

03.05-05/01/98-02134

**WORK PLAN
FOR
MAINTENANCE AT RANGES D-29 AND A-1
MCB CAMP LEJEUNE, NORTH CAROLINA**

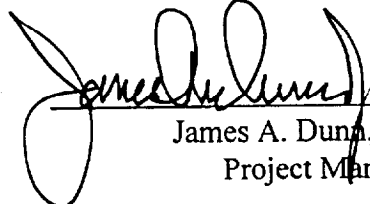
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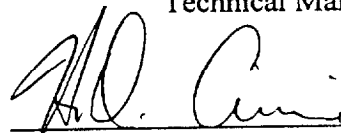
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OHM Project No. 19668

 OHM Remediation
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1.0 INTRODUCTION

This Maintenance Activity Work Plan reviews OHM Remediation Services Corp.'s (OHM) approach to implementation of the scope of work under Delivery Order No. 0151 Modification No. 2 of Navy Atlantic Division (LANTDIV) Contract N62470-93-D-3032. The elements of this work plan are based on the OHM Proposal/Cost Estimate for Range A-1 and D-29 Remediation dated September 3, 1997 and the Statement of Work Design Package and Specifications dated June 24, 1997.

This work plan identifies and describes how OHM will implement the major tasks encompassing the removal and separation of bullet fragments, chemical stabilization of lead-contaminated soil, and site restoration at Ranges A-1 and D-29 in conformance with the contract requirements. It includes the following sections:

- Section 2.0 Pre-construction Activities
- Section 3.0 System Construction Tasks and Methods
- Section 4.0 Field Activities
- Section 5.0 Site Restoration
- Section 6.0 Electrical Power Installation
- Section 7.0 Demobilization and Final Report
- Section 8.0 Project Schedule

1.1 SITE BACKGROUND

The D-29 pistol and rifle battle site zero (BZO) range was commissioned in 1955 and has 17 firing points. The A-1 pistol and shotgun range was commissioned in the 1950's and has 10 firing points. These ranges are currently in use for small-arms target practice. Lead reclamation has not occurred at either range.

1.2 SITE DESCRIPTION

Camp Lejeune is a training base for the U.S. Marine Corps, located in Onslow County, North Carolina. The base covers approximately 234 square miles and includes 14 miles of coast line. MCB Camp Lejeune is bounded to the southeast by the Atlantic Ocean, to the northeast by State Route 24, and to the west by U.S. Route 17. The town of Jacksonville, North Carolina is located north of the Base.

Ranges D-29 and A-1 are located adjacent to the New River as shown in Figures 1 and 2. Range D-29 is located on River Road near F Street in the Hadnot Point Area. Range A-1 is located at Montford Point, Camp Johnson. The ranges are essentially flat with earthen berms located parallel to the shoreline of the New River to prevent bullets from leaving the range area.

1.3 MAINTENANCE ACTIVITY OBJECTIVES FOR SOIL

Munitions on an active range are not considered "discarded material" (thus not solid waste) for RCRA purposes until the range is closed or transferred as specified in the Military Munitions Rule (MMR), 40 CFR 266, subpart M of 12 February, 1997, and as interpreted in the DoD Interim Policy developed to prepare the services of MMR implementation. The objective of this maintenance activity for soil at Ranges D-29 and A-1 at Camp Lejeune is to recover bullet metals and reduce the mobility of lead present in the surface soils of the existing berms. This is being accomplished as part of the range management program to minimize the potential for environmental releases at the small arm ranges. Recovered bullet metals will be shipped to an off-site recycling facility. The soil will be physically screened, chemically stabilized on-site and used as backfill material during construction of the upgraded range berms. In addition, a new bullet trap with a dust collector will be installed at Range A-1 to capture bullets and prevent further lead contamination of the berm soil.

1.4 REFERENCES

The following reference documents were utilized as the basis for preparing the elements of this work plan:

- Battelle and HEPACO, Inc., Contract DAAL03-91-C-0034, Scientific Services Program Task Number 96-198, Delivery Order 1960, Draft Implementation Report for Maintenance of a Small-Arms Range Berm at MCB Camp Lejeune, N.C., July 1, 1997.
- OHM Remediation Services Corp., Contract N62470-93-D-3032, Delivery Order 0151, Modification 2, Proposal for Range Remediation, Ranges A-1 and D-29, MCB Camp Lejeune, N.C., September 3, 1997
- LANTDIV, Statement of Work Design Package with Specification, Remediation of Ranges D-29 and A-1. MCB Camp Lejeune, N.C., June 24, 1997

2.0 PRE-CONSTRUCTION ACTIVITIES

2.1 PRECONSTRUCTION SUBMITTALS

The following plans have been developed for this delivery order and are to be considered as complementary components to this work plan:

- Site-Specific Health and Safety Plan (SHSP) (included herein as Appendix A)
- Construction Quality Control Plan (CQCP) (included herein as Appendix B)
- Sampling and Analysis Plan (SAP) (included herein as Appendix C)
- Environmental Protection Plan (EPP) (included herein as Appendix D)
- Transportation and Disposal (T&D) Plan (included herein as Appendix E)

Additional reports, certifications, etc., will be submitted in accordance with the submittal register. The submittal register is included in the Construction Quality Control Plan.

2.2 PERMITS

OHM will prepare all permit applications for submission by the Base as required for construction of this remediation system. Permits required for this project include the following:

Utility clearances

Base construction/digging permits

Electrical Permits

2.3 PROCUREMENT

Upon approval of this Work Plan, OHM will initiate procurement of new equipment, materials, and subcontractors necessary for the execution of this project. The major equipment and materials to be procured include:

- Bullet Trap with roof and dust collector
- Timber for retaining wall
- Concrete for Range A-1 Bullet Trap Foundation

Specialty subcontractors will be procured to execute certain portions of work at Ranges D-29 and A-1. The following is a list of anticipated subcontractors to be procured:

- Installation of Bullet Trap with roof and dust collector

- Electrical contractor for power distribution to the bullet trap
- Laboratory services for analyses
- Transportation and disposal for residuals management

2.4 PRECONSTRUCTION MEETING

OHM will participate in a pre-construction meeting at MCB Camp Lejeune with Base, LANTDIV, and other parties prior to mobilization to the site. OHM representatives will include at a minimum the Project Manager and Site Supervisor. The purpose of this meeting will be to:

- Confirm roles and responsibilities of key personnel and flow of communication for project execution
- Review the project schedule, work hours, sequence of tasks, and key milestones
- Identify and discuss Base-specific issues relative to the upcoming mobilization and construction activities
- Obtain the necessary security clearances for operations personnel

3.0 SYSTEM CONSTRUCTION TASKS AND METHODS

3.1 MOBILIZATION

OHM will mobilize personnel and equipment as necessary from its Southern Region offices, including Covington, Georgia; Clermont, Florida; and Gallatin, Tennessee. Prior to beginning work on site, a training meeting will be conducted to brief all site personnel on the Site-Specific Health and Safety Plan, construction drawings, and other relevant site-specific plans. Site hazards and conditions will be discussed and all personnel will acknowledge their understanding and compliance with the plan by signing an approved acceptance form.

3.2 SITE PREPARATION

Project mobilization and site setup will consist of the following main activities:

- Temporary Facilities Installation - OHM will utilize its office trailer already located at Lot 203 as an administrative area and command center. In addition a canopy/lab trailer will be set-up on-site at Ranges D-29 and A-1. The lab trailer/canopy will serve as the control check point for contractor/subcontractor personnel entering the site.
- Site Survey - OHM will survey the height of the existing berms and layout the limits of area affected by extending the existing berms. The berm limits will be visibly marked using reinforcing bars and/or wood stakes. OHM will also mark the location of other features such as equipment lay down areas, retaining walls, concrete trenches, and new side walks.
- Excavation Limits - OHM will visibly mark the top and front face of the berms to be excavated for easy recognition using paint and/or wooden stakes. Visibly marking the excavation areas allows for better determination of the work/safety zones and clearly defines the work area for the equipment operator.
- Erosion and Sedimentation Control - OHM will establish controls to prevent erosion and sedimentation through the use of sediment fencing. In this manner, OHM will mitigate the possibility of run-off to other areas and minimize run-on into the active work area. Silt fencing will be placed at the base of down gradient sides of the berm face being modified. The Environmental Protection Plan included with this RAWP provides details on environmental controls.
- Decontamination Areas - Personnel and equipment decontamination areas will be provided within the Contamination Reduction Zones (CRZ) upon exiting the contaminated working areas. The Site-Specific Health and Safety Plan addresses these areas in detail.
- Site Security - All persons entering the site will be required to sign in and out daily. OHM reserves the right to deny access to any individual not showing proper identification.
- Health and Safety Zones - The site will be segregated into work areas on the basis of degree of hazard and PPE requirements. In general, the fenced area excluding the open excavations will

comprise the contamination reduction zone (CRZ). Personnel working within the CRZ will be required to wear the appropriate PPE as outlined in the Site-Specific Health and Safety Plan. Excavation areas within the CRZ will be designated the exclusion zone and will be delineated by orange safety fencing. OHM health and safety personnel will provide site air monitoring and will adjust work zone boundaries as appropriate.

- Personnel Decontamination Facility - OHM will set up a personnel decontamination area at the site. The location will be near construction areas depending on the phase of remediation activities. It will be furnished with portable wash basins. All decontamination and cleaning water generated from the decontamination activities will be collected and stored prior to disposal.

3.3 UTILITY CLEARANCES

OHM will contract with No-Cuts or JPL to provide utility location services consisting of identification and marking of all known utilities potentially within the work zones. OHM will exercise caution while performing intrusive work and will implement its Standard Operating Procedures for excavation near utilities. Techniques for minimizing damage to existing utilities include the use of location devices, utility location services, and hand digging. OHM's Health and Safety Plan also addresses these concerns.

4.0 FIELD ACTIVITIES

4.1 PRE-EXCAVATION FIELD SCREENING/SITE CHARACTERIZATION

A field sampling crew will collect samples at Ranges D-29 and A-1 in accordance with the Sampling and Analyses Plan and ship samples off-site for analyses to characterize the berm soil. Samples will also be sent to OHM's laboratory in Finlay, Ohio for limited treatability testing necessary to optimize chemical addition rates for soil stabilization. The goal target contaminant is lead. The overall goal of the treatability study is to reduce leachable lead to below 5 mg/l as determined by the Toxic Characteristic Leaching Procedure (TCLP) test. A more complete discussion of this activity is provided in the Sampling and Analysis Plan.

In the unlikely event that laboratory results indicate that stabilization of the lead-contaminated berm soil is not feasible, OHM will notify the Navy Technical Representative (NTR) and propose additional sampling and analyses or off-site disposal of the soil as appropriate.

4.2 CLEARING AND GRUBBING

The areas will be cleared and grubbed on the top and side face of the berm adjacent to the range as shown in Figures 3 and 4. The under growth, tree limbs, roots, concrete, material generated during demolition of existing drainage trough, and other non-contaminated debris shall be stock piled for disposal at a nonhazardous solid waste landfill in accordance with the Transportation and Disposal (T&D) Plan. This material will be sampled as specified in the sampling and analysis plan. Timbers from the existing retaining walls to be demolished will be cut to a maximum of 4-feet in length and placed in a roll-off container for disposal in accordance with the Transportation and Disposal Plan.

4.3 BERM SOIL EXCAVATION

The soil on the top and side face of the berm adjacent to the range will be excavated until no lead particles remain visible in the soil. The depth of excavation using a backhoe is anticipated to be between 2-feet and 4-feet. A total of approximately 1,155 bank cubic yards (BCY) of soil are estimated to be excavated based on the following estimated excavation depths:

- 3-feet on the top face of the berm on the active portion of Range D-29.
- 4-feet on the face of the berm adjacent to the active portion of Range D-29.
- 2-feet on the top face of the berm on the intermittent portion of Range D-29.
- 3-feet on the face of the berm adjacent to the intermittent portion of Range D-29.
- 3-feet on the top face of the berm of Range A-1.
- 4-feet on the face of the berm adjacent to the Range A-1.

4.4 EXCAVATED MATERIAL HANDLING AND SCREENING

This section describes excavation, handling potentially contaminated soils, stockpiling, and soil screening of berm materials. Excavation will proceed with the removal of soil on the top and front surface of the berms. After the berm soil is excavated, a visual inspection will be performed on the surrounding soil for metal bullet fragments. If metal bullet fragments are visible, additional soil will be excavated. Excavation depths will be manually monitored with a tape measure or equivalent measuring device to determine excavation depth. The final depth of excavation at each berm face will be recorded in the field notebook to document the extent of soil removal.

The objective of the screening operation is to physically separate the metal bullet fragments from the remaining soil and debris such that the lead based materials can be recycled at an off-site facility. Two other streams will be generated in this process, an oversize fraction greater than 4-inch (which will consist of debris, rocks, etc), and an undersize fraction less than 1/4-inch. The oversize will be managed as non-hazardous solid waste debris. The undersize soil may contain leachable lead which will undergo on-site stabilization prior to reuse at the site.

Potentially contaminated soil excavated by the backhoe from the berm area will be stockpiled on plastic sheeting. Stockpiled soil which may be lead contaminated shall be covered with plastic sheeting prior to leaving the site at the end of each day and when rain occurs to minimize the potential for contaminated stormwater run-off at the site.

A front end loader will deliver excavated soil to a grizzly with a live bottom feeder to separate large debris, rocks, and oversize material greater than 4-inch diameter. Oversize material will be stockpiled. Material less than 4-inch will be conveyed to a vibratory shaker screen which will further size segregate the soil particles. The vibratory screen will be capable of making further cuts to separate the metal bullet fragments, which are expected to be greater than 3/16-inch (or roughly 5 mm). Screens will be selected based on the percent of material greater than 1/2 to 1-inch. Material greater than 1-inch will be diverted as debris to a separate stockpile. Material less than 1-inch and greater than 3/16-inch will be conveyed back to the head of the screening plant. Bullet fragments (assumed to be > 3/16-inch) will be separated from the bulk of the soil and debris as a separate stream. Soil passing the 3/16-inch diameter screen will be stockpiled and chemically stabilized as necessary as discussed below.

4.5 SOIL STABILIZATION

The less than 3/16-inch screened soils shall be placed on plastic sheeting in the designated soil stabilization area in piles containing 100 cubic yards or less. Trisodium phosphate or an approved equivalent stabilization agent at a mix ratio determined by treatability testing will be added to each of these stock piles of soil to stabilize the lead. The stockpiled soil will be mixed with the trisodium phosphate material on the plastic sheeting using the backhoe. A five-point composite sample will be collected from each stabilized soil stockpile and sent off-site for analyses as indicated in the sampling and analyses plan. Once it is determined that lead the contaminated soils have been stabilized, the treated soils will be used as backfill on the berms that have had the bullet fragments removed. If the soil is not suitable for use as backfill for the berms, OHM will notify and consult with the NTR to evaluate available options. OHM will make recommendations for additional testing/stabilization and/or other disposal options based on laboratory results.

5.0 SITE RESTORATION

Once the bullet fragments have been removed from the excavated berm soil and this material stabilized, OHM will begin site restoration activities.

5.1 BERM RESTORATION, RANGES D-29 AND A-1

Berm restoration operations will be implemented as soon as possible after the excavated berm soil has been stabilized in order to reduce the potential for berm erosion. Stabilized berm soil will be returned to the berm. To raise the existing berm an additional 2-feet additional suitable backfill material from the borrow area at Camp LeJeune or an off-site location will be required. Fill will be spread evenly above surface to be filled in lifts not exceeding 12 inches and compacted in horizontal layers as nearly even as possible using the backhoe. Refer to Figures 3 through 5 for berm restoration details. Following berm site restoration OHM will survey the height of the berm for inclusion on the as-built drawings.

5.2 EXCESS NON-BERM SOIL EXCAVATION, RANGES D-29 AND A-1

Clean soil that is free from organic material which is excavated during removal of existing walk ways, installation of drainage trenches, installation of side walks, installation of retaining wall posts, and installation of the bullet trap foundation slab will be used on-site as fill during restoration activities. Stockpiling of this clean soil on-site is permissible providing appropriate erosion controls measure at taken as specified in the Environmental Protection Plan. Site restoration activities requiring clean fill include increasing the height of the both range berms, adjustments to site drainage, and construction of a soil filled double timber side wall for Range D-29.

5.3 REPLACEMENT RETAINING WALL CONSTRUCTION, RANGE D-29

A new 3-foot tall retaining wall shall be constructed along at the bottom of the front face of the active portion of Range D-29 as shown in Figures 2 and 4. The wall shall be constructed of 12-inch x 12-inch rough cut treated timber. No spikes or metal components will be required to connect the horizontal timbers wall to the vertical posts.

5.4 CONCRETE FOUNDATION FOR BULLET TRAP

A 83-feet by 22-feet by 4" thick concrete foundation slab will be installed to support the bullet trap at Range A-1 as shown in Figures 3 and 5. An 8 feet by 12 feet by 6 inch thick slab will also be provided for the dust collection equipment.

5.5 BULLET TRAP WITH DUST COLLECTOR, RANGE A-1

The bullet trap with dust collector for Range A-1 will be supplied, installed, tested, and started-up by the manufacturer. The location of the bullet trap and dust collector are shown in Figures 3 and 5. The bullet trap shall meet the following requirements:

- Consist of 14 trap lane modules 5-feet wide separated by a center 3 foot module and with 3-foot modules on each end to form a single aperture 79 feet wide. The trap will include a crisp style steel roof covering the entire area occupied by the trap.
- The trap will employ a single stage air collection and filtration system to collect and purify the air within the main deflection aperture/collection chamber.
- The dust collector will be weather proof, suitable for outdoor installations.
- The dust collector and duct work shall be protected from stray bullets.
- Start-up of dust collector to verify air flow meets design requirements, duct work system does not leak, and dust collector system functions as designed.

5.6 SITE DRAINAGE AND REVEGETATION, RANGES D-29 AND A-1

The ranges will be graded to drain as shown in Figures 2 and 3. OHM will Hydroseed the entire disturbed area and provide erosion control netting on berm slopes.

5.7 OTHER ACTIVITIES

The base will contract with another firm to perform additional activities associated with range restoration. A summary of these activities is:

Range D-29

- Install a new 24" thick wall at the edge of the new 14 line active range.
- Raise the height of the existing walls to meet the new baffles.
- Install new baffles on both active ranges.

- Install new 2" wide sidewalks at each firing position, adjacent to each wall and down the middle of EBCAF active range.

Range A-1

- Install two new 24" thick walls as indicated on the drawings.
- Install 6 new baffle
- Install new 2 feet wide sidewalks at each firing position, adjacent to each wall and down the middle of the range

Layout of the ranges is depicted on figures 2 and 3 and sections shown on Figures 4 and 5. Drawings depicting the details of the above construction are included as Figures 8 and 9.

6.0 ELECTRICAL POWER DISTRIBUTION

OHM will provide primary electrical power to the dust collector by tapping into the Base's existing aerial 12.47 kV power line. OHM's electrical subcontractor will install a new power pole with three 15 kVA transformers and a 100 amp service entrance rated panel board. Approximately 1,000 feet of new overhead power lines and associated power poles will be installed between the existing power pole and the new power pole with the transformer as shown on Figure 6.

The main distribution panel board will be enclosed in a NEMA 3R enclosure and it will be mounted on the new service pole. Prior to start-up, all electrical equipment will be tested to ensure proper operation. All electrical work shall be in accordance with NFPA 70. An electrical one-line diagram is provided in Figure 7.

7.0 DEMOBILIZATION AND FINAL REPORT

All equipment, support trailers and personnel will be demobilized from the project site. A Contractor Close-out Report will be completed and submitted for review and comment. The Contractor Close-out Report will include the following:

- Summary of maintenance activities
- Quality Control Daily Reports
- On-site sample test results
- Laboratory analyses
- Quality assurance sample results
- Contaminated material disposal and recycling documentation including manifests
- "As-built" drawings showing the elevation of the range berms
- Corrective actions taken (if required)
- Bullet trap and dust collector operation and maintenance manual

8.0 SCHEDULE

The project schedule depicts the major tasks and durations to perform the maintenance activities at Ranges D-29 and A-1.

Act ID	Orig Dur	Early Start	Early Finish	Total Float	%	Resource	1997			1998				1999																
							SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR				
1050	1d	21SEP97	21SEP97		100		X Pre-Remediation Screening																							
1060	7d	22SEP97	30SEP97		100		▶ X Treatability Study																							
0000	0	30SEP97			100		▶ ♦ Construction Award																							
1000	33d	01OCT97	14NOV97		100		▶ █████ Site Sampling & Analysis Plan																							
1010	33d	01OCT97	14NOV97		100		▶ █████ Site Health & Safety Plan																							
1020	33d	01OCT97	14NOV97		100		▶ █████ General Site Work Plan																							
1030	33d	01OCT97	14NOV97		100		▶ █████ Disposal Plan																							
1065	126d	17NOV97	13MAY98		100		▶ █████ Submittals Review & Approval																							
1042	11d	14MAY98	29MAY98	0	36		▶ █████ Workplan Corrections & Resubmittal																							
1043	30d	01JUN98	13JUL98	0	0		▶ █████ Base Procurement Process																							
1044	1d	14JUL98	14JUL98	0	0		▶ X Precon																							
1040	1d	15JUL98	15JUL98	0	0		▶ X Mobilization																							
1070	1d	15JUL98	15JUL98	0	0		▶ X Site D-29 Set-up																							
1240	70d	15JUL98	21OCT98	0	0		▶ ◁ Admin & Support ▷																							
1080	13d	16JUL98	03AUG98	56d	0		▶ █████ Excavate D-29 Berm Soils																							
1090	13d	16JUL98	03AUG98	0	0		▶ █████ Vibratory Screening D-29 Berm Soils																							
1100	4d	04AUG98	07AUG98	0	0		▶ X Lead Contamination Stabilization, Range D-29																							
1110	4d	10AUG98	13AUG98	0	0		▶ X Stabilization Sampling, Range- D29																							
1120	9d	10AUG98	20AUG98	0	0		▶ █ Rebuild Berms, Range D-29																							
1200	1d	21AUG98	21AUG98	0	0		▶ X Site D-29 Restoration																							
1210	1d	24AUG98	24AUG98	0	0		▶ X Site D-29 Tear-Down																							

Start date 16SEP97
 Finish date 21OCT98
 Data date 20MAY98
 Run date 22MAY98
 Page number 1A
 Project name 19668UB

OHM Remediation Services Corp.
 LANTDIV Lead Remed. Ranges D-29 & A-1

- █ Early bar
- △ Early start point
- ▽ Early finish point
- █ Progress bar
- █ Critical bar
- Summary bar
- ◁ Summary point
- ♦ Start milestone point
- ◆ Finish milestone point

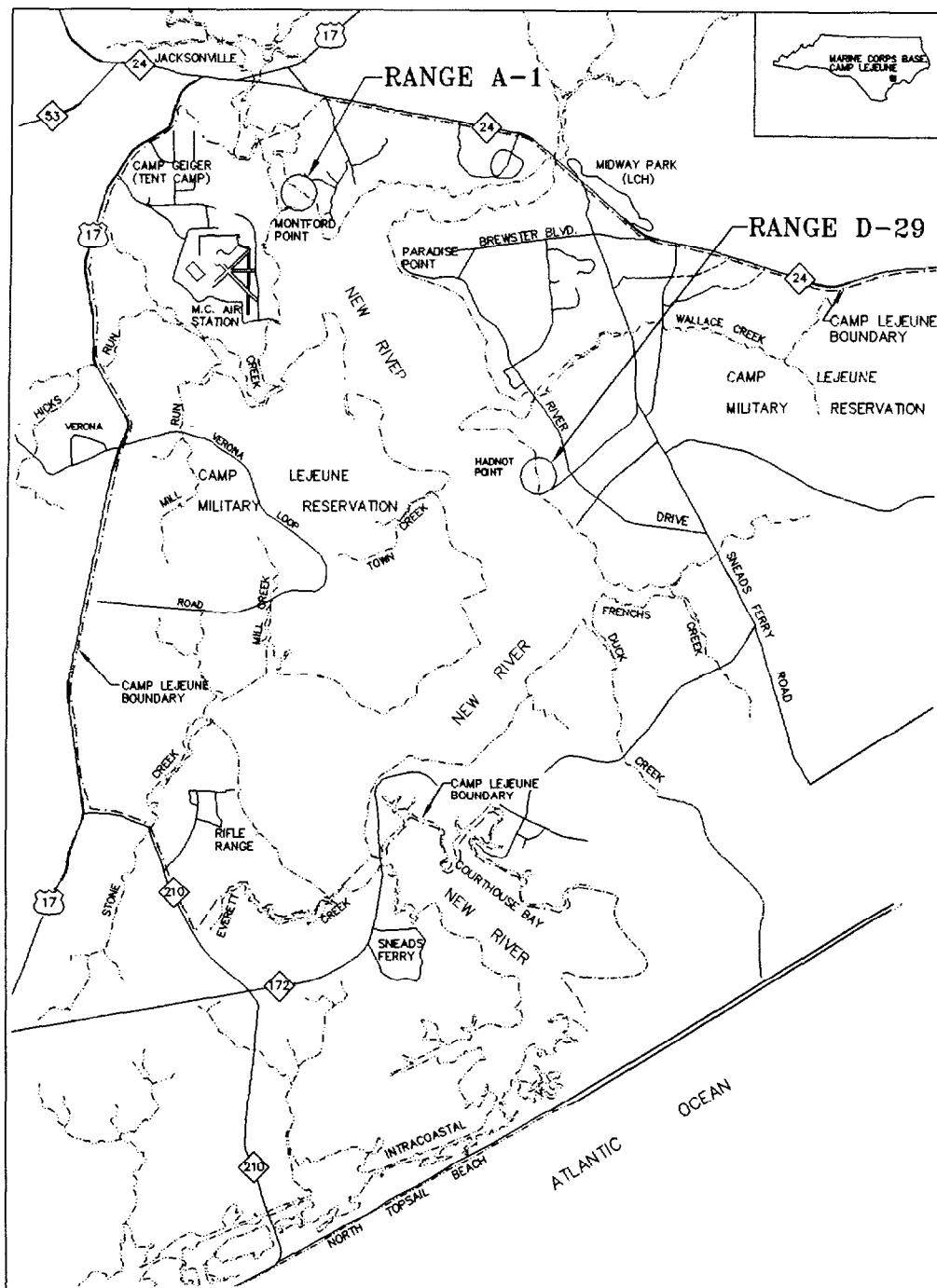
Act ID	Orig Dur	Early Start	Early Finish	Total Float	%	Resource	1997												1998											
							SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	JAN	FEB	MAR	APR				
2070	1d	25AUG98	25AUG98	0	0		▶ Site A-1 Set-up																							
2080	4d	26AUG98	31AUG98	0	0		▶ Excavate A-1 Berm Soils																							
2090	4d	26AUG98	31AUG98	28d	0		▶ Vibratory Screening A-1 Berm Soils																							
2100	1d	01SEP98	01SEP98	28d	0		▶ Lead Contamination Stabilization, Range A-1																							
2120	3d	01SEP98	03SEP98	0	0		▶ Rebuild Berms, Range A-1																							
1170	5d	02SEP98	09SEP98	28d	0		▶ T & D Analysis																							
2110	1d	02SEP98	02SEP98	34d	0		▶ Stabilization Sampling, Range A-1																							
1150	3d	04SEP98	09SEP98	0	0		▶ Concrete Slab for Bullet Trap, Range A-1																							
1155	5d	04SEP98	11SEP98	0	0		▶ Overhead Power to Range A-1																							
1180	2d	10SEP98	11SEP98	28d	0		▶ T & D Concrete Debris																							
1190	1d	10SEP98	10SEP98	29d	0		▶ Recycle Lead/Copper (Bullets)																							
1160	15d	14SEP98	02OCT98	0	0		▶ Bullet Trap, Range A-1																							
2140	1d	05OCT98	05OCT98	0	0		▶ Site A-1 Restoration																							
2150	1d	06OCT98	06OCT98	0	0		▶ Site A-1 Tear-Down																							
1220	1d	07OCT98	07OCT98	0	0		▶ Demobilization																							
1230	10d	08OCT98	21OCT98	0	0		▶ Final Report																							

Start date 16SEP97
 Finish date 21OCT98
 Data date 20MAY98
 Run date 22MAY98
 Page number 2A
 Project name 19668UB

OHM Remediation Services Corp.
 LANTDIV Lead Remed. Ranges D-29 & A-1

- ▬ Early bar
- △ Early start point
- ▽ Early finish point
- █ Progress bar
- █ Critical bar
- Summary bar
- ◓ Summary point
- ◆ Start milestone point
- ◆ Finish milestone point

MARINE CORPS BASE, CAMP LEJEUNE NORTH CAROLINA



VICINITY MAP



**OHM Remediation
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NORCROSS, GEORGIA
A SUBSIDIARY OF OHM CORPORATION

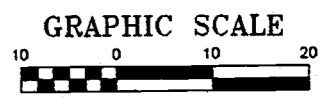
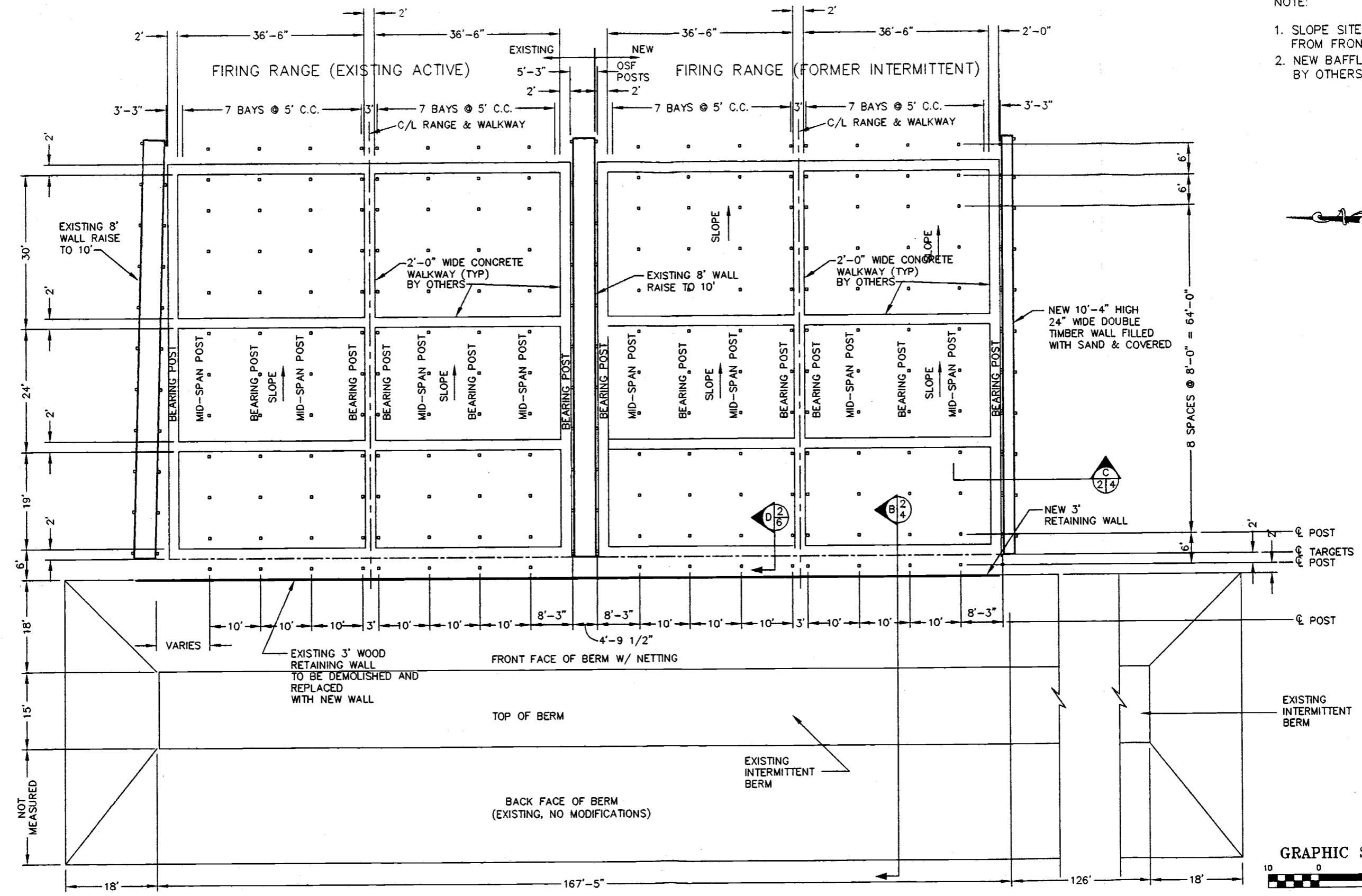
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APPROVED BY	J. DUNN	10/23/97
REV.	SHEET #	PROJECT NO.
0	-	19668

FIGURE 1

VICINITY MAP
RANGES D-29 AND A-1
REMEDATION OF LEAD
CONTAMINATED SOIL

021345012

- NOTE:
1. SLOPE SITE DRAINAGE AWAY FROM FRONT FACE OF BERM.
 2. NEW Baffle CONSTRUCTION BY OTHERS



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A Subsidiary of OHM Corporation

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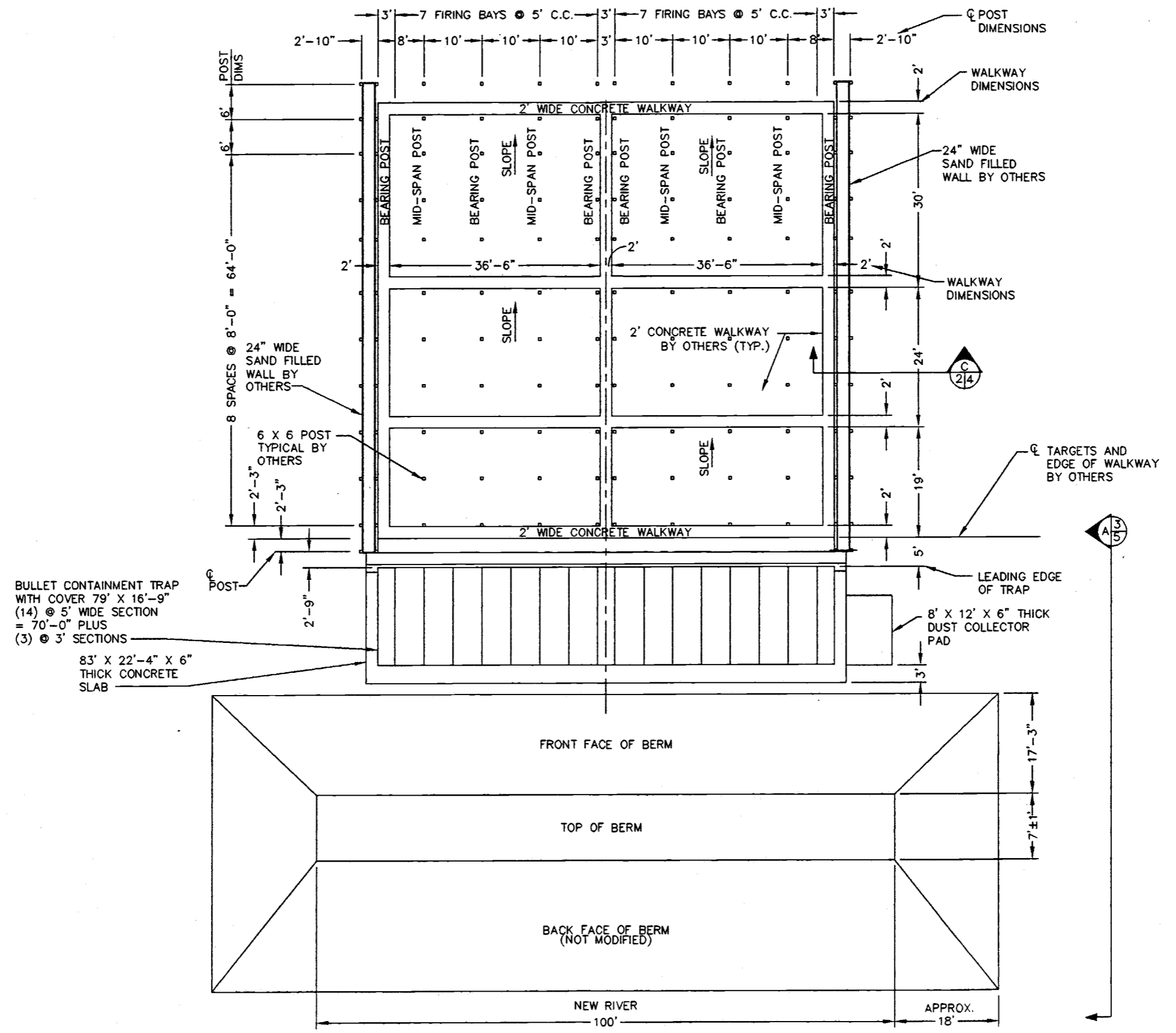
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FIGURE 2
RANGE D-29
PLAN VIEW

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SHEET NUMBER: _____
DATE: 11/9/97

G:\LANTDIV\LEJEUNE\668\NEW\FIG2.DWG

021345022



A:\LANTINA\LEJUNE\19668\FIG3.DWG

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CHECKED: G. GILLES

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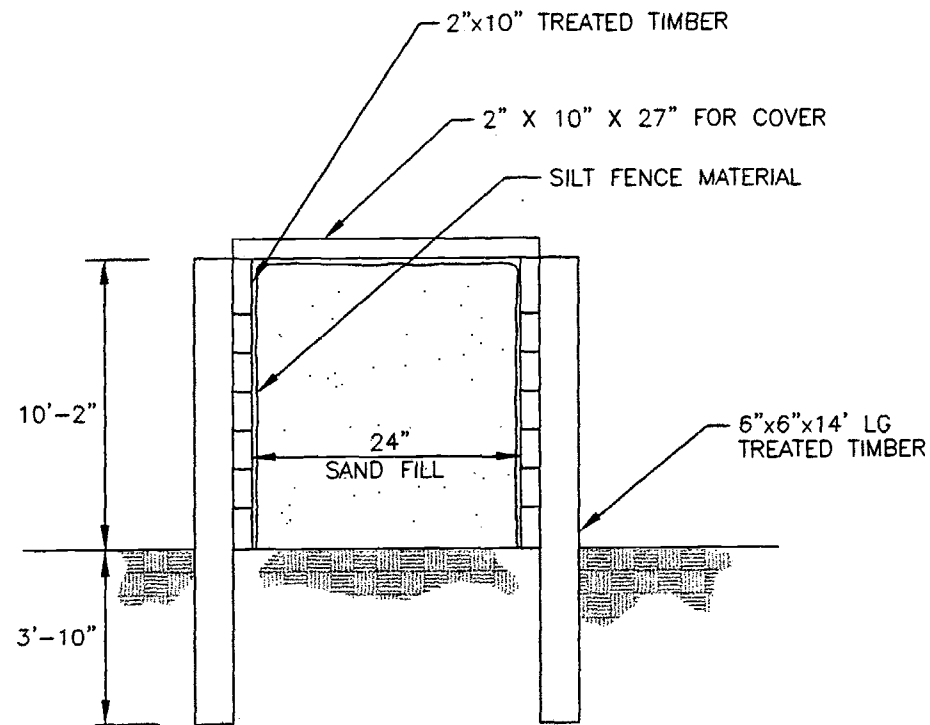
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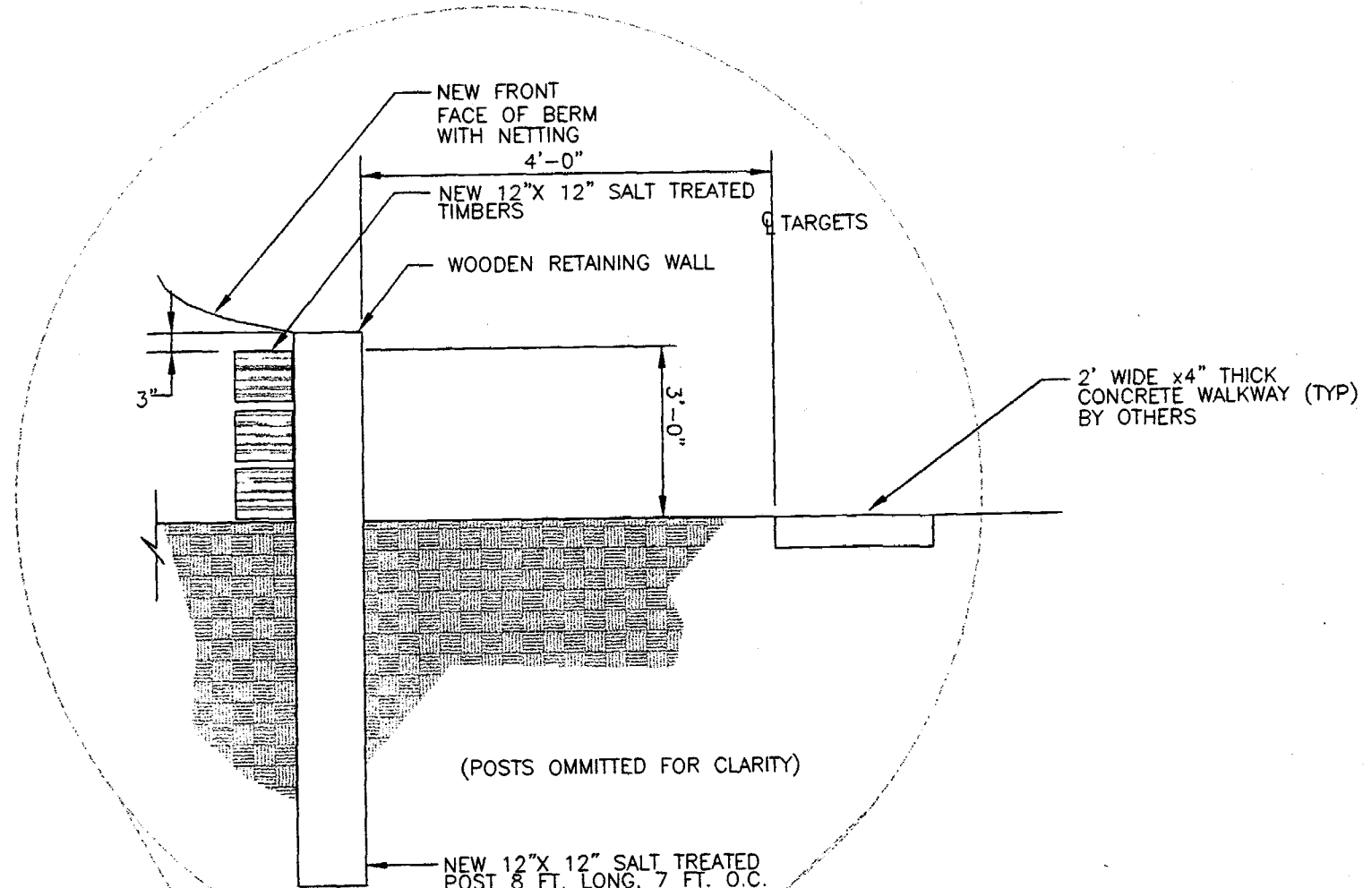
MARINE CORPS BASE CAMP LEJUNE, N.C.

