenization error in subsampling is to make use of mechanical sample splitting devices. A riffle splitter, for example, can efficiently eliminate segregation errors in subsampling. If mechanical splitters are not available, then the manual cone-and-quarter method can reduce bias in subsampling.

OTHER LABORATORY ERRORS

The analytical error of field portable XRF is around 10 to 15 percent for lead-in-soil samples at 400 ppm. While this analytical error is far worse than that of laboratory atomic spectrometry, the overall error of the methods may be fairly similar after taking into account sampling, sample handling, and sample preparation.[17]

THE SMALL PARTICLE CASE

If all the contaminant particles of the sample unit are very small, then fundamental errors greatly diminish, and sample handling can be simplified. Lead contamination from airborne sources (e.g. automobile emissions, smelter emissions, incinerator emissions, abrasive blasting of painted surfaces) and from chalking (powdery deterioration) of painted surfaces tends to be dispersed as fine particles. If the lead is found only in particles less than 0.032 mm (32 microns) in diameter, then the fundamental error for a 0.3 gram sample or subsample cannot be more than 4% at 400 ppm. In such a sample, grinding and sieving are not likely to make dramatic differences in the laboratory result. Sampling bias resulting from spatial variation is still a concern, so I always recommend careful attention to sampling design, sample support, and homogenization.

Even with the minimal sample preparation (dry, sieve 2 mm, mix), field portable XRF can perform very well in cases of small particle size.[18,19] The minimal sample preparation and high analytical throughput of XRF enable an investigator to collect large quantities of useful data in a short period of time, and at low cost. In many situations, the field XRF provides better overall decision making data than laboratory analysis by virtue of its ability to overcome spatial variability through massively increased sampling density.[20,21]

IN-SITU FIELD XRF

The in-situ capability of some field portable XRF instruments may be especially attractive for high speed, low cost screening and characterization. Depending on the nature of the contaminant and the soil matrix, the in-situ method can offer screening quality data with practically no sample preparation at all. To reduce bias and increase sample support, the field technician can mix and composite a sample on the ground before an in-situ XRF measurement.

Moisture and particle size effects can be especially pronounced for in-situ XRF, so quality assurance is especially important. The field technician may prepare one or more samples by the full protocol (dry, grind, sieve, split) in the field and compare the result to the in-situ measurement to determine if the soil conditions allow the in-situ XRF method to meet the data quality objectives. To back up field measurements, the technician should collect representative samples for laboratory analysis.

QUALITY ASSURANCE FOR SAMPLING AND ANALYSIS

Quality assurance programs usually include sample duplicates, replicates, spikes, blanks, and splits. To assess field based error (that is, error caused by sampling and sample handling), the sampling program should include field duplicates and replicates taken as early as possible in the sampling process. To assess the error due to spatial variation and sampling, the field technician takes duplicates or replicates according to the normal sampling protocol, but from spatially distinct points (sample points should be spread apart from each other) within the representative sampling unit. To assess the error due to sample handling, the technician makes several large field composites and splits them into situ protocols, do take advantage of the higher analytical throughput to collect more data. But always proceed with a degree of caution and support your data with solid confirmatory analysis.

ACKNOWLEDGEMENT

The author thanks Dr. Evan Englund (U.S. EPA Environmental Monitoring Systems Laboratory) for sharing his knowledge of particulate sampling theory and its application to environmental measurement.

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$$P_x = \left(\frac{n!}{x!(n-x)!}\right) p^x (1-p)^{n-x}$$

where x is an integer and p is the probability that any particular particle will be in the sample. Note that the sum of all probabilities (the sum of P_x for x running over the range of 0 to n) is always 1. The probability for an individual particle, p, is simply the mass of the sample, m, divided by the mass of the sampling unit, M.

The mean or "expected" value for the number of contaminant particles in the sample, $\bar{X}$ can be found by summing the function xP_x over the range of $x=0$ to n. The resulting mean is simply $\bar{X} = np$, as one would reasonably expect.

The variance σ_x^2 of the number of contaminant particles around the mean $\bar{X}$ is found by summing the function $(x - \bar{X})^2 P_x$ over the range of x=0 to n. The resulting variance is $\sigma_x^2 = \bar{X}(1 - p)$. If the mass of the sample is much smaller than the mass of the sampling unit, then p = m / M will be much smaller than 1, and drops out of the formula, leaving $\sigma_x^2 \approx {}_x$. The standard deviation of x, or σ_x, will then be approximated by SQRT($\bar{X}$).

In calculating fundamental error for an even 50/50 sample split, where n is the number of contaminant particles in the whole sample (now considered the sampling unit for the splitting operation), $p = 0.5$, so

$$\bar{X} = 0.5\,n, \text{ and } \sigma_x^2 = 0.5\,\bar{X}.$$

In the limit as the sampling unit becomes extremely large, (n becomes extremely large, p becomes very small) the probability distribution simplifies to the Poisson formula:

$$P_x = \bar{X}^{x} e^{-x}/x!$$

where the mean, or expected value, is once again $\bar{X}$. As before, the variance, σ_x^2, *simplifies to* $\bar{X}$.

APPENDIX B: PIERRE GY'S PARTICULATE SAMPLING THEORY

An overview of Gy's sampling theory can be found in Ingamells and Pitard.[6] An important element of the theory is the concept of fundamental error. Fundamental error (FE) is an inherent property of the particulate nature of geological samples. FE can never be removed from a sample, but it can be reduced by controlling the maximum particle size allowed into the sample, and increasing the sample size.

FE is the product of a several factors. In terms of the variance, σ_{FE}^2,

Table 2: XRF particle effect for lead-in-soil derived from lead bearing paint. The original sample from the dripline of an 1874 train depot was separated by sieve into seven particle size ranges prior to independent analysis of the fractions. Recovery (%) is the response of the sample unground relative to the same sample ground to pass 0.032 mm. Note that analytical recovery is generally poor for the largest particle sizes.