FIGURE 3
RANGE A-1
PLAN VIEW

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SHEET NUMBER:	
DATE:	10/12/95



SECTION C
 NOT TO SCALE $\frac{2}{4}$
 NEW WALL CONSTRUCTION
 BY OTHERS



SECTION B
 $\frac{2}{4}$

NOTES:

1. THE SLOPE OF BERM FACE ADJACENT TO NEW RIVER WILL NOT BE MODIFIED.
2. THE HEIGHT OF THE BERM WILL BE INCREASED BY 2 FT. FROM APPROXIMATELY 12'-0" TO 14'-0" ABOVE GRADE.

021345032

NTDVA\LEJEUNE\19868\NEW\FIG 4.DWG

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 PROJECT MANAGER: _____ DATE: _____

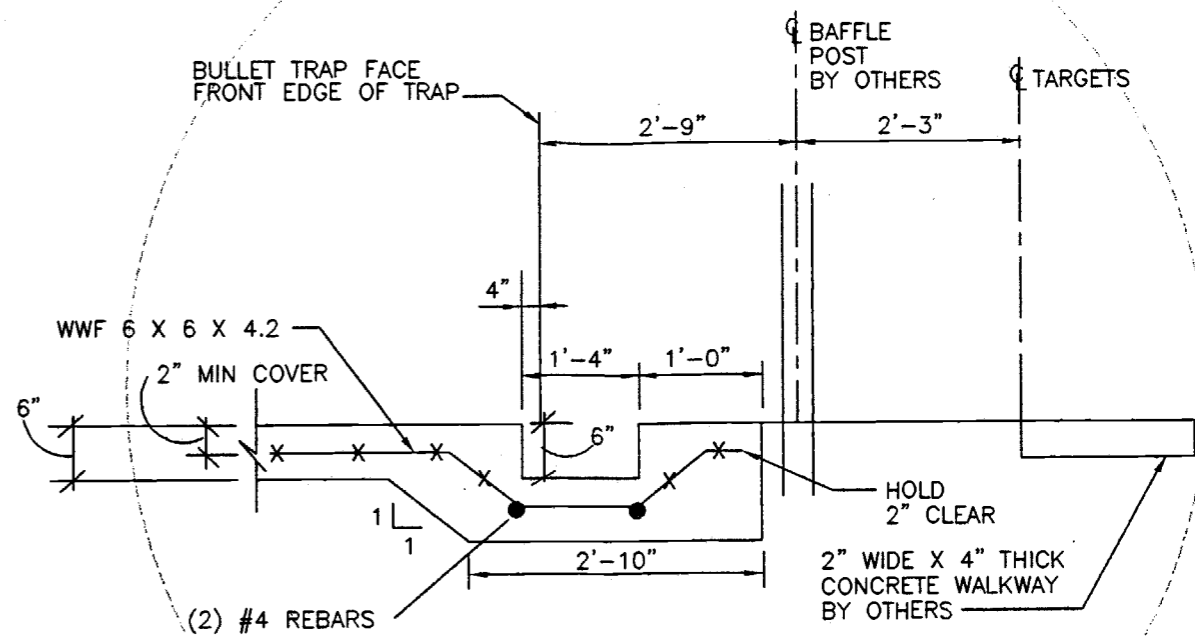
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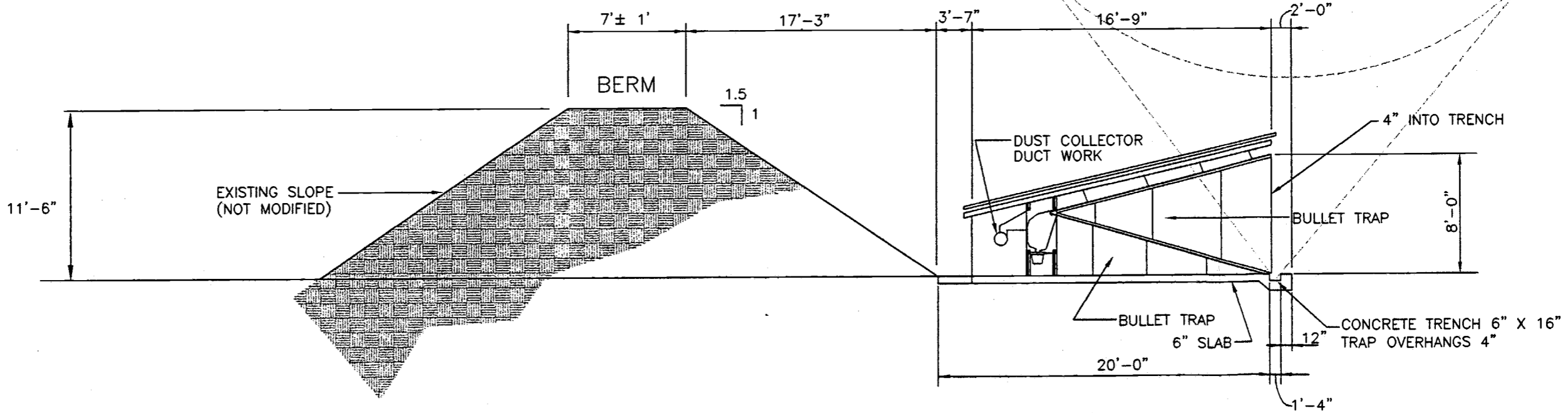
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ATLANTIC DIVISION
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 CONTRACT N82470-93-D-3032 DELIVERY ORDER 0151 MOD 2
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FIGURE 4
BERM SECTION RANGE D-29

DRAWING NUMBER: _____
 SHEET NUMBER: _____
 DATE: 3/3/98



CONCRETE TRENCH DETAIL
NOT TO SCALE



SECTION A
3/5

NOTES:

1. THE SLOPE OF BERM FACE ADJACENT TO NEW RIVER WILL NOT BE MODIFIED.
2. THE HEIGHT OF THE BERM WILL BE INCREASED BY 2 FT. FROM APPROXIMATELY 9'-6" TO 11'-6" ABOVE GRADE.

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APPROVED: _____ DEPT. MANAGER: _____ DATE: _____

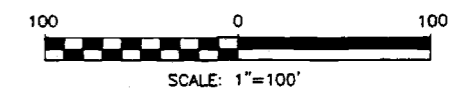
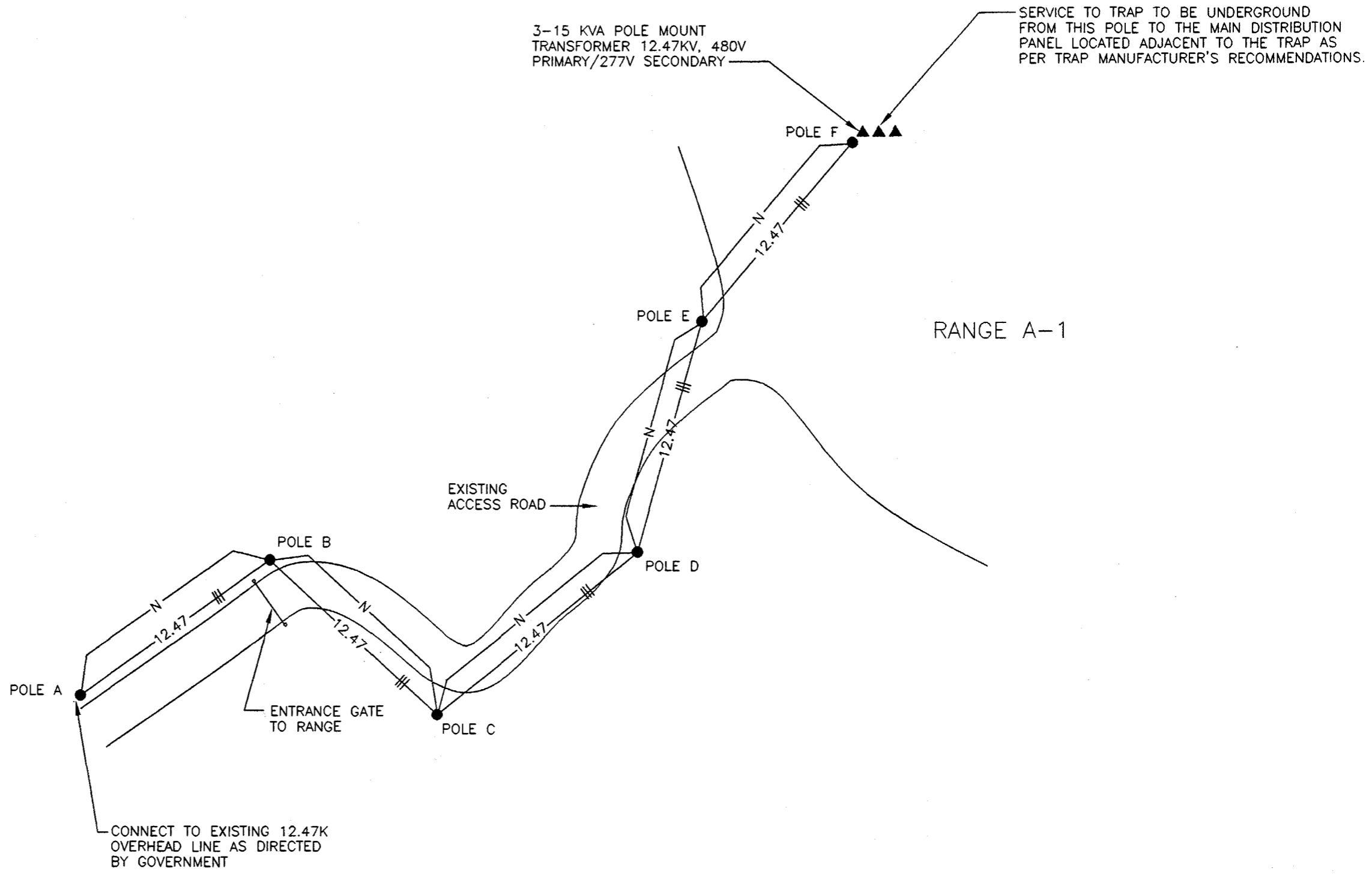
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FIGURE 5
BERM & BULLET TRAP SECTION
RANGE A-1

DRAWING NUMBER:
SHEET NUMBER:
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G:\LANDVA\LEJEUNE\19668\NEW FIGS.DWG



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G:\LANTOVA\LEJEUNE\19668\FIG6.DWG

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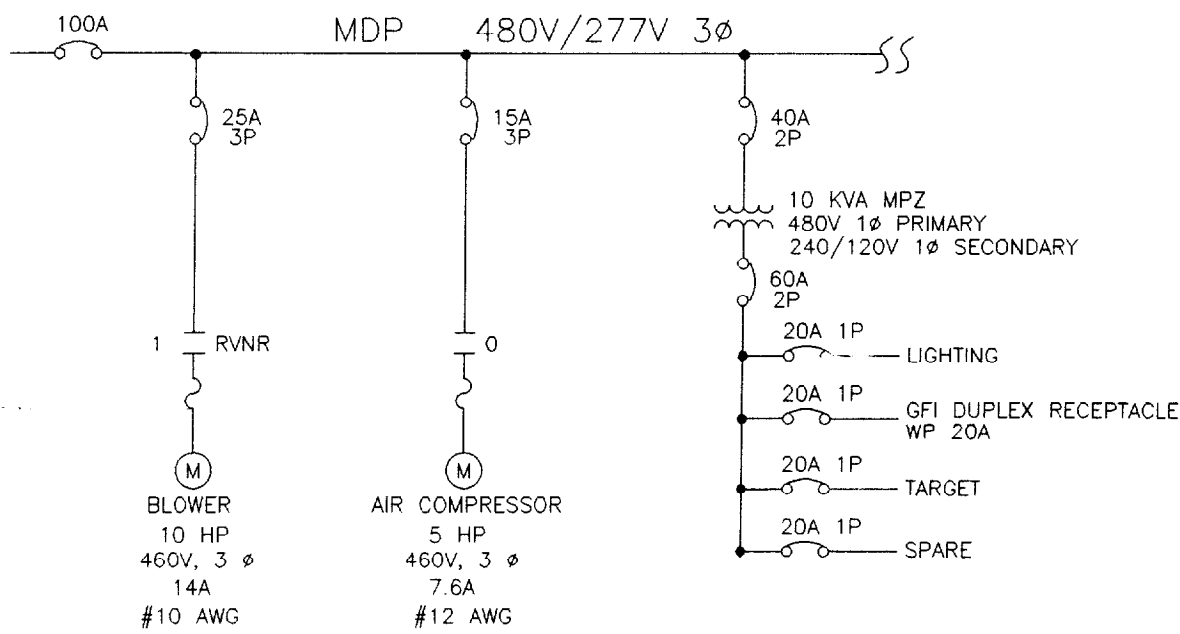
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OHM PROJECT NO. 19668 MARINE CORPS BASE, CAMP LEJEUNE, N.C.

FIGURE 6
ELECTRICAL PLAN
12.47 OVERHEAD DISTRIBUTION
RANGES D-29 & A-1

DRAWING NUMBER:
SHEET NUMBER:
DATE: 12/18/97



ONE LINE DIAGRAM
N.T.S.

NOTES:

1. MAIN DISTRIBUTION PANEL SHALL BE SERVICE ENTRANCE RATED.

G:\LANTDVA\LEJUNE\FIG7.DWG


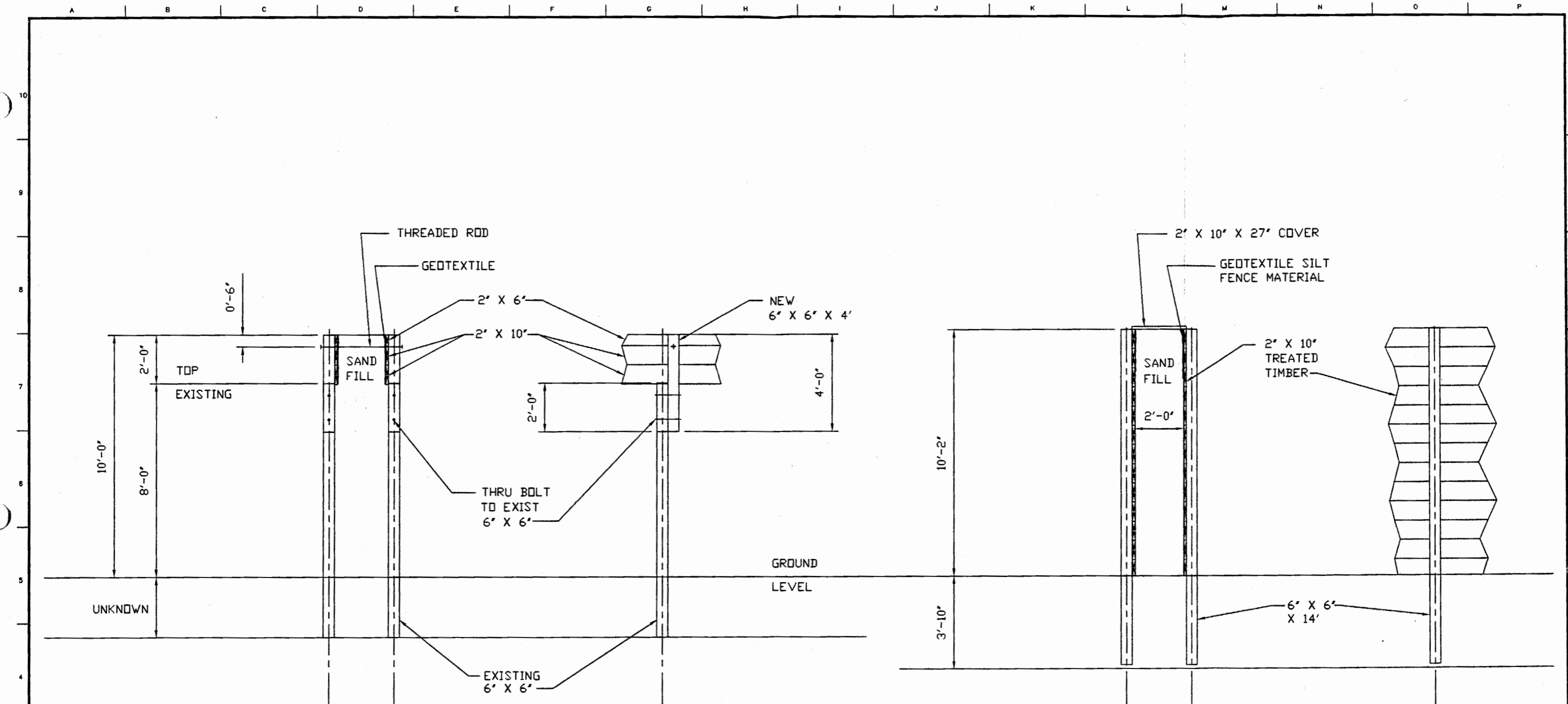
 OHM Remediation Services Corp. <small>NORCROSS, GEORGIA A SUBSIDIARY OF OHM CORPORATION</small>		
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CHECKED BY	F. HAAS	12/17/97
APPROVED BY	G. GILLES	12/17/97
REV. 1	SHEET # -	PROJECT NO. 19668

FIGURE 7
ELECTRICAL ONE-LINE DIAGRAM
RANGES A-1



**EXISTING WALL MODIFICATIONS
BY OTHERS**

**NEW WALLS
BY OTHERS**

SCALE = 1/4" = 1'-0"

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\\LANTOVA\LEJEUNE\1986\NEW\FIG8.DWG

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APPROVED: _____ DATE: _____
SR. PROJECT ENGINEER

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CHECKED:

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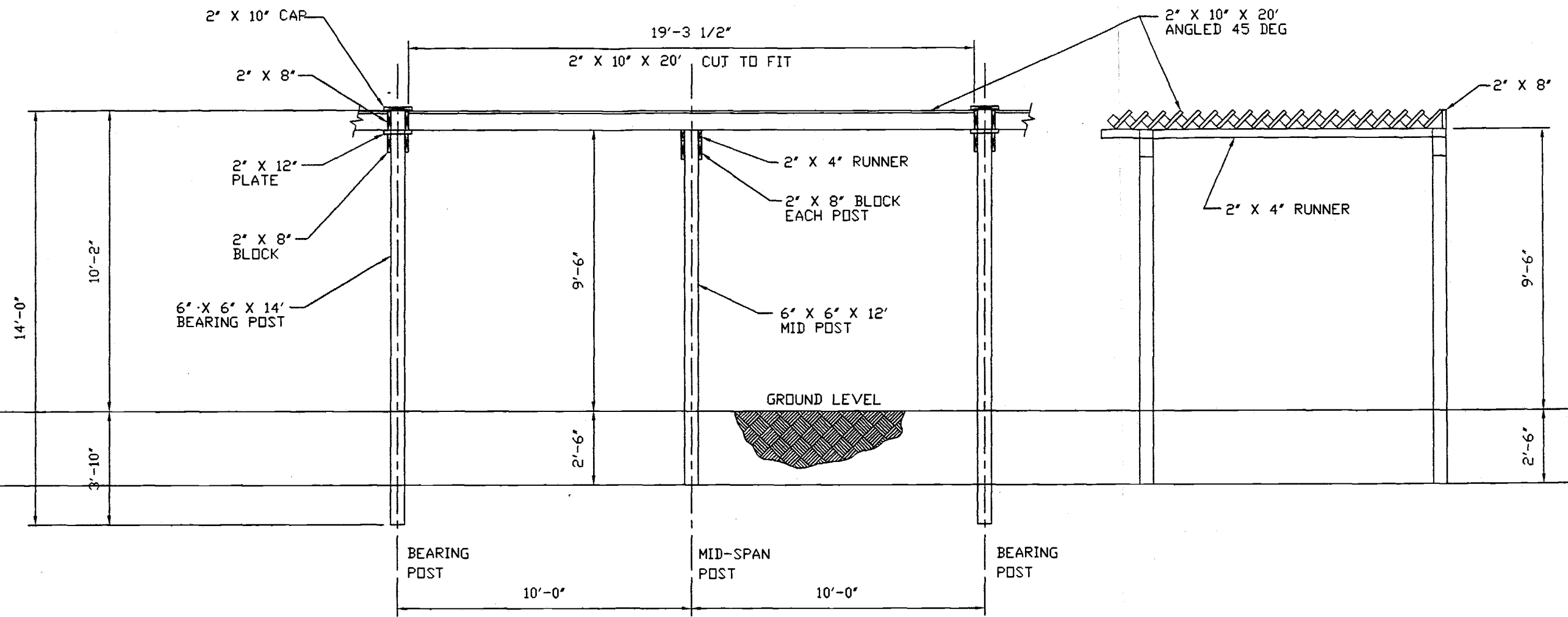
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FIGURE 8

OLD AND NEW WALLS
FRONT AND SIDE VIEWS

DRAWING NUMBER:
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DATE: 3/4/98



FRONT VIEW

SIDE VIEW

BAFFLE CONSTRUCTION BY OTHERS

SCALE = 1/4" = 1'-0"

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FIGURE 9
NEW BAFFLE DETAILS
FRONT AND SIDE VIEWS

DRAWING NUMBER: _____
 SHEET NUMBER: _____
 DATE: 3/4/98

I:\LANDVA\LEJEUNE\19 NEW FIGS.DWG

APPENDIX A

HEALTH AND SAFETY PLAN

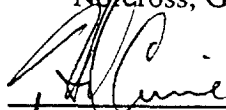
**SITE-SPECIFIC HEALTH AND SAFETY PLAN
FOR
SITE A1 AND D29 RIFLE RANGE
MCB CAMP LEJEUNE, NORTH CAROLINA**

Prepared for:

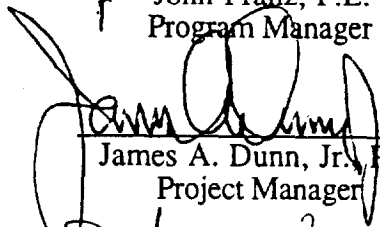
DEPARTMENT OF THE NAVY
Contract No. N62470-93-D-3032
Delivery Order 0151

Prepared by

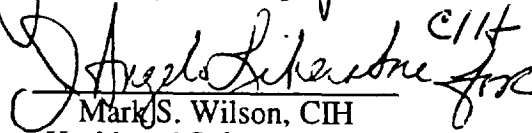
OHM Remediation Services Corp.
Norcross, Georgia



for John Franz, P.E.
Program Manager



James A. Dunn, Jr., P.E.
Project Manager



Mark S. Wilson, CIH
Health and Safety Manager

May 1998

OHM Project No. 19668



**OHM Remediation
Services Corp.**

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APPENDIX D SPECIFIC OHM HEALTH AND SAFETY PROCEDURES

APPENDIX E HEALTH AND SAFETY FORMS

1.0 INTRODUCTION

This Health and Safety Plan (HASP) has been developed for United States Navy, LANTDIV, Delivery Order entitled, Site A1 and D29 Rifle Range, MCB Camp Lejeune, North Carolina. The Delivery Order will be executed per the requirements stated in the Final Statement of Work (SOW) for Service Delivery Order per Contract No. N62470-93-D-3032, Delivery Order 0151, in cooperation with the Navy. This Delivery Order will also be executed in accordance with Naval Facilities Control Plan (NAVFAC) Specification No. 05-93-3124 dated September 27, 1994.

This HASP documents the policies and procedures which protect workers and the public from potential hazards posed by work at this site. OHM considers safety the highest priority during work at a site containing potentially hazardous materials and has established a goal of zero accidents for all projects. All projects will be conducted in a manner which minimizes the probability of injury, accident, or incident occurrence. This HASP is a key element in the proper planning of project work which is necessary to assure the goal of zero accidents. The HASP Certification (Appendix A) will be signed by all who actively participate at this project.

Although this plan focuses on the specific work activities planned for this site, it must remain flexible because of the nature of this work. Conditions may change and unforeseen situations may arise that require deviations from the original plan. This flexibility allows modification by the OHM supervisors and health and safety officials with approval from the project CIH.

This plan has been prepared in accordance with OSHA's "Hazardous Waste Operations and Emergency Response" standard contained in 29 CFR 1910.120 and the U. S. Army Corps of Engineers' (USACE's) Safety and Health Requirements Manual (COE EM-385-1-1, October 1992).

1.1 SITE HISTORY

The ranges D-29 and A-1 are currently active ranges used for small arms target practice at MCB Camp Lejeune. General locations of each range are indicated on the attached maps. Both of these ranges are located immediately adjacent to the New River and without adequate maintenance may represent a potential source of contamination to the New River sediment. General information about the two ranges is presented below:

D-29 Pistol and Rifle Battle Site Zero (BZO) Range

- Located on River Road near F Street in the Hadnot Point area
- Commissioned in 1955
- No lead reclamation has occurred at this location
- Approximate length of berm is 84 feet (17 firing points)
- Approximate berm dimensions - see attached diagram



A-1 Pistol and Shotgun Range

- Located at Monford Point, Camp Johnson
- Commissioned in the 1950s
- No lead reclamation has occurred at this location
- Approximately length of berm is 50 feet (10 firing points)
- Approximately berm dimensions - see attached diagram

1.2 SCOPE OF WORK

OHM will be mobilizing to the site to complete a facility decontamination which will include demolition and construction operations. The completion of Delivery Order 0151 will include performance of the following major tasks:

- Mobilization and site preparation
- Excavate contaminated soil/replaced processed soils
- Screen soils for bullet metals
- Process excavated soils with binder to stabilize metal contaminants
- Collect samples
- Site restoration
- Decontaminate equipment
- Demobilization

2.0 KEY PERSONNEL AND MANAGEMENT

The Project Manager (PM), Site Supervisor (SS), Certified Industrial Hygienist (CIH) and Site Safety Officer (SSO) are responsible for formulating and enforcing health and safety requirements, and implementing the HASP.

2.1 PROJECT MANAGER

The PM has the overall responsibility for the project and to assure that the goals of the construction remedial action are attained in a manner consistent with the HASP requirements. The PM will coordinate with the SS and the SSO to assure that the remedial action goals are completed in a manner consistent with the HASP. The PM will identify contacts and telephone numbers, with assistance from LANTDIV, of local health care providers, the NOSC/NOSCDR, the LEPC and other agencies that may be asked to provide emergency support during project activities. The PM will conduct a monthly health and safety audit of the project using the Management Health and Safety Report Form.

2.2 SITE SUPERVISOR

The SS is responsible for field implementation of the HASP. The SS will coordinate with the SSO to establish communications with local health care providers, the NOSC/NOSCDR, the LEPC and other outside organizations and agencies that may be asked to provide emergency support during project activities. The SS will be the main contact in any on-site emergency situation. The SS will conduct periodic inspection of the work site to confirm compliance with all health and safety requirements. The SS is also responsible for coordinating remedial actions for all deficiencies and for enforcing the OHM "Cardinal Safety Rules" (included in Appendix E) and the site specific health and safety procedures (included in Appendix B).

2.3 SITE SAFETY OFFICER

The SSO has responsibility for administering the HASP relative to site activities, and will be in the field full-time while site activities are in progress. The SSO's primary operational responsibilities include personal and environmental monitoring, coordination of job safety analyses, personal protective equipment maintenance, and assignment of protection levels. The SSO will direct all field activities involved with safety and is authorized to stop work when an imminent health or safety risk exists. The SSO is responsible for assuring that all on-site personnel understand all safety requirements.

2.4 CERTIFIED INDUSTRIAL HYGIENIST

The CIH is responsible for the contents of the HASP and ensures that the HASP complies with all federal, state and local health and safety requirements. If necessary, the CIH can modify specific aspects of the HASP to adjust for on-site changes that affect safety. The CIH



will coordinate with the SSO on all modifications to the HASP and will be available for consultation when required. The CIH will not necessarily be on site during OHM activities; however, he may perform site safety audits to confirm field compliance with the HASP.

2.5 EMPLOYEE SAFETY RESPONSIBILITY

Each employee is responsible for personal safety as well as the safety of others in the area. The employee will use all equipment provided in a safe and responsible manner as directed by the SS. All OHM personnel will follow the policies set forth in OHM's Health and Safety Procedures Manual, with particular emphasis on the OHM "Cardinal Safety Rules." which will be maintained on-site by the site safety officer. Specific health and safety procedures applicable to this project are provided in Appendix D of this plan.

2.6 KEY SAFETY PERSONNEL

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

Project Manager	James A. Dunn, Jr. P.E. (770) 453-8072 1-800-999-6710 PIN 9968061 (pager)
Site Supervisor	Randy Smith (910) 451-2390 (Pager) (910) 346-7110
Site Safety Officer	TBD (site phone)
Program Manager for LANTDIV	John Franz, P.E. (609) 584-8900
SR Health and Safety Director/Project CIH	J. Angelo Liberatore, CIH (770) 453-7671 (office) 1-800-999-6710 PIN 997-6102 (pager)

3.0 JOB HAZARD ANALYSIS

This section outlines the potential chemical and physical hazards which workers may be exposed to during work on this project. Table 3.1 lists significant contaminants identified at the site and their respective published occupational exposure limits. The OSHA permissible exposure limits (PELs) and the ACGIH threshold limit values (TLVs) were reviewed for these contaminants, evaluated, and the more stringent value of the two selected as exposure guidelines. An MSDS list is included in Appendix C.

3.1 CHEMICAL HAZARDS

Lead

Permissible Exposure Limit - 0.05 mg/m³

Exposure to lead can be from inhalation of dusts or from skin exposure. Symptoms are nonspecific and can be hard to distinguish from minor seasonal illnesses. The symptoms are decreased physical fitness, fatigue, sleep disturbance, headache, aching bones and muscles, digestive disorders (particularly constipation), abdominal pains, and decreased appetite.

3.2 PHYSICAL HAZARDS

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

The SS and SSO will observe the general work practices of each crew member and equipment operator, and enforce safe procedures to minimize physical hazards. 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. The Health and Safety Procedures Manual for LANTDIV will be maintained at the project site as a reference document.

3.2.1 Safety Hazards

All OHM personnel will become familiar with the field activities which will be conducted at the site. All OHM personnel are trained to work safely under various field conditions.

In addition, the SS will observe the general work practices of each crew member and equipment operator, and enforce safe procedures to minimize safety hazards. Procedures from the OHM Health and Safety Procedures Manual that specifically apply to planned project activities will be attached to the SHSP as Appendix D. The following sections are typical safety hazards that may occur at project site along with relevant hazard control procedures.

- **Heavy and Bulky Loads**
Intelligent thought shall be exercised before heavy and bulky loads are lifted or handled manually by personnel. Mechanical equipment such as fork-lifts, wheel barrows,



hand-trucks, loaders, and cranes shall be utilized when possible and needed. Note: Back injuries are real, debilitating, unproductive, and costly to both employees and employers, and sometime permanent. Back injury prevention must be given high priority on all project sites. If you think the load you are about to lift is too heavy or bulky, it probably is! Get help or utilize mechanical equipment.

- **Flame, Heat or Spark Producing Operations**

Because of the possibilities of flammable materials being present at this site, flame, heat, or spark producing operations will be limited. If a case arises where hot work is necessary, OHM will follow the hot work procedures and permit detailed in the appendix.

- **High Pressure Washing**

Washing or cleaning certain pieces of equipment may require the use of high pressure washers, referred to as lasers. These devices can be hazardous if not used properly. Specific laser safety instructions are provided in Procedure No. 30. The following protective equipment will be worn: safety shoes or boots, metal foot and shin guards, goggles and face shield, hard hat, heavy-duty PVC rain suit, heavy chemical resistant gloves. Only trained personnel will operate the high pressure washer. The operator must have an assistant to move the hose and back-up the operator. Other personnel must remain a minimum of 25 feet from the area. The equipment cannot be altered. (Trigger shall never be tied down.) Operator should be changed every hour. Hydroblasting lacerations are serious and must be reported.

- **Small Quantity Flammable Liquids**

Small quantities of flammable liquids will be stored in "safety" cans and labeled according to contents.

- **Electrical Hazards**

Overhead power lines, downed electrical wires, and buried cables all pose a danger of shock or electrocution if workers contact or sever them during site operations. Electrical equipment used on-site may also pose a hazard to workers. To help minimize this hazard, low-voltage equipment with ground-fault interrupters and water-tight, corrosion-resistant, connecting cables will be used on-site. In addition, lightning is a hazard during outdoor operations, particularly for workers handling metal containers or equipment. To eliminate this hazard, weather conditions will be monitored and work will be suspended during electrical storms. An additional electrical hazard involves capacitors that may retain a charge. All such items will be properly grounded before handling. OSHA's standard 29 CFR Part 1910.137 describes clothing and equipment for protection against electrical hazards.



Electrical devices and equipment must be de-energized prior to working near them. All extension cords must be kept out of water, protected from crushing, and inspected regularly to ensure structural integrity. Temporary electrical circuits must be protected with ground fault interrupters. Only qualified electricians are authorized to work on electrical circuits.

- **Slip/Trip/Fall Hazards**

Some areas may have wet surfaces which will greatly increase the possibility of inadvertent slips. Caution must be exercised when using steps and stairs due to slippery surfaces in conjunction with fall hazards. Use of handrails when climbing stairs will be enforced, and handrails will remain secure until the support itself is removed and lowered to ground level. Good housekeeping practices are essential to minimize trip hazards. Safety belts or harnesses will be required by personnel working four feet or more above surfaces, including manlifts.

The work area shall be kept clean and orderly. Tools and debris must be picked up and placed in the proper place to prevent a tripping hazard. Walkways and grating shall be kept in good condition. Spills will be cleaned up immediately. Personnel shall not walk or climb on piping, valves, fittings, or any other equipment not designed as walking surfaces.

- **Ground Personnel**

All ground personnel should be constantly aware of the possibility of slips, trips, and falls due to poor and possibly slippery footing in the work areas. before crossing either in front of or behind a piece of heavy equipment, ground personnel will signal the equipment operator and receive confirmation before moving.

- **Head and Back Injuries**

As minimum requirements, hard hats and safety glasses will be donned prior to performing any site activities. This requirement will prevent minor injuries caused by bumping one's head while working around and under piping and other process related structures. At the daily safety meeting, personnel are instructed in proper lifting techniques and reminded not to lift heavy items without assistance.

- **Falling Objects**

OHM believes that the dismantlement process as well as other remediation processes can be accomplished without any object, regardless of size, free falling to the ground. All support structures will be slowly lowered to the ground using a grapple and/or skip bucket. No personnel shall work under this equipment at any time. Also, the SSO will ensure that an adequate area is clear of personnel while the equipment is in operation.



- **Confined Space Entry**

A Confined Space Entry (ES) is defined as an enclosed area having a limited means of egress where ventilation is not adequate to remove a toxic or flammable atmosphere or oxygen deficiency which may exist. Examples of ESs include, but are not limited to the following: tanks, boilers, vessels, bins, manholes, tunnels, below grade well-head enclosures, pipelines, underground utility vaults, or any open top space more than 4 feet in depth, such as pits, tubes, trenches, or vessels. Procedure No. 24 in the OHM Health and Safety Procedures Manual outlines OHM's entry procedures in detail.

The OHM Confined Space Permit will be completed before entry. The written rescue plan will include the type of equipment to be used and the names of the rescue and standby personnel. The atmosphere will be monitored for oxygen, combustible gases, and toxins. All personnel will be trained for confined space entry. The confined space will be ventilated, purged when possible and isolated. and locked out and tagged out if there are mechanical or electrical hazards.

The SS will be responsible for securing the permit. The permit will list employees performing work, monitoring the work, and will also list rescue personnel and employees conducting the pre-entry briefing. The permit will provide type of confined space preparation performed, pre-entry atmosphere testing results, emergency/rescue procedures, entry/egress requirements, other potential hazards, subcontractor notifications, and the permit authorization signature.

- **Equipment and Hand Tools**

All hand tools and power tools shall be in good repair and will be used only for the task for which they were designed. All damaged tools will be tagged "Out of Service." All tools will be kept clean. Sharp tools shall not be carried in pockets. When working, overhead tools will be placed in a holding receptacle or secured when not in use. Tools cannot be thrown or dropped from heights. Only non sparking tools will be used in flammable or explosive atmospheres. Cheater pipes will not be used.

- **Equipment and Hand Tools**

All hand tools and power tools shall be in good repair and will be used only for the task for which they were designed. All damaged tools will be tagged "out of service." All tools will be kept clean. Sharp tools shall not be carried in pockets. When working, overhead tools will be placed in a holding receptacle or secured when not in use. Tools cannot be thrown or dropped from heights. Only nonsparking tools will be used in flammable or explosive atmospheres. Cheater pipes will not be used.



- Ladders
Access to high places will be obtained by using approved ladders and stairs in accordance with ANSI 14.1-3. Ladders will be used for access to and from the excavation.

3.3 ENVIRONMENTAL HAZARDS

Environmental factors such as weather, wild animals, insects, and irritant plants pose a hazard when performing outdoor work. The SSO and SS will take all necessary measures to alleviate these hazards should they arise.

3.3.1 Heat Stress

The combination of warm ambient temperature and protective clothing result in the potential for heat stress. Heat stress disorders include:

- Heat rash
- Heat cramps
- Heat exhaustion
- Heat stroke

Heat stress prevention is outlined in procedure No. 22 of the OHM Corp. Health and Safety Procedures manual. This information will be reviewed during safety meetings. Workers will be encouraged to increase consumption of water and electrolyte-containing beverages (eg, Gatorade).

The following is a summary of the signs and symptoms of heat stress disorders.

- Heat rash – characteristic rash which may develop on the skin in areas which may be chapped by clothing. Frequent clothing changes help to prevent chapping from contact with wet clothes.
- Heat cramps – caused by heavy sweating and inadequate electrolyte replacement. Provide frequent breaks with fluid replacement. Cramps are usually relieved when victim is moved to a cool resting place and provided fluids every 15 minutes for approximately 1 hour. Symptoms include:
 - Muscle spasms
 - Pain in the hands, feet, abdomen
- Heat exhaustion – caused by increased stress of various body organs including inadequate blood circulation due to cardiovascular insufficiency or dehydration.



Immediately remove the victim from the hot environment and provide rest while lying the victim down with feet elevated, and care for shock. Attempt to cool the victim by fanning or applying wet towels. Provide fluid replacement every 15 minutes and refer for medical evaluation if not improved within 30 minutes. Symptoms include:

- Pale, cool, moist skin
 - Heavy sweating
 - Dizziness
 - Nausea
 - Fainting
- Heat stroke – temperature regulation fails and the body core temperature rises to critical levels. Immediate action must be taken to cool the body. Competent medical care must be obtained immediately since this is a life threatening disorder. Symptoms include:
 - Hot, dry skin, usually red, mottled or cyanotic
 - 104° temperature
 - Confusion, dizziness
 - Loss of consciousness
 - Convulsions
 - Strong, rapid pulse

It is recommended that workers break at least every two hours for 10 to 15 minute rest periods when temperatures rise above 72.5 degrees F and protective clothing is worn. Ambient temperatures will be determined from a Hg/glass thermometer shielded from radiant heat. In addition, workers are encouraged to take rests whenever they feel any adverse effects that may be heat-related. The frequency of breaks may need to be increased upon worker recommendation to the SSO and SS. Heat stress can be prevented by assuring an adequate work/rest schedule; guidelines are printed below.

AMBIENT TEMPERATURE	LEVEL D PPE	LEVEL C PPE/ MODIFIED LEVEL D
90° F or above	After 45 minutes of work	After 15 minutes of work
87.5 F-90 F	After 60 minutes of work	After 30 minutes of work
82.5-87.5 F	After 90 minutes of work	After 60 minutes of work
77.5-82.5 F	After 120 minutes of work	After 90 minutes of work
72.5-77.5 F	After 150 minutes of work	After 120 minutes of work



The work/rest schedule can be calculated based on heat stress monitoring results. Monitoring consists of taking the radial pulse of a worker for 30 seconds immediately after exiting the work area. If the heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the next work cycle by 1/3 and keep the rest period the same. If the heart rate still exceeds 110 beats per minute at the next rest period, decrease the work period by 1/3. The initial rest period should be at least 10 minutes.

Monitoring for heat stress will begin when the ambient temperature reaches or exceeds 70 degrees Fahrenheit when wearing Level C PPE, or 80 degrees Fahrenheit for site activities performed in Level D. Monitoring will include pulse rate, weight loss, oral temperature and signs and symptoms of heat stress. The employees radial pulse will be monitored for 30 seconds to determine heart rate. When monitored, oral temperatures (OT) will be obtained utilizing a clinical thermometer or equivalent. If the employees' OT exceeds 99.6°F, the work period will be reduced by 1/3. If after this work period, the oral temperature still exceeds 99.6°F, the work period will again be shortened by 1/3. If the employee's OT exceeds 100.6°F, the employee will not be permitted to wear PPE. See Procedure 22 LANTDIV Health and Safety Procedures Manual.

3.3.2 Exposure to Cold

With outdoor work in the winter months, the potential exists for hypothermia and frostbite. Protective clothing greatly reduces the possibility of hypothermia in workers. However, personnel will be instructed to wear warm clothing and to stop work to obtain more clothing if they become too cold. Employees will also be advised to change into dry clothes if their clothing becomes wet from perspiration or from exposure to precipitation. Since wind chill temperature takes into account the potential for loss of body heat through convection, the wind-chill adjusted temperature will be used to evaluate for potential cold stress occurrence.

In cold weather, the potential for frostbite exists, especially in body extremities. Personnel will be instructed to pay particular attention to hands, feet, and any exposed skin when dressing. Personnel will be advised to obtain more clothing if they begin to experience loss of sensation due to cold exposure.

Employees will be encouraged to use the heated shelters on site at regular intervals depending upon the severity of ambient temperatures. When temperatures are less than 20°F (actual or wind chill) workers should break regularly to the heated shelter to warm up (every 45 minutes at a minimum). Since cold weather does cause significant water loss as a result of the dryness of the air, fluid intake will be encouraged to prevent dehydration which directly affects blood volumes and flow to the extremities. Warm, sweet, caffeine-free, nonalcoholic drinks and soup offer the best fluid replacement and provide calorie energy. Symptoms of cold stress, including heavy shivering, excessive fatigue, drowsiness, irritability, or euphoria



necessitate immediate return to the shelter.

3.3.3 Project 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 OHM personnel and OHM subcontractors. OHM's Corporate Hazard Communication Program is included in Appendix B for reference. Hazard communication will include the following:

- **Container Labeling**
OHM 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.
- **Material Safety Data Sheets (MSDSs)**
There will be an MSDS located on site for each hazardous chemical known to be used on site. All MSDSs will be located in Appendix C of the SHSP. The site safety plan can be found in the project office trailer.
- **Employee Information and Training**
Training employees on chemical hazards is accomplished through an ongoing corporate training program. Additionally, chemical hazards are communicated to employees through daily safety meetings held at OHM field projects and by an initial site orientation program.

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

- 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 sites



- Emergency spill procedures
- Proper storage and labeling

Before any new hazardous chemical is introduced on site, each OHM 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 C 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.

3.3.4 Noise

Hearing protection is required for workers operating or working near heavy equipment, where the noise level is greater than 85 dbA (Time Weighted Average) as well as personnel working around heavy equipment. The SSO will determine the need and appropriate testing procedures, (i.e., sound level meter and/or dosimeter) for noise measurement.

3.4 TASK-SPECIFIC RISK ASSESSMENT/ACTIVITY HAZARD ANALYSIS

Prior to beginning each major phase of work, an activity hazard analysis (form included in Appendix E) will be performed. The analysis will define the activity being performed, identify the sequence of work, the specific hazards anticipated and the control measures to be implemented to eliminate or reduce each hazard to an acceptable level.

Work will not proceed on that project phase until the activity hazard analysis has been accepted by the designated on-site authority, as well as being discussed with all site personnel that will perform the activity. The following Task-Specific Risk Assessment/Activity Hazard Analysis identifies the major project phases and anticipated hazards to be encountered and control measures that will be instituted during the execution of the scope of work, previously approved by LANTDIV for this project.



Task Breakdown – Mobilization and Site Preparation – Equipment mobilization; installation of facilities; utility connections; staging equipment

P o t e n t i a l Hazards	Hazard Control Measures
Struck by, Against Heavy Equipment, Flying Debris, Protruding Objects	<ul style="list-style-type: none"> • Use reflective warning vests when exposed to vehicular traffic • Isolate equipment swing areas • Make eye contact with operators before approaching equipment • Restrict entry to the work area to authorized personnel • 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 posted hand signals
Handling Heavy Objects	<ul style="list-style-type: none"> • Observe proper lifting techniques • Obey sensible lifting limits (60 pounds maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large awkward loads • Do not exceed equipment/crane load specifications when hoisting loads • Do not suspend loads over ground personnel
Electrical Shock	<ul style="list-style-type: none"> • 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, cords, and receptacles out of water • Use approved water-proof, weather-proof type if exposure is likely • Inspect all electrical power circuits prior to commencing work • Follow Lockout/Tagout procedures in accordance with OHM Health and Safety Procedures Manual
Slips, Trips, Falls	<ul style="list-style-type: none"> • Clear walkways of equipment, construction debris and other materials • Mark, identify or barricade other obstructions • Use body harness and lifeline when working 6 feet or more above the ground • Use approved ladders in accordance with OHM Health and Safety Procedures Manual
Fire/Explosion	<ul style="list-style-type: none"> • Eliminate sources of ignition from the work area • Prohibit smoking • Provide ABC (or equivalent) fire extinguishers in all work areas, flammable storage areas, generator and compressor facilities • Store flammable liquids in well ventilated areas • Post "NO SMOKING" signs • Store combustible materials away from flammables • Store all compressed gas cylinders upright, caps in place when not in use • Separate Flammables and Oxidizers by 20 feet
Insect/Snake Bites	<ul style="list-style-type: none"> • Review injury potential and types of snakes with workers • Avoid insect nests areas, likely habitats of snakes outside work areas • Use the Buddy System where such injury potential exists • Use insect repellent, wear PPE to protect against sting/bite injuries
Underground / Overhead Utilities	<ul style="list-style-type: none"> • Identify all underground utilities around the excavation site before work commences • Cease work immediately if unknown utility markers are uncovered • Maintain a minimum 15-foot buffer between the trackhoe stick and overhead electrical lines or de-energize overhead lines within 15 feet of equipment operations

Task Breakdown – Excavate contaminated soils/replace processed soils

Potential Hazards	Hazard Control Measures
Struck by, Against Heavy Equipment, Flying Debris, Protruding Objects	<ul style="list-style-type: none"> • Restrict entry to the work area to authorized personnel • Wear hard hats, safety glasses with side shields, or splash/face shields and goggles, and steel-toe safety boots at all times • Personnel approaching heavy equipment will make eye contact and signal the operator to cease activity • Do not carry personnel or lift anyone except in an approved safety platform • Personnel shall be cognizant of the boom swing area and stay clear • Heavy equipment shall have fully functioning safety devices
Handling Heavy Objects	<ul style="list-style-type: none"> • Observe proper lifting techniques • Obey sensible lifting limits (60 pounds maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large awkward loads
Slips, Trips, Falls	<ul style="list-style-type: none"> • Clear walkways of equipment, construction debris and other materials • Mark, identify or barricade other obstructions • Use body harness and lifeline when working 6 feet or more above the ground • Use approved ladders in accordance with OHM Health and Safety Procedures Manual
Inhalation and contact with hazardous substances	<ul style="list-style-type: none"> • 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 specified level of protection
Shooting hazard	<ul style="list-style-type: none"> • Ensure shooting range is closed and posted to warn of workers in shooting range
Excavation Care-in	<ul style="list-style-type: none"> • All underground installations will be located and marked • All materials must be kept 2 feet from the excavation edge • Daily inspections of the excavations will be conducted by a competent person and soil type determined • The OHM excavation permit will be used • Excavations for piping trenches and others requiring personnel entry will not be greater than 4 feet deep • Excavations with potential hazardous atmosphere must be tested O₂/LEL/toxic • Follow OHM SOP for excavation
Utility (electric/gas)	<ul style="list-style-type: none"> • Locate all buried utilities prior to excavation operations • Maintain 15-foot buffer between heavy equipment and overhead electrical utilities



Task Breakdown: Screen soils for bullet metals

Potential Hazards	Hazard Control Measures
Struck by, Against Heavy Equipment, Flying Debris, Protruding Objects	<ul style="list-style-type: none"> • Isolate equipment swing areas • Make eye contact with operators before approaching equipment • Barricade or enclose the work area • Restrict entry to the work area to authorized personnel • Wear hard hats, safety glasses with side shields, or splash/face shields and goggles, and steel-toe safety boots at all times
High Noise Levels	<ul style="list-style-type: none"> • Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period)
Handling Heavy Objects	<ul style="list-style-type: none"> • Observe proper lifting techniques • Obey sensible lifting limits (60 pounds maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large awkward loads
Caught In/Between Moving Parts	<ul style="list-style-type: none"> • Identify and understand parts of equipment which may cause crushing, pinching, rotating or similar motions • Ensure guards are in place to protect from these parts of equipment during operation • Provide and use proper work gloves when the possibility of crush, pinch, or other injury may be caused by moving/stationary edges or objects • Maintain all equipment in a safe condition • Keep all guards in place during use • De-energize and lockout machinery before maintenance or service
Slips, Trips, Falls	<ul style="list-style-type: none"> • Clear walkways of equipment, construction debris and other materials • Mark, identify or barricade other obstructions • Use body harness and lifeline when working 6 feet or more above the ground • Use approved ladders in accordance with OHM Health and Safety Procedures Manual
Inhalation and Contact with Hazardous Substances	<ul style="list-style-type: none"> • 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 for dust emissions in personnel breathing zones
Falls from Elevations	<ul style="list-style-type: none"> • Provide safe access to elevated work areas • Safety belts and lanyards required at unguarded elevated work areas 6 feet and greater in height • Safety belts and lanyards required when personnel work from man-lifts
Electrical Shock	<ul style="list-style-type: none"> • De-energize or shut off utility lines at their source before work begins • Electrical circuits must be tested and proved to be de-energized 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, cords, and receptacles out of water • Use approved water-proof, weather-proof type if exposure is likely • Inspect all electrical power circuits prior to commencing work • Follow Lockout/Tagout procedures in accordance with OHM Health and Safety Procedures Manual



Task Breakdown – Process excavated soils with binder to stabilize metals

Potential Hazards	Hazard Control Measures
Struck by, Against Heavy Equipment, Flying Debris, Protruding Objects	<ul style="list-style-type: none">• Restrict entry to the work area to authorized personnel• Wear hard hats, safety glasses with side shields, or splash/face shields and goggles, and steel-toe safety boots at all times• Personnel approaching heavy equipment will make eye contact and signal the operator to cease activity• Do not carry personnel or lift anyone except in an approved safety platform• Personnel shall be cognizant of the boom swing area and stay clear• Heavy equipment shall have fully functioning safety devices
Handling Heavy Objects	<ul style="list-style-type: none">• Observe proper lifting techniques• Obey sensible lifting limits (60 pounds maximum per person manual lifting)• Use mechanical lifting equipment (hand carts, trucks) to move large awkward loads
Slips, Trips, Falls	<ul style="list-style-type: none">• Clear walkways of equipment, construction debris and other materials• Mark, identify or barricade other obstructions• Use body harness and lifeline when working 6 feet or more above the ground• Use approved ladders in accordance with OHM Health and Safety Procedures Manual
Inhalation and contact with hazardous substances	<ul style="list-style-type: none">• 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 specified level of protection
Contact Dermatitis	<ul style="list-style-type: none">• Wear PPE to avoid skin contact with contaminated surfaces
Spills/Splash	<ul style="list-style-type: none">• Wear splash protection• Clean up spills immediately



Task Breakdown: Collect samples

Task Breakdown	Potential Hazards	Hazard Control Measures
Collect samples	Struck by, Against Heavy Equipment, Flying Debris, Protruding Objects	<ul style="list-style-type: none">• Restrict entry to the work area to authorized personnel• Wear hard hats, safety glasses with side shields, or splash/face shields and goggles, and steel-toe safety boots at all times
	Sharp Objects	<ul style="list-style-type: none">• Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects
	High Noise Levels	<ul style="list-style-type: none">• Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period)
	Handling Heavy Objects	<ul style="list-style-type: none">• Observe proper lifting techniques• Obey sensible lifting limits (60 pounds maximum per person manual lifting)• Use mechanical lifting equipment (hand carts, trucks) to move large awkward loads
	Slips, Trips, Falls	<ul style="list-style-type: none">• Clear walkways of equipment, construction debris and other materials• Mark, identify or barricade other obstructions• Use body harness and lifeline when working 6 feet or more above the ground• Use approved ladders in accordance with OHM Health and Safety Procedures Manual
	Inhalation and Contact with Hazardous Substances	<ul style="list-style-type: none">• 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 specified level of protection



Task Breakdown: Site restoration

Potential Hazards	Hazard Control Measures
Struck by, Against Heavy Equipment, Flying Debris, Protruding Objects	<ul style="list-style-type: none"> • Isolate equipment swing areas • Make eye contact with operators before approaching equipment • Barricade or enclose the work area • Restrict entry to the work area to authorized personnel • Wear hard hats, safety glasses with side shields, or splash/face shields and goggles, and steel-toe safety boots at all times
Sharp Objects	<ul style="list-style-type: none"> • 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
High Noise Levels	<ul style="list-style-type: none"> • Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period)
Handling Heavy Objects	<ul style="list-style-type: none"> • Observe proper lifting techniques • Obey sensible lifting limits (60 pounds maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large awkward loads
Slips, Trips, Falls	<ul style="list-style-type: none"> • Clear walkways of equipment, construction debris and other materials • Mark, identify or barricade other obstructions • Use body harness and lifeline when working 10 feet or more above the ground • Use approved ladders in accordance with OHM Health and Safety Procedures Manual
Insect/Snake Bites	<ul style="list-style-type: none"> • Review injury potential and types of snakes with workers • Avoid insect nests areas, likely habitats of snakes outside work areas • Use the Buddy System where such injury potential exists • Use insect repellent, wear PPE to protect against sting/bite injuries
Underground Utilities	<ul style="list-style-type: none"> • Identify all underground utilities around the excavation site before work commences • Cease work immediately if unknown utility markers are uncovered
Inhalation and Contact with Hazardous Substances	<ul style="list-style-type: none"> • Provide worker with proper protective equipment • Review hazardous properties of contaminants • Wear specified level of protection



Task Breakdown – Equipment Cleaning/Decontamination

Potential Hazards	Hazard Control Measures
Struck by, Against Heavy Equipment, Flying Debris, Protruding Objects	<ul style="list-style-type: none"> • Use 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 entry to the work area to authorized personnel • Wear hard hats, safety glasses with side shields, or splash/face shields and goggles, and steel-toe safety boots at all times
Sharp Objects	<ul style="list-style-type: none"> • Wear cut resistant work gloves when the possibility of lacerations or other injury may be caused by sharp edges or objects
High Noise Levels	<ul style="list-style-type: none"> • Use hearing protection when exposed to excessive noise levels (greater than 85 dBA over an 8-hour work period)
Handling Heavy Objects	<ul style="list-style-type: none"> • Observe proper lifting techniques • Obey sensible lifting limits (60 pounds maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large awkward loads • Do not exceed equipment load specifications • Do not suspend loads over ground personnel • Ground personnel near cleaning vats wear splash shield and apron
Slips, Trips, Falls	<ul style="list-style-type: none"> • Clear walkways of equipment, construction debris and other materials • Mark, identify or barricade other obstructions • Use body harness and lifeline when working 6 feet or more above the ground • Use approved ladders in accordance with OHM Health and Safety Procedures Manual
Inhalation and Contact with Hazardous Substances	<ul style="list-style-type: none"> • 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 splash shield and saran coveralls when soaking, handling wet materials, pressure washing • Collect and contain spent wash water for proper disposal
Burns	<ul style="list-style-type: none"> • Use proper gloves, face shield/safety goggles, shin and toe guards, and splash suits to protect workers from skin burns and injury when operating hot water/steam laser (high pressure washers)



Task Breakdown – Demobilization

Potential Hazards	Hazard Control Measures
Struck by, Against Heavy Equipment, Flying Debris, Protruding Objects	<ul style="list-style-type: none"> • Use reflective warning vests when exposed to vehicular traffic • Isolate equipment swing areas • Make eye contact with operators before approaching equipment • Restrict entry to the work area to authorized personnel • Wear hard hats, safety glasses with side shields, or splash/face shields and goggles, and steel-toe safety boots at all times
Handling Heavy Objects	<ul style="list-style-type: none"> • Observe proper lifting techniques • Obey sensible lifting limits (60 pounds maximum per person manual lifting) • Use mechanical lifting equipment (hand carts, trucks) to move large awkward loads • Do not exceed equipment/crane load specifications when hoisting loads • Do not suspend loads over ground personnel
Electrical Shock	<ul style="list-style-type: none"> • 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, cords, and receptacles out of water • Use approved water-proof, weather-proof type if exposure is likely • Inspect all electrical power circuits prior to commencing work • Follow Lockout/Tagout procedures in accordance with OHM Health and Safety Procedures Manual
Slips, Trips, Falls	<ul style="list-style-type: none"> • Clear walkways of equipment, construction debris and other materials • Mark, identify or barricade other obstructions • Use body harness and lifeline when working 6 feet or more above the ground • Use approved ladders in accordance with OHM Health and Safety Procedures Manual

4.0 WORK AND SUPPORT AREAS

To prevent migration of contamination caused through tracking by personnel or equipment, work areas and personal protective equipment will be clearly specified prior to beginning operations. OHM has designated work areas or zones as suggested by the NIOSH/OSHA/USCG/EPA'S document titled, "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities." Each work area will be divided into three zones as follows:

- An Exclusion or "hot" Zone (EZ)
- A Contamination Reduction Zone (CRZ)
- A Support Zone (SZ)

4.1 EXCLUSION ZONE

The EZ is the area suspected of contamination and presents the greatest potential for worker exposure. Personnel entering the area must wear the mandated level of protection for that area. In certain instances, different levels of protection will be required depending on the tasks and monitoring performed within that zone.

4.2 CONTAMINATION REDUCTION ZONE

The CRZ or transition zone will be established between the EZ and SZ. In this area, personnel will begin the sequential decontamination process required to exit the EZ. To prevent off-site migration of contamination and for personnel accountability, all personnel will enter and exit the EZ through the CRZ.

4.3 SUPPORT ZONE

The SZ serves as a clean, control area. Operational support facilities are located within the SZ. Normal work clothing and support equipment are appropriate in this zone. Contaminated equipment or clothing will not be allowed in the SZ. The support facilities should be located upwind of site activities. There will be a clearly marked controlled access point from the SZ into the CRZ and EZ that is monitored closely by the SSO and the SS to ensure proper safety protocols are followed.

4.4 SITE CONTROL LOG

A log of all personnel visiting, entering or working on the site shall be maintained in the main office trailer location. The log will record the date, name, company or agency, and time entering or exiting the site.



No visitor will be allowed in the EZ without showing proof of training and medical certification. Visitors will supply their own boots and respiratory equipment, if required. Visitors will attend a site orientation given by the SSO and sign the HASP.

4.5 GENERAL

The following items are requirements to protect the health and safety of workers and will be discussed in the safety briefing prior to initiating work on the site.

- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand to mouth transfer and ingestion of contamination is prohibited in the EZ and CRZs.
- All personnel exiting the exclusion zone or the contamination reduction zone, must at a minimum, thoroughly wash their face and hands.
- 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. All personnel will be aware of dangerous situations that may develop.
- 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 PROTECTIVE EQUIPMENT

This section addresses the various levels of personal protective equipment (PPE) which are or may be required at this job site. OHM personnel are trained in the use of all PPE utilized.

5.1 ANTICIPATED PROTECTION LEVELS

Task	Protection Level
Mobilization and site preparation	Level D
Excavate contaminated soil/replace processed soil	Level C with tyvek
Screen soils for bullet metals	Level C with tyvek
Process excavated soils with binder to stabilize metal contaminants	Level C with tyvek
Collect samples	Level C with tyvek
Site restoration	Level C with tyvek
System operation and maintenance	Level C with tyvek
Decontaminate equipment	Level C with tyvek
Demobilization	Level D

5.2 PROTECTION LEVEL DESCRIPTIONS

This sections lists the minimum requirements for each protection level. Modification to these requirements will be noted above.

5.2.1 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

5.2.2 Modified Level D

Modified Level D consists of the following:

- Safety glasses with side shields
- Hard hat



- Steel-toed work boots
- Nitrile, neoprene, latex or PVC overboots
- Outer nitrile, neoprene, or PVC gloves over latex sample gloves
- Face shield (when projectiles or splashes pose a hazard)
- Tyvek coverall [Polyethylene-coated Tyveks required when workers have a potential to be exposed to contaminated liquids or sludges.]

5.2.3 Level C

Level C consists of the following:

- Full-face, air-purifying respirator with appropriate cartridges
- Hooded Tyvek Coveralls [Polyethylene- or saran-coated Tyveks required when workers have a potential to be exposed to contaminated liquids or sludges].
- Hard hat
- Steel-toed work boots
- Nitrile, neoprene, latex or PVC overboots
- Nitrile, neoprene, or PVC gloves over latex sample gloves
- Face shield (when projectiles or splashes pose a hazard)

5.2.4 Level B

Level B protection consists of the items required for Level C protection with the exception that an air-supplied respirator is used in place of the air-purifying respirator.

5.2.5 Level A

Level A protection consists of the items required for Level B protection with the addition of a fully-encapsulating, vapor-proof suit capable of maintaining positive pressure.

5.3 SUPPLIED-AIR RESPIRATORS

If air monitoring shows that Level B protection is needed, OHM personnel will wear Survivair 9881-02 Hippack Airline respirators with 5-minute egress bottles. Personnel requiring Level "B" protection and high mobility will wear Survivair Mark 2 SCBA units.

5.4 BREATHING-AIR QUALITY

Code of Federal Regulations 29 CFR 1910.134 states breathing air will meet the requirement of the specification for Grade D breathing air as described in the ANSI/CGA Specification G-7.1-1989. OHM requires a certificate of analysis from vendors of breathing air in order to show that the air meets this standard. Breathing air will be obtained in cylinders exclusively and will be stationed in the exclusion zone (EZ).

5.5 AIR-PURIFYING RESPIRATORS

A NIOSH-approved full-face respirator with appropriate air-purifying cartridges will be used for Level C work.

5.6 RESPIRATOR CARTRIDGES

The crew members working in Level C will wear respirators equipped with air-purifying cartridges approved for the following contaminants.

- 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/m³
- Asbestos-containing dusts and mists
- Radionuclides

5.7 CARTRIDGE CHANGES

All cartridges will be changed a minimum of once daily, or more frequently if personnel begin to experience increased inhalation resistance or breakthrough of a chemical warning property. Cartridges will be labeled with the date service began.

5.8 INSPECTION AND CLEANING

Respirators are checked periodically by a qualified individual and inspected before each use by the wearer. All respirators and associated equipment will be decontaminated and hygienically cleaned after

each use.

5.9 FIT TESTING

All personnel required to wear an air-purifying respirator as part of their employment will be fit-tested at the time of assignment and a minimum of annually thereafter. The test will use isoamyl acetate or irritant smoke. The fit test must be for the style and size of the respirator to be used.

5.10 FACIAL HAIR

Personnel who have facial hair which interferes with the respirator's sealing surface will not be permitted to wear a respirator and will not be permitted to work in areas requiring respirator use.

5.11 CORRECTIVE LENSES

Normal eyeglasses cannot be worn under full-face respirators because the temple bars interfere with the respirator's sealing surfaces. For workers requiring corrective lenses, special spectacles designed for use with respirators will be provided.

5.12 CONTACT LENSES

Contact lenses will not be worn with any type of respirator.

5.13 MEDICAL CERTIFICATION

Only workers who have been certified by a physician as being physically capable of respirator usage will be issued a respirator. Personnel unable to pass a respiratory fit test or without medical clearance for respirator use will not be permitted to enter or work in areas on site that require respiratory protection. Employees receive a written physicians opinion that they are fit for general hazardous waste operations as per 29 CFR 1910.120(f)(7).

5.14 SITE-SPECIFIC RESPIRATORY PROTECTION PROGRAM

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 and expected levels of protection are outlined in Section 5.1. Air monitoring will be conducted to confirm that respiratory protection levels are adequate (Section 7.0). All respirator users are 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, and SSO will also evaluate this 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.

6.0 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.

6.1 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. This sequence describes the general decontamination procedure. The specific stages will vary depending on the work area, the task, the protection level, etc.

1. Go to end of EZ
2. Wash outer boots and gloves in detergent solution
3. Rinse outer boots and gloves in water
4. Remove outer boots and let dry
5. Remove outer gloves and let dry
6. Cross into CRZ
7. Remove SCBA or hip pack (Level B)
8. Remove first pair sample gloves
9. Remove outer saran or tyvek
10. Remove and wash respirator
11. Rinse respirator and hang to dry
12. Remove second pair sample gloves and discard

6.1.1 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 proceed to the decontamination facility. Here the worker will remove clothing, shower, don clean clothing, and immediately be taken to the first-aid station. Medical attention will be provided as determined by the degree of injury.

6.1.2 Personal Hygiene

Before any eating, smoking, or drinking, personnel will wash hands, arms, neck and face. A personnel decontamination facility will be provided for site operations consisting of showers, change rooms, and separate lockers for street clothes and work clothes. Site personnel are required to shower daily at the completion of that day's work. Also, eye wash facilities and emergency showers will be provided at personnel decontamination facilities and at the water treatment system where hazardous chemicals are handled.

6.2 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 SSO.

6.3 DISPOSAL

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

7.0 AIR MONITORING

Air monitoring will be conducted in order to determine airborne contamination levels. This ensures that respiratory protection is adequate to protect personnel against the chemicals that are encountered. The following air monitoring efforts will be used at this site. Additional air monitoring may be conducted at the discretion of the SSO.

The following chart describes the air monitoring required and appropriate action levels.

<i>Monitoring Device</i>	<i>Action Level</i>	<i>Action</i>
LEL/O ₂ (work area) To be performed at start-up and four times daily during soil disturbing activities	>10% LEL <20.8% O ₂ *See 7.1 below for confined space entry action levels	Evacuate area, ventilate, upgrade to Level B if necessary, continue to monitor
PID (Breathing Zone) To be performed at start-up and four times daily during soil disturbing activities	>10 meter units for 5 min. >250 meter units for 5 min.	Level C Stop operations and allow vapors to dissipate to <250 before continuing
Mini-Ram (Breathing Zone) To be performed at start-up and four times daily during soil disturbing activities	>0.2 mg/m ³ for 5 min.	Level C

7.1 LOWER EXPLOSIVE LIMIT/OXYGEN (LEL/O₂) METER

Prior to entering a confined-space area or performing hot work involving welding, cutting, or other high heat-producing operations where flammable or combustible vapors may be present, LEL/O₂ measurements will be taken.

7.2 PHOTOIONIZATION DETECTOR (PID)

A PID will be used to monitor total ionizable organic content of the ambient air. A PID will prove useful as a direct reading instrument to aid in determining if respiratory protection needs to be upgraded and to define the EZ.

For known contaminants only, to determine a protection level from PID data, the SSO will multiply the TLV of the known compound by 25. This will be the limit for Level C protection for that compound. If PID readings exceed 25 times the TLV, Level B protection will be required. Also, regardless of the TLV, a PID reading of 1,000 ppm or more will indicate that the GMC-H cartridges may become overloaded and

will necessitate Level B protection. (Note: PID readings do not always indicate the actual air concentration of a compound. Consult the manual, HNU, or the CIH for clarification.)

The SSO will take measurements before operations begin in an area to determine the amount of organic compounds naturally occurring in the air. This is referred to as a background level.

Levels of volatile organic compounds will be measured in the air at active work sites once every hour and at the support zone once every hour when levels are detected above background in the exclusion zone. If levels exceed background at any time in the support zone, work in the exclusion zone will cease and corrective actions will be taken, e.g., cover soil with polyethylene sheeting. Work will not resume until levels reach background in the support zone.

7.3 REAL-TIME AEROSOL MONITOR (MINIRAM)

A real-time aerosol monitor (miniram) will be used to measure airborne particulate in personnel breathing zones and site work area locations. A breathing zone action level has been specified that requires upgrading to Level C protection based on sustained (5-minute average) miniram results of 0.1 mg/m³. This action level is based on the maximum concentration of lead identified in dust (approximately 5.6 percent), the lead PEL and a safety factor (10x). The miniram will also be used to monitor personnel breathing zone when wearing Modified Level D protection and to determine when an upgrade to Level C is warranted.

7.4 HYDROGEN CYANIDE MONITOR

Hydrogen cyanide (HCN) monitors are required to measure personnel breathing zones when site personnel are potentially exposed to HCN during site remedial operations. An action level of 5 ppm for 5 minutes requires an upgrade to Level B protection because air monitoring respirators are not appropriate (respiratory protective) for HCN exposures. An HCN action level of 25 ppm for 5 minutes requires operations to be shut down until HCN vapors vent to 10 ppm before continuing operations. The 25 ppm HCN action level represents 50 percent of the published "Immediately Dangerous to Life and Health" (IDLH) atmosphere for HCN which is 50 ppm.

7.5 AIR SAMPLING AND ANALYSIS

Personal air samples will be collected in personnel breathing zones to document that the appropriate level of protection was worn during remedial actions on-site. Perform personal lead air sampling on RTs and operators (3 per day) for 4 days. Perform perimeter lead air sampling at the four compass points each day for 4 days. Air samples will be collected on personnel with the greatest potential for exposure during each major project phase. Air samples will be taken according to 29 CFR 1926.62 and analyzed by an AIHA accredited laboratory.

7.6 AIR MONITORING LOG

The SSO will ensure that all air-monitoring data is logged into a monitoring notebook. Data will include all information identified in Procedure 12 of the ER Safety Procedures Manual. The Project CIH will periodically review this data

7.7 CALIBRATION REQUIREMENTS

The PID, LEL/O₂ meter and sampling pumps required with fixed-media air sampling will be calibrated daily prior to and after each use. A separate log will be kept detailing date, time, span gas, or other standard, and name of person performing the calibration.

7.8 AIR MONITORING RESULTS

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

8.0 EMERGENCY RESPONSE

8.1 PRE-EMERGENCY PLANNING

Prior to engaging in construction/remediation activities at the site, OHM will plan for possible emergency situations and have available adequate supplies and manpower to respond. The PM will coordinate this plan with the NOSC/NOSCDR prior to commencing work. In addition site personnel will receive training during the site orientation concerning proper emergency response procedures. This training will include review of the elements of this plan and all action procedures described herein.

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

Fire/Explosion	<ul style="list-style-type: none">•The potential for human injury exists•Toxic fumes or vapors are released•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
Spill or Release of Hazardous Materials	<ul style="list-style-type: none">•The spill could result in the release of flammable liquids or vapors, thus causing a fire or gas explosion hazard•The spill could cause the release of toxic liquids or fumes in sufficient quantities or in a manner that is hazardous to or could endanger human health
Spill or Release of High Temperature Liquid or Vapor	<ul style="list-style-type: none">•The spill can be contained on site, but the potential exists for ground-water contamination•The spill cannot be contained on site, resulting in off-site soil contamination and/or ground-water or surface water pollution•The spill quantity is greater than the reportable quantity limit for the material
Natural Disaster	<ul style="list-style-type: none">•A rain storm 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	<ul style="list-style-type: none">•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)•Cold stress (Hypothermia)•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 Planning Committee (LEPC) 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 at the command post to summon assistance in an emergency.

Primary communication with local responders in the event of an emergency will be accomplished using commercial telephone lines.

8.2 EMERGENCY RECOGNITION AND PREVENTION

Because unrecognized hazards may result in emergency incidents, it will be the responsibility of the Site Supervisor and 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	<ul style="list-style-type: none">• Materials at the site• Materials brought to the site
Physical Hazards	<ul style="list-style-type: none">• Fire/explosion• Slip/trip/fall• Electrocutation• Confined space• IDLH atmospheres• Excessive noise
Mechanical Hazards	<ul style="list-style-type: none">• Heavy equipment• Stored energy system• Pinch points• Electrical equipment• Vehicle traffic
Environmental Hazards	<ul style="list-style-type: none">• Electrical Storms• High winds• Heavy Rain/Snow• Temperature Extremes (Heat/Cold Stress)• Poisonous Plants/Animals

Once a hazard has been recognized, the Site Supervisor and/or the 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
- Lockout/tagout
- Personal Protective Equipment (PPE) selection/use
- Written and approved permits for hot work, confined space
- Trenching/shoring procedure
- Air monitoring
- Following all OHM standard operating procedures
- Practice drills for fire, medical emergency, and hazardous substances spills

**Table 8.1
Emergency Telephone Numbers**

<u>Local Agencies All services</u>	
Police Dept.	911 on-base (910) 451-3855 (off-base)
Fire Department	911 on-base
Ambulance	911 on-base (910) 455-9119 (off-base)
<u>Hospital</u>	
Onslow County Hospital	(910) 577-2240
<u>On-Base Facilities</u>	
USMC Hospital	(910) 451-4840
<u>Federal Agencies</u>	
EPA Region Branch Response Center	(404) 347-3931
National Response Center	800-424-8802
Agency for Toxic Substances and Disease Registry	(404) 639-0615 (24 HR)
<u>Navy ROICC / NTR</u>	
National Response Center	800-424-8802
<u>Project Manager</u>	
James Dunn	(770) 734-8072
Director, Health and Safety, Angelo Liberatore, CIH	(770) 453-7671
OHM Corporation (24 hour)	800-537-9540
<u>NOSC/NOSC DR</u>	
Brent Reuse	(910) 451-2583
Note: Additional Phone Nos's in Section 2.0 this HASP	

Routes to Hospital: (MAPS ARE POSTED ON-SITE)

ON-BASE

1. From Range D-29 proceed west to Holcomb Blvd. and turn left (north).
2. Proceed north on Holcomb Boulevard and turn left on Brewster Street
3. Base hospital is approximately 1/2-mile ahead on right.
4. Follow signs to the emergency room entrance.

OFF-BASE

1. From Range D-29 proceed west to Holcomb Blvd. and turn left (north).
2. Proceed north on Holcomb Boulevard and exit MCB Camp Lejeune through the main gate.
3. Follow Highway 24 West (approximately 2.4 miles) to Western Boulevard and turn right (north).
4. Continue on Western Boulevard (approximately 1.5 miles) to the fifth stoplight and the hospital is on the left side of the street.
5. Follow signs to the emergency room entrance.

A map depicting the route to the Onslow County Memorial Hospital and the Base Naval Hospital will be posted in each trailer.

8.3 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 Site Safety Officer 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.

8.3.1 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 will follow procedures as directed by the fire department, LEPC, State and Federal Agencies as required. OHM 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.

8.3.2 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. While operations are dormant, monitor for leaks, pressure build-up, gas generation, or ruptures in valves, pipes, or other equipment, where appropriate.
- Notify the NOSC/NOSCDR if outside emergency response help is necessary to control the

incident. Table 8.1 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 Base Fire Department.
- Notify LANTDIV ROICC
- Notify OHM 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 (as determined by the NOSC/NOSCDR), 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.
- Notify the USEPA Regional Administrator that cleanup procedures have been completed and that all emergency equipment is fit for its intended use before resuming operations in the affected area of the facility. The USEPA Regional Administrator's telephone number is included in the Emergency Contacts.
- Record time, date, and details of the incident, and submit a written report to the USEPA Regional Administrator. Report is due to USEPA within 15 days of the incident.
- Perform post incident evaluation and response critique and submit a written report to the Regional Health and Safety Director within 30 days of the incident conclusion.

8.4 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 which 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.

In the event of a major hazardous material release (large spills of high toxicity/greater than 55 gallons), workers will be evacuated from the building/site. Workers will assemble at the entrance to the site for a head count by their foremen and to await further instruction.

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 8.1.

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
- Power loss
- Medical emergency
- Hazardous weather

In general, evacuation will be made to the crew trailers, 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.

8.5 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.

8.5.1 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. Each crew supervisor will have a two way radio. A base station will be installed in the OHM office trailer to monitor for emergencies. Total site evacuation will be initiated only by the emergency coordinator; however, in his absence, decision to preserve the health and safety of employees will take precedence. Evacuation routes will be posted in each outside work area. Signs inside buildings will be posted on walls or other structural element of a building. Periodic drills will be conducted to familiarize each employee with the proper routes and procedures.