Min. size (mm)	Max. size (mm)	Recovery (%)
1.000	2.000	3
0.500	1.000	31
0.250	0.500	46
0.125	0.250	70
0.063	0.125	90
0.000	0.063	100

Table 3: Example calculations of fundamental error in lead-in-soil sampling and subsampling based on realistic assumptions of concentration and density. Note that σ_{FE} is the calculated 1-sigma relative error at an average contaminant lead concentration of 400 ppm. We assume particles to be spherical, except for paint chips, which we assume to be flat squares. Since real-world contaminants vary widely in particle size, shape, and concentration, one should view these figures as rough approximations.

Contaminant particle	Assumptions	Sample or subsample size (grams)	σ_{FE} (%)
Lead shot, 2 mm dia.	95 % Pb, density 11.3 g/cm^3	100	>100
Paint chips, 2 x 2 mm	20 mg/cm^2 Pb	100	14.1
Paint chips, 1 x 1 mm	20 mg/cm^2 Pb	100	7.1
Paint, .500 mm (#35)	15 % Pb, density 2 g/cm^3	0.3	40.5
Paint, .500 mm (#35)	15 % Pb, density 2 g/cm^3	1.0	22.2
Paint, .250 mm (#60)	15 % Pb, density 2 g/cm^3	0.3	14.3
Paint, .250 mm (#60)	15 % Pb, density 2 g/cm^3	1.0	7.8
Paint, .125 mm (#120)	15 % Pb, density 2 g/cm^3	0.3	5.1
Paint, .125 mm (#120)	15 % Pb, density 2 g/cm^3	1.0	2.8

NITON

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NITON Model 702
Multi Element
Bulk Sample Analyzer

xrf@niton.com

May 1, 1998

METHOD 6200

METHOD 6200

FIELD PORTABLE X-RAY FLUORESCENCE SPECTROMETRY FOR THE

DETERMINATION OF ELEMENTAL CONCENTRATIONS IN SOIL AND SEDIMENT

1.0 SCOPE AND APPLICATION

1.1 This method is applicable to the in situ and intrusive analysis of the 26 analytes listed in Table 1 for soil and sediment samples. Some common elements are not listed in Table 1 because they are considered "light" elements that cannot be detected by field portable x-ray fluorescence (FPXRF). They are: lithium, beryllium, sodium, magnesium, aluminum, silicon, and phosphorus. Most of the analytes listed in Table 1 are of environmental concern, while a few others have interference effects or change the elemental composition of the matrix, affecting quantitation of the analytes of interest. Generally elements of atomic number 16 or greater can be detected and quantitated by FPXRF.

1.2 Detection limits depend on several factors, the analyte of interest, the type of detector used, the type of excitation source, the strength of the excitation source, count times used to irradiate the sample, physical matrix effects, chemical matrix effects, and interelement spectral interferences. General instrument detection limits for analytes of interest in environmental applications are shown in Table 1. These detection limits apply to a clean matrix of quartz sand (silicon dioxide) free of interelement spectral interferences using long (600-second) count times. These detection limits are given for guidance only and will vary depending on the sample matrix, which instrument is used, and operating conditions. A discussion of field performance-based detection limits is presented in Section 13.4 of this method. The clean matrix and field performance-based detection limits should be used for general planning purposes, and a third detection limit discussed, based on the standard deviation around single measurements, should be used in assessing data quality. This detection limit is discussed in Sections 9.7 and 11.3.

1.3 Use of this method is restricted to personnel either trained and knowledgeable in the operation of an XRF instrument or under the supervision of a trained and knowledgeable individual. This method when using a cadmium-109 source, which has an excitation energy of 22.1 kiloelectron volts (keV), FPXRF would exhibit better sensitivity for zirconium which has a K line energy of 15.7 keV than to chromium, which has a K line energy of 5.41 keV.

2.2 Under this method, inorganic analytes of interest are identified and quantitated using a field portable energy-dispersive x-ray fluorescence spectrometer. Radiation from one or more radioisotope sources or an electrically excited x-ray tube is used to generate characteristic x-ray emissions from elements in a sample. Up to three sources may be used to irradiate a sample. Each source emits a specific set of primary x-rays that excite a corresponding range of elements in a sample. When more than one source can excite the element of interest, the source is selected according to its excitation efficiency for the element of interest.

For measurement, the sample is positioned in front of the probe window. This can be done in two manners using FPXRF instruments: in situ or intrusive. If operated in the in situ mode, the probe window is placed in direct contact with the soil surface to be analyzed. When an FPXRF instrument is operated in the intrusive mode, a soil or sediment sample must be collected, prepared, and placed in a sample cup. The sample cup is then placed on top of the window inside a protective cover for analysis.

Sample analysis is then initiated by exposing the sample to primary radiation from the source. Fluorescent and backscattered x-rays from the sample enter through the detector window and are converted into electric pulses in the detector. The detector in FPXRF instruments is usually either a solid-state detector or a gas-filled proportional counter. Within the detector, energies of the characteristic x-rays are converted into a train of electric pulses, the amplitudes of which are linearly proportional to the energy of the x-rays. An electronic multichannel analyzer (MCA) measures the pulse amplitudes, which is the basis of qualitative x-ray analysis. The number of counts at a given energy per unit of time is representative of the element concentration in a sample and is the basis for quantitative analysis. Most FPXRF instruments are menu-driven from software built into the units or from personal computers (PC).

The measurement time of each source is user-selectable. Shorter source measurement times (30 seconds) are generally used for initial screening and hot spot delineation, and longer measurement times (up to 300 seconds) are typically used to meet higher precision and accuracy requirements.

FPXRF instruments can be calibrated using the following methods: internally using fundamental parameters determined by the manufacturer, empirically based on site-specific calibration standards (SSCS), or based on Compton peak ratios. The Compton peak is produced by backscattering of the source radiation. Some FPXRF instruments can be calibrated using multiple methods.

3.0 DEFINITIONS

3.1 FPXRF: Field portable x-ray fluorescence.

3.2 MCA: Multichannel analyzer for measuring pulse amplitude.

3.3 SSCS: Site specific calibration standard.

3.4 FP: Fundamental parameter.

enhancement phenomena. Both effects are common in soils contaminated with heavy metals. As examples of absorption and enhancement effects; iron (Fe) tends to absorb copper (Cu) x-rays, reducing the intensity of the Cu measured by the detector, while chromium (Cr) will be enhanced at the expense of Fe because the absorption edge of Cr is slightly lower in energy than the fluorescent peak of iron. The effects can be corrected mathematically through the use of fundamental parameter (FP) coefficients. The effects also can be compensated for using SSCS, which contain all the elements present on site that can interfere with one another.

4.6 When present in a sample, certain x-ray lines from different elements can be very close in energy and, therefore, can cause interference by producing a severely overlapped spectrum. The degree to which a detector can resolve the two different peaks depends on the energy resolution of the detector. If the energy difference between the two peaks in electron volts is less than the resolution of the detector in electron volts, then the detector will not be able to fully resolve the peaks.

The most common spectrum overlaps involve the $K_{[beta]}$ line of element Z-1 with the K_a line of element Z. This is called the $K_a/K_{[beta]}$ interference. Because the $K_a:K_{[beta]}$ intensity ratio for a given element usually is about 7:1, the interfering element, Z-1, must be present at large concentrations to cause a problem. Two examples of this type of spectral interference involve the presence of large concentrations of vanadium (V) when attempting to measure Cr or the presence of large concentrations of Fe when attempting to measure cobalt (Co). The V K_a and $K_{[beta]}$ energies are 4.95 and 5.43 keV, respectively, and the Cr K_a energy is 5.41 keV. The Fe K_a and $K_{[beta]}$ energies are 6.40 and 7.06 keV, respectively, and the Co K_a energy is 6.92 keV. The difference between the V $K_{[beta]}$ and Cr K_a energies is 20 eV, and the difference between the Fe $K_{[beta]}$ and the Co K_a energies is 140 eV. The resolution of the highest-resolution detectors in FPXRF instruments is 170 eV. Therefore, large amounts of V and Fe will interfere with quantitation of Cr or Co, respectively. The presence of Fe is a frequent problem because it is often found in soils at tens of thousands of parts per million (ppm).

4.7 Other interferences can arise from K/L, K/M, and L/M line overlaps, although these overlaps are less common. Examples of such overlap involve arsenic (As) K_a/lead (Pb) L_a and sulfur (S) K_a/Pb M_a. In the As/Pb case, Pb can be measured from the Pb $L_{[beta]}$ line, and As can be measured from either the As K_a or the As K_β line; in this way the interference can be corrected. If the As $K_{[beta]}$ line is used, sensitivity will be decreased by a factor of two to five times because it is a less intense line than the As K_a line. If the As K_a line is used in the presence of Pb, mathematical corrections within the instrument software can be used to subtract out the Pb interference. However, because of the limits of mathematical corrections, As concentrations cannot be efficiently calculated for samples with Pb:As ratios of 10:1 or more. This high ratio of Pb to As may result in no As being reported regardless of the actual concentration present.

No instrument can fully compensate for this interference. It is important for an operator to understand this limitation of FPXRF instruments and consult with the manufacturer of the FPXRF instrument to evaluate options to minimize this limitation. The operator's decision will be based on action levels for metals in soil established for the site, matrix effects, capabilities of the instrument, data quality objectives, and the ratio of lead to arsenic known to be present at the site. If a site is encountered that contains lead at concentrations greater than ten times the concentration of arsenic it is advisable that all critical soil samples be sent off site for confirmatory analysis by an EPA-approved method.

by the analyst prior to analysis. Radiation safety for each specific instrument can be found in the operators manual. Protective shielding should never be removed by the analyst or any personnel other than the manufacturer. The analyst should be aware of the local state and national regulations that pertain to the use of radiation-producing equipment and radioactive materials with which compliance is required. Licenses for radioactive materials are of two types; (1) general license which is usually provided by the manufacturer for receiving, acquiring, owning, possessing, using, and transferring radioactive material incorporated in a device or equipment, and (2) specific license which is issued to named persons for the operation of radioactive instruments as required by local state agencies. There should be a person appointed within the organization that is solely responsible for properly instructing all personnel, maintaining inspection records, and monitoring x-ray equipment at regular intervals. A copy of the radioactive material licenses and leak tests should be present with the instrument at all times and available to local and national authorities upon request. X-ray tubes do not require radioactive material licenses or leak tests, but do require approvals and licenses which vary from state to state. In addition, fail-safe x-ray warning lights should be illuminated whenever an x-ray tube is energized. Provisions listed above concerning radiation safety regulations, shielding, training, and responsible personnel apply to x-ray tubes just as to radioactive sources. In addition, a log of the times and operating conditions should be kept whenever an x-ray tube is energized. Finally, an additional hazard present with x-ray tubes is the danger of electric shock from the high voltage supply. The danger of electric shock is as substantial as the danger from radiation but is often overlooked because of its familiarity.