8.5.2 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.
- A final tally of persons will be made by the emergency coordinator or designee. No attempt to find persons not accounted for will involve endangering lives of OHM or other employees by reentry 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 Supervisor. 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.
- Reentry into the site will be made only after clearance is given by the emergency coordinator. At his direction, a signal or other notification will be given for reentry 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.

8.6 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 8.1 provide a quick reference guide to follow in the event of a major spill.

8.6.1 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.

The 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.

8.6.2 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 the spill results in the formation of a toxic vapor cloud (by reaction with surrounding materials or by

outbreak of fire) and its release (due to high vapor pressures under ambient conditions), further evacuation will be enforced. In general an area at least 500 feet wide and 1,000 feet long will be evacuated downwind if volatile materials are spilled. (Consult the DOT Emergency Response Guide for isolation distances for listed hazardous materials.)

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 8.1)

As called for in regulations developed under the Comprehensive Environmental Response Compensation Liability Act of 1980 (Superfund), OHM'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 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.

8.6.3 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 (This equipment will be in conformance with ANSI Z358.1-1990.)
- Emergency oxygen unit
- Emergency signal horn
- Self contained breathing apparatus (two)
- Stretcher/backboard

In addition to the equipment listed above, OHM maintains direct reading instrumentation that may be used in emergency situations to assess the degree of environmental hazard. This equipment will only be used by the Site Safety Officer or other specially trained personnel. This equipment will be stored, charged and ready for immediate use in evaluating hazardous chemical concentrations. The equipment will be located at the OHM office trailer.

<i>EQUIPMENT NAME</i>	<i>APPLICATION</i>
Portable H-NU Photoionization Meter	Measures selected inorganic and organic chemical concentrations
MSA Oxygen and Combustible Gas Meter	Measures oxygen and combustible gas levels
Draeger Detector Tubes	Assorted detector tubes to measure specific chemical concentrations

8.6.4 Personal Protective Equipment

A supply of two (minimum) SCBAs will be located in the support zone for use in emergency response to hazardous materials releases. They will be inspected at least monthly, according to OSHA requirements. In addition, all emergency response personnel will have respirators available for use with cartridge selection determined by the Site Safety Officer based on the results of direct reading instruments. Emergency response personnel will also be provided with protective clothing as warranted by the nature of the hazardous material and as directed by the Site Safety Officer. All OHM personnel who may be expected to wear SCBAs are trained at assignment and annually thereafter on the proper use and maintenance of SCBAs and airline respirators.

8.6.5 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 materials listed below will be kept on site for spill control, depending on the types of hazardous materials present on site. The majority of this material will be located in the support zone, in a supply trailer or storage area. Small amounts will be placed on pallets and located in the active work areas.

- Sand or clay to solidify/absorb liquid spills.
- Lime (calcium oxide), soda ash (sodium carbonate), or baking soda (sodium bicarbonate) for neutralizing acid (pH <7) spills.
- Activated charcoal (carbon) to adsorb organic solvents (hydrocarbons) and to reduce flammable vapors.
- Citric acid for neutralizing caustic (pH >7) spills.
- Vapor-suppressing foam, if required by the Client, for controlling the release of volatile organic compounds.
- Appropriate solvents e.g. CITRIKLEEN, for decontamination of structures or equipment.

The following equipment will be kept on site and dedicated for spill cleanup:

- Plastic shovels for recovering corrosive and flammable materials.
- Sausage-shaped absorbent booms for diking liquid spills, drains, or sewers.
- Sorbent sheets (diapers) for absorbing liquid spills.
- Overpack drums for containerizing leaking drums.
- 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, labelled, and disposed of off-site.

8.7 EMERGENCY CONTINGENCY PLAN

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

8.7.1 Medical Emergency Contingency Measures

The procedures listed below will be used to respond to medical emergencies. The 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. All OHM first aid and CPR Responders have received training as required by 29 CFR 1910.1030 Bloodborne Pathogen Standard. A copy of the OHM exposure control plan may be obtained from the Site Safety Officer or Regional Health and Safety Director.

8.7.1.1 Response

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

The crew foreman will immediately make radio contact with the on-site emergency coordinator to alert him of a medical emergency situation. The foreman 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 foreman 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 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 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 scene has been cleared by the Site Safety Officer.

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 SSO or the Site Supervisor. An accident/injury/illness report will be completely and properly filled out and submitted to the Regional Health and Safety Director/Project CIH, in accordance with OHM's reporting procedures.

A list of emergency telephone numbers is given in Table 8.1.

8.7.1.2 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
- Client Representative

8.7.2 Fire Contingency Measures

OHM 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.
- The air will be monitored for explosivity before and during hot work and periodically where flammable materials are present. Hot work permits will be required for all such work.
- "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.

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

- Anyone who sees a fire will notify their 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 small fire has been extinguished by a worker, the emergency coordinator will be notified.

8.7.3 Hazardous Weather Contingency Measures

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

- Lightning
- Heavy Rains/Snow
- High Winds

8.7.3.1 Response

- Excavation/soil stock piles will be covered with plastic liner.
- All equipment will be shut down and secured to prevent damage.
- Personnel will be moved to safe refuge, initially crew trailers. 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.

8.7.3.2 Notification

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

- OHM employees and subcontractors
- Client Representative
- Local Civil Defense Organization

8.7.4 Spill/Release Contingency Measures

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

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. 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. Air monitoring will be implemented by the emergency coordinator and SSO to determine the potential impact on the surrounding community. 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 LANTDIV 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
- Clay absorbent
- Polyethylene liner
- Personal safety equipment
- Steel drums
- Pumps and miscellaneous hand tools

The major supply of material and equipment will be located in the Support Zone. Smaller supplies will be 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.

9.0 TRAINING REQUIREMENTS

As a prerequisite to employment at OHM, all field employees are required to take a 40-hour training class and pass a written examination. This training covers all forms of personal protective equipment, toxicological effects of various chemicals, hazard communication, bloodborne pathogens, handling of unknown tanks and drums confined-space entry procedures, and electrical safety. This course is in full compliance with OSHA requirements in 29 CFR 1910.120. In addition, all employees receive annual 8-hour refresher training and three day on-site training under a trained experienced supervisor. Supervisory personnel receive an additional 8-hour training in handling hazardous waste operations. Copies of certification of this training will be maintained on-site for all workers assigned to this project.

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

10.0 MEDICAL SURVEILLANCE PROGRAM

All OHM 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's worker medical profile is shown below. This program was developed in conjunction with a consultant toxicologist and OHM's occupational health physician. Other medical consultants are retained when additional expertise is required. Medical certification for all site workers assigned to the project will be maintained on-site.

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

*Table 10.1
Worker Medical Profile*

<i>Item</i>	<i>Initial</i>	<i>Annual</i>
Medical History	X	X
Work History	X	X
Visual Acuity and Tonometry	X	X
Pulmonary Function Tests	X	X
Physical Examination	X	X
Audiometry Tests	X	X
Chest X-Ray	X	X
Complete Blood Counts	X	X
Blood Chem. (SSAC-23 or equivalent)	X	X
Urinalysis	X	X
Dermatology Examination	X	X
Electrocardiogram/Stress Test	X	X (based on age)

Specific Tests (as required):

- Blood lead with zinc protoporphyn consistent with 29 CFR 1910.1025



10.1 EXAMINATION SCHEDULE

Employees are examined initially upon start of employment, annually thereafter, and may be examined upon termination of employment. Unscheduled medical examinations are conducted:

- At employee request after known or suspected exposure to toxic or hazardous materials
- At the discretion of the client, the CIH, SSO, or OHM occupational physician after known or suspected exposure to toxic or hazardous materials
- At the discretion of the OHM occupational physician

All nonscheduled medical examinations will include, as a minimum, all items specified above for periodic surveillance examination, with the exception of the chest x-ray, which will be conducted at the discretion of the occupational physician performing the examination.

APPENDIX A
HEALTH AND SAFETY PLAN CERTIFICATION

APPENDIX B
OHM HAZARD COMMUNICATION PROGRAM

APPENDIX B - OHM HAZARD COMMUNICATION PROGRAM

1.0 GENERAL

The following written hazard communication program has been established for OHM Corporation. The purpose of this program is to transmit information about the various Chemical hazards in the work place to the workers using various media. The transmittal of information will be accomplished by means of a comprehensive hazard communication program, which will include container labeling and other forms of warning, material safety data sheets, and employee training in accordance with 29 CFR 1910.1200 and 29 CFR 1926.59.

The program will be available in corporate and regional Health and Safety Departments for reviews by all employees. It will also be available in the corporate library and clearly marked "Employee Right-to-Know" stations located within each individual shop and on each job site. OHM Corporation will accomplish the hazard communication requirements through formal safety training, departmental safety meetings, and job site safety meetings.

2.0 RESPONSIBILITIES

Purpose: Overall responsibility rests with all corporate officers of OHM Corporation. A brief outline of responsibilities for those persons directly involved with the program will follow. These responsibilities are not all inclusive, but are designed to give guidance in initial and long-term program development since each area is different. These responsibilities may vary.

Scope: This program is intended to cover those employees who are directly involved with the handling of hazardous materials or supervision of those activities.

2.1 Health and Safety Department Responsibilities

1. Review operations with supervisors to determine what tasks require hazard communication training.
2. Advise supervisory people as to which materials may need to be considered hazardous initially and eventually to ensure that hazard task determination is being done according to the written policy.
3. Follow up through safety meetings and safety audits to ensure that supervisors are carrying out prescribed company policy.
4. Notify supervisors of any operating changes affecting the hazardous materials being used.
5. Periodically audit the Hazard Communication Program's progress. Initially, this should be done biweekly, but later the audit may be done on a monthly or quarterly basis.

2.2 Training Department Responsibilities

1. Ensure that up-to-date records are maintained on training of all employees required to handle hazardous materials. The supervisor should keep copies of these records and should also send copies of the initial training to the corporate training secretary for the training file.
2. Educate personnel upon initial training to the requirements of the Hazard Communication Standard.

2.3 Supervisor Responsibilities

1. Identify jobs requiring the use of hazardous chemicals and provide lists of those jobs and chemicals to the Health and Safety Department.
2. Provide the training required by the Hazard Communication Standard and document training of employees in the safe handling of hazardous materials.
3. Inspect engineering controls and personal protective equipment before each use. Health and Safety can help determine a suitable inspection plan for each application as needed.
4. Make daily surveys of the work area to ensure that safe practices are being followed. Advise employees of unsafe work practices on the first occasion and consider further violations as disciplinary violations.
5. Ensure required labeling practices are being followed. Labeling should be affixed to the container when it arrives. If the contents are transferred to another container, then all label information (manufacturer, product name, and product number) must also be affixed to the new container, so that all containers of the material, regardless of size, are labeled.
6. Enforce all applicable safety and health standards through periodic audits.
7. Before ordering a material, determine if a Material Safety Data Sheet exist on file. Request an MSDS for any material without one.
8. Send all new MSDSs to the Health and Safety Department after making a copy for the Employee Right-to-Know file.

2.4 Employee Responsibilities

1. Obey established safety rules and regulations
2. Use all safety procedures and personnel protective equipment as required by company procedures
3. Notify supervisor of the following:
 - a. Any symptoms or unusual effects that may be related to the use of hazardous chemicals.
 - b. Any missing or unreadable labels on containers.
 - c. Missing, damaged, or malfunctioning safety equipment.
4. Use approved labels on containers; do not remove labels (labels will be located in the warehouse).
5. Do not use unapproved containers for hazardous materials. (are materials and containers compatible?)
6. Know where emergency equipment and first-aid supplies are located before considering a possibly dangerous task.
7. Know location of Material Safety Data Sheets (MSDSs). These will be located in the "Employee Right-to-know" station for the respective shop/job site.

8. Know what you are expected to do in case of an emergency. Before the commencement of any task, emergency considerations shall be made.

2.5 Shipping/Receiving Personnel Responsibilities

1. Ensure MSDS are received with initial shipment of a hazardous material; if not, contact purchasing to request the appropriate MSDS and also call the Health and Safety Department to determine if there is an MSDS available until the requested MSDS arrives.
2. Ensure labels are affixed to all containers.
3. Store hazardous materials in designated locations.
4. Use proper personal protective equipment when handling hazardous materials.
5. Report damaged containers or spills to the appropriate Health and Safety Department immediately.
6. Request an MSDS from the manufacturer for any hazardous material that arrives in Findlay from a job. Also, a MSDS shall accompany any hazardous material that is sent to a job.

3.0 HAZARD DETERMINATION

OHM Corporation will rely on Material Safety Data Sheets from hazardous chemical supplier to meet hazard determination requirements. Other relevant data from laboratory analyses, chemical reference materials, and chemical manufacturers', written evaluation procedures will be utilized when warranted. No other method shall be used to determine chemical hazard unless approved by the Health and Safety Department.

4.0 LABELING

The shipping and receiving supervisors will be responsible for seeing that all containers arriving at OHM Corporation are properly and clearly labeled. Shipping and receiving supervisors shall also check all labels for chemical identity and appropriate hazard warnings. If the hazardous chemical is regulated by OSHA in a substance specific health standard, the supervisor or department manager shall ensure that the labels or other forms of warning used are in accordance with the requirements of that standard. Any container that is not labeled shall be immediately labeled correctly after initial discovery.

Each supervisor or department manager shall be responsible for seeing that all portable containers used in their work area are properly labeled with chemical identity and hazard warning.

Supervisors or department managers shall also ensure that labels on hazardous chemical containers are not removed or defaced unless the container is immediately marked with the required information and that all labels are legible in English and prominently displayed on the container or readily available in the work area throughout each shift.

If any container is found and the contents cannot be identified, the supervisor or manager shall be contacted immediately. When proper identification is made, a label shall be affixed to the container immediately. If it is discovered that no MSDS is available, the manufacturer and the Health and Safety Department shall be contacted to assist in locating the proper MSDS. If there is no way to identify the material in the container, the container should be set aside, away from all personnel until it can be tested by the Health and Safety Department or laboratory personnel. Supervisors and managers shall communicate their findings or awareness of such containers to all personnel in the area and to those who enter later.

5.0 MATERIAL SAFETY DATA SHEETS (MSDSs)

Each supervisor or department manager at OHM Corporation will be responsible for maintaining a current MSDS relevant to the hazardous chemicals used in their area. The Health and Safety Department will be responsible for compiling the master MSDS file for the facility and aiding all shops/job sites with the completion and maintenance of their respective MSDS files.

All MSDSs will be readily available for review by all employees during each work shift. Each shop/job site will designate a clearly marked "Employee Right-to-Know" station where employees can immediately obtain a MSDS and the required information in an emergency.

Although manufacturers are required to provide employers with MSDSs on an initial chemical shipment, OHM Corporation purchasing agents (and supervisors purchasing their own material) shall request MSDSs and updates to MSDSs on all purchase orders. Supervisors and department managers that are without proper MSDSs shall be responsible for requesting this information from manufacturers for chemicals. A file of follow-up letters shall be maintained for all hazardous chemical shipments received without MSDSs.

6.0 EMPLOYEE INFORMATION AND TRAINING

It is the responsibility of the supervisor in charge of each employee to ensure that the employee is properly trained. Training employees on chemical hazards and chemical handling is accomplished at the time of initial employment at OHM Corporation, whenever a new chemical (or physical) hazard is introduced into the work area, and through ongoing formal and informal training programs. Additionally, chemical hazards are communicated to employees through daily, morning, shop specific safety meetings, which shall be documented according to topic, major points discussed, and names of those attending (attendance is mandatory). Also, biweekly hazardous chemical safety meetings will be prepared by the Health and Safety Department using similar documentation for shop areas. Attendance is mandatory for these meetings also. Documentation for shop safety meetings will be available in the respective Employee Right-to-know stations and biweekly safety meeting documentation will be available in the Health and Safety Department to all employees for further referencing and questioning. Records of all formal training conducted at OHM Corporation are coordinated and maintained by the Training Department secretary.

At a minimum, OHM Corporation will inform employees on the following:

- The requirements of 29 CFR 1910.1200--Hazard Communication--Evaluating the potential hazards of chemicals and communication of information concerning hazards and appropriate protective measures to employees. This is accomplished in several different ways including, but not limited to, 40-hour OSHA Hazardous Waste Worker Training (29 CFR 1910.120), shop safety meetings, job site safety meetings, Health and Safety Department safety meetings, and formal and informal training about specific chemical hazards.
- The location and availability of the written hazard communication program, list of hazardous chemicals, and MSDS sheets--Notices will be periodically posted on the employee bulletin boards providing the location of the above material.
- Any operations in their work area where hazardous chemicals are present.
- What the company has done to lessen or prevent workers' exposure to these chemicals.

Employee training shall include at least:

- Methods and observations that may be used to detect the presence or release of a hazardous chemical in the work area (monitoring instruments, visual appearance or odor), and acute and chronic health effects.
- The physical and health hazards of chemicals in the work area (accomplished through periodic physical and chemical hazard awareness sessions developed by the Health and Safety Department). These sessions shall serve as chemical hazards refreshers.
- The methods of preventing exposure to hazardous chemicals including the measures OHM Corporation has taken to protect the employees.
- Procedures to follow if OHM Corporation employees are exposed to hazardous chemicals (location of nearest phone, emergency eyewash, and shower will be included). These discussions shall include proper operating procedures for all emergency equipment.
- The details of the hazard communication program developed by OHM Corporation, including an explanation of the labeling system and the Material Safety Data Sheets, and how employees can obtain and use the appropriate hazard information.
- Standard operating procedures within each respective shop. OHM Corporation company policy determines what is considered standard operating procedures.
- Procedures for workers involved in non-routine tasks.

Each supervisor or department manager shall ensure that the above training is emphasized to OHM Corporation employees. The Health and Safety Department will ensure that each shop, department, and job site is properly informing and training all employees through daily group meetings and individual discussions. Whenever a new hazardous chemical is placed into use, the supervisor or department manager shall inform the employees of the hazards which that chemical may pose. The supervisor or manager shall also be responsible for obtaining and making available a MSDS for the new chemical.

7.0 HAZARDOUS NON-ROUTINE TASKS

Occasionally, employees at OHM Corporation are required to perform tasks which are considered to be non-routine. All tasks considered to be non-routine shall be carefully discussed among the supervisor and those performing the task. This safety briefing shall include all possible hazards that may be encountered while completing the task, including:

- Hazard recognition
- Chemicals involved and their hazardous properties
- Physical hazards
- Methods of avoiding all hazards (technical instruments, proper personal protective equipment, etc.)

The following is list of some of the non-routine tasks which may occur at OHM Corporation together with some information needed to complete the tasks safely.

- Confined Space Entry
 - Obtain confined space entry procedure/permit from Health and Safety Department and follow all protocol before beginning task. Complete and

have supervisor sign permit before any work begins.

- Monitor atmosphere with explosimeter, oxygen meter, and any toxic gas meter as may be appropriate.
 - Discuss specific chemical hazards.
 - Discuss protective/safety measures the employee can take (e.g., Personal protective equipment and engineering controls, use of life lines, lock-out/tagout procedures, etc).
 - Measures the company has taken to lessen the hazards including ventilation, respirator, presence of another employee, and emergency procedures.
- **Excavation, Trenching, and Shoring**
 - Obtain guidelines from Health and Safety Department before beginning task.
 - Comply with all requirements set forth for this activity in 29 CFR Subpart P(excavating, trenching, shoring).
 - Discuss specific chemical hazards.
 - Follow confined space entry procedure above if trench is above shoulder height.
 - Discuss protective/safety measures the employee can take.
 - Review appropriate accident prevention steps.
 - **Decontamination of Equipment**
 - Determine possible contaminants and the hazards associated with them.
 - Determine personal protection needed by contacting the Health and Safety Department.
 - Alert all personnel in areas of contamination and decontamination
 - Contain and secure all contaminated materials and decontamination materials.
 - Contact the Health and Safety Department for proper disposal.

It is company policy that no OHM Corporation employee will begin work on any non-routine task without first receiving a safety briefing from their supervisor or a Health and Safety Department representative.

8.0 INFORMING CONTRACTORS

- Hazardous chemicals to which they may be exposed while performing a task including the following:
 - Chemical properties

- Physical properties
- Acute/Chronic health effects
- Location of "Employee Right-to Know" station which includes the following:
 - MSDS for work area
 - Hazard Communication Program
 - Other relevant safety material
- Precautionary measures to be taken to protect employees from chemical and physical hazards.
- Location of nearest emergency equipment (fire extinguisher, eyewash, shower, phone, first-aid kit, etc.)
- Procedures to follow in the event of employee exposure.
- Steps OHM Corporation has taken to reduce the risk of exposure to physical and chemical hazards including the following:
 - Safety meetings
 - Hazard Communication Program
 - Proper storage and labeling of hazardous chemicals
 - Health and Safety Department shop audits
- The methods used to label all hazardous chemicals.

The Health and Safety Department shall offer assistance in providing the above information to contractors working at OHM Corporation. On initial visit by a contractor to OHM Corporation, a "Contractor Right-to-Know" release form shall be completed. This form will state that the above information has been communicated to the perspective contractor.

APPENDIX C

SITE MATERIAL SAFETY DATA SHEETS

Anti-fog
Bleach
Breathing air
Diesel fuel
Fire extinguishers
Gasoline
Gear lube
Grease
Hydraulic oil

Hydrogen cyanide (calibration gas)
Hydrogen sulfide (calibration gas)
Isobutylene (calibration gas)
Isopropyl alcohol
Liquid detergent
Methane (calibration gas)
Motor oil (hydraulic)
Pentane (calibration gas)
Starting fluid
WD-40

Site Contaminants
Lead



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, dressing, 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 construction 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.

R 0
I 4
S -
K 0



Genium
HMIS
H 3
F 1
R 0
PPG*

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.

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. * Sec. 8

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

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

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

1988 NIOSH REL
10-hr TWA: <100 µg/m³

* 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 pressure 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) or 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.⁽¹⁰⁾

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, CHH; Medical Review: MJ Upfal, MD, MPH; Edited by: JR Stuart, MS

MATERIAL SAFETY DATA SHEET

BAUSCH & LOMB, INCORPORATED
PERSONAL PRODUCTS DIVISION

Page 1 of 5

Effective Date: August 30, 1995

Supersedes: NA

SECTION 1: CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: SIGHT SAVERS brand ANTI-FOG LIQUID
 Product Code: 24, 25, 68, 69, 8565, 8569, 8570, 143060
 Chemical Family: NA

For Information: 1-800-553-5340
 For Emergency: 1-800-553-5340

Manufacturer: Bausch & Lomb, Inc.
 Personal Products Division
 P. O. Box 450
 1400 N. Goodman St.
 Rochester, New York 14692

SECTION 2: COMPOSITION/INFORMATION ON INGREDIENTS

COMPONENT:	CAS #	PERCENTAGE (W/V)	EXPOSURE STANDARDS/GUIDELINES*				
			OSHA		ACGIH		
			TWA	STEL	TWA	STEL	UNITS
Isopropyl alcohol	67-63-0	12	400	500	400	500	ppm
Dipropylene glycol methyl ether	34590-94-3	2	100	150	100	150	ppm

Other components considered as non-hazardous ingredients

NE = Not Established
 STEL = Short Term Exposure Limit
 OSHA = Occupational Safety & Health Administration

NA = Not Applicable
 TWA = Time Weighted Average
 ACGIH = American Conference of Governmental Industrial Hygienists

Section 3: HAZARDS IDENTIFICATION

PRECAUTIONS TO CONSIDER: This product is intended to be used to clean lenses in personal items such as eyewear, face shields, etc. This product is not intended to be ingested nor administered through any other routes of exposure. If you are sensitive to any ingredient in this product, do not use.

EYE CONTACT: This product is intended to be used per label instructions. Avoid eye contact. In the event of accidental eye contact flush with water for 15 minutes and obtain medical assistance.

SKIN CONTACT: This product is intended to be used per label instructions. Discontinue use if skin irritation develops.

INGESTION: In the event of ingestion of this product or any other untoward events, contact a Poison Control Center or other emergency service and obtain the appropriate medical attention. Accidental ingestion of Sight Savers Anti-fog liquid may cause gastric and intestinal irritation. Ingestion of larger quantities may cause nausea, vomiting, headache, dizziness, abdominal pain or related gastrointestinal disturbance. Give fluids and seek medical care.

INHALATION: Normal use of this product will not present an inhalation hazard. An acute exposure to high concentrations, as from a large spill, may result in upper respiratory tract irritation and central nervous system depression. Move to fresh air and seek medical attention.

CARCINOGENICITY: None of the ingredients contained in this product are listed under IARC, NTP or 29 CFR 1910 subpart Z (as a suspect or known carcinogen).

Section 4: FIRST AID MEASURES

SKIN, INGESTION, INHALATION: Skin irritation is not expected. Should irritation develop discontinue use. This product is not intended to be ingested or taken internally. In the event of ingestion of contents or any untoward events, contact a Poison Control Center or other emergency service and obtain the appropriate medical attention. Refer to the statements in sections 3 and 11.

Section 5: FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES: This product is flammable.

FLASH POINT: 88° F Method: closed cup

FLAMMABLE LIMITS: Lower Flammable Limit: NA Upper Flammable Limit: NA

AUTO IGNITION TEMPERATURE: NA

HAZARDOUS DECOMPOSITION/ COMBUSTION PRODUCTS: Carbon dioxide and carbon monoxide.

Section 5: FIRE FIGHTING MEASURES - CONTINUED

FIRE FIGHTING INSTRUCTIONS: As with all fires, evacuate personnel to safe area. Normal fire fighting procedures may be used.
EXTINGUISHING MEDIA: Use foam, CO₂, dry chemical, or water fog.

Section 6: ACCIDENTAL RELEASE MEASURES

SPILL: Remove sources of ignition and absorb with vermiculite or other absorbent. Use respiratory protection and gloves.
DISPOSAL: Dispose of in accordance with all applicable Federal, State, and local environmental regulations. This product does not meet the definition of hazardous waste per 40 CFR, Part 261.11

Section 7: HANDLING AND STORAGE

HANDLING/STORAGE CONDITIONS: This product is stable and non-reactive. Keep away from heat, sparks and flame.

Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

The following information assumes and pertains to situations where an event (such as warehouse storage or an industrial accident) occurs with large quantities of this product.

ENGINEERING CONTROLS: Not Applicable

RESPIRATORY PROTECTION:

Ventilation: General room ventilation
Respirator: A respirator with organic vapor cartridges should be used for spill cleanup.

SKIN AND EYE PROTECTION:

Eye protection should worn to protect against splash hazards and gloves should be used to prevent prolonged skin contact during spill cleanup.

ADDITIONAL PROTECTIVE CLOTHING & EQUIPMENT:

Not Applicable

HYGIENIC WORK PRACTICES:

No special work practices are required.

Section 9 PHYSICAL AND CHEMICAL PROPERTIES

PRODUCT APPEARANCE: Purple liquid. Refer to product labeling for description.
ODOR: Slight odor of rubbing alcohol.
PHYSICAL STATE: Liquid

CHEMICAL PROPERTIES:

BOILING POINT: 212 ° F	MELTING POINT: NA
VAPOR PRESSURE: 30 mm @ 77 ° F	VAPOR DENSITY: NA
SOLUBILITY IN WATER: Soluble	SPECIFIC GRAVITY: 1.0
VISCOSITY: Same as water	EVAPORATION RATE: <1 (i.e. Butyl Acetate = 1)
pH: 7	% VOLATILE: 100%
MOLECULAR WEIGHT: NA	FREEZING POINT: 0 ° C or 32 ° F

Section 10: STABILITY AND REACTIVITY

GENERAL STABILITY CLASSIFICATION: This product is stable and non-reactive.

**INCOMPATIBLE MATERIALS/
CONDITIONS TO AVOID:** Prevent contact with strong acids and bases, as with water.

HAZARDOUS DECOMPOSITION: None

Section 11: TOXICOLOGICAL INFORMATION

TOXICITY: Under normal use of this product (per label instructions) there is low toxicity potential associated with this product.

<u>COMPONENT</u>	<u>PERCENTAGE (W/W)</u>	<u>TOXICOLOGICAL DATA</u>
Isopropyl alcohol	12	LCLo 16,000 ppm/4 hours
Dipropylene glycol methyl ether	2	LD ₅₀ (dog) 7500 mg/kg

Section 12: ECOLOGICAL INFORMATION

Ecological effects have not been determined at this time.

Section 13: DISPOSAL CONSIDERATIONS

Dispose of in accordance with all applicable Federal, State, and local environmental regulations. This product does not meet the definition of hazardous waste per 40 CFR, Part 261.11

Section 14: TRANSPORT INFORMATION

There is no unreasonable risk (health, safety or property) that this product would pose when transported in commerce. Hazard class definitions (49 CFR, Part 173) are not applicable to this product.

Section 15: REGULATORY INFORMATION

TSCA: NA

CERCLA: NA

SARA TITLE III:

- SECTION 302 (Extremely Hazardous Substances): NA
- SECTION 311/312 (Hazard Categories): NA
- SECTION 313 (Toxic Chemicals): NA

TSCA = Toxic Substance Control Act

CERCLA = Comprehensive Response Compensation, and Liability Act

Sara Title III = Superfund Amendment and Reauthorization Act

SECTION 16: OTHER INFORMATION

The information contained herein is provided upon request without warranty of any kind. The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. Users should make independent determinations of the suitability and completeness of information from other sources to assure proper use and disposal of these materials and the safety and health of employees and customers. Bausch and Lomb Incorporated recommends that use of this product is in accordance with product labeling and appropriate safety practices and handling procedures.

MATERIAL SAFETY DATA SHEET

BAUSCH & LOMB, INCORPORATED
PERSONAL PRODUCTS DIVISION

Page 1 of 5

Effective Date: August 30, 1995

Supersedes: NA

SECTION 1: CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: SIGHT SAVERS brand ANTI-FOG LIQUID WITHOUT SILICONE

Product Code: 68GM, 69GM, 8565GM, 8569GM, 8570GM, 143060GM

For Information: 1-800-553-5340

Chemical Family: NA

For Emergency: 1-800-553-5340

Manufacturer: Bausch & Lomb, Inc.
 Personal Products Division
 P. O. Box 450
 1400 N. Goodman St.
 Rochester, New York 14692

SECTION 2: COMPOSITION/INFORMATION ON INGREDIENTS

COMPONENT:	CAS #	PERCENTAGE (W/W)	EXPOSURE STANDARDS/GUIDELINES*				
			OSHA		ACGIH		
			TWA	STEL	TWA	STEL	UNITS
Isopropyl alcohol	67-63-0	12	400	500	400	500	ppm
Dipropylene glycol methyl ether	34590-94-8	2	100	150	100	150	ppm

Other components considered as non-hazardous

NE = Not Established
 STEL = Short Term Exposure Limit
 OSHA - Occupational Safety & Health Administration

NA = Not Applicable
 TWA - Time Weighted Average
 ACGIH = American Conference of Governmental Industrial Hygienists

Section 3: HAZARDS IDENTIFICATION

PRECAUTIONS TO CONSIDER: This product is intended to be used to clean lenses in personal items such as eyewear, face shields, etc. This product is not intended to be ingested nor administered through any other routes of exposure. If you are sensitive to any ingredient in this product, do not use.

EYE CONTACT: This product is intended to be used per label instructions. Avoid eye contact. In the event of accidental eye contact flush with water for 15 minutes and obtain medical assistance.

SKIN CONTACT: This product is intended to be used per label instructions. Discontinue use if skin irritation develops.

INGESTION: In the event of ingestion of this product or any other untoward events, contact a Poison Control Center or other emergency service and obtain the appropriate medical attention. Accidental ingestion of Sight Savers Anti-fog Liquid may cause gastric and intestinal irritation. Ingestion of larger quantities may cause nausea, vomiting, headache, dizziness, abdominal pain or related gastrointestinal disturbance. Give fluids and seek medical care.

INHALATION: Normal use of this product will not present an inhalation hazard. An acute exposure to high concentrations, as from a spill, may result in upper respiratory tract irritation and central nervous system depression. Move to fresh air and seek medical care.

CARCINOGENICITY: None of the ingredients contained in this product are listed under IARC, NTP or 29 CFR 1910 subpart Z (as a suspect or known carcinogen).

Section 4: FIRST AID MEASURES

SKIN, INGESTION, INHALATION: Skin irritation is not expected. However, should irritation develop discontinue use. This product is not intended to be ingested or taken internally. In the event of ingestion of contents or any untoward events, contact a Poison Control Center or other emergency service and obtain the appropriate medical attention. Refer to the statements in sections 3 and 11.

Section 5: FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES: This product is flammable.

FLASH POINT: 88° F Method: closed cup

FLAMMABLE LIMITS: Lower Flammable Limit: NA Upper Flammable Limit: NA

AUTO IGNITION TEMPERATURE: NA

HAZARDOUS DECOMPOSITION/ COMBUSTION PRODUCTS: Carbon dioxide and carbon monoxide.

Section 5: FIRE FIGHTING MEASURES - CONTINUED

FIRE FIGHTING INSTRUCTIONS: As with all fires, evacuate personnel to safe area. Normal fire fighting procedures may be used.
EXTINGUISHING MEDIA: Use foam, CO₂, dry chemical, or water fog.

Section 6: ACCIDENTAL RELEASE MEASURES

SPILL: Remove sources of ignition and absorb with vermiculite or other absorbent. Use respiratory protection and gloves.
DISPOSAL: Dispose of in accordance with all applicable Federal, State, and local environmental regulations. This product does not meet the definition of hazardous waste per 40 CFR, Part 261.11

Section 7: HANDLING AND STORAGE

HANDLING/STORAGE CONDITIONS: This product is stable and non-reactive. Keep away from heat, sparks and flame.

Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION

The following information assumes and pertains to situations where an event (such as warehouse storage or an industrial accident) occurs with large quantities of this product.

ENGINEERING CONTROLS: Not Applicable

RESPIRATORY PROTECTION:

Ventilation: General room ventilation
Respirator: A respirator with organic vapor cartridges should be used for spill cleanup.

SKIN AND EYE PROTECTION:

Eye protection should be worn to protect against splash hazards and gloves should be used to prevent prolonged skin contact during spill cleanup.

ADDITIONAL PROTECTIVE CLOTHING & EQUIPMENT:

Not Applicable

HYGIENIC WORK PRACTICES:

No special work practices are required.

Section 9 PHYSICAL AND CHEMICAL PROPERTIES

PRODUCT APPEARANCE: Clear liquid. Refer to product labeling for description.
ODOR: Slight odor of rubbing alcohol.
PHYSICAL STATE: Liquid.

CHEMICAL PROPERTIES:

BOILING POINT:	212 ° F	MELTING POINT:	NA
VAPOR PRESSURE:	30 mm@ 77 ° F	VAPOR DENSITY:	NA
SOLUBILITY IN WATER:	Soluble	SPECIFIC GRAVITY:	1.0
VISCOSITY:	Same as water	EVAPORATION RATE:	<1 (i.e. Butyl Acetate = 1)
pH:	7	% VOLATILE:	100%
MOLECULAR WEIGHT:	NA	FREEZING POINT:	0 ° C or 32 ° F

Section 10: STABILITY AND REACTIVITY

GENERAL STABILITY CLASSIFICATION: This product is stable and non-reactive.

**INCOMPATIBLE MATERIALS/
CONDITIONS TO AVOID:** Prevent contact with strong acids and bases, as with water.

HAZARDOUS DECOMPOSITION: None

Section 11: TOXICOLOGICAL INFORMATION

TOXICITY: Under normal use of this product (per label instructions) there is low toxicity potential associated with this product.

<u>COMPONENT</u>	<u>PERCENTAGE (W/W)</u>	<u>TOXICOLOGICAL DATA</u>
Isopropyl alcohol	12	LCLo 16,000 ppm/4 hours
Dipropylene glycol methyl ether	2	LD 50 (dog) 7500 mg/kg

Section 12: ECOLOGICAL INFORMATION

Ecological effects have not been determined at this time.

Section 13: DISPOSAL CONSIDERATIONS

Dispose of in accordance with all applicable Federal, State, and local environmental regulations. This product does not meet the definition of hazardous waste per 40 CFR, Part 261.11

Section 14: TRANSPORT INFORMATION

There is no unreasonable risk (health, safety or property) that this product would pose when transported in commerce. Hazard class definitions (49 CFR, Part 173) are not applicable to this product.

Section 15: REGULATORY INFORMATION

TSCA: NA

CERCLA: NA

SARA TITLE III:

- SECTION 302 (Extremely Hazardous Substances): NA
- SECTION 311/312 (Hazard Categories): NA
- SECTION 313 (Toxic Chemicals): NA

TSCA = Toxic Substance Control Act
 CERCLA = Comprehensive Response Compensation, and Liability Act
 Sara Title III = Superfund Amendment and Reauthorization Act

SECTION 16: OTHER INFORMATION

The information contained herein is provided upon request without warranty of any kind. The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. Users should make independent determinations of the suitability and completeness of information from other sources to assure proper use and disposal of these materials and the safety and health of employees and customers. Bausch and Lomb Incorporated recommends that use of this product is in accordance with product labeling and appropriate safety practices and handling procedures.



The Clorox Company
 7200 Johnson Drive
 Pleasanton, California 94588
 Tel. (510) 847-6100

Material Safety Data Sheet

I Product: CLOROX BLEACH - FOR INSTITUTIONAL USE																	
Description: CLEAR, LIGHT YELLOW LIQUID WITH CHLORINE ODOR																	
Other Designations	Manufacturer																
EPA Reg. No. 5813-1 Sodium hypochlorite solution Liquid chlorine bleach Clorox Liquid Bleach Clorox Germicidal Bleach	The Clorox Company 1221 Broadway Oakland, CA 94612																
Emergency Telephone No.																	
For Medical Emergencies, call Rocky Mountain Poison Center: 1-800-446-1014 For Transportation Emergencies, call: Chemtrec: 1 800-424-9300																	
II Health Hazard Data	III Hazardous Ingredients																
<p>* Causes substantial but temporary eye injury. May irritate skin. May cause nausea and vomiting if ingested. Exposure to vapor or mist may irritate nose, throat and lungs. The following medical conditions may be aggravated by exposure to high concentrations of vapor or mist; heart conditions or chronic respiratory problems such as asthma, chronic bronchitis or obstructive lung disease. Under normal consumer use conditions the likelihood of any adverse health effects are low.</p> <p>FIRST AID: <u>EYE CONTACT:</u> Immediately flush eyes with plenty of water. If irritation persists, see a doctor. <u>SKIN CONTACT:</u> Remove contaminated clothing. Wash area with water. <u>INGESTION:</u> Drink a glassful of water and call a physician. <u>INHALATION:</u> If breathing problems develop remove to fresh air.</p>	<table border="1"> <thead> <tr> <th>Ingredients</th> <th>Concentration</th> <th>Worker Exposure Limit</th> </tr> </thead> <tbody> <tr> <td>Sodium hypochlorite CAS # 7681-52-9</td> <td>5.25%</td> <td>not established</td> </tr> </tbody> </table> <p>None of the ingredients in this product are on the IARC, NTP or OSHA carcinogen list. Occasional clinical reports suggest a low potential for sensitization upon exaggerated exposure to sodium hypochlorite if skin damage (e.g. irritation) occurs during exposure. Routine clinical tests conducted on intact skin with Clorox Liquid Bleach found no sensitization in the test subjects.</p>	Ingredients	Concentration	Worker Exposure Limit	Sodium hypochlorite CAS # 7681-52-9	5.25%	not established										
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IV Special Protection and Precautions	V Transportation and Regulatory Data																
<p><u>Hygienic Practices:</u> Wear safety glasses. With repeated or prolonged use, wear gloves.</p> <p><u>Engineering Controls:</u> Use general ventilation to minimize exposure to vapor or mist.</p> <p><u>Work Practices:</u> Avoid eye and skin contact and inhalation of vapor or mist.</p> <p><u>Keep out of the reach of children.</u></p>	<p><u>U.S. DOT Hazard Class:</u> Not restricted</p> <p><u>U.S. DOT Proper Shipping Name:</u> Hypochlorite solution with not more than 7% available chlorine. Not Restricted per 49CFR172.101(c)(12)(iv).</p> <p><u>EPA CERCLA/SARA TITLE III Superfund Amendment and Reauthorization Act:</u></p> <table border="1"> <thead> <tr> <th></th> <th colspan="3">CERLA/304</th> </tr> <tr> <th></th> <th>RQ (lbs)</th> <th>311/312</th> <th>313</th> </tr> </thead> <tbody> <tr> <td>Sodium hypochlorite</td> <td>100</td> <td>—</td> <td>—</td> </tr> <tr> <td>Sodium hydroxide</td> <td>1000</td> <td>Yes</td> <td>—</td> </tr> </tbody> </table>		CERLA/304				RQ (lbs)	311/312	313	Sodium hypochlorite	100	—	—	Sodium hydroxide	1000	Yes	—
	CERLA/304																
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VI Spill or Leak Procedures	VII Reactivity Data																
<p><u>Small Spills (<5 gallons)</u></p> <p>1) Absorb, containerize, and landfill in accordance with local regulations. (2) Wash down residual to sanitary sewer.*</p> <p><u>Large Spills (>5 gallons)</u></p> <p>1) Absorb, containerize, and landfill in accordance with local regulations; wash down residual to sanitary sewer.* - OR - (2) Pump material to waste drum(s) and dispose in accordance with local regulations; wash down residual to sanitary sewer.*</p>	<p>Stable under normal use and storage conditions. Strong oxidizing agent. Reacts with other household chemicals such as toilet bowl cleaners, rust removers, vinegar, acids or ammonia containing products to produce hazardous gases, such as chlorine and other chlorinated species. Prolonged contact with metal may cause pitting or discoloration.</p>																
VIII Fire and Explosion Data	IX Physical Data																
<p>Flammable or explosive. In a fire, cool containers to prevent rupture release of sodium chloride.</p>	<p>Boiling point 212°F/100°C decomposes)</p> <p>Specific Gravity (H₂O=1) 1.085</p> <p>Solubility in Water complete</p> <p>pH 11.4</p>																



The Clorox Company
7200 Johnson Drive
Pleasanton, California 94588
Tel. (510) 847-8100

Material Safety Data Sheet

I Product: REGULAR CLOROX BLEACH							
Description: CLEAR, LIGHT YELLOW LIQUID WITH CHLORINE ODOR							
Other Designations	Manufacturer						
Sodium hypochlorite solution Liquid chlorine bleach Clorox Liquid Bleach	The Clorox Company 1221 Broadway Oakland, CA 94612						
Emergency Telephone No.							
Notify your Supervisor Rocky Mountain Poison Center (800) 446-1014 For Transportation Emergencies Chemtrec (800) 424-9300							
II Health Hazard Data	III Hazardous Ingredients						
<p>* Causes substantial but temporary eye injury. May irritate skin. May cause nausea and vomiting if ingested. Exposure to vapor or mist may irritate nose, throat and lungs. The following medical conditions may be aggravated by exposure to high concentrations of vapor or mist; heart conditions or chronic respiratory problems such as asthma, chronic bronchitis or obstructive lung disease. Under normal consumer use conditions the likelihood of any adverse health effects are low.</p> <p>FIRST AID: <u>EYE CONTACT:</u> Immediately flush eyes with plenty of water. If irritation persists, see a doctor. <u>SKIN CONTACT:</u> Remove contaminated clothing. Wash area with water. <u>INGESTION:</u> Drink a glassful of water and call a physician. <u>INHALATION:</u> If breathing problems develop remove to fresh air.</p>	<table border="1"> <thead> <tr> <th>Ingredients</th> <th>Concentration</th> <th>Worker Exposure Limit</th> </tr> </thead> <tbody> <tr> <td>Sodium hypochlorite CAS # 7681-52-9</td> <td>5.25%</td> <td>not established</td> </tr> </tbody> </table> <p>None of the ingredients in this product are on the IARC, NTP or OSHA carcinogen list. Occasional clinical reports suggest a low potential for sensitization upon exaggerated exposure to sodium hypochlorite if skin damage (e.g. irritation) occurs during exposure. Routine clinical tests conducted on intact skin with Clorox Liquid Bleach found no sensitization in the test subjects.</p>	Ingredients	Concentration	Worker Exposure Limit	Sodium hypochlorite CAS # 7681-52-9	5.25%	not established
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VI Spill or Leak Procedures	VII Reactivity Data						
<p><u>Small Spills (<5 gallons)</u> 1) Absorb, containerize, and landfill in accordance with local regulations. 2) Wash down residual to sanitary sewer.*</p> <p><u>Large Spills (>5 gallons)</u> 1) Absorb, containerize, and landfill in accordance with local regulations; wash down residual to sanitary sewer.* - OR - (2) Pump material to waste drum(s) and dispose in accordance with local regulations; wash down residual to sanitary sewer.*</p> <p>* Contact the sanitary treatment facility in advance to assure ability to process washed-down material.</p>	<p>Stable under normal use and storage conditions. Strong oxidizing agent. Reacts with other household chemicals such as toilet bowl cleaners, rust removers, vinegar, acids or ammonia containing products to produce hazardous gases, such as chlorine and other chlorinated species. Prolonged contact with metal may cause pitting or discoloration.</p>						
VIII Fire and Explosion Data	IX Physical Data						
<p>Not flammable or explosive. In a fire, cool containers to prevent rupture and release of sodium chloride.</p>	<p>Boiling point 212°F/100°C decomposes Specific Gravity (H₂O=1) 1.085 Solubility in Water complete pH 11.4</p>						



AGA Gas Inc.
5225 Oaktree Blvd.
P.O. Box 34737
Cleveland, Ohio 44101-4737

Telephone
(216) 542-6600

MATERIAL No. 1
SAFETY
DATA SHEET

PRODUCT NAME Compressed Air	CAS # N/A
TRADE NAME AND SYNONYMS Compressed Air; Air; Compressed Air, Breathing Quality	DOT ID No. UN 1002
CHEMICAL NAME AND SYNONYMS See last page.	DOT Hazard Class Nonflammable gas
ISSUE DATE AND REVISIONS 25 November 1985	Formula See last page. Chemical Family N/A

HEALTH HAZARD DATA

TIME WEIGHTED AVERAGE EXPOSURE LIMIT None listed (ACGIH, 1985-86)
SYMPTOMS OF EXPOSURE Air is nontoxic and necessary to support life. Inhalation of air in a high pressure environment such as underwater diving, caissons or hyperbaric chambers can result in symptoms similar to overexposure to pure oxygen. These include tingling of fingers and toes, abnormal sensations, impaired coordination and confusion. Decompression sickness pains or "bends" are possible following rapid decompression.
TOXICOLOGICAL PROPERTIES High pressure effects (greater than two atmospheres of oxygen) are on the central nervous system. Improper decompression results in the accumulation of nitrogen in the blood.
RECOMMENDED FIRST AID TREATMENT Facilities or practices at which air is breathed in a high pressure environment should be prepared to deal with the illnesses associated with decompression (bends or caisson disease). Decompression equipment may be required.

Information contained in this material safety data sheet is offered without charge for use by technically qualified personnel at their discretion and risk. All statements, technical information and recommendations contained herein are based on tests and data which we believe to be reliable, but the accuracy or completeness thereof is not guaranteed and no warranty of any kind is made with respect thereto. This information is not intended as a license to operate under or a recommendation to practice or infringe any patent of this Company or others covering any process, composition or matter of use. Since the Company shall have no control of the use of the product described herein, the Company assumes no liability for loss or damage incurred from the proper or improper use of such product.

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES

N/A

PHYSICAL DATA

BOILING POINT -317.8°F (-194.3°C)	LIQUID DENSITY AT BOILING POINT 54.56 lb/ft ³ (874 kg/m ³)
VAPOR PRESSURE @ 70°F (21.1°C): Above the critical temp. of -221.1°F (-140.6°C)	GAS DENSITY AT 70°F @ 1 atm .0749 lb/ft ³ (1.200 kg/m ³)
SOLUBILITY IN WATER Very slightly	FREEZING POINT N/A
EVAPORATION RATE N/A	SPECIFIC GRAVITY (AIR=1) 1.0
APPEARANCE AND ODOR Colorless, odorless gas	

FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used) N/A	AUTO IGNITION TEMPERATURE N/A	FLAMMABLE LIMITS - BY VOLUME LEL N/A UEL N/A	
EXTINGUISHING MEDIA Nonflammable gas	ELECTRICAL CLASSIFICATION Nonhazardous		
SPECIAL FIRE FIGHTING PROCEDURES N/A			

UNUSUAL FIRE AND EXPLOSION HAZARDS

Compressed air at high pressures will accelerate the burning of materials to a greater rate than they burn at atmospheric pressure.

REACTIVITY DATA

STABILITY Unstable	CONDITIONS TO AVOID	
Stable	X	N/A
INCOMPATIBILITY (Materials to avoid) None		
HAZARDOUS DECOMPOSITION PRODUCTS None		
HAZARDOUS POLYMERIZATION May Occur	CONDITIONS TO AVOID	
Will Not Occur	X	N/A

SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

N/A

WASTE DISPOSAL METHOD

N/A

RESPIRATORY PROTECTION Summary:

N/A

VENTILATION

LOCAL EXHAUST

N/A

SPECIAL

N/A

N/A

MECHANICAL Genl

N/A

OTHER

N/A

PROTECTIVE GLOVES

Any material

EYE PROTECTION

Safety goggles or glasses

OTHER PROTECTIVE EQUIPMENT

Safety shoes

SPECIAL PRECAUTIONS*

SPECIAL LABELING INFORMATION

DOT Shipping Name: Air, compressed

DOT Hazard Class: Nonflammable gas

DOT Shipping Label: Nonflammable gas

I.D. No.: UN 1002

SPECIAL HANDLING RECOMMENDATIONS

Valve protection caps must remain in place unless container is secured with valve outlet piped to use point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure reducing regulator when connecting cylinder to lower pressure (<3,000 psig) piping or systems. Do not heat cylinder by any means to increase the discharge rate of product from the cylinder. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder.

For additional handling recommendations, consult the Compressed Gas Association's Pamphlets P-1, G-7 and G-7.1.

SPECIAL STORAGE RECOMMENDATIONS

Protect cylinders from physical damage. Store in cool, dry, well-ventilated area away from heavily trafficked areas and emergency exits. Do not allow the temperature where cylinders are stored to exceed 130F (54C). Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Full and empty cylinders should be segregated. Use a "first in-first out" inventory system to prevent full cylinders being stored for excessive periods of time.

For additional storage recommendations, consult the Compressed Gas Association's Pamphlets P-1, G-7, and G-7.1.

SPECIAL PACKAGING RECOMMENDATIONS

Dry air is noncorrosive and may be used with all materials of construction. Moisture causes metal oxides which are formed with air to be hydrated so that they increase in volume and lose their protective role (rust formation). Concentrations of SO₂, Cl₂, salt, etc. in the moisture enhances the rusting of metals in air.

OTHER RECOMMENDATIONS OR PRECAUTIONS

Compressed gas cylinders should not be refilled except by qualified producers of compressed gases. Shipment of a compressed gas cylinder which has not been filled by the owner or with his (written) consent is a violation of Federal Law (49CFR).

CHEMICAL FORMULA: (Continued)

Atmospheric air which is compressed is composed of the following concentrations of gases:

<u>Gas</u>	<u>Molar %</u>
Nitrogen	78.09
Oxygen	20.94
Argon	0.93
Carbon Dioxide	0.033*
Neon	18.18×10^{-4}
Helium	5.239×10^{-4}
Krypton	1.139×10^{-4}
Hydrogen	0.5×10^{-4}
Xenon	0.086×10^{-4}
Radon	6×10^{-18}
Water vapor	Varying concentrations

*Concentrations may have slight variations.

Compressed air is also produced by reconstitution using only oxygen and nitrogen. This product contains 79 molar percent nitrogen and 21 molar percent oxygen plus trace amounts of other atmospheric gases which are present in the oxygen and nitrogen.



Genium Publishing Corporation

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

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

Issued: 10/81

Revision: A, 11/90

Section 1. Material Identification

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*TM for a suppliers list.

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.

R	1	NFPA
I	-	
S	2	
K	2	
HMIS		
H 0		
F 2		
R 0		
PPG*		
* Sec. 3		

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)

Specific Gravity: <0.86

Viscosity: 1.9 to 4.1 centistoke at 104 °F (40 °C)

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.

Section 6. Health Hazard Data

Carcinogenicity: Although the IARC has not assigned an overall evaluation to diesel fuels as a group, it has evaluated occupational exposures in petroleum refining as an IARC probable human carcinogen (Group 2A). It has evaluated distillate (light) diesel oils as not classifiable as human carcinogens (Group 3).

Routes of Risks: Although diesel fuel's toxicologic effects should resemble kerosine's, they are somewhat more pronounced due to additives such as sulfurized esters. Excessive inhalation of aerosol or mist can cause respiratory tract irritation, headache, dizziness, nausea, vomiting, and loss of coordination, depending on concentration and exposure time. When removed from exposure area, affected persons usually recover completely. If vomiting occurs after ingestion and if oil is aspirated into the lungs, hemorrhaging and pulmonary edema, progressing to renal involvement and chemical pneumonitis, may result. A comparative ratio of oral to aspirated lethal doses may be 1 pt vs. 5 ml. Aspiration may also result in transient CNS depression or excitement. Secondary effects may include hypoxia (insufficient oxygen in body cells), infection, pneumatocele formation, and chronic lung dysfunction. Inhalation may result in euphoria, cardiac dysrhythmias, respiratory arrest, and CNS toxicity. Prolonged or repeated skin contact may irritate hair follicles and block sebaceous glands, producing a rash of acne pimples and spots, usually on arms and legs.

Medical Conditions Aggravated by Long-Term Exposure: None reported.

Target Organs: Central nervous system, skin, and mucous membranes.

Primary Entry Routes: Inhalation, ingestion.

Acute Effects: Systemic effects from ingestion include gastrointestinal irritation, vomiting, diarrhea, and in severe cases central nervous system depression, progressing to coma or death. Inhalation of aerosols or mists may result in increased rate of respiration, tachycardia (excessively rapid heart beat), and cyanosis (dark purplish discoloration of the skin and mucous membranes caused by deficient blood oxygenation).

Chronic Effects: Repeated contact with the skin causes dermatitis.

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. If large areas of the body have been exposed or if irritation persists, get medical help immediately. Wash affected area with soap and water.

Inhalation: Remove exposed person to fresh air and support breathing as needed.

Ingestion: Never give anything by mouth to an unconscious or convulsing person. If ingested, *do not induce vomiting* due to aspiration hazard.

Aspiration: Contact a physician immediately. Position to avoid aspiration.

After first aid, get appropriate in-plant, paramedic, or community medical support.

Notes to Physicians: Gastric lavage is contraindicated due to aspiration hazard. Preferred antidotes are charcoal and milk. In cases of severe aspiration pneumonitis, consider monitoring arterial blood gases to ensure adequate ventilation. Observe the patient for 6 hr. If vital signs become normal or symptoms develop, obtain a chest x-ray.

Section 7. Spill, Leak, and Disposal Procedures

Spill/Leak: Notify safety personnel, evacuate area for large spills, remove all heat and ignition sources, and provide maximum explosion-proof ventilation. Cleanup personnel should protect against vapor inhalation and liquid contact. Clean up spills promptly to reduce fire or vapor hazards. Use a noncombustible absorbent material to pick up small spills or residues. For large spills, dike far ahead to contain. Pick up liquid for reclamation or disposal. Do not release to sewers or waterways due to health and fire and/or explosion hazard. Follow applicable OSHA regulations (29 CFR 1910.120). Diesel fuel oil No. 2-D spills may be environmental hazards. Report large spills.

Spill/Leak Response: Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

HA Designations

HA Hazardous Waste (40 CFR 261.21): Ignitable waste

HA RCLHA Hazardous Substance (40 CFR 302.4): Not listed

HA RA Extremely Hazardous Substance (40 CFR 355): Not listed

HA RA Toxic Chemical (40 CFR 372.65): Not listed

HA Designations

HA Contaminant (29 CFR 1910.1000, Subpart Z): Not listed

Section 8. Special Protection Data

Eye Protection: Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133).

Respirator: Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, use a NIOSH-approved respirator with a mist filter and organic vapor cartridge. For emergency or nonroutine operations (cleaning spills, maintenance on vessels, or storage tanks), wear an SCBA. *Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.*

Hand Protection: Wear impervious gloves, boots, aprons, and gauntlets to prevent skin contact.

Ventilation: Provide general and local explosion-proof ventilation systems to maintain airborne concentrations that promote worker safety and productivity. Local exhaust ventilation is preferred since it prevents contaminant dispersion into the work area by controlling it at its source.⁽¹⁰⁷⁾

Emergency 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.

Personal Hygiene: Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9. Special Precautions and Comments

Storage Requirements: Use and storage conditions should be suitable for a OSHA Class II combustible liquid. Store in closed containers in a well-ventilated area away from heat and ignition sources and strong oxidizing agents. Protect containers from physical damage. To prevent static sparks, electrically ground and bond all containers and equipment used in shipping, receiving, or transferring operations. Use nonsparking tools and explosion-proof electrical equipment. No smoking in storage or use areas.

Engineering Controls: Avoid vapor or mist inhalation and prolonged skin contact. Wear protective rubber gloves and chemical safety glasses when contact with liquid or high mist concentration may occur. Additional suitable protective clothing may be required depending on working conditions. Institute a respiratory protection program that includes regular training, maintenance, inspection, and evaluation. Practice good personal hygiene and housekeeping procedures. Do not wear oil contaminated clothing. At least weekly laundering of work clothes is recommended. Do not put oily rags in pockets. When working with this material, wear gloves or use barrier cream.

Transportation Data (49 CFR 172.101)

Shipping Name: Fuel oil

Hazard Class: Combustible liquid

NA 1993

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

Prepared by: MJ Allison, BS; Industrial Hygiene Review: DJ Wilson, CIH; Medical Review: AC Darlington, MD; Edited by: JR Stuart, MS

ANSUL

ANSUL FIRE PROTECTION
MANNETTE, MI 54140-2542

MATERIAL SAFETY DATA SHEET

FORAY

CLICK IDENTIFIER in Print Common Name:

Manufacturer's Name:	ANSUL FIRE PROTECTION, NORMALD U.S., INC.	Emergency Telephone No.:	(716) 735-7411
Address:	One Stanton Street, Mannette, MI 54140-2542	Other Information:	Same as above
Prepared By:	Safety and Health Department	Date Prepared:	June 1, 1989

SECTION 1 — IDENTITY

Common Name: (Used on label) (Trade Name and Synonyms)	FORAY Dry Chemical Extinguishing Agent	CAS No.:	N/A
Chemical Name:	N/A This is a Mixture	Chemical Family:	Mixture
Formula:	N/A		

SECTION 2 — INGREDIENTS

PART A — HAZARDOUS INGREDIENTS				
Principal Hazardous Component(s) (chemical and common name(s))	%	CAS No.	ACGIH TLV	Acute Toxicity Data
Muscovite Talc	Less than 5	12001-25-2	20 mppcf*	NDA
Magnesium Aluminum Silicate	Less than 10	8031-18-3	10 mg/M3	NDA
*Million particles per cubic foot				
PART B — OTHER INGREDIENTS				
Other Component(s) (chemical and common name(s))	%	CAS No.		Acute Toxicity Data
Monoammonium Phosphate	Greater than 75	7722-76-1		NDA
Ammonium Sulfate	Greater than 10	7783-20-2		NDA
Methyl Hydrogen Polysiloxane	Less than 1	63148-57-2		NDA
Yellow Pigment	Less than 0.1	5468-75-7		NDA

SECTION 3 — PHYSICAL AND CHEMICAL CHARACTERISTICS (Fire and Explosion Data)

Boiling Point:	N/A	Specific Gravity (H ₂ O = 1):	N/A	Vapor Pressure (mm Hg):	N/A
Percent Volatile by Volume (%):	N/A	Vapor Density (Air = 1):	N/A	Evaporation Rate (H ₂ O = 1):	N/A
Solubility in Water:	Slight	Reactivity in Water:	Unreactive		
Appearance and Odor:	Yellow colored powder, no characteristic odor				
Flash Point:	None	Flammable Limits in Air % by Volume:	N/A	Extinguisher Media:	N/A
Auto-ignition Temperature:	N/A				
Special Fire Fighting Procedures:	NONE — THIS IS AN EXTINGUISHING AGENT				
Unusual Fire and Explosion Hazards:	None				

SECTION 4 — PHYSICAL HAZARDS

Stability:	Unstable <input type="checkbox"/> Stable <input checked="" type="checkbox"/>	Conditions to Avoid:	N/A
Incompatibility (Materials to Avoid):	Strong alkalis, Mg		
Hazardous Decomposition Products:	NH ₃ and/or PO _x may be evolved		
Hazardous Polymerization:	None		

SECTION 5 — HEALTH HAZARDS

Threshold Limit Value:	OSHA nuisance dust limit of 15 mg/M ³ or ACGIH nuisance dust value of 10 mg/M ³ for the eight-hour time-weighted average.		
Routes of Entry: Eye Contact:	Mildly irritating for a short period of time.		
Skin Contact:	May be mildly irritating.		
Inhalation:	Treat as a mineral dust irritant to the respiratory tract.		
Ingestion:	Not an expected route of entry.		
Signs and Symptoms:	Acute Overexposure: Transient cough, shortness of breath. Chronic Overexposure: Chronic fibrosis of the lung, pneumoconiosis.		
Medical Conditions Generally Aggravated by Exposure:	Reactive airway		
Chemicals Listed as Carcinogen or Potential:	National Toxicology Program:	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	U.S. R.C. Monographs: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
	CSHA:	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>	

SECTION 6 — EMERGENCY AND FIRST AID PROCEDURES

Eye Contact:	Flush with large amounts of water; if irritation persists, seek Medical attention.
Skin Contact:	Wash with soap and water; if irritation persists, seek Medical attention.
Inhalation:	Remove victim to fresh air. Seek Medical attention if discomfort continues.
Ingestion:	If patient is conscious, give large amounts of water and induce vomiting. Seek Medical help.

SECTION 7 — SPECIAL PROTECTION INFORMATION

Respiratory Protection (Specify Type):	Dust mask where dustiness is prevalent, or TLV exceeded. Mechanical filter respirator if exposure is prolonged.		
Ventilation:	Local Exhaust	Discretionary	Mechanical (General): Recommended
Protective Gloves:	N/A		Eye Protection: Recommended as mechanical barrier for prolonged exposure.
Other Protective Clothing or Equipment:	If irritation occurs, long sleeves and impervious gloves should be worn.		

SECTION 8 — SPECIAL PRECAUTIONS AND SPILL/LEAK PROCEDURES

Precautions to be Taken in Handling and Storage:	Should be stored in original container or Ansul fire extinguisher.
Other Precautions:	Do not mix agents.
Steps to be Taken in Case Material is Released or Spilled:	Sweep up.
Waste Disposal Methods:	Dispose of in compliance with local, state, and federal regulations.

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM RATINGS

HAZARD INDEX:	
4 Severe Hazard	<u>1</u> HEALTH
3 Serious Hazard	<u>0</u> FLAMMABILITY
2 Moderate Hazard	<u>0</u> REACTIVITY
1 Slight Hazard	
0 Minimal Hazard	

N/A = Not Applicable

NDA = No Data Available



Genium Publishing Corporation

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

Material Safety Data Sheets Collection:

Sheet No. 467
Automotive Gasoline, Lead-free

Issued: 10/81 Revision: A, 9/91

Section 1. Material Identification

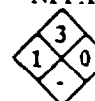
35

Automotive Gasoline, Lead-free, Description: A mixture of volatile hydrocarbons composed mainly of branched-chain paraffins, cycloparaffins, olefins, naphthenes, and aromatics. In general, gasoline is produced from petroleum, shale oil, Athabasca tar sands, and coal. Motor gasolines are made chiefly by cracking processes, which convert heavier petroleum fractions into more volatile fractions by thermal or catalytic decomposition. Widely used as fuel in internal combustion engines of the spark-ignited, reciprocating type. Automotive gasoline has an octane number of approximately 90. A high content of aromatic hydrocarbons and a consequent high toxicity are also associated with a high octane rating. Some gasolines sold in the US contain a minor proportion of tetraethyllead, which is added in concentrations not exceeding 3 ml per gallon to prevent engine "knock." However, methyl-tert-butyl ether (MTBE) has almost completely replaced tetraethyllead.

Other Designations: CAS No. 8006-61-9, benzin, gasoline, gasolene, motor spirits, naural gasoline, petrol.

Manufacturer: Contact your supplier or distributor. Consult latest *Chemical Week Buyers' Guide*TM for a suppliers list.

R 1
I 2
S 2*
K 4
* Skin absorption



NFPA
HMIS
H 2
F 3
R 1
PPG†
† Sec. 8

Cautions: Inhalation of automotive gasoline vapors can cause intense burning in throat and lungs, central nervous system (CNS) depression, and possible fatal pulmonary edema. Gasoline is a dangerous fire and explosion hazard when exposed to heat and flames.

Section 2. Ingredients and Occupational Exposure Limits

Automotive gasoline, lead-free*

1990 OSHA PELs

3-hr TWA: 300 ppm, 900 mg/m³

15-min STEL: 500 ppm, 1500 mg/m³

1990-91 ACGIH TLVs

TWA: 300 ppm, 890 mg/m³

STEL: 500 ppm, 1480 mg/m³

1990 NIOSH REL

None established

1985-86 Toxicity Data*

Man, inhalation, TC₅₀: 900 ppm/1 hr; toxic effects include sense organs and special senses (conjunctiva irritation), behavioral (hallucinations, distorted perceptions), lungs, thorax, or respiration (cough)

Human, eye: 140 ppm/8 hr; toxic effects include mild irritation

Rat, inhalation, LC₅₀: 300 g/m³/5 min

* A typical modern gasoline composition is 80% paraffins, 14% aromatics, and 6% olefins. The mean benzene content is approximately 1%. Other additives include sulfur, phosphorus, and MTBE.

† See NIOSH, *RTECS* (LX3300000), for additional toxicity data.

Section 3. Physical Data

Boiling Point: Initially, 102 °F (39 °C); after 10% distilled, 140 °F (60 °C); after 50% distilled, 230 °F (110 °C); after 90% distilled, 338 °F (170 °C); final boiling point, 399 °F (204 °C)

Vapor Density (air = 1): 3.0 to 4.0

Density/Specific Gravity: 0.72 to 0.76 at 60 °F (15.6 °C)

Water Solubility: Insoluble

Appearance and Odor: A clear (gasoline may be colored with dye), mobile liquid with a characteristic odor recognizable at about 10 ppm in air.

Section 4. Fire and Explosion Data

Flash Point: -45 °F (-43 °C)

Autoignition Temperature: 536 to 853 °F (280 to 456 °C)

LEL: 1.3% v/v

UEL: 6.0% v/v

Extinguishing Media: Use dry chemical, carbon dioxide, or alcohol foam as extinguishing media. Use of water may be ineffective to extinguish fire, but use water spray to knock down vapors and to cool fire-exposed drums and tanks to prevent pressure rupture. Do not use a solid stream of water since it may spread the fuel.

Unusual Fire or Explosion Hazards: Automobile gasoline is an OSHA Class IB flammable liquid and a dangerous fire and explosion hazard when exposed to heat and flames. Vapors can flow to an ignition source and flash back. Automobile gasoline can also react violently with oxidizing agents.

Special Fire-fighting Procedures: Isolate hazard area and deny entry. Since fire may produce toxic fumes, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in pressure-demand or positive-pressure mode, and full protective clothing. When the fire is extinguished, use nonsparking tools for cleanup. Be aware of runoff from fire control methods. Do not release to sewers or waterways.

Section 5. Reactivity Data

Stability/Polymerization: Automotive gasoline is stable at room temperature in closed containers under normal storage and handling conditions. Hazardous polymerization cannot occur.

Chemical Incompatibilities: Automotive gasoline can react with oxidizing materials such as peroxides, nitric acid, and perchlorates.

Conditions to Avoid: Avoid heat and ignition sources.

Hazardous Products of Decomposition: Thermal oxidative decomposition of automotive gasoline can produce oxides of carbon and partially oxidized hydrocarbons.

Section 6. Health Hazard Data

Carcinogenicity: In 1990 reports, the IARC list gasoline as a possible human carcinogen (Group 2B). Although the IARC has assigned an overall evaluation to gasoline, it has not assigned an overall evaluation to specific substances within this group (inadequate human evidence).

Summary of Risks: Gasoline vapors are considered moderately poisonous. Vapor inhalation can cause central nervous system (CNS) depression and mucous membrane and respiratory tract irritation. Brief inhalations of high concentrations can cause a fatal pulmonary edema. Reported responses to gasoline vapor concentrations are: 160 to 270 ppm causes eye and throat irritation in several hours; 500 to 900 ppm causes eye, nose, and throat irritation, and dizziness in 1 hr; and 2000 ppm produces mild anesthesia in 30 min. Higher concentrations are intoxicating in 4 to 10 minutes. If large areas of skin are exposed to gasoline, toxic amounts may be absorbed. Repeated or prolonged skin exposure causes dermatitis. Certain individuals may develop hypersensitivity. Ingestion can cause CNS depression. Pulmonary aspiration after ingestion can cause severe pneumonitis. In adults, ingestion of 20 to 50 g gasoline may produce severe symptoms of poisoning.

Medical Conditions Aggravated by Long-Term Exposure: None reported.

Target Organs: Skin, eye, respiratory and central nervous systems.

Primary Entry Routes: Inhalation, ingestion, skin contact.

Acute Effects: Acute inhalation produces intense nose, throat, and lung irritation; headaches; blurred vision; conjunctivitis; flushing of the face; mental confusion; staggering gait; slurred speech; and unconsciousness, sometimes with convulsions. Ingestion causes inebriation (drunkenness), vomiting, dizziness, fever, drowsiness, confusion, and cyanosis (a blue to dark purplish coloration of skin and mucous membrane caused by lack of oxygen). Aspiration causes choking, cough, shortness of breath, increased rate of respiration, excessively rapid heartbeat, fever, bronchitis, and pneumonitis. Other symptoms following acute exposure include acute hemorrhage of the pancreas, fatty degeneration of the liver and kidneys, and passive congestion of spleen.

Chronic Effects: Chronic inhalation results in appetite loss, nausea, weight loss, insomnia, and unusual sensitivity (hyperesthesia) of the distal extremities followed by motor weakness, muscular degeneration, and diminished tendon reflexes and coordination. Repeated skin exposure can cause blistering, drying, and lesions.

FIRST AID

Eyes: Gently lift the eyelids and flush immediately and continuously with flooding amounts of water until transported to an emergency medical facility. Consult a physician immediately.

Skin: Quickly remove contaminated clothing. Rinse with flooding amounts of water for at least 15 min. For reddened or blistered skin, consult a physician. Wash affected area with soap and water.

Inhalation: Remove exposed person to fresh air and support breathing as needed.

Ingestion: Never give anything by mouth to an unconscious or convulsing person. If ingested, *do not induce vomiting* due to aspiration hazard.

Give conscious victim a mixture of 2 tablespoons of activated charcoal mixed in 8 oz of water to drink. Consult a physician immediately.

After first aid, get appropriate in-plant, paramedic, or community medical support.

Section 7. Spill, Leak, and Disposal Procedures

Spill/Leak: Notify safety personnel, evacuate all unnecessary personnel, remove heat and ignition sources, and provide maximum explosion-proof ventilation. Cleanup personnel should protect against vapor inhalation and liquid contact. Use nonsparking tools. Take up small spills with sand or other noncombustible adsorbent. Dike storage areas to control leaks and spills. Follow applicable OSHA regulations (29 CFR 1910.120).

Aquatic Toxicity: Bluegill, freshwater, LC₅₀, 8 ppm/96 hr.

Disposal: Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

PA Designations

CRA Hazardous Waste (40 CFR 261.21): Characteristic of ignitability

CERCLA Hazardous Substance (40 CFR 302.4): Not listed

SARA Extremely Hazardous Substance (40 CFR 355): Not listed

SARA Toxic Chemical (40 CFR 372.65): Not listed

OSHA Designations

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). Since contact lens use in industry is controversial, establish your own policy.

Respirator: Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a NIOSH-approved respirator. There are no specific NIOSH recommendations. However, for vapor concentrations not immediately dangerous to life or health, use chemical cartridge respirator equipped with organic vapor cartridge(s), or a supplied-air 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 prolonged or repeated skin contact. Materials such as neoprene or polyvinyl alcohol provide excellent/good resistance for protective clothing. Note: Resistance of specific materials can vary from product to product.

Ventilation: Provide general and local explosion-proof exhaust 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.⁽¹⁹⁾

Safety Stations: Make available in the work area emergency eyewash stations, safety/quick-drench showers, and washing facilities.

Contaminated Equipment: Remove this material from your shoes and equipment. Launder contaminated clothing before wearing.

Comments: Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9. Special Precautions and Comments

Storage Requirements: Store in closed containers in a cool, dry, well-ventilated area away from heat and ignition sources and strong oxidizing agents. Protect containers from physical damage. Avoid direct sunlight. Storage must meet requirements of OSHA Class IB liquid. Outside or detached storage preferred.

Engineering Controls: Avoid vapor inhalation and skin or eye contact. Consider a respiratory protection program that includes regular training, maintenance, inspection, and evaluation. Indoor use of this material requires explosion-proof exhaust ventilation to remove vapors. Only use gasoline as a fuel source due to its volatility and flammable/explosive nature. Practice good personal hygiene and housekeeping procedures. Wear clean work clothing daily.

Transportation Data (49 CFR 172.101, .102)

OT Shipping Name: Gasoline (including casing-head and natural)

DOT Hazard Class: Flammable liquid

ID No.: UN1203

DOT Label: Flammable liquid

DOT Packaging Exceptions: 173.118

DOT Packaging Requirements: 173.119

IMO Shipping Name: Gasoline

IMO Hazard Class: 3.1

ID No.: UN1203

IMO Label: Flammable liquid

IMDG Packaging Group: II

MSDS Collection References: 26, 73, 89, 100, 101, 103, 124, 126, 127, 132, 133, 136, 138, 140, 143, 146, 153, 159

Prepared by: M Allison, BS, Industrial Hygiene **Review:** DJ Wilson, CIH; **Medical Review:** W Silverman, MD; **Edited by:** JR Stuart, MS

W I T C O M A T E R I A L S A F E T Y D A T A S H E E T

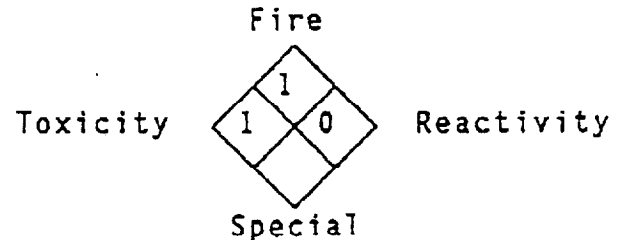
AMALIE MULTI-PURPOSE LS GEAR LUBRICANT

PAGE I

Product Code: 473 6752

NFPA HAZARD RATING

- 4 - Extreme
- 3 - High
- 2 - Moderate
- 1 - Slight
- 0 - Insignificant



DIVISION AND LOCATION---SECTION I

Division: AMALIE REFINING COMPANY

Location: BRADFORD, PENNSYLVANIA

ONE AMALIE WAY, BRADFORD, PA, 16701

Emergency Telephone Number: (814) 368-6111

Transportation Emergency: CHEMTREC I-(800) 424-9300 (U.S. and Canada)

CHEMICAL AND PHYSICAL PROPERTIES---SECTION II

Chemical Name:

petroleum hydrocarbon plus additives

Formula: not applicable

Hazardous Decomposition Products:

carbon monoxide and carbon dioxide from burning.
oxides of phosphorous from burning
oxides of sulfur

Incompatibility (Keep away from):

strong oxidizers such as hydrogen peroxide, bromine, and chromic acid.

Toxic and Hazardous Ingredients:

none

Form: liquid

Odor: pungent, sulfur type

Appearance: viscous liquid

Color: green to brown

Specific Gravity (water=1): .89

Boiling Point: greater than 330°C (625°F)

Melting Point: -18°C (0°F)

Solubility in Water (by weight %): 0 at 20°C

Volatile (by weight %): 0

Evaporation Rate: 0

Vapor Pressure (mm Hg at 20°C): 0

Vapor Density (air=1): not volatile

pH (as is): not applicable

Stability: Product is stable under normal conditions

Viscosity SUS at 100°F: Less than 100

(Continued on next page)

WITCO MATERIAL SAFETY DATA SHEET

WALIE MULTI-PURPOSE LS GEAR LUBRICANT

PAGE 2

Product Code: 473 6752

FIRE AND EXPLOSION DATA---SECTION III

Special Fire Fighting Procedures:

Do not use water except as fog.

Unusual Fire and Explosion Hazards:

none

Flashpoint: (Method Used) Cleveland open cup greater than 190°C (375°F)Flammable limits %: not applicableExtinguishing agents:Drychemical or Waterfog or CO₂ or Foam

Closed containers exposed to fire may be cooled with water.

HEALTH HAZARD DATA---SECTION IV

Permissible concentrations (air):If used in applications where a mist may be generated, observe a TWA/PEL of 5 mg/m³ for mineral oil mist (OSHA and ACGIH).Chronic effects of overexposure:

Prolonged or repeated skin contact may cause dermatitis (skin irritation)

Acute toxicological properties:

no data available

Emergency First Aid Procedures:Eyes: Immediately flush with large quantities of water for at least 15 minutes and call a physician.Skin Contact: Remove excess with cloth or paper. Wash thoroughly with soap and water.Inhalation: Remove victim to fresh air. Call a physician.If Swallowed: Call a physician immediately. DO NOT induce vomiting. (Vomiting may cause aspiration into lungs resulting in chemical pneumonia.)

SPECIAL PROTECTION INFORMATION---SECTION V

Ventilation Type Required (Local, mechanical, special):

Local if necessary to maintain allowable PEL(permissible exposure limit) or TLV(threshold limit value)

Respiratory Protection (Specify type):

Use NIOSH/MSHA certified respirator with dual organic vapor/mist and particulates cartridge if vapor concentration exceeds permissible exposure limit.

Protective Gloves:

neoprene type

Eye Protection:

chemical safety goggles

Other Protective Equipment:

none

(Continued on next page)

WITCO MATERIAL SAFETY DATA SHEET

AMALIE MULTI-PURPOSE LS GEAR LUBRICANT

PAGE 3

Product Code: 473 6752

HANDLING OF SPILLS OR LEAKS---SECTION VI

Procedures for Clean-Up:

Transfer bulk of mixture into another container. Absorb residue with an inert material such as earth, sand, or vermiculite. Sweep up and dispose as solid waste in accordance with local, state, and federal regulations.

Waste Disposal:

Dispose of in accordance with all applicable federal, state and local regulations.

SPECIAL PRECAUTIONS---SECTION VII

Precautions to be taken in handling and storage:

Do not handle or store at temperatures over

Maximum Storage Temperature: 38°C (100°F)

TRANSPORTATION DATA---SECTION VIII

D.O.T.: Not Regulated

Reportable Quantity: not applicable

Freight Classification: Petroleum Lubricating Oil

Special Transportation Notes:

none

COMMENTS

*

STATE REGULATORY INFORMATION:

Pennsylvania Worker And Community Right To Know Act: This product contains the following ingredient(s).

Hydrocarbon oils CAS. NO. 8020-83-5

The additive mixtures in this product have been declared a trade secret by the additive manufacturers.