5.2 Radiation monitoring equipment should be used with the handling of the instrument. The operator and the surrounding environment should be monitored continually for analyst exposure to radiation. Thermal luminescent detectors (TLD) in the form of badges and rings are used to monitor operator radiation exposure. The TLDs should be worn in the area of most frequent exposure. The maximum permissible whole-body dose from occupational exposure is 5 Roentgen Equivalent Man (REM) per year. Possible exposure pathways for radiation to enter the body are ingestion, inhaling, and absorption. The best precaution to prevent radiation exposure is distance and shielding.

5.3 Refer to Chapter Three for guidance on some proper safety protocols.

6.0 EQUIPMENT AND SUPPLIES

6.1 FPXRF Spectrometer: An FPXRF spectrometer consists of four major components: (1) a source that provides x-rays; (2) a sample presentation device; (3) a detector that converts x-ray-generated photons emitted from the sample into measurable electronic signals; and (4) a data processing unit that contains an emission or fluorescence energy analyzer, such as an MCA, that processes the signals into an x-ray energy spectrum from which elemental concentrations in the sample may be calculated, and a data display and storage system. These components and additional, optional items, are discussed below.

6.1.1 Excitation Sources: Most FPXRF instruments use sealed radioisotope sources to produce x-rays in order to irradiate samples. The FPXRF instrument may contain between one and three radioisotope sources. Common radioisotope sources used for analysis for metals in soils are iron (Fe)-55, cadmium (Cd)-109, americium (Am)-241, and curium (Cm)-244. These sources may be contained in a probe along with a window and the detector; the probe is connected to a data reduction and handling system by means of a flexible cable. Alternatively, the sources, window, and detector may be included in the same unit as the data reduction and handling system.

liter. Proportional counter detectors are rugged and lightweight, which are important features of a field portable detector. However, the resolution of a proportional counter detector is not as good as that of a solid-state detector. The energy resolution of a detector for characteristic x-rays is usually expressed in terms of full width at half-maximum (FWHM) height of the manganese K_a peak at 5.89 keV. The typical resolutions of the above mentioned detectors are as follows: HgI_2-270 eV; silicon pin diode-250 eV; Si(Li)-170 eV; and gas-filled, proportional counter-750 eV.

During operation of a solid-state detector, an x-ray photon strikes a biased, solid-state crystal and loses energy in the crystal by producing electron-hole pairs. The electric charge produced is collected and provides a current pulse that is directly proportional to the energy of the x-ray photon absorbed by the crystal of the detector. A gas-filled, proportional counter detector is an ionization chamber filled with a mixture of noble and other gases. An x-ray photon entering the chamber ionizes the gas atoms. The electric charge produced is collected and provides an electric signal that is directly proportional to the energy of the x-ray photon absorbed by the gas in the detector.

6.1.4 Data Processing Units: The key component in the data processing unit of an FPXRF instrument is the MCA. The MCA receives pulses from the detector and sorts them by their amptitudes (energy level). The MCA counts pulses per second to determine the height of the peak in a spectrum, which is indicative of the target analyte's concentration. The spectrum of element peaks are built on the MCA. The MCAs in FPXRF instruments have from 256 to 2,048 channels. The concentrations of target analytes are usually shown in parts per million on a liquid crystal display (LCD) in the instrument. FPXRF instruments can store both spectra and from 100 to 500 sets of numerical analytical results. Most FPXRF instruments are menu-driven from software built into the units or from PCs. Once the data-storage memory of an FPXRF unit is full, data can be downloaded by means of an RS-232 port and cable to a PC.

6.2 Spare battery chargers.

6.3 Polyethylene sample cups: 31 millimeters (mm) to 40 mm in diameter with collar, or equivalent (appropriate for FPXRF instrument).

6.4 X-ray window film: Mylar™, Kapton™, Spectrolene™, polypropylene, or equivalent; 2.5 to 6.0 micrometers (um) thick.

6.5 Mortar and pestle: glass, agate, or aluminum oxide; for grinding soil and sediment samples.

6.6 Containers: glass or plastic to store samples.

6.7 Sieves: 60-mesh (0.25 mm), stainless-steel, Nylon, or equivalent for preparing soil and sediment samples.

6.8 Trowels: for smoothing soil surfaces and collecting soil samples.

6.9 Plastic bags: used for collection and homogenization of soil samples.

6.10 Drying oven: standard convection or toaster oven, for soil and sediment samples that require drying.

Sample handling and preservation procedures used in FPXRF analyses should follow the guidelines in Chapter Three, Inorganic Analytes.

9.0 QUALITY CONTROL

9.1 Refer to Chapter One for additional guidance on quality assurance protocols. All field data sheets and quality control data should be maintained for reference or inspection.

9.2 Energy Calibration Check: To determine whether an FPXRF instrument is operating within resolution and stability tolerances, an energy calibration check should be run. The energy calibration check determines whether the characteristic x-ray lines are shifting, which would indicate drift within the instrument. As discussed in Section 4.10, this check also serves as a gain check in the event that ambient temperatures are fluctuating greatly (> 10 to 20deg.F).

The energy calibration check should be run at a frequency consistent with manufacturers recommendations. Generally, this would be at the beginning of each working day, after the batteries are changed or the instrument is shut off, at the end of each working day, and at any other time when the instrument operator believes that drift is occurring during analysis. A pure element such as iron, manganese, copper, or lead is often used for the energy calibration check. A manufacturer-recommended count time per source should be used for the check.

9.2.1 The instrument manufacturer's manual specifies the channel or kiloelectron volt level at which a pure element peak should appear and the expected intensity of the peak. The intensity and channel number of the pure element as measured using the radioactive source should be checked and compared to the manufacturer's recommendation. If the energy calibration check does not meet the manufacturer's criteria, then the pure element sample should be repositioned and reanalyzed. If the criteria are still not met, then an energy calibration should be performed as described in the manufacturer's manual. With some FPXRF instruments, once a spectrum is acquired from the energy calibration check, the peak can be optimized and realigned to the manufacturer's specifications using their software.

9.3 Blank Samples: Two types of blank samples should be analyzed for FPXRF analysis: instrument blanks and method blanks. An instrument blank is used to verify that no contamination exists in the spectrometer or on the probe window.

9.3.1 The instrument blank can be silicon dioxide, a Teflon block, a quartz block, "clean" sand, or lithium carbonate. This instrument blank should be analyzed on each working day before and after analyses are conducted and once per every twenty samples. An instrument blank should also be analyzed whenever contamination is suspected by the analyst. The frequency of analysis will vary with the data quality objectives of the project. A manufacturer-recommended count time per source should be used for the blank analysis. No element concentrations above the method detection limits should be found in the instrument blank. If concentrations exceed these limits, then the probe window and the check sample should be checked for contamination. If contamination is not a problem, then the instrument must be "zeroed" by following the manufacturer's instructions.

9.3.2 A method blank is used to monitor for laboratory-induced contaminants or interferences. The method blank can be "clean" silica sand or lithium carbonate that undergoes the same preparation procedure as the samples. A method blank must be analyzed at least daily. The frequency of analysis of diminishing return. Increasing the count time also improves the detection limit, but decreases sample throughput.

9.6 Detection Limits: Results for replicate analyses of a low-concentration sample, SSCS, or SRM can be used to generate an average site-specific method detection and quantitation limits. In this case, the method detection limit is defined as 3 times the standard deviation of the results for the low-concentration samples and the method quantitation limit is defined as 10 times the standard deviation of the same results. Another means of determining method detection and quantitation limits involves use of counting statistics. In FPXRF analysis, the standard deviation from counting statistics is defined as $SD = (N)^{1/2}$, where SD is the standard deviation for a target analyte peak and N is the net counts for the peak of the analyte of interest (i.e., gross counts minus background under the peak). Three times this standard deviation would be the method detection limit and 10 times this standard deviation would be the method quantitation limit. If both of the above mentioned approaches are used to calculate method detection limits, the larger of the standard deviations should be used to provide the more conservative detection limits.

This SD based detection limit criteria must be used by the operator to evaluate each measurement for its useability. A measurement above the average calculated or manufacturer's detection limit, but smaller than three times its associated SD, should not be used as a quantitative measurement. Conversely, if the measurement is below the average calculated or manufacturer's detection limit, but greater than three times its associated SD. It should be coded as an estimated value.

9.7 Confirmatory Samples: The comparability of the FPXRF analysis is determined by submitting FPXRF-analyzed samples for analysis at a laboratory. The method of confirmatory analysis must meet the project and XRF measurement data quality objectives. The confirmatory samples must be splits of the well homogenized sample material. In some cases the prepared sample cups can be submitted. A minimum of 1 sample for each 20 FPXRF-analyzed samples should be submitted for confirmatory analysis. This frequency will depend on data quality objectives. The confirmatory analyses can also be used to verify the quality of the FPXRF data. The confirmatory samples should be selected from the lower, middle, and upper range of concentrations measured by the FPXRF. They should also include samples with analyte concentrations at or near the site action levels. The results of the confirmatory analysis and FPXRF analyses should be evaluated with a least squares linear regression analysis. If the measured concentrations span more than one order of magnitude, the data should be log-transformed to standardize variance which is proportional to the magnitude of measurement. The correlation coefficient (r^2) for the results should be 0.7 or greater for the FPXRF data to be considered screening level data. If the r^2 is 0.9 or greater and inferential statistics indicate the FPXRF data and the confirmatory data are statistically equivalent at a 99 percent confidence level, the data could potentially meet definitive level data criteria.

10.0 CALIBRATION AND STANDARDIZATION

10.1 Instrument Calibration: Instrument calibration procedures vary among FPXRF instruments. Users of this method should follow the calibration procedures outlined in the operator's manual for each specific FPXRF instrument. Generally, however, three types of calibration procedures exist for FPXRF instruments: FP calibration, empirical calibration, and the Compton peak ratio or normalization method. These three types of calibration are discussed below.

10.2 Fundamental Parameters Calibration: FP calibration procedures are extremely variable. An FP calibration provides the analyst with a "standardless" calibration. The advantages of FP calibrations

C_k = Certified concentration of standard sample

C_s = Measured concentration of standard sample

10.2.2 BFP Calibration: BFP calibration relies on the ability of the liquid nitrogen-cooled, Si(Li) solid-state detector to separate the coherent (Compton) and incoherent (Rayleigh) backscatter peaks of primary radiation. These peak intensities are known to be a function of sample composition, and the ratio of the Compton to Rayleigh peak is a function of the mass absorption of the sample. The calibration procedure is explained in detail in the instrument manufacturer's manual. Following is a general description of the BFP calibration procedure.

The concentrations of all detected and quantified elements are entered into the computer software system. Certified element results for an NIST SRM or confirmed and validated results for an SSCS can be used. In addition, the concentrations of oxygen and silicon must be entered; these two concentrations are not found in standard metals analyses. The manufacturer provides silicon and oxygen concentrations for typical soil types. Pure element standards are then analyzed using a manufacturer-recommended count time per source. The results are used to calculate correction factors in order to adjust for spectrum overlap of elements.

The working BFP calibration curve must be verified before sample analysis begins on each working day, after every 20 samples are analyzed, and at the end of the analysis. This verification is performed by analyzing either an NIST SRM or an SSCS that is representative of the site-specific samples. This SRM or SSCS serves as a calibration check. The standard sample is analyzed using a manufacturer-recommended count time per source to check the calibration curve. The analyst must then adjust the y-intercept and slope of the calibration curve to best fit the known concentrations of target analytes in the SRM or SSCS.