Prepared by: Robert Kellam

Title: Group Supervisor, Lubricants Testing, Maintenance, and Safety

Original Date: 05/20/81 Sent to: _____

Revision Date: 07/19/94 _____

Supersedes : 04/01/93 _____

Date Sent : _____

(Continued on next page)

W I T C O M A T E R I A L S A F E T Y D A T A S H E E T

AMALIE MULTI-PURPOSE LS GEAR LUBRICANT

PAGE 4

Product Code: 473 6752

We believe the statements, technical information and recommendations contained herein are reliable, but they are given without warranty or guarantee of any kind, express or implied, and we assume no responsibility for any loss, damage, or expense, direct or consequential, arising out of their use.

WITCO MATERIAL SAFETY DATA SHEET

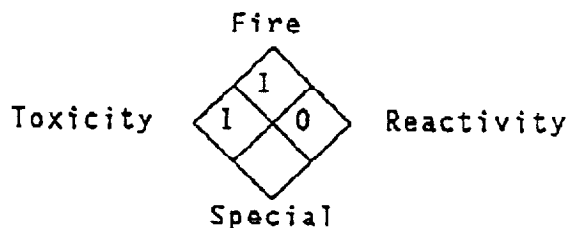
Kendall C-915 Grease

PAGE 1

Product Code: J63 7834

NFPA HAZARD RATING

- 4 - Extreme
- 3 - High
- 2 - Moderate
- 1 - Slight
- 0 - Insignificant



DIVISION AND LOCATION---SECTION I

Division: KENDALL REFINING COMPANYLocation: BRADFORD, PENNSYLVANIA

77 N. KENDALL AVE., BRADFORD, PA, 16701

Emergency Telephone Number: (814) 368-6111Transportation Emergency: CHEMTREC 1-(800) 424-9300 (U.S. and Canada)

CHEMICAL AND PHYSICAL PROPERTIES---SECTION II

Chemical Name:

petroleum hydrocarbon and calcium stearate

Formula: not applicableHazardous Decomposition Products:

carbon monoxide and carbon dioxide from burning.

Incompatibility (Keep away from):

strong oxidizers such as hydrogen peroxide, bromine, and chromic acid.

Toxic and Hazardous Ingredients:

none

Form: semi-solidOdor: mineral oilAppearance: greaseColor: blackSpecific Gravity (water=1): .94Boiling Point: greater than 260°C (500°F)Melting Point: not applicableSolubility in Water (by weight %): negligibleVolatile (by weight %): negligibleEvaporation Rate: negligibleVapor Pressure (mm Hg at 20°C): negligibleVapor Density (air=1): not applicablepH (as is): not applicableStability: Product is stable under normal conditionsViscosity SUS at 100°F: Greater than or = to 100

FIRE AND EXPLOSION DATA---SECTION III

Special Fire Fighting Procedures:

Do not use water except as fog.

Unusual Fire and Explosion Hazards:

none

(Continued on next page)

WITCO MATERIAL SAFETY DATA SHEET

Kendall C-915 Grease

PAGE 2

Product Code: J63 7834

(Section III continued)

Flashpoint: (Method Used) ASTM D92 greater than 210°C (410°F)Flammable limits %: not applicableExtinguishing agents:Drychemical or Waterfog or CO₂ or Foam or Sand/Earth
Water may cause frothing.

Closed containers exposed to fire may be cooled with water.

HEALTH HAZARD DATA---SECTION IVPermissible concentrations (air):

not applicable

Chronic effects of overexposure:

Extended skin contact may cause dermatitis to some individuals.

Acute toxicological properties:

no data available

Emergency First Aid Procedures:Eyes: Immediately flush with large quantities of water for at least 15
minutes and call a physician.Skin Contact: Remove excess with cloth or paper. Wash thoroughly with soap and
water.Inhalation: Remove victim to fresh air. Call a physician.If Swallowed: Contact a physician immediately.SPECIAL PROTECTION INFORMATION---SECTION VVentilation Type Required (Local, mechanical, special):

none required

Respiratory Protection (Specify type):

none required

Protective Gloves:

rubber

Eye Protection:

chemical safety goggles

Other Protective Equipment:

none

HANDLING OF SPILLS OR LEAKS---SECTION VIProcedures for Clean-Up:Transfer bulk of mixture into another container. Absorb residue with an inert
material such as earth, sand, or vermiculite. Sweep up and dispose as solid waste
in accordance with local, state, and federal regulations.Waste Disposal:Dispose of in accordance with all applicable federal, state and local
regulations.

(Continued on next page)

WITCO MATERIAL SAFETY DATA SHEET

Kendall C-915 Grease

PAGE 3

Product Code: J63 7834

SPECIAL PRECAUTIONS---SECTION VII

Precautions to be taken in handling and storage:

Do not handle or store at temperatures over
Maximum Storage Temperature: 38°C (100°F)

TRANSPORTATION DATA---SECTION VIII

D.O.T.: Not RegulatedReportable Quantity: not applicableFreight Classification: Petroleum Lubricating GreaseSpecial Transportation Notes:

COMMENTS

* STATE REGULATORY INFORMATION:
Pennsylvania Worker And Community Right To Know Act: This product contains the following ingredient(s).
Hydrocarbon oils CAS. NO. 8020-83-5
Partial contents are withheld as trade secret information.

Prepared by: Robert KellamTitle: Group Supervisor, Lubricants Testing, Maintenance, and SafetyOriginal Date: 06/18/82 Sent to: _____Revision Date: 08/09/94Supersedes: 04/01/93Date Sent: _____

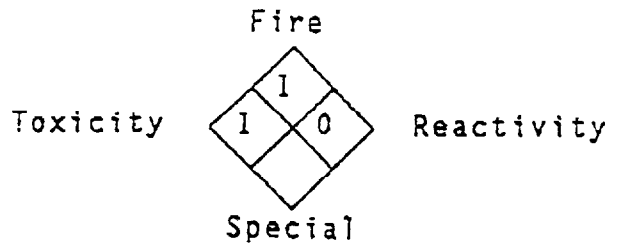
We believe the statements, technical information and recommendations contained herein are reliable, but they are given without warranty or guarantee of any kind, express or implied, and we assume no responsibility for any loss, damage, or expense, direct or consequential, arising out of their use.

WITCO MATERIAL SAFETY DATA SHEET

KENDALL FOUR SEASONS HYDRAULIC FLUID
AW-22,32,46,68,100 and 150

PAGE I

NFPA HAZARD RATING
4 - Extreme
3 - High
2 - Moderate
1 - Slight
0 - Insignificant



 DIVISION AND LOCATION---SECTION I

Division: KENDALL REFINING COMPANY

Location: BRADFORD, PENNSYLVANIA
77 N. KENDALL AVE., BRADFORD, PA, 16701

Emergency Telephone Number: (814) 368-6111

Transportation Emergency: CHEMTREC 1-(800) 424-9300 (U.S. and Canada)

 CHEMICAL AND PHYSICAL PROPERTIES---SECTION II

Chemical Name:

petroleum hydrocarbon

Formula: not applicable

Hazardous Decomposition Products:

carbon monoxide and carbon dioxide from burning.
oxides of phosphorous from burning
oxides of sulfur

Incompatibility (Keep away from):

strong oxidizers such as hydrogen peroxide, bromine, and chromic acid.

Toxic and Hazardous Ingredients:

none

Form: liquid

Odor: bland

Appearance: liquid

Color: amber

Specific Gravity (water=1): .87 to .88

Boiling Point: greater than 330°C (625°F)

Melting Point: less than -18°C (0°F)

Solubility in Water--(by weight %): 0 at 20°C

Volatile (by weight %): 0

Evaporation Rate: 0

Vapor Pressure (mm Hg at 20°C): 0

Vapor Density (air=1): not volatile

pH (as is): not applicable

Stability: Product is stable under normal conditions

Viscosity SUS at 100°F: Greater than or = to 100

(Continued on next page)

WITCO MATERIAL SAFETY DATA SHEET

KENDALL FOUR SEASONS HYDRAULIC FLUID
AW-22,32,46,68,100 and 150

PAGE 2

FIRE AND EXPLOSION DATA---SECTION III

Special Fire Fighting Procedures:

Do not use water except as fog.

Unusual Fire and Explosion Hazards:

none

Flashpoint: (Method Used) Cleveland open cup greater than 200°C (390°F)**Flammable limits %:** not applicable**Extinguishing agents:**Drychemical or Waterfog or CO₂ or Foam

Closed containers exposed to fire may be cooled with water.

HEALTH HAZARD DATA---SECTION IV

Permissible concentrations (air):

see COMMENTS section

Chronic effects of overexposure:

no data available

Acute toxicological properties:

no data available

Emergency First Aid Procedures:**Eyes:** Immediately flush with large quantities of water for at least 15 minutes and call a physician.**Skin Contact:** Remove excess with cloth or paper. Wash thoroughly with soap and water.**Inhalation:** Remove victim to fresh air. Call a physician.**If Swallowed:** Contact a physician immediately.

SPECIAL PROTECTION INFORMATION---SECTION V

Ventilation Type Required (Local, mechanical, special):

see COMMENTS section

Respiratory Protection (Specify type): -

Use NIOSH/MSHA certified respirator with dual organic vapor/mist and particulates cartridge if vapor concentration exceeds permissible exposure limit.

Protective Gloves:

neoprene type

Eye Protection:

chemical safety goggles

Other Protective Equipment:

none

(Continued on next page)

WITCO MATERIAL SAFETY DATA SHEET

KENDALL FOUR SEASONS HYDRAULIC FLUID
AW-22,32,46,68,100 and 150

PAGE 3

HANDLING OF SPILLS OR LEAKS---SECTION VIProcedures for Clean-Up:

Transfer bulk of mixture into another container. Absorb residue with an inert material such as earth, sand, or vermiculite. Sweep up and dispose as solid waste in accordance with local, state, and federal regulations.

Waste Disposal:

Dispose of in accordance with all applicable federal, state and local regulations.

SPECIAL PRECAUTIONS---SECTION VIIPrecautions to be taken in handling and storage:

Do not handle or store at temperatures over

Maximum Storage Temperature: 38°C (100°F)

TRANSPORTATION DATA---SECTION VIII

D.O.T.: Not Regulated

Reportable Quantity: not applicable

Freight Classification: Petroleum Lubricating Oil

Special Transportation Notes:

none

ENVIRONMENTAL/SAFETY REGULATIONS---SECTION IXSection 313 (Title III Superfund Amendment and Reauthorization Act):

This product does not contain any chemical in sufficient quantity to be subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

COMMENTS

If used in applications where a mist may be generated, observe a TWA/PEL of 5 mg/m³ for mineral oil mist (OSHA and ACGIH).

*

STATE REGULATORY INFORMATION:

Pennsylvania Worker And Community Right To Know Act: This product contains the following ingredient(s).

Hydrocarbon oils CAS. NO. 8020-83-5

The additive mixtures in this product have been declared a trade secret by the additive manufacturers.

(Continued on next page)

W I T C O M A T E R I A L S A F E T Y D A T A S H E E T

KENDALL FOUR SEASONS HYDRAULIC FLUID
W-22,32,46,68,100 and 150

PAGE 4

(COMMENTS continued)

Prepared by: Robert Kellam
Title: Group Supervisor, Lubricants Testing, Maintenance, and Safety
Original Date: 05/24/89 Sent to:
Revision Date: 08/09/94
Supersedes : 04/01/93
Date Sent :

We believe the statements, technical information and recommendations contained herein are reliable, but they are given without warranty or guarantee of any kind, express or implied, and we assume no responsibility for any loss, damage, or expense, direct or consequential, arising out of their use.



LIQUID AIR CORPORATION
ALPHAGAZ DIVISION

ALPHAGAZ

Specialty Gas

Material Safety Data Sheet

PRODUCT NAME Hydrogen Cyanide		
TELEPHONE (415) 977-8500 EMERGENCY RESPONSE INFORMATION ON PAGE 2		
LIQUID AIR CORPORATION ALPHAGAZ DIVISION One California Plaza, Suite 350 2121 N. California Blvd. Walnut Creek, California 94598	TRADE NAME AND SYNONYMS Hydrogen Cyanide, Hydrocyanic acid	CAS Number: 74-90-8
	CHEMICAL NAME AND SYNONYMS Hydrogen Cyanide, Formonitrile	
ISSUE DATE OCTOBER 1, 1985 AND REVISIONS CORPORATE SAFETY DEPT.	FORMULA HCN	MOLECULAR WEIGHT 27.018 CHEMICAL FAMILY Cyanide compound

HEALTH HAZARD DATA

TIME WEIGHTED AVERAGE EXPOSURE LIMIT Pure hydrogen cyanide is a liquid, is unstable, and must be stabilized with the addition of sulfuric or phosphoric acid. Liquid Air Corporation
(Continued on last page.)

SYMPTOMS OF EXPOSURE
Inhalation: At approximately 1 molar PPM concentration, the detection of its odor of "bitter almonds" is possible.
At levels of 20-40 molar PPM, slight symptoms of digestive irritation, mental confusion, and slowing of the breathing rate are evident after several hours of exposure. Cyanosis also appears even though the circulatory function is only slightly impaired.
(Continued on last page.)

TOXICOLOGICAL PROPERTIES
It is one of the quickest acting poisons; It hinders the vital oxydation-reduction reactions in the body resulting in anoxia affecting the central nervous system resulting in respiratory paralysis.

Listed as Carcinogen or Potential Carcinogen	National Toxicology Program	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	I.A.R.C. Monographs	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	OSHA	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
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RECOMMENDED FIRST AID TREATMENT
PROMPT RENDERING OF FIRST AID IS IMPERATIVE.
PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE TO HYDROGEN CYANIDE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS AND BE COGNIZANT OF EXTREME FIRE AND EXPLOSION HAZARD.
Treatment is based on forming methemaglobin in the blood which complexes with the cyanide ion rendering it incapable of acting as a poison. It is reported that up to 20% the hemoglobin can be converted to methemaglobin without danger of anoxia. The formation of methemoglobin is accomplished by injecting intravenously 10 ml of a sterile 3% solution of sodium nitrate followed immediately by 50 ml of a 25% sterile solution of
(Continued on last page.)

Judgements as to the suitability of information herein for purchaser's purposes are necessarily purchaser's responsibility. Therefore, although reasonable care has been taken in the preparation of such information, Liquid Air Corporation extends no warranties, makes no representations, and assumes no responsibility as to the accuracy or suitability of such information for application to purchaser's intended purposes or consequences of its use. Since Liquid Air Corporation has no control over the use of this product, it assumes no liability for damage or loss of product resulting from proper (or improper) use or application of the product. Data Sheets may be changed from time to time. Be sure to consult the latest edition.

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES

Hydrogen cyanide is slowly polymerized to ammonia. In the presence of moisture, oxides, potassium and bases, this exothermic, autocatalytic reaction is accelerated. Acids retard this reaction.

PHYSICAL DATA

BOILING POINT 78.3°F (25.7°C)	LIQUID DENSITY AT BOILING POINT 41.7 lb/ft ³ (668 kg/m ³)
VAPOR PRESSURE @ 70°F (21.1°C) 12.3 psia (85 kPa)	GAS DENSITY AT 70°F 1 atm .071 lb/ft ³ (1.14 kg/m ³)
SOLUBILITY IN WATER @ 68°F (20°C) Bunsen coefficient = 224	FREEZING POINT 8.1°F (-13.3°C)
APPEARANCE AND ODOR Colorless liquid with a bitter almond odor. Specific gravity @70°F (Air = 1.0) is .95.	

FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (METHOD USED) -0.4°F (-18°C) Closed cup	AUTO IGNITION TEMPERATURE 1000°F (538°C)	FLAMMABLE LIMITS % BY VOLUME LEL = 5.6 UEL = 40	
EXTINGUISHING MEDIA Water, carbon dioxide		ELECTRICAL CLASSIFICATION Class 1, Group not specified	
SPECIAL FIRE FIGHTING PROCEDURES			
UNUSUAL FIRE AND EXPLOSION HAZARDS			

REACTIVITY DATA

STABILITY Unstable	X	CONDITIONS TO AVOID See Hazardous Polymerization below
Stable		
INCOMPATIBILITY (Materials to avoid) Moisture, cyanides, potassium or bases		
HAZARDOUS DECOMPOSITION PRODUCTS Ammonia		
HAZARDOUS POLYMERIZATION May Occur	X	CONDITIONS TO AVOID Pure HCN slowly polymerizes to ammonia. With incompatible materials this reaction is accelerated. Acids are added to pure HCN to retard this exothermic polymerization.
Will Not Occur		

SPILL OR LEAK PROCEDURES**STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED**

Evacuate all personnel from affected area. Use appropriate protective equipment. If leak is in user's equipment, be certain to purge piping with an inert gas prior to attempting repairs. If leak is in container or container valve, contact the closest Liquid Air Corporation location.

WASTE DISPOSAL METHOD

Do not attempt to dispose of residual or unused quantities. Return in the shipping container properly labeled, with any valve outlet plugs or caps secured and valve protection cap in place to Liquid Air Corporation for proper disposal. For emergency disposal, contact the closest Liquid Air Corporation location.

EMERGENCY RESPONSE INFORMATION

IN CASE OF EMERGENCY INVOLVING THIS MATERIAL, CALL DAY OR NIGHT (800) 231-1366
OR CALL CHEMTREC AT (800) 424-9300

SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type) Positive pressure air line with mask or self-contained breathing apparatus should be available for emergency use.		
VENTILATION Hood with forced ventilation.	LOCAL EXHAUST To prevent accumulation above the TWA.	SPECIAL
	MECHANICAL (Gen.)	OTHER
PROTECTIVE GLOVES Rubber		
EYE PROTECTION Safety goggles or glasses		
OTHER PROTECTIVE EQUIPMENT Safety shoes, safety shower		

SPECIAL PRECAUTIONS*

SPECIAL LABELING INFORMATION DOT Shipping Name: Hydrocyanic acid, liquefied (RQ 10/4.54) I.D. No.: NA 1051 DOT Shipping Label: Poison gas and flammable gas DOT Hazard Class: Poison A
SPECIAL HANDLING RECOMMENDATIONS Use only in well-ventilated areas. Valve protection caps must remain in place unless container is secured with valve outlet piped to use point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure reducing regulator when connecting cylinder to lower pressure (<3,000 psig) piping or systems. Do not heat cylinder by any means to increase the discharge rate of product from the cylinder. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder. For additional handling recommendations consult L'Air Liquide's Encyclopedie de Gaz or Compressed Gas Association Pamphlet P-1.
SPECIAL STORAGE RECOMMENDATIONS Protect cylinders from physical damage. Store in cool, dry, well-ventilated area of non-combustible construction away from heavily trafficked areas and emergency exits. Do not allow the temperature where cylinders are stored to exceed 130F (54C). Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Full and empty cylinders should be segregated. Use a "first in-first out" inventory system to prevent full cylinders being stored for excessive periods of time. Post "No Smoking or Open Flames" signs in the storage area. There should be no sources of ignition in the storage or use area. It may also be advisable to post signs indicating that a poison is stored in this area. For additional storage recommendations consult L'Air Liquide's Encyclopedie de Gaz or Compressed Gas Association Pamphlet P-1.
SPECIAL PACKAGING RECOMMENDATIONS Most common structural materials are compatible with hydrogen cyanide. Equipment for containing HCN must be kept scrupulously dry and leak-tight.
OTHER RECOMMENDATIONS OR PRECAUTIONS Because of hydrogen cyanide's extreme toxicity, it is recommended that a continuous monitoring system with alarm be installed to monitor the atmosphere wherever hydrogen cyanide is being handled or used. The system should have sensitivity and accuracy to a level at least one half of the TWA. Earth-ground and bond all lines and equipment associated with the hydrogen cyanide system. Electrical equipment should be non-sparking or explosion proof. Compressed gas cylinders should not be refilled except by qualified producers of compressed gases. Shipment of a compressed gas cylinder which has not been filled by the owner or with his (written) consent is a violation of Federal Law (49CFR).



LIQUID AIR CORPORATION
ALPHA GAZ DIVISION

ADDITIONAL DATA

TIME WEIGHTED AVERAGE EXPOSURE LIMIT: (Continued)

only offers HCN for sale as low concentrations of vapor diluted in other gases.
The Ceiling Limit for hydrogen cyanide is 10 molar PPM. (ACGIH, 1984-85)
TWA (skin) 10 molar PPM (OSHA, 1985).

SYMPTOMS OF EXPOSURE: (Continued)

- 135 Molar PPM - death within 30 minutes of exposure.
- 180 Molar PPM - death within 10 minutes of exposure.
- 270 Molar PPM - death within 5 minutes of exposure.

RECOMMENDED FIRST AID TREATMENT: (Continued)

sodium thiosulfate - both solutions injected at a rate of 2.5-5.0 ml per minute.
if the victim is unconscious, assisted respiration should be started immediately
on clearing the contaminated area.

For further information refer to L'Air Liquide's Encyclopedie des Gaz.



LIQUID AIR CORPORATION
ALPHAGAZ DIVISION

ALPHAGAZ

Specialty Gas

Material Safety Data Sheet

		PRODUCT NAME Hydrogen Sulfide	
		TELEPHONE (415) 977-6500 EMERGENCY RESPONSE INFORMATION ON PAGE 2	
LIQUID AIR CORPORATION ALPHAGAZ DIVISION One California Plaza, Suite 350 2121 N. California Blvd. Walnut Creek, California 94598	TRADE NAME AND SYNONYMS Hydrogen Sulfide		CAS NUMBER 7783-06-04
	CHEMICAL NAME AND SYNONYMS Hydrogen Sulfide		
ISSUE DATE OCTOBER 1, 1985 AND REVISIONS CORPORATE SAFETY DEPT.	FORMULA H ₂ S	MOLECULAR WEIGHT 34.06	CHEMICAL FAMILY Nonmetal hydride

HEALTH HAZARD DATA

TIME WEIGHTED AVERAGE EXPOSURE LIMIT

10 molar PPM; STEL = 15 molar PPM (ACGIH, 1984-85)

SYMPTOMS OF EXPOSURE

Continuous exposure to low (15-50 PPM) concentrations will generally cause irritation to mucous membranes and conjunctivae of the eyes. It may also cause headache, dizziness or nausea. Higher concentrations (200-300 PPM) can result in respiratory arrest leading to coma or unconsciousness. Exposures for more than 30 minutes at concentrations of greater than 700 PPM have been fatal. Continuous inhalation of low concentrations may cause olfactory fatigue or paralysis rendering the detection of its presence by odor ineffective.

TOXICOLOGICAL PROPERTIES

Inhalation of hydrogen sulfide is highly toxic. It is also an irritant to mucus tissue, membranes and the conjunctivae of the eyes. Continued exposure renders the olfactory sensors inoperative. Toxicologically its reaction with enzymes in the blood stream inhibit cell respiration resulting in pulmonary paralysis, sudden collapse and death. This overshadows its irritant effect on mucous membranes and tissues which at worst will cause pulmonary edema or conjunctival lesions.

Listed as Carcinogen
or Potential Carcinogen

National Toxicology Yes
Program No

I.A.R.C. Yes
Monographs No

OSHA Yes
No

RECOMMENDED FIRST AID TREATMENT

PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE TO HYDROGEN SULFIDE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS. RESCUE PERSONNEL SHOULD RECOGNIZE THE HAZARDS OF OVEREXPOSURE DUE TO OLFACTORY FATIGUE.

Inhalation: Extreme fire hazard when rescuing semi-conscious or unconscious persons due to flammability of hydrogen sulfide. Avoid use of rescue equipment which might contain ignition sources or cause static discharge. Move affected person to an uncontaminated area. If breathing has stopped, give assisted respiration. Oxygen or a mixture of 5% carbon dioxide in oxygen should be administered by a qualified person. Keep victim warm and calm. Seek immediate medical assistance. (Continued on last page.)

Judgements as to the suitability of information herein for purchaser's purpose are necessarily purchaser's responsibility. Therefore, although reasonable care has been taken in the preparation of such information, Liquid Air Corporation makes no warranties, makes no representations, and assumes no responsibility as to the accuracy or suitability of such information for application to purchaser's intended purposes or consequences of its use. Since Liquid Air Corporation has no control over the use of this product, it assumes no liability for damage or loss of product resulting from proper (or improper) use or application of the product. Data Sheets may be changed from time to time. Be sure to consult the latest edition.

AG 00244

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES
 Hydrogen sulfide will explode or burn over a wide range of mixtures in air. It becomes dangerously reactive when mixed with concentrated nitric acid or other strong oxidizers such as sulfuric acid. Vapors will combust spontaneously when mixed with vapors of chlorine, oxygen difluoride or nitrogen trifluoride.

PHYSICAL DATA

BOILING POINT -76.4°F (-60.2°C)	LIQUID DENSITY AT BOILING POINT 57.11 lb/ft ³ (914.9 kg/m ³)
VAPOR PRESSURE 266.9 psia (1840 kPa)	GAS DENSITY AT 70°F, 1 atm .091 lbs/ft ³ (1.45 kg/m ³)
SOLUBILITY IN WATER Soluble	FREEZING POINT -122.3°F (-85.7°C)
APPEARANCE AND ODOR Shipped and stored as a liquid under its own vapor pressure. Vapor is colorless with a characteristic "rotten egg" odor. Specific gravity (Air=1.0) is 1.21	

FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (METHOD USED) Gas	AUTO IGNITION TEMPERATURE 554°F (290°C)	FLAMMABLE LIMITS % BY VOLUME LEL: 4.0 UEL: 44.0
EXTINGUISHING MEDIA Carbon dioxide, dry chemical or water spray		ELECTRICAL CLASSIFICATION NEC Class I
SPECIAL FIRE FIGHTING PROCEDURES Shut off flow of gas. Cool surrounding fire-exposed containers with water spray. Fire fighters should use self-contained breathing apparatus.		
UNUSUAL FIRE AND EXPLOSION HAZARDS Hydrogen sulfide is slightly heavier than air so may accumulate in low spots and may "travel" a considerable distance to a flame or other source of ignition.		

REACTIVITY DATA

STABILITY Unstable	CONDITIONS TO AVOID	
Stable	X	Avoid heat, flame or other sources of ignition.
INCOMPATIBILITY (Materials to avoid) Concentrated nitric acid, chlorine, nitrogen trifluoride, oxygen difluoride or other strong oxidizing agents.		
HAZARDOUS DECOMPOSITION PRODUCTS Oxides of sulfur		
HAZARDOUS POLYMERIZATION May Occur	CONDITIONS TO AVOID	
Will Not Occur	X	

SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED Evacuate all personnel from affected area. Use appropriate protective equipment. If leak is in user's equipment, be certain to purge piping with an inert gas prior to attempting repairs. If leak is in container or container valve, contact the closest Liquid Air Corporation location.
WASTE DISPOSAL METHOD Do not attempt to dispose of waste or unused quantities. Return in the shipping container properly labeled, with any valve outlet plugs or caps secured and valve protection cap in place to Liquid Air Corporation for proper disposal. For emergency disposal, contact the closest Liquid Air Corporation location.

EMERGENCY RESPONSE INFORMATION

IN CASE OF EMERGENCY INVOLVING THIS MATERIAL, CALL DAY OR NIGHT (800) 231-1366 OR CALL CHEMTREC AT (800) 424-9300

SPECIAL PROTECTION INFORMATION

Page 3

RESPIRATORY PROTECTION (Specify type) Positive pressure air line with mask or self-contained breathing apparatus should be available for emergency use.		
VENTILATION Hood with forced ventilation.	LOCAL EXHAUST To prevent accumulation above the TWA for H ₂ S	SPECIAL
	MECHANICAL (Gen.)	OTHER
PROTECTIVE GLOVES Neoprene or butyl rubber, PVC, polyethylene		
EYE PROTECTION Safety goggles or glasses		
OTHER PROTECTIVE EQUIPMENT Safety shoes, safety shower, eyewash "fountains"		

SPECIAL PRECAUTIONS*

SPECIAL LABELING INFORMATION DOT Shipping Name: Hydrogen sulfide (RQ-100/45.4) I.D. No.: UN 1053 DOT Hazard Class: Flammable gas DOT Shipping Label: Flammable gas, Poison		
SPECIAL HANDLING RECOMMENDATIONS Use only in well-ventilated areas. Valve protection caps must remain in place unless container is secured with valve outlet piped to use point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure reducing regulator when connecting cylinder to lower pressure (<750 psig) piping or systems. Do not heat cylinder by any means to increase the discharge rate of product from the cylinder. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder. For additional handling recommendations consult L'Air Liquide's Encyclopedie de Gaz or Compressed Gas Association Pamphlet P-1.		
SPECIAL STORAGE RECOMMENDATIONS Protect cylinders from physical damage. Store in cool, dry, well-ventilated area of non-combustible construction away from heavily trafficked areas and emergency exits. Do not allow the temperature where cylinders are stored to exceed 130F (54C). Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Full and empty cylinders should be segregated. Use a "first in, first out" inventory system to prevent full cylinders being stored for excessive periods of time. Post "No Smoking or Open Flames" signs in the storage or use area. There should be no sources of ignition in the storage or use area. For additional storage recommendations consult L'Air Liquide's Encyclopedie de Gaz or Compressed Gas Association Pamphlet P-1.		
SPECIAL PACKAGING RECOMMENDATIONS Many metals corrode rapidly with wet hydrogen sulfide. Anhydrous (water content <-40F or C) hydrogen sulfide can be handled in carbon steel, aluminum, Inconel [®] , Stellite [®] and 304 and 316 stainless steels. Avoid hard steels which are highly stressed since they may be susceptible to hydrogen embrittlement from hydrogen sulfide.		
OTHER RECOMMENDATIONS OR PRECAUTIONS Earth-ground and bond all lines and equipment associated with the hydrogen sulfide system. All electrical equipment should be non-sparking or explosion proof. Do not rely on the olfactory sense to detect the presence of hydrogen sulfide. Analytical devices and instrumentation are readily available for this purpose. Perform frequent analytical tests to be certain that the TWA is not being exceeded. Compressed gas cylinders should not be refilled except by qualified producers of (Continued on last page.)		

*Various Government agencies (i.e., Department of Transportation, Occupational Safety and Health Administration, Food and Drug Administration and others) may have specific regulations concerning the transportation, handling, storage or use of this product which may not be contained herein. The customer or user of this product should be familiar with these regulations.



LIQUID AIR CORPORATION
ALPHAGAZ DIVISION

ADDITIONAL DATA

Recommended First Aid Treatment: (Continued)

Eye Contact: PERSONS WITH POTENTIAL EXPOSURE TO HYDROGEN SULFIDE SHOULD NOT WEAR CONTACT LENSES.

Flush contaminated eye(s) with copious quantities of water. Part eyelids with fingers to assure complete flushing. Continue for at least 15 minutes.

Other Recommendations or Precautions: (Continued)

compressed gases. Shipment of a compressed gas cylinder which has not been filled by the owner or with his (written) consent is a violation of Federal Law (49CFR).



LIQUID AIR CORPORATION
ALPHAGAZ DIVISION

ALPHAGAZ

Specialty Gas

Material Safety Data Sheet

PRODUCT NAME Isobutylene		
TELEPHONE (415) 977-8500 EMERGENCY RESPONSE INFORMATION ON PAGE 2		
LIQUID AIR CORPORATION ALPHAGAZ DIVISION One California Plaza, Suite 350 2121 N. California Blvd. Walnut Creek, California 94596	TRADE NAME AND SYNONYMS Isobutylene	CAS NUMBER 115-11-7
	CHEMICAL NAME AND SYNONYMS Isobutene, Isobutylene, 2-Methylpropene	
ISSUE DATE OCTOBER 1, 1985 AND REVISIONS CORPORATE SAFETY DEPT.	FORMULA (iso) C ₄ H ₈	MOLECULAR WEIGHT 56.03 CHEMICAL FAMILY Monolefin

See last page.

HEALTH HAZARD DATA

TIME WEIGHTED AVERAGE EXPOSURE LIMIT Isobutylene is defined as a simple asphyxiant. Oxygen levels should be maintained at greater than 18 molar percent at normal atmospheric pressure which is equivalent to a partial pressure of 135 mm Hg. (ACGIH, 1984-85)

SYMPTOMS OF EXPOSURE

Inhalation: Moderate concentrations so as to exclude an adequate supply of oxygen to the lungs causes dizziness, drowsiness and eventual unconsciousness. It also has a very mild anesthetic effect which might cause lack of co-ordination or lessened mental alertness.

Skin and Eye Contact: It is mildly irritating to mucous membranes. Due to its rapid rate of evaporation, it can cause tissue freezing or frostbite on dermal contact.

TOXICOLOGICAL PROPERTIES

It has a very mild anesthetic effect; however, the major property is the exclusion of an adequate supply of oxygen to the lungs.

Frostbite effects are a change in color of the skin to gray or white possibly followed by blistering.

Listed as Carcinogen
or Potential Carcinogen

National Toxicology
Program Yes
No

I.A.R.C.
Monographs Yes
No

OSHA Yes
No

RECOMMENDED FIRST AID TREATMENT

PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE TO ISOBUTYLENE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS AND BE COGNIZANT OF EXTREME FIRE AND EXPLOSION HAZARD.

Inhalation: Conscious persons should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the contaminated area is most important. Unconscious persons should be moved to an uncontaminated area, given mouth-to-mouth resuscitation and supplemental oxygen. Medical assistance should be sought immediately.

Dermal Contact or Frostbite: Remove contaminated clothing and flush affected areas
(Continued on last page.)

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES

Isobutylene is flammable over a wide range in air.

PHYSICAL DATA

BOILING POINT 19.18°F (-7.12°C)	LIQUID DENSITY AT BOILING POINT 39.09 lb/ft ³ (626.2 kg/m ³)
VAPOR PRESSURE @ 70°F (21.1°C) = 38.43 psia (265 kPa)	GAS DENSITY AT 70°F 1 atm .148 lb/ft ³ (2.37 kg/m ³)
SOLUBILITY IN WATER Insoluble	FREEZING POINT -220.63°F (-140.35°C)
APPEARANCE AND ODOR Colorless gas with an unpleasant odor similar to that which is emitted when burning anthracite coal. Specific gravity @70°F (Air = 1.0) is 1.98	

FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (METHOD USED) -105°F (-76°C) Closed cup	AUTO IGNITION TEMPERATURE 869°F (465°C)	FLAMMABLE LIMITS % BY VOLUME LEL: 1.8 UEL: 9.6
EXTINGUISHING MEDIA Water, carbon dioxide, dry chemical	ELECTRICAL CLASSIFICATION Class 1, Group not specified	
GENERAL FIRE FIGHTING PROCEDURES If possible, stop the flow of isobutylene. Use water spray to cool surrounding containers.		

UNUSUAL FIRE AND EXPLOSION HAZARDS Isobutylene is heavier than air and may travel a considerable distance to a source of ignition. Should flame be extinguished and flow of gas continue, increase ventilation to prevent flammable mixture formation in low areas or pockets.

REACTIVITY DATA

STABILITY Unstable	CONDITIONS TO AVOID
Stable	X
INCOMPATIBILITY (Material to avoid) Oxidizers	
HAZARDOUS DECOMPOSITION PRODUCTS None	
HAZARDOUS POLYMERIZATION May Occur	CONDITIONS TO AVOID
Will Not Occur	X

SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
Evacuate all personnel from affected area. Use appropriate protective equipment. If leak is in user's equipment, be certain to purge piping with an inert gas prior to attempting repairs. If leak is in container or container valve, contact the closest Liquid Air Corporation location.

WASTE DISPOSAL METHOD
Do not attempt to dispose of waste or unused quantities. Return in the shipping container properly labeled, with any valve outlet plugs or caps secured and valve protection cap in place to Liquid Air Corporation for proper disposal. For

SPECIAL PROTECTION INFORMATION

Page 3

RESPIRATORY PROTECTION (Specify type) Positive pressure air-line with mask or self-contained breathing apparatus should be available for emergency use.		
VENTILATION Hood with forced ventilation	LOCAL EXHAUST To prevent accumulation above the LEL.	SPECIAL
	MECHANICAL (Gen.) In accordance with electrical codes.	OTHER
PROTECTIVE GLOVES Plastic or rubber		
EYE PROTECTION Safety goggles or glasses		
OTHER PROTECTIVE EQUIPMENT Safety shoes, safety shower, eyewash "fountain"		

SPECIAL PRECAUTIONS*

SPECIAL LABELING INFORMATION DOT Shipping Name: Liquefied petroleum gas DOT Shipping Label: Flammable gas	DOT Hazard Class: Flammable gas I.D. No.: UN 1075
SPECIAL HANDLING RECOMMENDATIONS Use only in well-ventilated areas. Valve protection caps must remain in place unless container is secured with valve outlet piped to use point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure reducing regulator when connecting cylinder to lower pressure (<250 psig) piping or systems. Do not heat cylinder by any means to increase the discharge rate of product from the cylinder. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder.	
For additional handling recommendations consult L'Air Liquide's Encyclopedia de Gaz or Compressed Gas Association Pamphlet P-1.	
SPECIAL STORAGE RECOMMENDATIONS Protect cylinders from physical damage. Store in cool, dry, well-ventilated area of non-combustible construction away from heavily trafficked areas and emergency exits. Do not allow the temperature where cylinders are stored to exceed 130F (54C). Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Full and empty cylinders should be segregated. Use a "first in-first out" inventory system to prevent full cylinders being stored for excessive periods of time. Post "No Smoking or Open Flames" signs in the storage or use area. There should be no sources of ignition in the storage or use area.	
For additional storage recommendations consult L'Air Liquide's Encyclopedia de Gaz or Compressed Gas Association Pamphlet P-1.	
SPECIAL PACKAGING RECOMMENDATIONS Isobutylene is noncorrosive and may be used with any common structural material.	
OTHER RECOMMENDATIONS OR PRECAUTIONS Earth-ground and bond all lines and equipment associated with the isobutylene system. Electrical equipment should be non-sparking or explosion proof. Compressed gas cylinders should not be refilled except by qualified producers of compressed gases. Shipment of a compressed gas cylinder which has not been filled by the owner or with his (written) consent is a violation of Federal Law (49CFR).	



LIQUID AIR CORPORATION
ALPHAGAZ DIVISION

ADDITIONAL DATA

RECOMMENDED FIRST AID TREATMENT: (Continued)

with lukewarm water. DO NOT USE HOT WATER. A physician should see the patient promptly if the cryogenic "burn" has resulted in blistering of the dermal surface or deep tissue freezing.

TIME WEIGHTED AVERAGE EXPOSURE LIMIT (Continued)

TWA (OSHA, 1985) for LPG (Liquefied Petroleum Gas) is 1,000 molar PPM.



Section 1 - Chemical Product and Company Identification

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Product/Chemical Name: Isopropyl Alcohol
Chemical Formula: $(CH_3)_2CHOH$
CAS No.: 67-63-0
Synonyms: Dimethyl carbinol, 2-hydroxypropane, IPA, Isodol, Lutisol, Isopropanol, Propanol, 2-propanol, *sec*-propyl alcohol, rubbing alcohol, Spectral.
Derivation: Treating propylene with sulfuric acid and then hydrolyzing or direct hydration of propylene using superheated steam. Most commonly available as rubbing alcohol (70% IPA).
General Use: As a solvent for gums, shellac, and essential oils, chemical intermediate, dehydrating agent, vehicle for germicidal compounds, de-icing agent for liquid fuels; for denaturing ethyl alcohol, preserving pathological specimens; in extraction of alkaloids, quick-drying inks and oils, and an ingredient of skin lotions, cosmetics, window cleaner, liquid soaps, and pharmaceuticals.
Vendors: Consult the latest *Chemical Week Buyers' Guide*. (73)

Section 2 - Composition / Information on Ingredients

Isopropyl alcohol, 100% vol. Most commonly sold as 70% isopropyl alcohol (rubbing alcohol).