A %D is then calculated for each target analyte. The %D should fall within +/-20 percent of the certified value for each analyte. If the %D falls outside this acceptance range, then the calibration curve should be adjusted by varying the slope of the line the y-intercept value for the analyte. The standard sample is reanalyzed until the %D falls within +/-20 percent. The group of 20 samples analyzed before an out-of-control calibration check should be reanalyzed.

10.3 Empirical Calibration: An empirical calibration can be performed with SSCS, site-typical standards, or standards prepared from metal oxides. A discussion of SSCS is included in Section 7.2; if no previously characterized samples exist for a specific site, site-typical standards can be used. Site-typical standards may be selected from commercially available characterized soils or from SSCS prepared for another site. The site-typical standards should closely approximate the site's soil matrix with respect to particle size distribution, mineralogy, and contaminant analytes. If neither SSCS nor site-typical standards are available, it is possible to make gravimetric standards by adding metal oxides to a "clean" sand or silicon dioxide matrix that simulates soil. Metal oxides can be purchased from various chemical vendors. If standards are made on site, a balance capable of weighing items to at least two decimal places is required. Concentrated ICP or AA standard solutions can also be used to make standards. These solutions are available in concentrations of 10,000 parts per million, thus only small volumes have to be added to the soil.

An empirical calibration using SSCS involves analysis of SSCS by the FPXRF instrument and by a conventional analytical method such as ICP or AA. A total acid digestion procedure should be used when analyte concentrations exceed a few percent.

The certified standard used for this type of calibration could be an NIST SRM such as 2710 or 2711. The SRM must be a matrix similar to the samples and must contain the analytes of interests at concentrations near those expected in the samples. First, a response factor has to be determined for each analyte. This factor is calculated by dividing the net peak intensity by the analyte concentration. The net peak intensity is gross intensity corrected for baseline interference. Concentrations of analytes in samples are then determined by multiplying the baseline corrected analyte signal intensity by the normalization factor and by the response factor. The normalization factor is the quotient of the baseline corrected Compton K_a peak intensity of the SRM divided by that of the samples. Depending on the FPXRF instrument used, these calculations may be done manually or by the instrument software.

11.0 PROCEDURE

11.1 Operation of the various FPXRF instruments will vary according to the manufacturers' protocols. Before operating any FPXRF instrument, one should consult the manufacturer's manual. Most manufacturers recommend that their instruments be allowed to warm up for 15 to 30 minutes before analysis of samples. This will help alleviate drift or energy calibration problems later on in analysis.

11.2 Each FPXRF instrument should be operated according to the manufacturer's recommendations. There are two modes in which FPXRF instruments can be operated: in situ and intrusive. The in situ mode involves analysis of an undisturbed soil sediment or sample. Intrusive analysis involves collection and preparation of a soil or sediment sample before analysis. Some FPXRF instruments can operate in both modes of analysis, while others are designed to operate in only one mode. The two modes of analysis are discussed below.

11.3 For in situ analysis, one requirement is that any large or nonrepresentative debris be removed from the soil surface before analysis. This debris includes rocks, pebbles, leaves, vegetation, roots, and concrete. Another requirement is that the soil surface be as smooth as possible so that the probe window will have good contact with the surface. This may require some leveling of the surface with a stainless-steel trowel. During the study conducted to provide data for this method, this modest amount of sample preparation was found to take less than 5 minutes per sample location. The last requirement is that the soil or sediment not be saturated with water. Manufacturers state that their FPXRF instruments will perform adequately for soils with moisture contents of 5 to 20 percent but will not perform well for saturated soils, especially if ponded water exists on the surface. Another recommended technique for *in situ* analysis is to tamp the soil to increase soil density and compactness for better repeatability and representativeness. This condition is especially important for heavy element analysis, such as barium. Source count times for in situ analysis usually range from 30 to 120 seconds, but source count times will vary among instruments and depending on required detection limits.

11.4 For intrusive analysis of surface or sediment, it is recommended that a sample be collected from a 4- by 4-inch square that is 1 inch deep. This will produce a soil sample of approximately 375 grams or 250 cm^3, which is enough soil to fill an 8-ounce jar. The sample should be homogenized, dried, and ground before analysis. The sample can be homogenized before or after drying. The homogenization technique to be used after drying is discussed in Section 4.2. If the sample is homogenized before drying, it should be thoroughly mixed in a beaker or similar container, or if the

13.2 The six FPXRF instruments included the TN 9000 and TN Lead Analyzer manufactured by TN Spectrace; the X-MET 920 with a SiLi detector and X-MET 920 with a gas-filled proportional detector manufactured by Metorex, Inc.; the XL Spectrum Analyzer manufactured by Niton; and the MAP Spectrum Analyzer manufactured by Scitec. The TN 9000 and TN Lead Analyzer both have a HgI_2 detector. The TN 9000 utilized an Fe-55, Cd-109, and Am-241 source. The TN Lead Analyzer had only a Cd-109 source. The X-Met 920 with the SiLi detector had a Cd-109 and Am-241 source. The X-MET 920 with the gas-filled proportional detector had only a Cd-109 source. The XL Spectrum Analyzer utilized a silicon pin-diode detector and a Cd-109 source. The MAP Spectrum Analyzer utilized a solid-state silicon detector and a Cd-109 source.