OSHA PELs 8-hr TWA: 400 ppm (980 mg/m ³) STEL: 500 ppm (1225 mg/m ³) *	NIOSH REL 10-hr TWA: 400 ppm (980 mg/m ³) STEL: 500 ppm (1225 mg/m ³)	DFG (Germany) MAK TWA: 400 ppm (980 mg/m ³) Category II: Substances with systemic effects Half-life: < 2 hr Peak Exposure Limit: 300 ppm, 30 min. average value, 4/shift
ACGIH TLVs TWA: 400 ppm (983 mg/m ³) STEL: 500 ppm (1230 mg/m ³)	IDLH Level 12,000 ppm	

* Vacated 1989 Final Rule Limits

Section 3 - Hazards Identification

☆☆☆☆☆ Emergency Overview ☆☆☆☆☆

Isopropyl alcohol is a highly flammable, volatile liquid. It is considered more toxic than ethyl alcohol, but less toxic than methyl alcohol. Inhalation can cause irritation of the eyes and respiratory tract and central nervous system depression at high concentrations. Repeated skin contact may cause dermatitis. Systemic toxicity appears to occur mostly in cases of heavy ingestion or inhalation. There is recent evidence that skin absorption may be more likely to cause systemic effects than previously thought.

Potential Health Effects

Primary Entry Routes: Inhalation, ingestion, skin contact/absorption.

Target Organs: Eyes, skin, respiratory system.

Acute Effects

Inhalation: Vapor inhalation is irritating to the respiratory tract and can cause central nervous system depression at high concentrations. Volunteers exposed to 400 ppm for 3 to 5 min experienced mild eye and respiratory irritation. At 800 ppm, irritation was not severe, but most people found the air uncomfortable to breathe.

Eye: Exposure to the vapor or direct contact with the liquid causes irritation and possible corneal burns.

Skin: Some irritation may occur after prolonged exposure.

Ingestion: Accidental ingestions have provided the most information on isopropyl alcohol toxicity. Symptoms include nausea and vomiting, headache, facial flushing, dizziness, lowered blood pressure, mental depression, hallucinations and distorted perceptions, difficulty breathing, respiratory depression, stupor, unconsciousness, and coma. Kidney insufficiency including oliguria (reduced urine excretion), anuria (absent urine excretion), nitrogen retention, and edema (fluid build-up in tissues) may occur. One post-mortem examination in a case of heavy ingestion showed extensive hemorrhagic tracheobronchitis, broncho-pneumonia, and hemorrhagic pulmonary edema. Death can occur in 24 to 36 h post-ingestion due to respiratory paralysis.

Carcinogenicity: NTP and OSHA do not list isopropyl alcohol as a carcinogen. The IARC has studied IPA and has classified it as Class-3 (unclassifiable, inadequate human and animal evidence). There appears to be an association between the manufacture (strong acid process, rather than the alcohol itself) of isopropanol and paranasal cancer, but this may be due to the diisopropyl sulfate or isopropyl oil by-products.

Medical Conditions Aggravated by Long-Term Exposure: Dermatitis or respiratory or kidney disorders.

Chronic Effects: Repeated skin contact can cause drying of skin and delayed hypersensitivity reactions in some individuals.

Wilson Risk Scale
R 1
I 2
S 3
K 3

*Skin absorption

HMIS
H 1
F 3
R 0

PPET
*Sec. 3

Other: Isopropyl alcohol is oxidized in the body to acetone where it is excreted by the lungs or kidneys. Some acetone may be further metabolized to acetate, formate, and finally carbon dioxide. Probable oral lethal dose is 240 mL.

Section 4 - First Aid Measures

Inhalation: Remove exposed person to fresh air and support breathing as needed.

Eye Contact: Do not allow victim to rub or keep eyes tightly shut. Gently lift eyelids and flush immediately and continuously with flooding amounts of water until transported to an emergency medical facility. Consult a physician immediately.

Skin Contact: Quickly remove contaminated clothing. Rinse with flooding amounts of water for at least 15 min. Wash exposed area with soap and water. For reddened or blistered skin, consult a physician.

Ingestion: Never give anything by mouth to an unconscious or convulsing person. Contact a poison control center. Unless the poison control center advises otherwise, have the *conscious and alert* person drink 1 to 2 glasses of water to dilute. Vomiting may be contraindicated because of the rapid onset of central nervous system depression. Gastric lavage is preferred.

After first aid, get appropriate in-plant, paramedic, or community medical support.

Note to Physicians: Diagnostic test: acetone in urine.

Section 5 - Fire Fighting Measures

Flash Point: 53 °F (12 °C)

Flash Point Method: CC

Burning Rate: 2.3 mm/min.

Autoignition Temperature: 750 °F (399 °C)

LEL: 2 % v/v

UEL: 12.7 % v/v at 200 °F

Flammability Classification: Class IB Flammable Liquid

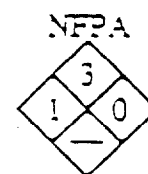
Extinguishing Media: Carbon dioxide, dry chemical, water spray (solid streams can spread fire), alcohol-resistant foam, or fog.

Unusual Fire or Explosion Hazards: Container may explode in heat of fire. Vapors may travel to an ignition source and flash back. Isopropyl alcohol poses an explosion hazard indoors, outdoors, and in sewers.

Hazardous Combustion Products: Carbon oxides and acrid smoke.

Fire-Fighting Instructions: If possible without risk, move container from fire area. Apply cooling water to container side until well after fire is out. Stay away from ends of tanks. For massive fire in cargo area, use monitor nozzles or unmanned hose holders; if impossible, withdraw and let fire burn. Withdraw immediately if you hear a rising sound from venting safety device or notice any tank discoloration due to fire. *Do not* release runoff from fire control methods to sewers or waterways.

Fire-Fighting Equipment: Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in pressure-demand or positive-pressure mode. Structural firefighters' protective clothing provides only limited protection.



Section 6 - Accidental Release Measures

Spill/Leak Procedures: Notify safety personnel, isolate and ventilate area, deny entry, and stay upwind. Shut off ignition sources. Cleanup personnel should protect against vapor inhalation and skin/eye contact. Water spray may reduce vapor, but may not prevent ignition in closed spaces.

Small Spills: Take up with earth, sand, vermiculite, or other absorbent, noncombustible material and place in suitable containers.

Large Spills

Containment: For large spills, dike far ahead of liquid spill for later disposal. Do not release into sewers or waterways.

Regulatory Requirements: Follow applicable OSHA regulations (29 CFR 1910.120).

Section 7 - Handling and Storage

Handling Precautions: Use non-sparking tools to open containers.

Storage Requirements: Store in a cool, dry, well-ventilated area away from heat, ignition sources, and incompatibles (Sec 10).

Install electrical equipment of Class I, Group D.

Section 8 - Exposure Controls / Personal Protection

Engineering Controls: To prevent static sparks, electrically ground and bond all equipment used with and around IPA.

Ventilation: Provide general or local exhaust ventilation systems to maintain airborne levels below 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⁾

Administrative Controls: Consider preplacement and periodic medical exams of exposed workers with emphasis on the skin, kidneys, and respiratory system. Be extra cautious when using IPA concurrently with carbon tetrachloride because animal studies have shown it enhances carbon tetrachloride's toxicity.

Protective Clothing/Equipment: Wear chemically protective gloves, boots, aprons, and gauntlets to prevent prolonged or repeated skin contact. Nitrile rubber (breakthrough time > 3 hr), Neoprene and Teflon (breakthrough time > 4 hr) are suitable materials for PPE. Do not use PVA, PVC or natural rubber (breakthrough time < 1 hr). Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133). Because contact lens use in industry is controversial, establish your own policy.

Respiratory Protection: Seek professional advice prior to respirator selection and use. Follow OSHA respirator Regulations (29 CFR 1910.134) and, if necessary, wear a MSHA/NIOSH-approved respirator. For < 1000 ppm, use any powered, air-purifying respirator with organic vapor cartridges or any chemical cartridge respirator with a full facepiece and organic vapor cartridges. For < 10,000 ppm, use any supplied-air respirator (SAR) operated in continuous-flow mode. For < 10,000 ppm, use any air-purifying, full facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister or any SCBA or SAR with a full facepiece. For emergency or entrance into unknown concentrations, use any SCBA or SAR (with auxiliary SCBA) with a full facepiece and operated in pressure-demand or other positive-pressure mode. For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA. *Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.* If respirators are used, OSHA requires a written respiratory protection program that includes at least medical certification, training, fit-testing, periodic environmental monitoring, maintenance, inspection, cleaning, and convenient, sanitary storage areas.

Safety Stations: Make available in the work area emergency eyewash stations, safety/quick-drench showers, and washing facilities.

Contaminated Equipment: Separate contaminated work clothes from street clothes. Launder before reuse. Remove isopropyl alcohol from your shoes and clean personal protective equipment.

Comments: Never eat, drink, or smoke in work areas. Practice good personal hygiene after using isopropyl alcohol, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9 - Physical and Chemical Properties

Physical State: Liquid	Other Solubilities: Soluble in alcohol, ether, chloroform, and benzene. Insoluble in salt solutions.
Appearance and Odor: Colorless with a slight odor and bitter taste.	Boiling Point: 180.5 °F (82.5 °C)
Odor Threshold: 22 ppm*	Freezing Point: -129.1 °F (-89.5 °C)
Vapor Pressure: 44 mm Hg at 25 °F (7 °C)	Viscosity: 2.1 cP at 77 °F (25 °C)
Saturated Vapor Density (Air = 1.2 kg/m³, 0.075 lb/ft³): 1.274 kg/m ³ or 0.080 lb/ft ³	Refraction Index: 1.375 at 68 °F (20 °C)
Formula Weight: 60.09	Surface Tension: 20.8 dyne/cm at 77 °F (25 °C)
Density (H₂O=1, at 4 °C): 0.78505 at 68 °F (20 °C)	Critical Temperature: 455 °F (235 °C)
Water Solubility: > 10 %	Critical Pressure: 47 atm
Ionization Potential: 10.10 eV	Octanol/Water Partition Coefficient: log Kow = 0.05

* References range from 1 to as high as 610 ppm.

Section 10 - Stability and Reactivity

Stability: Isopropyl alcohol is stable at room temperature in closed containers under normal storage and handling conditions.

Polymerization: Hazardous polymerization does not occur.

Chemical Incompatibilities: Include acetaldehyde, chlorine, ethylene oxide, acids and isocyanates, hydrogen + palladium, nitroform, oleum, phosgene, potassium *t*-butoxide, oxygen (forms unstable peroxides), trinitromethane, barium perchlorate, tetrafluoroborate, chromium trioxide, sodium dichromate + sulfuric acid, aluminum, aluminum triisopropoxide, and oxidizers. Will attack some forms of plastic, rubber, and coatings.

Conditions to Avoid: Exposure to heat, ignition sources, and incompatibles.

Hazardous Decomposition Products: Thermal oxidative decomposition of isopropyl alcohol can produce carbon oxides and acid smoke.

Section 11 - Toxicological Information

Toxicity Data:

Eye Effects:

Rabbit, eye: 100 mg caused severe irritation.

Skin Effects:

Rabbit, skin: 500 mg caused mild irritation.

Reproductive:

Rat, inhalation: 3500 ppm/7 hr given from 1 to 19 days of pregnancy caused fetotoxicity.

Acute Oral Effects:

Human, oral, TD₀₁: 223 mg/kg caused hallucinations, distorted perceptions, lowered blood pressure, and a change in pulse rate.

Human, oral, LD₅₀: 3570 mg/kg caused coma, respiratory depression, nausea, and vomiting.

Rat, oral, LD₅₀: 5045 mg/kg caused a change in righting reflex, and somnolence (general depressed activity).

* See NIOSH, RTECS (NT3050000), for additional toxicity data.

Section 12 - Ecological Information

Ecotoxicity: Guptes (*Psephenus renouletii*) LC₅₀ = 7,060 ppm/7 days; fathead minnow (*Pimephales promelas*) LC₅₀ = 11,350 mg/L in BOD = 133 F/S days.

Environmental Degradation: On soil, IPA will volatilize or leach into groundwater. Biodegradation is possible but rates are not found in available literature. It will volatilize (est. half-life = 5.4 days) or biodegrade in water. It is not expected to bioconcentrate in fish. In the air, it reacts with photochemically produced hydroxyl radicals with a half-life of one to several days. Because it is soluble, removal by rain, snow or other precipitation is possible.

Section 13 - Disposal Considerations

Disposal: Microbial degradation is possible by oxidizing isopropyl alcohol to acetone by members of the genus *Derulfovibrio*. Spray waste into incinerator (permit-approved facilities only) equipped with an afterburner and scrubber. Isopropyl alcohol can be settled out of water spills by salting with sodium chloride. Note: Salt may harm aquatic life, so weigh the benefits against possible harm before application. Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.

Container Cleaning and Disposal: Triple rinse containers.

Section 14 - Transport Information

DOT Transportation Data (49 CFR 172.101):

Shipping Name: Isopropanol or isopropyl alcohol	Packaging Authorizations a) Exceptions: 173.150	Quantity Limitations a) Passenger, Aircraft, or Railroad: 5 L
Shipping Symbols: -	b) Non-bulk Packaging: 173.202	b) Cargo Aircraft Only: 60 L
Hazard Class: 3	c) Bulk Packaging: 173.242	
ID No.: UN1219		Vessel Stowage Requirements
Packing Group: II		a) Vessel Stowage: B
Label: Flammable Liquid		b) Other: -
Special Provisions (172.102): T1		

Section 15 - Regulatory Information

EPA Regulations:

Listed as a RCRA Hazardous Waste Number (40 CFR 261.21)

RCRA Hazardous Waste Classification (40 CFR 261.21): Characteristic of Ignitability

and (Unlisted Hazardous Waste, Characteristic of Ignitability) as a CERCLA Hazardous Substance (40 CFR 302.4) per RCRA, Sec. 3001

CERCLA Reportable Quantity (RQ), 100 lb (45.4 kg)

SARA 311/312 Codes: 1, 2, 3

Listed as a SARA Toxic Chemical (40 CFR 372.65); only persons who manufacture by the strong acid process are subject: no supplier notification.

SARA EHS (Extremely Hazardous Substance) (40 CFR 355): Not listed

OSHA Regulations:

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

Section 16 - Other Information

References: 73, 103, 124, 126, 127, 132, 136, 139, 148, 153, 159, 164, 167, 168, 176, 187

Prepared By _____ M Gannon, BA
Industrial Hygiene Review _____ PA Roy, MPH, CIH
Medical Review _____ T Thoburn, MD, MPH

Disclaimer: Judgments as to the suitability of information herein for the purchaser's purposes are necessarily the purchaser's responsibility. Although reasonable care has been taken in the preparation of such information, Genium Publishing Corporation extends no warranties, makes no representations, and assumes no responsibility as to the accuracy or suitability of such information for application to the purchaser's intended purpose or for consequences of its use.

MATERIAL SAFETY DATA SHEET

NOTE: This Material Safety Data Sheet (MSDS) is prepared for industrial/commercial use situations. The preparation of this MSDS may be required by law but this is not an assertion that this product presents a risk in the normal consumer use situation.

**1. PRODUCT IDENTIFICATION**

PRODUCT (AS LABELED): Dove® Dishwashing Liquid

GENERAL USE: A consumer hand dishwashing liquid

MANUFACTURER'S NAME: LEVER BROTHERS COMPANY
ADDRESS: 390 Park Avenue
 New York, NY 10022

BUSINESS PHONE: 212-688-6000

DATE OF PREPARATION 8/01/95
MSDS#: C024, Replaces version dated 2/2/95

2. COMPOSITION and INFORMATION ON INGREDIENTS

INGREDIENTS: The cleaning agents in Dove are biodegradable. Dove contains no phosphorous.

EXPOSURE LIMITS IN AIR:

CHEMICAL NAME:	CAS#	ACGM		OSHA	
		TLV mg/m ³	STEL mg/m ³	PEL mg/m ³	STEL mg/m ³
Anionic alkyl benzene sulfonate	1331-61-8	NA	NA	NA	NA
Anionic alcohol ethoxysulfate	NA	NA	NA	NA	NA
Lauric-Myristic monoethanolamide	NA	NA	NA	NA	NA
Sodium alyl sulfonate	NA	NA	NA	NA	NA
Headol	64-17-5	1000ppm	NA	1000ppm	3300ppm

NA = Not Applicable
 *See Section 12. for DEFINITION OF TERMS

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: **EMERGENCY OVERVIEW:** This product is a liquid detergent with a perfumed odor. It presents a low risk other than a possible slip hazard in the event of a spill.

POTENTIAL HEALTH EFFECTS:

CONTACT WITH SKIN: No irritation with brief contact. Possible irritation from prolonged or repeated industrial contact.
CONTACT WITH EYES: May cause mild irritation and discomfort.
INGESTION: May cause gastrointestinal irritation with nausea, vomiting, and delayed diarrhea.
INHALATION: While inhalation of a product mist is unlikely, such exposure may cause transient upper respiratory irritation.
CHRONIC HEALTH EFFECTS: None expected.
CONSUMER PRODUCT PRECAUTIONARY STATEMENT: Not for use in automatic dishwashers. Do not mix with chlorine bleach or other household cleaning products. KEEP OUT OF REACH OF CHILDREN.

4. FIRST-AID MEASURES

SKIN EXPOSURE: Rinse with water.
EYE EXPOSURE: Flush with water for 15 minutes.
INGESTION: Do not induce vomiting. Drink a glass of milk or water.
INHALATION: Move individual to fresh air.
Note: If symptoms persist, seek medical attention.

5. FIRE-FIGHTING MEASURES

FLASH POINT: No flash to 200 F..
AUTOIGNITION TEMPERATURE: Not applicable.
FLAMMABLE LIMITS(in air by volume, %): Not applicable.
FIRE EXTINGUISHING MATERIALS: Not applicable

Water Spray: Yes
Dry Chemical: Yes

Carbon Dioxide: Yes
Halon: Yes

Foam: Yes

UNUSUAL FIRE AND EXPLOSION HAZARDS: Product is not combustible. Use appropriate fire extinguishing agent for the packaging material.

SPECIAL FIRE FIGHTING PROCEDURES: None.

6. ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK RESPONSE: Disposal is to be performed in compliance with applicable laws. Small or household quantities may be disposed of in refuse or sewer. Product contains biodegradable ingredients. Contains no phosphorous. For large (industrial) releases, prevent spill from entering a waterway. Absorbent materials may be used.

7. HANDLING and STORAGE

WORK PRACTICES AND HYGIENE PRACTICES: Use personal protective equipment appropriate for the task.
STORING AND HANDLING PRACTICES: None required with normal use.
PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Use personal protective equipment when contact is likely.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation. Mechanical ventilation not normally required during normal operation.
EYE PROTECTION: Wear safety glasses.
HAND PROTECTION: Wear rubber gloves for prolonged contact.

BODY PROTECTION: None required.

9. PHYSICAL and CHEMICAL PROPERTIES

VAPOR DENSITY: Not applicable.

SPECIFIC GRAVITY: 1.032 - 1.048

SOLUBILITY IN WATER: soluble.

VAPOR PRESSURE, mm Hg @ 20 C: (approximately) 18

APPEARANCE AND COLOR: This liquid is a pleasant smelling, slippery, opaque white solution.

EVAPORATION RATE (water = 1): 1

MELTING POINT OR RANGE: < 0 C

BOILING POINT: > 100 C

pH (1% solution): 8.0 - 8.9 (as is)

10. STABILITY and REACTIVITY

STABILITY: Stable.

DECOMPOSITION PRODUCTS: None.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Do not mix with chlorine bleach.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Do not use in automatic dishwasher.

11. TRANSPORTATION INFORMATION

THIS MATERIAL IS NOT HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.

PROPER SHIPPING NAME: Not applicable.

HAZARD CLASS NUMBER and DESCRIPTION: Not applicable.

UN IDENTIFICATION NUMBER: Not applicable.

PACKING GROUP: Not applicable.

DOT LABEL(S) REQUIRED: Not applicable.

EMERGENCY RESPONSE GUIDE NUMBER: Not applicable.

MARINE POLLUTANT: Not applicable.

CANADIAN TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: THIS MATERIAL IS NOT CLASSIFIED AS "DANGEROUS GOODS".

12. OTHER INFORMATION

PREPARED BY: LEVER BROTHERS COMPANY
NEW YORK, NY 10022

The information contained in this MSDS is based on data which is believed to be accurate. While Lever Brothers Company believes that the data contained herein comply with 29 CFR 1910.1200, they are not to be taken as a warranty or representation for which Lever Brothers Company assumes legal responsibility. They are offered solely for your consideration and verification. This MSDS is not prepared for consumer use situations.



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Material Safety Data Sheets Collection:

Sheet No. 440
Methane

Issued: 7/80

Revision: A, 8/89

29



NFPA
HMIS
H 1
F 4
R 0
PPG*
* Sec. 8

Section 1. Material Identification

Methane Description: Widely distributed in nature, methane comprises 0.00022% by volume of the earth's atmosphere. American natural gas is mostly methane (85%). At temperatures greater than 2012 °F (1100 °C), pure carbon combines with pure hydrogen to form methane. Above 2732 °F (1500 °C), the amount of methane produced increases with temperature. Obtained from sodium acetate and sodium hydroxide or from aluminum carbide and water. Commercially prepared from natural gas or by fermentation of cellulose and sewage sludge. Constituent of illuminating and cooking gas. Used in the manufacture of hydrogen, hydrogen cyanide, ammonia, acetylene, formaldehyde, and many other organics.
Other Designations: Fire damp; marsh gas; methyl hydride; CH₄; CAS No. 0074-82-8.
Manufacturer: Contact your supplier or distributor. Consult the latest *Chemicalweek Buyers' Guide* (Genium ref. 73) for a suppliers list.

R 1
I -
S -
K 4

Section 2. Ingredients and Occupational Exposure Limits

Methane, ca 100%*	ACGIH TLV, 1988-89	NIOSH REL	Toxicity Data†
OSHA PEL None established	None established	None established	Not listed

* Check with your supplier to determine the exact composition of the purchased methane. Possible contaminants are ethane (C₂H₆), propane (C₃H₈), butane (C₄H₁₀), higher molecular weight alkanes, carbon dioxide (CO₂), nitrogen (N₂), and oxygen(O₂).
† Monitor NIOSH, RTECS (PA149000), for future toxicity data.

Section 3. Physical Data

Boiling Point: -259 °F (161.6 °C) **Water Solubility:** Slight*
Vapor Density (Air = 1): 0.544 at 32 °F (0 °C) **Melting Point:** -296.5 °F (-182.5 °C)
Molecular Weight: 16 g/mol
Appearance and Odor: A colorless, odorless, tasteless, extremely flammable gas. Commercial methane's trace amounts of a suitable mercaptan compound give it natural gas's familiar rotten egg smell.
*Soluble in alcohol and ether.

Section 4. Fire and Explosion Data

Flash Point: -213 °F (-136.11 °C) **Autoignition Temperature:** 999 °F (537 °C) **LEL:** 5% v/v* **UEL:** 15% v/v*

Extinguishing Media: Methane's extreme flammability, extensive explosibility range, and very low flash point represent dangerous fire and explosion risks. *Treat any fire situation involving rapidly escaping and burning methane gas as an emergency.* Extinguish methane fires by shutting off the source of the gas. Use water sprays to cool fire-exposed containers and to protect the personnel attempting to seal the source of the escaping gas.
Unusual Fire or Explosion Hazards: Methane gas is very flammable with an extensive explosibility range. The best fire-fighting technique may be simply to let the burning gas escape from the pressurized cylinder, tank car, or pipelines. Never extinguish the burning gas without first locating and sealing its source. Otherwise, the still leaking gas could explosively re-ignite without warning and cause more damage than if it burned itself out.
Special Fire-fighting Procedures: Wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode.
* The loudest methane-air explosions occur when 1 volume of methane is mixed with 10 volumes of air (or 2 volumes of oxygen). **Warning:** Air with more than 14% by volume methane burns *noiselessly*. Methane burns with a pale, faintly luminous, not always easily detected flame.

Section 5. Reactivity Data

Stability/Polymerization: Methane is stable at room temperature in closed, pressurized containers during routine operations. Hazardous polymerization cannot occur.
Chemical Incompatibilities: Genium reference 84 reports that methane can react violently with bromine pentafluoride, chlorine, chlorine dioxide, nitrogen trifluoride, liquid oxygen, and oxygen difluoride.
Conditions to Avoid: Never expose methane to ignition sources such as open flame, lighted cigarettes or pipes, uninsulated heating elements, or electrical or mechanical sparks. Prevent any accidental or uncontrollably rapid release of methane gas from high-pressure cylinders, tank cars, or pipelines.
Hazardous Products of Decomposition: Thermal oxidative degradation of methane can produce carbon dioxide and toxic carbon monoxide (CO).

Section 6. Health Hazard Data

Carcinogenicity: Neither the NTP, IARC, nor OSHA lists methane as a carcinogen. **Summary of Risks:** As a simple asphyxiant, methane does not cause significant physiological responses, but it can displace the minimum required atmospheric oxygen level. Significant displacement results in an oxygen deficient atmosphere with no adequate warning properties. Asphyxiation can occur especially in confined, poorly ventilated, undisturbed spaces infrequently entered by workers. **Frostbite (cryogenic damage)** can result from contact with liquid methane's extremely low temperature. **Medical Conditions Aggravated by Long-Term Exposure:** None reported. **Target Organs:** None reported. **Primary Entry:** Inhalation. **Acute Effects:** The initial symptoms of simple asphyxiant gases's effects are rapid respiration and air hunger, diminished mental alertness, and impaired muscular coordination. Continuing lack of oxygen causes faulty judgement, depression of all sensations, rapid fatigue, emotional instability, nausea, vomiting, prostration, unconsciousness, and finally, convulsions, coma, and death. **Chronic Effects:** None reported.

FIRST AID

Skin: (Liquid methane): Promptly flush the affected area with lots of tepid/lukewarm water to reduce freezing of tissues. Never apply direct heat to frostbitten areas. Loosely apply dry, bulky dressings to protect the area from further injury. Get treatment from qualified medical personnel. **Inhalation:** Rescuers must consider their own safety when entering confined, poorly ventilated, oxygen-deficient areas. Self-contained breathing equipment must be readily available. Rescuers must use nonsparking tools and equipment; e.g., floodlights lowered into any incident area must be electrically grounded and bonded, shatter resistant, and sparkproof. **After first aid, get appropriate in-plant, paramedic, or community medical attention and support for inhalation exposures in oxygen-deficient atmospheres. Seek prompt medical assistance for further observation and treatment.**

Section 7. Spill, Leak, and Disposal Procedures

Spill/Leak: Design and practice a methane spill control and countermeasure plan (SCCP). When a leak occurs, notify safety personnel, eliminate heat and ignition sources, evacuate unnecessary personnel, provide maximum explosion proof ventilation, and implement the SCCP. Use only nonsparking tools and equipment. Locate and seal the source of the leaking gas. Use water sprays to protect the personnel attempting this shutdown. Large methane releases can result in spectacular explosions. If attempts to shut off the leaking gas are unsuccessful, evacuate the likely explosion area. **Disposal:** Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations. Remove leaking or defective cylinders to a safe, outside, posted, discharge location. Let the methane gas discharge at a moderate rate. When it is empty, return the cylinder to the supplier after it is properly tagged, labelled, or stenciled MF (empty) or defective.

OSHA Designations

Air Contaminant (29 CFR 1910.1000, Subpart Z): Not listed

EPA Designations

RCRA Hazardous Waste (40 CFR 261.33): Not listed

CFRCA Hazardous Substance (40 CFR 302.4): Not listed

SARA Extremely Hazardous Substance (40 CFR 355): Not listed

SARA Toxic Chemical (40 CFR 372.65): Not listed

Section 8. Special Protection Data

Goggles: Wear protective eyeglasses or chemical safety goggles, per OSHA eye and face protection regulations (29 CFR 1910.133). **Gloves:** To prevent skin contact, workers handling liquid methane should wear appropriate insulating gloves, safety glasses, and splash aprons, as required by the particular work conditions. **Respirator:** Wear a NIOSH approved respirator if necessary. Follow OSHA respirator regulations (29 CFR 1910.134). For emergency or nonroutine operations (spills or cleaning reactor vessels and storage tanks), wear an SCBA. **Warning:** Air-purifying respirators do not protect workers in oxygen-deficient atmospheres; use self-contained breathing equipment there. **Ventilation:** Provide general and local explosion-proof ventilation systems to maintain airborne concentrations below the 5% v/v LEL (Sec. 4). Local exhaust ventilation is preferred since it prevents methane dispersion into the work area by eliminating it at its source (Genium ref. 103). Give special attention to proper ventilation of enclosed areas. **Safety Stations:** Make available in the work area emergency eyewash stations, safety/quick-drench showers, washing facilities, fire extinguishers, and oxygen bottles for emergency first-aid. **Contaminated Equipment:** Never wear contact lenses in the work area: soft lenses may absorb, and all lenses concentrate, irritants. Launder contaminated clothing before wearing. Remove this material from your shoes and equipment. **Other:** If appropriate, consider installing automatic sensing equipment that warns workers of oxygen-deficient atmospheres or of potentially explosive air-gas mixtures. All engineering systems in any methane gas storage, handling, or processing area must be explosion-proof so they have no spark potential or hot spots. Pressurized systems must use only approved valves, manifolds, flanges, and flame arrestors. **Comments:** Methane gas presents dangerous fire, explosion, and reactivity risks. Regularly inspect and service all the piping systems which transport methane gas in production and storage areas. Before use, thoroughly test methane lines with nitrogen gas for leaking, especially in enclosed areas.

Section 9. Special Precautions and Comments

Storage Requirements: Store methane in closed, pressurized cylinders, tank cars, pipelines, or other containers in a cool, dry, well ventilated, fireproof area away from heat and ignition sources and incompatible chemicals (Sec. 5). Protect these containers from physical damage and heat. Shield them from direct sunlight. **Special Handling/Storage:** Electrically ground and bond all containers, tanks, cylinders, tank cars and pipelines used in methane shipping, receiving, or transferring operations. Never smoke in any work area where the possibility of exposure to methane gas (fire hazard) exists. Recommended storage containers include steel.

Transportation Data (49 CFR 172.101-2)

DOT Shipping Name: Methane

IMO Shipping Name: Methane, compressed

DOT Hazard Class: Flammable gas

IMO Hazard Class: 2.1

DOT ID No.: UN1971

IMO Label: Flammable gas

DOT Label: Flammable gas

DOT Packaging Requirements: 49 CFR 173.302

DOT Packaging Exceptions: 49 CFR 173.306

MSDS Collection References: 1, 6, 7, 84-94, 100, 116, 117, 119, 120, 122

Prepared by: PJ Igoc, BS; Industrial Hygiene Review: DJ Wilson, CIH; Medical Review: MJ Hardies, MD

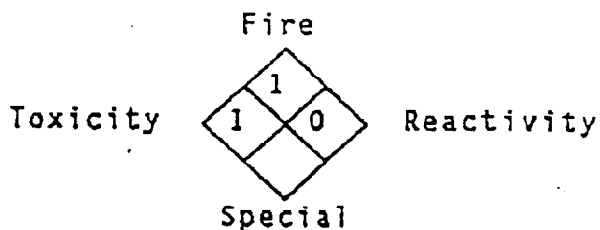
W I T C O M A T E R I A L S A F E T Y D A T A S H E E T

KENDALL NON-DETERGENT MOTOR OIL, ALL SAE GRADES

PAGE 1

NFPA HAZARD RATING

- 4 - Extreme
- 3 - High
- 2 - Moderate
- 1 - Slight
- 0 - Insignificant



DIVISION AND LOCATION---SECTION I

Division: KENDALL REFINING COMPANY
Location: BRADFORD, PENNSYLVANIA
 77 N. KENDALL AVE., BRADFORD, PA, 16701
Emergency Telephone Number: (814) 368-6111
Transportation Emergency: CHEMTREC 1-(800) 424-9300 (U.S. and Canada)

CHEMICAL AND PHYSICAL PROPERTIES---SECTION II

Chemical Name:
 petroleum hydrocarbon plus additives
Formula: not applicable
Hazardous Decomposition Products:
 carbon monoxide and carbon dioxide from burning.
 oxides of phosphorous from burning
 oxides of sulfur
Incompatibility (Keep away from):
 strong oxidizers such as hydrogen peroxide, bromine, and chromic acid.
Toxic and Hazardous Ingredients:
 none
Form: liquid Odor: motor oil
Appearance: liquid Color: dark green-brown
Specific Gravity (water=1): .86 to .89
Boiling Point: greater than 330°C (625°F)
Melting Point: less than -12°C (10°F)
Solubility in Water (by weight %): 0 at 20°C
Volatile (by weight %): 0
Evaporation Rate: 0
Vapor Pressure (mm Hg at 20°C): 0
Vapor Density (air=1): not volatile
pH (as is): not applicable
Stability: Product is stable under normal conditions
Viscosity SUS at 100°F: Greater than or = to 100

(Continued on next page)

WITCO MATERIAL SAFETY DATA SHEET

KENDALL NON-DETERGENT MOTOR OIL, ALL SAE GRADES

PAGE 2

FIRE AND EXPLOSION DATA---SECTION III

Special Fire Fighting Procedures:

Do not use water except as fog.

Unusual Fire and Explosion Hazards:

none

Flashpoint: (Method Used) Cleveland open cup greater than 190°C (380°F)**Flammable limits %:** not applicable**Extinguishing agents:**Drychemical or Waterfog or CO₂ or Foam

Closed containers exposed to fire may be cooled with water.

HEALTH HAZARD DATA---SECTION IV

Permissible concentrations (air):If used in applications where a mist may be generated, observe a TWA/PEL of 5 mg/m³ for mineral oil mist (OSHA and ACGIH).**Chronic effects of overexposure:**

Prolonged or repeated skin contact may cause dermatitis (skin irritation)

Acute toxicological properties:

no data available

Emergency First Aid Procedures:**Eyes:** Immediately flush with large quantities of water for at least 15 minutes and call a physician.**Skin Contact:** Remove excess with cloth or paper. Wash thoroughly with soap and water.**Inhalation:** Remove victim to fresh air. Call a physician.**If Swallowed:** Contact a physician immediately.

SPECIAL PROTECTION INFORMATION---SECTION V

Ventilation Type Required (Local, mechanical, special):

Local if necessary to maintain allowable PEL(permissible exposure limit) or TLV(threshold limit value)

Respiratory Protection (Specify type):

Use NIOSH/MSHA certified respirator with dual organic vapor/mist and particulates cartridge if vapor concentration exceeds permissible exposure limit.

Protective Gloves:

neoprene type

Eye Protection:

chemical safety goggles

Other Protective Equipment:

none

(Continued on next page)

WITCO MATERIAL SAFETY DATA SHEET

KENDALL NON-DETERGENT MOTOR OIL, ALL SAE GRADES

PAGE 3

HANDLING OF SPILLS OR LEAKS---SECTION VI

Procedures for Clean-Up:

Transfer bulk of mixture into another container. Absorb residue with an inert material such as earth, sand, or vermiculite. Sweep up and dispose as solid waste in accordance with local, state, and federal regulations.

Waste Disposal:

Dispose of in accordance with all applicable federal, state and local regulations.

SPECIAL PRECAUTIONS---SECTION VII

Precautions to be taken in handling and storage:

Do not handle or store at temperatures over

Maximum Storage Temperature: 38°C (100°F)

TRANSPORTATION DATA---SECTION VIII

D.O.T.: Not Regulated

Reportable Quantity: not applicable

Freight Classification: Petroleum Lubricating Oil

Special Transportation Notes:

none

ENVIRONMENTAL/SAFETY REGULATIONS---SECTION IX

Section 313 (Title III Superfund Amendment and Reauthorization Act):

This product does not contain any chemical in sufficient quantity to be subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

COMMENTS

* STATE REGULATORY INFORMATION:
Pennsylvania Worker And Community Right To Know Act: This product contains the following ingredient(s).
Hydrocarbon oils CAS. NO. 8020-83-5
The additive mixtures in this product have been declared a trade secret by the additive manufacturers.

(Continued on next page)

WITCO MATERIAL SAFETY DATA SHEETKENDALL NON-DETERGENT MOTOR OIL, ALL SAE GRADES

PAGE 4

(COMMENTS continued)

Prepared by: Robert KellamTitle: Group Supervisor, Lubricants Testing, Maintenance, and SafetyOriginal Date: 05/18/81 Sent to: _____Revision Date: 08/09/94 _____Supersedes : 04/01/93 _____Date Sent : _____

We believe the statements, technical information and recommendations contained herein are reliable, but they are given without warranty or guarantee of any kind, express or implied, and we assume no responsibility for any loss, damage, or expense, direct or consequential, arising out of their use.

LIQUID AIR CORPORATION
ALPHAQAZ DIVISION

ALPHAQAZ

Specialty Gas

Material Safety Data Sheet

			PRODUCT NAME Pentane		
			TELEPHONE (415) 877-6500 EMERGENCY RESPONSE INFORMATION ON PAGE 2		
LIQUID AIR CORPORATION ALPHAQAZ DIVISION California Plaza, Suite 350 2121 N. California Blvd. Walnut Creek, California 94598		TRADE NAME AND SYNONYMS Pentane; n-Pentane		CAS NUMBER 109-66-0	
		CHEMICAL NAME AND SYNONYMS Pentane; n-Pentane		HFPA 704 NUMBER (HFR) 0 4 0	
ISSUE DATE AUGUST 1, 1987	AND REVISIONS CORPORATE SAFETY DEPT.	FORMULA C ₅ H ₁₂	MOLECULAR WEIGHT 72.15	CHEMICAL FAMILY Alkane	

HEALTH HAZARD DATA

TIME WEIGHTED AVERAGE EXPOSURE LIMIT
600 Molar PPM; STEL = 750 Molar PPM (ACGIH 1986-87). OSHA (1985) TWA =
1,000 Molar PPM.

SYMPTOMS OF EXPOSURE Vapors may cause mild irritation of the eyes, skin or lungs.
Inhalation: High concentrations of pentane so as to exclude an adequate supply of oxygen to the lungs causes dizziness, deeper breathing due to air hunger, possible nausea and eventual unconsciousness.

Contact with rapidly evaporating liquid can cause cryogenic "burns" or frostbite.

TOXICOLOGICAL PROPERTIES

Pentane is inactive biologically and essentially nontoxic; therefore, the major property is the exclusion of an adequate supply of oxygen to the lungs.

Frostbite effects are a change in color of the skin to gray or white, possibly followed by blistering.

Pentane is not listed in the IARC, NTP or by OSHA as a carcinogen or a potential carcinogen.

Listed as Carcinogen or Potential Carcinogen	National Toxicology Program	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	I.A.R.C. Monographs	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>	OSHA	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
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RECOMMENDED FIRST AID TREATMENT

PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASES OF OVEREXPOSURE TO PENTANE. RESCUE PERSONNEL SHOULD BE EQUIPPED WITH SELF-CONTAINED BREATHING APPARATUS.

Inhalation: Conscious persons should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the contaminated area is most important. Unconscious persons should be moved to an uncontaminated area, given mouth-to-mouth resuscitation and supplemental oxygen. Further treatment should be symptomatic and supportive.

Dermal contact or frostbite: Remove contaminated clothing and flush affected areas with lukewarm water. DO NOT USE HOT WATER. A physician should see the patient promptly if the cryogenic "burn" has resulted in blistering of the dermal surface or deep tissue freezing.

Judgments as to the suitability of information herein for purchaser's purposes are necessarily purchaser's responsibility. Therefore, although reasonable care has been taken in the preparation of such information, Liquid Air Corporation extends no warranties, makes no representations, and assumes no responsibility as to the accuracy or suitability of such information for application to purchaser's intended purposes or consequences of its use. Since Liquid Air Corporation has no control over the use of this product, it assumes no liability for damage or loss of product (resulting from improper use or application of the product). Data Sheets may be changed from time to time. Be sure to consult the latest edition.

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES

Pentane is flammable in air.