13.3 All data presented in Tables 4 through 9 were generated using the following calibrations and source count times. The TN 9000 and TN Lead Analyzer were calibrated using fundamental parameters using NIST SRM 2710 as a calibration check sample. The TN 9000 was operated using 100, 60, and 60 second count times for the Cd-109, Fe-55, and Am-241 sources, respectively. The TN Lead analyzer was operated using a 60 second count time for the Cd-109 source. The X-MET 920 with the Si(Li) detector was calibrated using fundamental parameters and one well characterized site-specific soil standard as a calibration check. It used 140 and 100 second count times for the Cd-109 and Am-241 sources, respectively. The X-MET 920 with the gas-filled proportional detector was calibrated empirically using between 10 and 20 well characterized site-specific soil standards. It used 120 second times for the Cd-109 source. The XL Spectrum Analyzer utilized NIST SRM 2710 for calibration and the Compton peak normalization procedure for quantitation based on 60 second count times for the Cd-109 source. The MAP Spectrum Analyzer was internally calibrated by the manufacturer. The calibration was checked using a well-characterized site-specific soil standard. It used 240 second times for the Cd-109 source.

13.4 Field-Based Method Detection Limits: The field-based method detection limits are presented in Table 4. The field-based method detection limits were determined by collecting ten replicate measurements on site-specific soil samples with metals concentrations 2 to 5 times the expected method detection limits. Based on these ten replicate measurements, a standard deviation on the replicate analysis was calculated. The method detection limits presented in Table 4 are defined as 3 times the standard deviation for each analyte.

The field-based method detection limits were generated by using the count times discussed earlier in this section. All the field-based method detection limits were calculated for soil samples that had been dried and ground and placed in a sample cup with the exception of the MAP Spectrum Analyzer. This instrument can only be operated in the in situ mode, meaning the samples were moist and not ground.

Some of the analytes such as cadmium, mercury, silver, selenium, and thorium were not detected or only detected at very low concentrations such that a field-based method detection limit could not be determined. These analytes are not presented in Table 4. Other analytes such as calcium, iron, potassium, and titanium were only found at high concentrations (thousands of mg/kg) so that reasonable method detection limits could not be calculated. These analytes also are not presented in Table 4.

13.5 Precision Measurements: The precision data is presented in Table 5. Each of the six FPXRF instruments performed 10 replicate measurements on 12 soil samples that had analyte concentrations ranging from nondetects to thousands of mg/kg. Each of the 12 soil samples underwent 4 different

Table 8 provides a more detailed summary of accuracy data for one FPXRF instrument (TN 9000) for the 9 soil SRMs and 4 sediment SRMs. Table 8 shows the certified value, measured value, and percent recovery for five analytes. These analytes were chosen because they are of environmental concern and were most prevalently certified for in the SRM and detected by the FPXRF instrument. The first nine SRMs are soil and the last 4 SRMs are sediment. Percent recoveries for the four NIST SRMs were often between 90 and 110 percent for all analytes.

13.7 Comparability: Comparability refers to the confidence with which one data set can be compared to another. In this case, FPXRF data generated from a large study of six FPXRF instruments was compared to SW-846 Methods 3050 and 6010 which are the standard soil extraction for metals and analysis by inductively coupled plasma. An evaluation of comparability was conducted by using linear regression analysis. Three factors were determined using the linear regression. These factors were the y-intercept, the slope of the line, and the coefficient of determination (r^2).

As part of the comparability assessment, the effects of soil type and preparation methods were studied. Three soil types (textures) and four preparation methods were examined during the study. The preparation methods evaluated the cumulative effect of particle size, moisture, and homogenization on comparability. Due to the large volume of data produced during this study, linear regression data for six analytes from only one FPXRF instrument is presented in Table 9. Similar trends in the data were seen for all instruments.

Table 9 shows the regression parameters for the whole data set, broken out by soil type, and by preparation method. The soil types are as follows: soil 1--sand; soil 2--loam; and soil 3--silty clay. The preparation methods are as follows: preparation 1--in situ in the field; preparation 2--in situ, sample collected and homogenized; preparation 3--intrusive, with sample in a sample cup but sample still wet and not ground; and preparation 4--sample dried, ground, passed through a 40-mesh sieve, and placed in sample cup.

For arsenic, copper, lead, and zinc, the comparability to the confirmatory laboratory was excellent with r^2 values ranging from 0.80 to 0.99 for all six FPXRF instruments. The slopes of the regression lines for arsenic, copper, lead, and zinc, were generally between 0.90 and 1.00 indicating the data would need to be corrected very little or not at all to match the confirmatory laboratory data. The r^2 values and slopes of the regression lines for barium and chromium were not as good as for the other for analytes, indicating the data would have to be corrected to match the confirmatory laboratory.

Table 9 demonstrates that there was little effect of soil type on the regression parameters for any of the six analytes. The only exceptions were for barium in soil 1 and copper in soil 3. In both of these cases, however, it is actually a concentration effect and not a soil effect causing the poorer comparability. All barium and copper concentrations in soil 1 and 3, respectively, were less than 350 mg/kg.

Table 9 shows there was a preparation effect on the regression parameters for all six analytes. With the exception of chromium, the regression parameters were primarily improved going from preparation 1 to preparation 2. In this step, the sample was removed from the soil surface, all large debris was removed, and the sample was thoroughly homogenized. The additional two preparation methods did little to improve the regression parameters. This data indicates that homogenization is the most critical factor when comparing the results. It is essential that the sample sent to the confirmatory laboratory match the FPXRF sample as closely as possible.

16.0 REFERENCES

1. Metorex. X-MET 920 User's Manual.

2. Spectrace Instruments. 1994. Energy Dispersive X-ray Fluorescence Spectrometry: An Introduction.

3. TN Spectrace. Spectrace 9000 Field Portable/Benchtop XRF Training and Applications Manual.

4. Unpublished SITE data, recieved from PRC Environment Management, Inc.

17.0 TABLES, DIAGRAMS, FLOWCHARTS, AND VALIDATION DATA

The pages to follow contain Tables 1 through 9 and a method procedure flow diagram.

TABLE 1

INTERFERENCE FREE DETECTION LIMITS

Analyte	Chemical Abstract Series Number	Detection Limit in Quartz Sand (milligrams per kilogram)
Antimony (Sb)	7440-36-0	40
Arsenic (As)	7440-38-0	40
Barium (Ba)	7440-39-3	20
Cadmium (Cd)	7440-43-9	100
Calcium (Ca)	7440-70-2	70
Chromium (Cr)	7440-47-3	150
Cobalt (Co)	7440-48-4	60
Copper (Cu)	7440-50-8	50
Iron (Fe)	7439-89-6	60
Lead (Pb)	7439-92-1	20
Manganese (Mn)	7439-96-5	70
Mercury (Hg)	7439-97-6	30
Molybdenum (Mo)	7439-93-7	10
Nickel (Ni)	7440-02-0	50
Potassium (K)	7440-09-7	200
Rubidium (Rb)	7440-17-7	10
Selenium (Se)	7782-49-2	40
Silver (Ag)	7440-22-4	70

Cu	18-22	8.04	Potassium to Cobalt Silver to Gadolinium	K Lines L Lines
Mo	40-50	17.4	Cobalt to Yttrium Europium to Radon	K Lines L Lines
Ag	50-65	22.1	Zinc to Technicium Ytterbium to Neptunium	K Lines L Lines

Source: Reference 4

Notes: The sample elements excited are chosen by taking as the lower limit the same ratio of excitation line energy to element absorption edge as in Table 2 (approximately 0.45) and the requirement that the excitation line energy be above the element absorption edge as the upper limit (L2 edges used for L lines). K-beta excitation lines were ignored. **TABLE 4**

FIELD-BASED METHOD DETECTION LIMITS (mg/kg)[a]

Analyte	Instrument					
	TN 9000	TN Lead Analyzer	X-MET 920 (SiLi Detector)	X-MET 920 (Gas-Filled Detector)	XL Spectrum Analyzer	MAP Spectrum Analyzer
Antimony	55	NR	NR	NR	NR	NR
Arsenic	60	50	55	50	110	225
Barium	60	NR	30	400	NR	NR
Chromium	200	460	210	110	900	NR
Cobalt	330	NR	NR	NR	NR	NR
Copper	85	115	75	100	125	525
Lead	45	40	45	100	75	165
Manganese	240	340	NR	NR	NR	NR
Molybdenum	25	NR	NR	NR	30	NR
Nickel	100	NR	NA	NA	NA	NR
Rubidium	30	NR	NR	NR	45	NR
Strontium	35	NR	NR	NR	40	NR
Tin	85	NR	NR	NR	NR	NR
Zinc	80	95	70	NA	110	NA

Strontium	4.28	NR	NR	NR	8.86	NR
Tin	24.32[a]	NR	NR	NR	NR	NR
Titanium	4.87	NR	NR	NR	NR	NR
Zinc	7.27	7.48	4.26	2.28	10.95	0.83
Zirconium	3.58	NR	NR	NR	6.49	NR

Source: Reference 4

[a] These values are biased high because the concentration of these analytes in the soil samples was near the detection limit for that particular FPXRF instrument.

NR Not reported.

NA Not applicable; analyte was reported but was below the method detection limit.

TABLE 6

PRECISION AS AFFECTED BY SAMPLE PREPARATION

Analyte	**Average Relative Standard Deviation for Each Preparation Method**		
	In Situ-Field	**Intrusive- Undried and Unground**	**Intrusive- Dried and Ground**
Antimony	30.1	15.0	14.4
Arsenic	22.5	5.36	3.76
Barium	17.3	3.38	2.90
Cadmium[a]	41.2	30.8	28.3
Calcium	17.5	1.68	1.24
Chromium	17.6	28.5	21.9
Cobalt	28.4	31.1	28.4
Copper	26.4	10.2	7.90
Iron	10.3	1.67	1.57
Lead	25.1	8.55	6.03
Manganese	40.5	12.3	13.0
Mercury	ND	ND	ND
Molybdenum	21.6	20.1	19.2
Nickel[a]	29.8	20.4	18.2
Potassium	18.6	3.04	2.57
Rubidium	29.8	16.2	18.9

Cd	2	99-129	114.3	NA	--	--	--	--	6	81-202	110.5	45.7	--
Cr	2	99-178	138.4	NA	--	--	--	--	7	22-273	143.1	93.8	3
Cu	8	61-140	95.0	28.8	6	38-107	79.1	27.0	11	10-210	111.8	72.1	8
Fe	6	78-155	103.7	26.1	6	89-159	102.3	28.6	6	48-94	80.4	16.2	6
Pb	11	66-138	98.9	19.2	11	68-131	97.4	18.4	12	23-94	72.7	20.9	13
Mn	4	81-104	93.1	9.70	3	92-152	113.1	33.8	--	--	--	--	--
Ni	3	99-122	109.8	12.0	--	--	--	--	--	--	--	--	3
Sr	8	110-178	132.6	23.8	--	--	--	--	--	--	--	--	7
Zn	11	41-130	94.3	24.0	10	81-133	100.0	19.7	12	46-181	106.6	34.7	11

Source: Reference 4

n Number of samples that contained a certified value for the analyte and produced a detectable concentration from the FPXRF instrument.

SD Standard deviation.

NA Not applicable; only two data points, therefore, a SD was not calculated.

%Rec. Percent recovery.

-- No data.

TABLE 8

ACCURACY FOR TN 9000[a]

Standard Reference Material	Arsenic			Barium			Copper			Lead			Zi
	Cert. Conc.	Meas. Conc.	% Rec.	Cert. Conc.	Meas. Conc.	% Rec.	Cert. Conc.	Meas. Conc.	% Rec.	Cert. Conc.	Meas. Conc.	% Rec.	Ce Cc
RTC CRM-021	24.8	ND	NA	586	1135	193.5	4792	2908	60.7	144742	149947	103.6	54