PHYSICAL DATA

BOILING POINT 97°F (36°C)	LIQUID DENSITY AT BOILING POINT @ 60°F (15.5°C) = 39.3 lb/ft ³ (629.4 kg/m ³)
VAPOR PRESSURE @ 100°F (37.8°C) = 15 psia (103 kPa)	GAS DENSITY AT 760 mm Hg @ 60°F (15.5°C) = .2015 lb/ft ³ (3.228 kg/m ³)
SOLUBILITY IN WATER Negligible	FREEZING POINT -201.5°F (-129.7°C)
APPEARANCE AND COLOR	Colorless liquid and vapor with mild paraffinic odor. Specific gravity (air=1) = 2.48

FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (METHOD USED) <-40° F & C (C.C.)	AUTO IGNITION TEMPERATURE Unknown	FLAMMABLE LIMITS % BY VOLUME LEL = 1.4 UEL = 8.3
EXTINGUISHING MEDIA Water (foam), dry chemical, carbon dioxide	ELECTRICAL CLASSIFICATION Class 1, Group not specified	
SPECIAL FIRE FIGHTING PROCEDURES If possible, stop flow of pentane. Use water spray to cool surrounding containers.		

UNUSUAL FIRE AND EXPLOSION HAZARDS

None

REACTIVITY DATA

STABILITY Unstable	CONDITIONS TO AVOID	
Stable	X	N/A
INCOMPATIBILITY (Materials to avoid) Oxygen, other oxidizers		
HAZARDOUS DECOMPOSITION PRODUCTS None		
HAZARDOUS POLYMERIZATION May Occur	CONDITIONS TO AVOID	
Will Not Occur	X	N/A

SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Evacuate all personnel from affected area. Use appropriate protective equipment. If leak is in user's equipment, be certain to purge piping with an inert gas prior to attempting repairs. If leak is in container or container valve, contact your closest Liquid Air location or call the emergency telephone number listed herein.

WASTE DISPOSAL METHOD

Do not attempt to dispose of waste or unused quantities. Return in the shipping container properly labeled, with any valve outlet plugs or caps secured and valve protection cap in place to your supplier. For emergency disposal assistance, contact your closest Liquid Air location or call the emergency telephone number listed herein.

EMERGENCY RESPONSE INFORMATION

IN CASE OF EMERGENCY INVOLVING THIS MATERIAL, CALL DAY OR NIGHT (800) 231-1366
OR CALL CHEMTREC AT (800) 424-9300

SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type) Positive pressure air line with mask or self-contained breathing apparatus should be available for emergency use.		
VENTILATION Hood with forced ventilation	LOCAL EXHAUST To prevent accumulation above the IWA.	SPECIAL N/A
	MECHANICAL (Gen.) In accordance with electrical codes	OTHER N/A
PROTECTIVE GLOVES Plastic or rubber		
EYE PROTECTION Safety goggles or glasses		
OTHER PROTECTIVE EQUIPMENT Safety shoes, safety shower, eyewash "fountain"		

SPECIAL PRECAUTIONS*

SPECIAL LABELING INFORMATION		
DOT Shipping Name: Pentane	DOT Hazard Class: Flammable liquid	
DOT Shipping Label: Flammable liquid	DOT I.D. No.: UN 1265	
SPECIAL HANDLING RECOMMENDATIONS		
Use only in well-ventilated areas. Valve protection caps must remain in place unless container is secured with valve outlet piped to use point. Do not drag, slide or roll cylinders. Use a suitable hand truck for cylinder movement. Use a pressure reducing regulator when connecting cylinder to lower pressure (<50 psig) piping or systems. Do not heat cylinder by any means to increase the discharge rate of product from the cylinder. Use a check valve or trap in the discharge line to prevent hazardous back flow into the cylinder. Do not tamper with (valve) safety device. Close valve after each use and when empty.		
For additional handling recommendations consult L'Air Liquide's Encyclopédie de Gaz or Compressed Gas Association Pamphlet P-1.		

SPECIAL STORAGE RECOMMENDATIONS		
Protect cylinders from physical damage. Store in cool, dry, well-ventilated area of non-combustible construction away from heavily trafficked areas and emergency exits. Do not allow the temperature where cylinders are stored to exceed 130F (54C). Cylinders should be stored upright and firmly secured to prevent falling or being knocked over. Full and empty cylinders should be segregated. Use a "first in - first out" inventory system to prevent full cylinders being stored for excessive periods of time. Post "No Smoking or Open Flames" signs in the storage or use area. There should be no source of ignition in the storage or use area.		
For additional storage recommendations consult L'Air Liquide's Encyclopédie de Gaz or Compressed Gas Association Pamphlet P-1.		

SPECIAL PACKAGING RECOMMENDATIONS		
Pentane is noncorrosive and may be used with any common structural material.		

OTHER RECOMMENDATIONS OR PRECAUTIONS		
Earth-ground and bond all lines and equipment associated with the Pentane system. Electrical equipment should be non-sparking or explosion proof. Compressed gas cylinders should not be refilled except by qualified producers of compressed gases. Shipment of a compressed gas cylinder which has not been filled by the owner or with his (written) consent is a violation of Federal Law (49CFR). Always secure cylinders in an upright position before transporting them. NEVER transport cylinders in trunks of vehicles, (Continued on last page)		

*Various Government agencies (i.e., Department of Transportation, Occupational Safety and Health Administration, Food and Drug Administration and others) may have specific regulations concerning the transportation, handling, storage or use of this product which may not be contained herein. The customer or user of this product should be familiar with these regulations.



LIQUID AIR CORPORATION
ALPHAGAZ DIVISION

ADDITIONAL DATA

OTHER RECOMMENDATIONS OR PRECAUTIONS: (Continued) enclosed vans, truck cabs or in passenger compartments. Transport cylinders secured in open flatbed or in open pick-up type vehicles.



III. HAZARDOUS INGREDIENTS

(includes IARC, NTP, OSHA and ACGIH Listed carcinogens greater than 0.1%)

MATERIAL	%	CAS #	EXPOSURE LIMIT	SOURCE
Ethyl ether	40-70	60-29-7	400 ppm TWA 500 ppm STEL	(3) (3)
n-heptane	25-60	142-82-5	400 ppm TWA 500 ppm STEL	(3) (3)
Methylcyclohexane	25-60	108-87-2	400 ppm TWA	(3)
Carbon dioxide	5-10	124-38-9	10000 ppm TWA 5000 ppm TWA 30000 ppm STEL	(1) (2) (3)

NON-HAZARDOUS INGREDIENTS > 1%

None

None of the other ingredients is listed as a carcinogen or potential carcinogen by OSHA, NTP or IARC.

The source for exposure limits listed above are:

- (1) OSHA Permissible Exposure Limit (effective 9/89)
- (2) ACGIH Threshold Limit Value (1988-89 Edition)
- (3) Both the OSHA PEL and ACGIH TLV
- (4) Recommended by the Manufacturer

IV. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT

Tag Open Cup: Not determined
Pensky-Martens Closed Cup: -49°F

AEROSOL FLAME EXTENSION

Greater than 18 inches

FLASHBACK

Yes



AEROSOL FIRE PROTECTION LEVEL
Level 3 Aerosol (NFPA 30B)

FLAMMABLE LIMITS IN AIR, % BY VOLUME
LOWER: 1.35
UPPER: 36.5

AUTOIGNITION TEMPERATURE
180°C

EXTINGUISHING MEDIA
Foam, alcohol foam, carbon dioxide, and dry chemical. Water may be unsuitable except as cooling medium.

SPECIAL FIRE FIGHTING PROCEDURES
Use self-contained breathing apparatus. Toxic fumes may be emitted.

UNUSUAL FIRE AND EXPLOSION HAZARDS
Extremely flammable contents, pressurized containers. Vapors are heavier than air and may travel or be moved by air currents and be ignited by pilot lights, other flames, smoking, sparks, heaters, electrical equipment, static discharges or other ignition sources at locations distant from product handling point.

V. HEALTH HAZARD DATA

EFFECTS OF SINGLE OVEREXPOSURE

SWALLOWING May cause signs and symptoms of systemic intoxication, with incoordination, blurred vision, headache, analgesia, unconsciousness and respiratory failure due to depression of the central nervous system. Due to high volatility, may rapidly distend the stomach, causing discomfort and may make breathing difficult. May also cause pneumonitis if aspirated.

SKIN ABSORPTION Significant absorption not expected.

INHALATION Acts as a narcotic or general anesthetic. May cause irritation of the respiratory tract with cough and also signs and symptoms of intoxication, with incoordination, blurred vision, headache, analgesia, unconsciousness, cardiac irregularities, and respiratory failure due to depression of the central nervous system. Breathing high vapor concentrations may cause heart rate irregularities, possibly fatal, particularly in persons with heart disease.

SKIN CONTACT May cause mild irritation, experienced as local redness.



Material Safety Data Sheet
PRESTONE[®] Engine Starting Fluid

EYE CONTACT

Exposure to liquid or high concentrations of vapor may cause irritation, experienced as redness, excess tearing, and possible swelling of the conjunctiva.

EFFECTS OF REPEATED OVEREXPOSURE

Repeated skin exposure can cause cracking and drying. Repeated inhalation may cause loss of appetite, exhaustion, headaches, drowsiness, dizziness, cardiac arrhythmia, central nervous system excitability, and psychic disturbances.

OTHER EFFECTS OF OVEREXPOSURE

May cause albuminuria and polycythemia.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE

Because of its irritating and defatting properties, this material may aggravate an existing dermatitis. Existing cardiac conditions may be aggravated if inhaled in high concentrations and may be fatal as a result of serious arrhythmia and cardiac decompensation.

SIGNIFICANT LABORATORY DATA WITH POSSIBLE RELEVANCE TO HUMAN HEALTH HAZARDS

None currently known.

EMERGENCY AND FIRST AID PROCEDURES

SWALLOWING

Give at least 2 glasses of milk or water if the patient is conscious. Do not induce vomiting. Call a physician immediately.

SKIN

Wash with soap and water.

INHALATION

Remove to fresh air. Give artificial respiration if not breathing. CPR may be required if cardiac arrest occurs. Oxygen may be given if necessary. Call a physician.

EYES

Immediately flush eyes with plenty of water for least 15 minutes. Seek medical attention, preferably an ophthalmologist.

NOTES TO PHYSICIAN

May produce arrhythmia, especially in a person with an irritable myocardium. Because of possible arrhythmogenic effects, sympathomimetics should be used with caution. Avoid the use of epinephrine.



Material Safety Data Sheet
PRESTONE[®] Engine Starting Fluid

There is no specific antidote. Treatment of overexposure should be directed at the control of symptoms and the clinical condition. Artificial ventilation may be required if coma is deep and breathing shallow.

VI. REACTIVITY DATA

STABILITY Stable.

HAZARDOUS POLYMERIZATION
Will not occur.

CONDITIONS TO AVOID Heat, sparks and open flames.

INCOMPATIBILITY (Materials to Avoid)
Strong oxidizing agents

HAZARDOUS COMBUSTION OR DECOMPOSITION PRODUCTS
Extremely flammable. Will burn to form carbon dioxide, carbon monoxide. May form oxides of nitrogen.

VII. SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED
Wear appropriate personal protective equipment and remove all sources of ignition. Contain spill using absorbent material and collect material for disposal in a container suitable for flammable waste. See Section IV, "Unusual Fire and Explosion Hazards."

WASTE DISPOSAL METHOD
Waste material is a RCRA hazardous waste due to ignitability if discarded in its purchased form. Incineration, treatment or landfilling should be carried out in accordance with applicable RCRA Federal, State, and Local regulations.



VIII. SPECIAL PROTECTION INFORMATION

(for manufacturing and bulk spill cleanup)

RESPIRATORY PROTECTION

Use NIOSH/MSHA approved chemical cartridge respirator for operations which may result in employee exposure above the Permissible Exposure Limit (PEL).

VENTILATION

Use local exhaust ventilation for operations which may result in employee exposure above the PEL.

PROTECTIVE GLOVES

None required under normal use. PVA (polyvinyl alcohol) gloves are recommended for operations which may result in repeated skin contact.

EYE PROTECTION

Safety glasses are considered adequate for normal use.

OTHER PROTECTIVE EQUIPMENT

None required

IX. SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

- DANGER: Extremely flammable. Do not store near heat, sparks or open flame.
- Do not inhale vapors; use in well ventilated area.
- Avoid eye and prolonged skin contact.
- Do not drink or swallow contents.
- Contents under pressure; do not store at temperatures above 120°F.

OTHER PRECAUTIONS

Observe all requirements of plant, company or government regulations.

KEEP OUT OF REACH OF CHILDREN.



X. DEPARTMENT OF TRANSPORTATION

HAZARDOUS MATERIALS	Engine Starting Fluid
HAZARD CLASSIFICATION	Flammable Gas
IDENTIFICATION NUMBER	UN1960
LABEL(S) REQUIRED	Flammable Gas

XI. ENVIRONMENTAL DATA

EMERGENCY PLANNING AND COMMUNITY RIGHT TO KNOW INFORMATION

This product contains the following chemicals subject to SARA TITLE III, Section 313 reporting:

Chemical Name	CAS#	Weight %
None		

This MSDS is directed to professional users and bulk handlers of the product. Consumer products are labeled in accordance with Federal Hazardous Substances Act regulations.

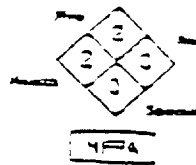
While First Brands Corporation believes that the data contained herein are factual and the opinions expressed are those of qualified experts regarding the results of the tests conducted, the data are not to be taken as a warranty or representation for which First Brands Corporation assumes legal responsibility. They are offered solely for your consideration, investigation and verification. Any use of these data and information must be determined by the user to be in accordance with applicable federal, state and local laws and regulations.

If more information is needed, please contact:

R. L. Lewis
First Brands Corporation
88 Long Hill Street
East Hartford, CT 06108
(203)723-6181



WD-40



MATERIAL SAFETY DATA SHEET

I. PRODUCT IDENTIFICATION

Manufacturer: WD-40 Company Address: 1061 Oudahy Place (S2110) P.O. Box 80607 San Diego, California 92108-8021	Telephone: Emergency Only: 1 (800) 424-6300 (CREATED) Information: (619) 275-1400 Chemical Name: Organic Mixture Trade Name: WD-40 Bulk Liquid
--	---

II. HAZARDOUS INGREDIENTS

Chemical Name	CAS Number	%	Exposure Limit ACGIH/OSHA
Aliphatic Petroleum Distillates	8052-41-3	70	100 ppm (PEL)
Petroleum Base Oil	64742-95-3	> 20	5 mg/M ³ (TWA)
Non-hazardous Ingredients		< 10	

III. PHYSICAL DATA

Boiling Point:	300°F (minimum)	Evaporation Rate:	Not determined
Vapor Density (air = 1):	Greater than 1	Vapor Pressure:	Not determined
Solubility in Water:	Insoluble	Appearance:	Cloudy light amber
Specific Gravity (H ₂ O = 1):	0.80 @ 70°F	Odor:	Characteristic odor
Percent Volatile (volume):	74%	VOC:	576 grams per liter

IV. FIRE AND EXPLOSION

Flash Point:	Tag Open Cup 110°F (minimum)
Flammable Limits:	(solvent portion) [Lel] 1.0% [Uel] 6.0%
Extinguishing Media:	CO ₂ , Dry Chemical, Foam
Special Fire Fighting Procedures:	None
Unusual Fire and Explosion Hazards:	None

V. HEALTH HAZARD / ROUTE(S) OF ENTRY

Threshold Limit Value	
Aliphatic Petroleum Distillates (Stoddard solvent) lowest TLV (ACGIH 100 ppm)	
Symptoms of Overexposure	
Inhalation (Breathing):	May cause anesthesia, headache, dizziness, nausea and upper respiratory irritation.
Skin Contact:	May cause drying of skin and/or irritation.
Eye Contact:	May cause irritation, tearing and redness.
Ingestion (Swallowed):	May cause irritation, nausea, vomiting and diarrhea.
First Aid Emergency Procedures	
Ingestion (Swallowed):	Do not induce vomiting, seek medical attention.
Eye Contact:	Immediately flush eyes with large amounts of water for 15 minutes.
Skin Contact:	Wash with soap and water.
Inhalation (Breathing):	Remove to fresh air. Give artificial respiration if necessary. If breathing is difficult, give oxygen.
DANGER!	
Aspiration Hazard:	If swallowed can enter lungs and may cause chemical pneumonia. Do not induce vomiting. Call Physician immediately.
Suspected Cancer Agent:	
Yes _____ No <input checked="" type="checkbox"/>	The components in this mixture have been found to be noncarcinogenic by NTP, IARC and OSHA.

235
 200X
 100

VI. REACTIVITY DATA

Stability:	Stable <u>X</u>	Unstable _____
Conditions to avoid:	NA	
Incompatibility:	Strong oxidizing materials	
Hazardous decomposition products:	Thermal decomposition may yield carbon monoxide and/or carbon dioxide.	
Hazardous polymerization:	May occur _____	Will not occur <u>X</u>

VII. SPILL OR LEAK PROCEDURES

Spill Response Procedures
 Absorb small quantities with sand, earth, sawdust. Large quantities pump into tank.
Waste Disposal Method
 Incinerate liquid, bury saturated absorbent in land fill. Dispose of in accordance with local, state and federal regulations.

VIII. SPECIAL HANDLING INFORMATION

Ventilation:	Sufficient to keep solvent vapor less than TLV.
Respiratory Protection:	Advised when concentrations exceed TLV.
Protective Gloves:	Advised to prevent possible skin irritation.
Eye Protection:	Approved eye protection to safeguard against potential eye contact, irritation or injury.
Other Protective Equipment:	None required.

IX. SPECIAL PRECAUTIONS

Keep from open flame, do not take internally. Avoid excessive inhalation of spray particles. Keep from children.

X. TRANSPORTATION DATA

Domestic Surface	
Description:	Petroleum Distillate Mixture
Hazard Class:	Combustible Liquid
ID No.:	UN 1263
Label Required:	NCNE, for containers less than 100 Gallons
Domestic Air	
Description:	Petroleum Distillate Mixture
Hazard Class:	Combustible Liquid
Label Required:	NCNE, for containers less than 110 Gallons

SIGNATURE: R. Miles *R. Miles* TITLE: Technical Director
 REVISION DATE: March 1988 SUPERSEDES: April 1988

NA = Not applicable NCA = No data available < = Less than > = More than

We believe the information, technical information and recommendations contained herein are reliable. However, the user is provided without warranty, expressed or implied, of the users responsibility here in determine safe conditions for use of this product and assume full, damage or expense, direct or consequential, arising from its use. Before using product, read label.

APPENDIX D

SPECIFIC OHM HEALTH AND SAFETY PROCEDURES

- SOP No. 2-1 Vehicle Safety
- SOP No. 2-3 Personal Lifting Safety
- SOP No. 2-4 Slip, Trip, Fall Prevention
- SOP No. 2-5 Electrical Safety
- SOP No. 2-7 Equipment Inspection
- SOP No. 2-9 Fall Protection
- SOP No. 3-4 Heat Stress Prevention
- SOP No. 4-2 Respiratory Protection
- SOP No. 5-4 Decontamination
- SOP No. 6-5 Excavation
- SOP No. 7-1 High Pressure Washers
- SOP No. 7-14 Equipment Operator Qualification
- Regional SOP - Buried Utility Location and Associated Subsurface Field Activities



OHM Remediation
Services Corp.

HEALTH & SAFETY PROCEDURES

VEHICLE SAFETY (OVER THE ROAD)

PROCEDURE NUMBER 2-1

Page 1 of 5

LAST REVISED 6/96

APPROVED BY: JFK/FHH

1.0 OBJECTIVE

OHM Remediation Services Corp. (OHM) is greatly concerned about safe operation of motor vehicles. Motor vehicle usage presents the most significant work risk to employees. United States Department of Labor statistics indicate that motor vehicle deaths and injuries continue to be the number one cause of work-related death and serious injury. Accordingly, it is essential that OHM have an effective vehicle safety program.

2.0 PURPOSE

This section establishes requirements for safe operation of vehicles and equipment. This procedure is an overview of the guidelines in the proposed OSHA Motor Vehicle Safety Standard 29 CFR 1910.140.

3.0 RESPONSIBILITIES

3.1 Driver's License. Operation of a vehicle without a valid operator's license is prohibited. Personnel operating vehicles regulated by the United States Department of Transportation (DOT) shall have a current commercial drivers license (CDL). Employees must notify Human Resources if they lose their driver's license for any reason.

3.2 The driver of a Company owned, rented or leased vehicle is responsible for:

- Operating the vehicle in a safe and legal manner.
- The safety of passengers.
- Reporting immediately any motor vehicle that is found to be defective or not operating properly.

3.3 The supervisor is responsible for the following:

- Ensuring that all vehicle accident reports are processed and the required number of copies submitted in accordance with OHM accident investigation procedures to local, state, and federal agencies, to the resource manager and to the insurance carrier.

- Assuring that appropriate individuals, including the corporate vice president of health and safety, are notified by telephone of accidents that involve fatalities or multiple serious injuries.
- Assuring that all accidents are documented and investigated. The investigation should be of sufficient depth to determine the cause and action required to prevent recurrence. Copies of all motor vehicle investigations shall be forwarded to the regional health and safety director and the regional resource manager.

4.0 SEAT BELTS

OSHA has determined that the use of seat belts in motor vehicles can significantly reduce the number and seriousness of occupational motor vehicle accidents, including crashes, by requiring employers to ensure that each employee uses occupant safety belts.

Accordingly, all OHM employees driving motor vehicles on company business (including rental cars, pick-up trucks, personal vehicles which are used for company compensated business travel, etc.) shall ensure that all occupants use seat belts at all times.

5.0 STATE AND LOCAL LAWS

- 5.1 All drivers shall drive OHM vehicles in accordance with the law.
- 5.2 Drivers shall not operate OHM vehicles which are known to be defective or not in compliance with the law.
- 5.3 Drivers of OHM vehicles are personally liable and responsible for the consequences of state and community violations.
- 5.4 The use of devices designed to identify active police speed detection systems (i.e. radar detectors) is prohibited in all OHM owned, leased and rented vehicles and in personal vehicles used for company compensated business travel.

6.0 SAFE DRIVING PRACTICES

- 6.1 Personnel shall operate vehicles in a defensive manner, i.e., being always on the alert and trying to anticipate what might occur under the existing conditions and driving in such a manner as to avoid hazards.

- 6.2 Personnel operating vehicles shall be considerate of, and courteous to, the traveling public and/or pedestrians and should yield the right-of-way to avoid accidents.
- 6.3 Personnel shall drive at speeds consistent with posted speed limits and prevailing conditions, such as weather, traffic and road conditions.
- 6.4 Personnel shall drive at all times with sufficient space around the vehicle to provide time to see conflicts arising, to react quickly, and to stop.

7.0 GENERAL SAFETY RULES

- 7.1 Blind Curves. Slow down and sound horn when approaching a blind curve.
- 7.2 School Buses. Obey school bus laws. Slow down and prepare to stop when approaching school buses, children on foot or on bicycles.
- 7.3 Emergency Vehicles. Give ambulances, fire fighting equipment and other vehicles the right-of-way during emergencies and lend assistance if required.
- 7.4 Gasoline. Gasoline and other flammable/combustible liquids shall not be carried in or on vehicles other than in permanent gas tanks or in approved safety cans. Approved safety containers must be properly secured when being carried in the back of pick-up trucks.
- 7.5 Laws and Regulations. Learn and obey all local, state, and federal laws.
- 7.6 Parking. Equipment and vehicles shall be parked off roads and highways whenever possible. When it is not possible, the vehicle shall be marked by red lights or flares at night and red flags during the day. Wheels should be blocked or chocked.
- 7.7 Passing. Do not pass when visibility is restricted for any reason.
- 7.8 Pedestrians. Be constantly alert for pedestrians. Remember they have the right-of-way.
- 7.9 Slow Down. Slow down and use caution at blind intersections and crossings when visibility is limited or when passing work crews.
- 7.10 Speeding. Speeding is strictly prohibited.

- 7.11 Visibility. Make sure all windshields, side and rear windows, mirrors and lights are clean before moving vehicles.
- 7.12 Warning Signs and Traffic Signals. Be alert for and strictly obey all directional and warning signs and signals.
- 7.13 Seat Belts. If unit is equipped with seat belts, operator and passengers must keep seat belts fastened at all times during operations.

8.0 DOT REGULATED VEHICLES

- 8.1 All OHM personnel operating a DOT regulated vehicle must hold a valid CDL from their state of residence.
- 8.2 Air Hose and Couplings. Periodically check air hoses and couplings and compressor hoses for worn or damaged parts. Do not crimp air hose to disconnect couplings; shut off air at the valve.
- 8.3 Backing Up. Never start or back up equipment or vehicles until you are sure the way is clear. If necessary, have another person guide you safely. Back up alarms, when required, must be working and audible over the surrounding noise.
- 8.4 Fueling and Repair. No fueling or repair shall be made to equipment while it is in operation.
- 8.5 Housekeeping. Operators should keep deckplates, steps, rung and hand rails on equipment free of grease, oil, ice, and mud. The inside of the cabs shall also be kept clean and free of flammable items.
- 8.6 Inspections. Equipment and vehicles shall not be used until known defects or discrepancies are corrected. Inspections shall be made at the start of each shift and defects or discrepancies shall be reported to the supervisor immediately.
- 8.7 Jumping. Jumping on or off equipment is prohibited. When climbing on or off equipment or vehicles, face the unit and use secure hand and foot holds to prevent slips and falls. Always look where you are stepping.
- 8.8 Know your Equipment or Vehicle. It is your responsibility to be thoroughly familiar with all features and manuals and if you are in doubt as to correct operating techniques or safety features, ask your supervisor at once.

- 8.9 Overloading. Avoid overloading vehicle beds. Excessive material can damage the unit and falling material can cause serious injury.
- 8.10 Power Lines. When operating trucks, cranes, shovels or other units, always use caution around power lines and maintain a minimum safe clearance of 10 feet or more depending upon the voltage.
- 8.11 Riders. Only authorized persons will be permitted to ride in equipment or vehicles.
- 8.12 Securing Loads. The operator of the vehicle is responsible for ensuring that their load is secure and will not shift during transport. All equipment must be secured by at least two (2) tie-down devices.
- 8.13 Long Hauls. On long hauls, tie-down chairs and binders should be checked periodically (at least during each rest or service stop) to make sure they are still secure and tight.
- 8.14 Overhanging and Oversize Loads. When it is necessary to transport overhanging or oversize loads, the OHM resource manager must obtain the appropriate permits and make sure the appropriate signs and red flags and red lights will be used.
- 8.15 Safety Chains. Safety chains of sufficient size and strength shall be installed on all trailers being towed.
- 8.16 Safety Hooks. Use safety hooks with latches on all trailer safety chains.
- 8.17 Side Roads and Railroad Tracks. Stop and look both ways before crossing railroad tracks or before driving onto a highway from a side road.
- 8.18 Stopping. Do not stop vehicles in the middle of the road to talk to occupants in another vehicle. Always pull to the side or off the road to maintain a clear, safe road.
- 8.19 Turn signals. Always use turn signals, emergency and other signals as appropriate when turning, stopping, passing, or performing other vehicle operations.
- 8.20 Vehicle Maintenance. It is the driver's responsibility to see that his vehicle is in good mechanical condition before and during operation. Special emphasis should be placed on ensuring the brakes, lights, horn, windshield wiper, tires and steering assembly are in good order. Defects must be reported and corrected immediately.



OHM Remediation
Services Corp.

HEALTH & SAFETY PROCEDURES

PERSONAL LIFTING SAFETY

PROCEDURE NUMBER 2-3

Page 1 of 3

LAST REVISED 6/96

APPROVED BY: MDH/JFK/FHH

1.0 OBJECTIVE

All OHM Remediation Services Corp. (OHM) employees will use the proper lifting techniques and will utilize mechanical means when an objects' weight or bulk cannot be safely lifted by manual means. Generally, employees will not be expected to lift more than 60 pounds.

2.0 PURPOSE

This procedure provides the general guidelines to be used by OHM employees. By utilizing proper technique, OHM employees can avoid debilitating lower back injuries.

3.0 REQUIREMENTS

3.1 Use mechanical material handling equipment whenever practical; however, mechanical lifting equipment shall be used only by qualified personnel.

3.2 If the material must be lifted manually, the following procedures apply:

3.2.1 Make certain that the load lifted can be safely handled. Consider the size, weight, and shape of the load. If necessary, get help.

3.2.2 Warm up for the lift by bending, stretching, and turning.

3.2.3 Do not attempt to lift more than 60 pounds.

3.2.4 Ensure proper lifting technique as follows.

- Place feet about shoulder width apart.
- Place one foot alongside the object being lifted and the other foot in front of the object.
- Bend at the knees to grasp the load.
- Maintain slight arch in the back when positioning over load.

- Draw the load close to the body, keeping the arms and elbows tucked into the side of the body.
- Take a firm hold on the load with the palms of the hands, not just the fingers.
- Maintain same slight arch in the back.
- Lift gradually, using your leg muscles. Make sure you draw the load close to your body.
- Do not twist the body when lifting. If you have to change direction, turn with your feet, not your trunk.
- Carry the object close to the body and watch where you are going. Do not carry objects in a manner that obstructs your vision.
- Avoid throwing or dropping objects. When lowering, maintain a firm grip. Watch out for pinching of the fingers. Use your leg muscles to lower the object by bending at the knees and keeping your back straight.

4.0 BACK BELT POLICY

This section addresses the Company's position in regards to the use of industrial type back belts.

The routine issuance for general use of industrial-type back belts (i.e., those designed for use in the workplace, as compared to medical or therapeutic orthosis) is not sanctioned by OHM. This position is based upon the May 1994 issue of NIOSH Workplace Use of Back Belts, Review and Recommendations, which concludes there is insufficient data to indicate that typical industrial-type back belts significantly reduce the biomechanical loading of the trunk during manual lifting.

It is recommended that intervention strategies other than back belts be used to reduce biomechanical loading on the spine during manual material handling.

This does not prohibit the use of medical or therapeutic devices prescribed by a physician as part of a comprehensive rehabilitation program. Individuals may purchase back belts for their personal use. However, they are strongly encouraged to consult with their personal medical physician on the selection and use of back belts prior to purchasing these devices.

The use of back belts does not excuse the individual from complying with the requirements set forth in this procedure.



OHM Remediation
Services Corp.

HEALTH & SAFETY PROCEDURES

SLIP, TRIP, AND FALL PREVENTION

PROCEDURE NUMBER 2-4

Page 1 of 2

LAST REVISED 5/96

APPROVED BY: DLM/FHH

1.0 OBJECTIVE

All OHM Remediation Services Corp. (OHM) will prevent injuries or "near misses" which could occur from slip, trip, or fall hazards by identification and control for these hazards.

2.0 PURPOSE

This procedure describes work practices that will reduce or eliminate slips, trips, and falls and thereby reduce or prevent the injuries associated with these types of accidents. The intent is to prevent injuries and maintain an efficient and healthy workforce.

3.0 REQUIREMENTS

The following requirements detail a number of rules and methods to prevent slips, trips, and falls.

- 3.1 General Housekeeping. Personnel shall keep the working area clean and orderly. Tools must not be left lying on the floor or decking where they present tripping hazards during a job or after a job is completed.
- 3.2 Debris. Small, loose items such as, disconnected joints of pipe, wood chips, other small objects and debris shall not be left lying around in any place, particularly in areas where personnel walk.
- 3.3 Walkways and Grating. Walkways and grating shall be kept free of obstacles. Openings in walkways and grating shall be repaired immediately if possible. If not immediately repaired, the section must be roped off or closed until repairs can be made.
- 3.4 Access Points. Access points or holes in gratings shall be covered or surrounded by an adequate guard rail.
- 3.5 Spills. Oil spills and spills of other materials slippery materials shall be cleaned up immediately.
- 3.6 Steel Decks. Personnel shall take extra precautions when walking on steel decking or catwalks during wet weather such as establishing firm hand holds, wearing

suitable footwear, and walking slowly.

- 3.7 Jumping. Personnel shall not jump from elevated places or the backs of trucks or equipment.
- 3.8 Tools. Personnel using hand and mechanical tools shall position themselves properly, consider leverage, and events if a tool is suddenly moved.
- 3.9 Climbing Surfaces. Personnel shall not walk or climb on piping, valves, fittings or any other equipment not designed as walking surfaces.
- 3.10 Stairways, Walkovers, and Ramps. Stairways, walkovers or ramps shall be installed where personnel must walk or step over equipment in the course of their normal duties.
- 3.11 Extension Cord. Electrical extension cords and electrical wiring must be kept clear of walking and working areas and/or covered, buried or otherwise secured.
- 3.12 Winter Conditions. Walking and working surfaces shall be properly maintained during inclement winter weather.
- 3.13 Running. Running is prohibited on job sites unless under emergency conditions.

4.0 FALL PROTECTION

Fall hazards of 4 feet or more must be evaluated by a competent person. Fall protection is required at heights of 6 feet or greater. Refer to SOP 2-9, Fall Protection, for further information.



OHM Remediation
Services Corp.

HEALTH & SAFETY PROCEDURES

ELECTRICAL SAFETY

PROCEDURE NUMBER 2-5

Page 1 of 4

LAST REVISED 7/96

APPROVED BY: JFK/FHH

1.0 OBJECTIVE

OHM Remediation Services Corp. (OHM) personnel performing work on electrical systems and equipment will control electrical hazards by following standards set by OSHA.

2.0 PURPOSE

This procedure specifies the requirements for electrical equipment and methods and is an overview of the requirements of 29 CFR 1910, Subpart S-Electrical. If work is to be performed on any electrical circuit, Lockout/Tagout/Try may be required. Refer to the Lockout/Tagout/Try procedure.

3.0 GENERAL REQUIREMENTS

- 3.1 Only approved electricians will be permitted to work on electrical equipment or permanent electrical wiring.
- 3.2 Use proper clearance and grounding procedures. All electrical circuits and equipment shall be de-energized and Lockout/Tagout/Try accomplished before maintenance or repair work is started.
- 3.3 Single-phase electric hand tools and other single-phase portable electrical equipment must be approved by a recognized testing agency, and all exposed non-current-carrying metal parts must be grounded, or be double insulated.
- 3.4 Before each use, portable electrical appliances are to be examined for obvious deficiencies in the appliance, cord, and plug. If any deficiency is noted, the appliance is not to be used.

4.0 PORTABLE ELECTRICAL EQUIPMENT

- 4.1 Double insulated portable industrial type electric tools meeting the requirements of the Underwriters Laboratory are authorized for use (ground wire not required). Where such a system is employed, the equipment must be distinctly marked.
- 4.2 All portable electrical appliances and equipment where the non-current carrying metal parts are exposed to contact by personnel shall be grounded by continuous

conductor of adequate capacity from the device to a grounded receptacle. The site safety officer shall resolve any question which arises as to whether or not a particular appliance should be grounded.

4.3 Grounding of receptacles shall be accomplished in one of two ways:

- A built-in ground wire of green color may be attached to the ground pole of the receptacle.
- The conduit system, if installed in an approved manner, may be relied upon for grounding of a receptacle serving single phase appliances with ratings up to 230 volts.

4.4 All single-phase 15 and 20 ampere receptacle outlets operating at 120 and 240 volts which are not a part of the permanent wiring of the building or structure must have GFCI for personnel protection. The GFCI should be located at the power source so that all extension cords and tools are protected by the GFCI. In situations where GFCI protection is not practical for 240 volt equipment, the supervisor must follow the procedures for assuring grounding conductors on all equipment.

The outlet box for portable extension cords for outdoor use shall be of weatherproof type maintained in good condition.

5.0 ELECTRICAL GUARDING

- 5.1 Suitable access and working space shall be provided and maintained about all electric equipment to permit ready and safe operation and maintenance of such equipment.
- 5.2 The dimension of the working space in the direction of access to energized parts in switchboards, control panels, fused switches, circuit breakers, panel boards, motor controllers, and similar equipment which require examination, adjustment, servicing, or maintenance while energized, shall not be less than 36" in depth (30" for installations built prior to 1981) and the side being 30" or the width of the equipment, whichever is greater.
- 5.3 The working space shall not be used for storage purposes. The "keep clear" area may be identified with suitable floor markings and/or posting of signs or decals on the equipment.
- 5.4 Energized parts of electrical equipment operating at 50 volts or more shall be guarded against accidental contact by the use of approved cabinets or enclosures.

- 5.5 Entrance to rooms and other guarded location containing exposed energized parts shall be marked with a conspicuous warning sign forbidding unqualified persons to enter. Doors shall be kept locked.
- 5.6 Temporary covers, warning signs, and/or barricades are to be used when it is necessary to remove covers of electrical panels during construction, major refurbishment, or for the purpose of providing temporary power to an area.
- 5.7 All openings in boxes, enclosures, or fittings shall be effectively guarded or closed to afford protection substantially equivalent to that of the wall of the box, enclosure, or fitting.
- 5.8 All electrical components over 230 volts shall have signs stating "High Voltage" 240 volts (or whatever voltage is present).

6.0 EXTENSION CORD REQUIREMENTS

- 6.1 Extension cords are designed for and will be used for **TEMPORARY USE ONLY!** All other electrical connections will be made permanent by proper construction methods.
- 6.2 Extension cords are to be kept clean, dry, free of kinks, and protected from oil, hot or sharp surfaces, and chemicals. Extension cords used on construction and hazardous waste sites shall be Ground Fault Circuit Interrupter (GFCI) protected. All extension cords shall be free from damage and are not to be placed across aisles, through doors, through holes in a wall, or in areas where the cord may be damaged or become a tripping hazard. Extension cords must not be placed in walkways, or on stairs or steps where the cords may pose a tripping hazard.
- 6.3 If a cord is damaged through use or abuse, it must be de-energized, destroyed, and discarded. OHM will not repair extension cords.
- 6.4 Cords shall be protected against contact with oil, hot surfaces and chemicals.
- 6.5 Cords must not be hung over nails or other sharp edges or placed where vehicles may run over them.

7.0 ELECTRICAL FUSE REQUIREMENTS

- 7.1 Circuits must be de-energized by Lockout/Tagout/Try procedures before attempting to replace fuses.

- 7.2 Bridging of fuses or circumventing the normal operation of circuit breakers is prohibited.
- 7.3 Blown fuses shall not be replaced with fuses having a higher amperage or voltage rating. Fuses should be replaced in kind to maintain proper circuit protection.
- 7.4 Use a fuse puller to remove fuses.

8.0 ASSURED ELECTRICAL GROUNDING STATEMENT

In limited circumstances, and only with the approval of the Regional Health and Safety Director will Assured Equipment Grounding be used at OHM projects or facilities. If implemented, all requirements of the OSHA regulations will be required.

9.0 TEMPORARY LIGHTING

Exposed bulbs on temporary lights shall be guarded to prevent accidental contact, except where bulbs are deeply recessed in the reflector. Temporary lights shall not be suspended by their electric cords unless designed for this use. Explosion-proof bulb covers shall be used when contact with flammable vapors or gases is possible and shall meet Class 1, Division 1 requirements.



OHM Remediation
Services Corp.

HEALTH & SAFETY PROCEDURES

EQUIPMENT INSPECTION

PROCEDURE NUMBER 2-7

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LAST REVISED 6/96

APPROVED BY: JFK/FHH

1.0 OBJECTIVE

OHM Remediation Services Corp. (OHM) will provide equipment for use that it is proper working order and free from all safety deficiencies. One component to accomplish this objective is routine equipment inspection.

2.0 PURPOSE

The procedure provides for the systematic inspection of mechanized equipment including heavy equipment and other diesel or gasoline powered equipment to ensure periodic maintenance is conducted, safety equipment is operable, and if necessary, the removal from service units which are found to be defective. OHM shall maintain a comprehensive equipment inspection plan that meets the requirements for heavy equipment as found in 29 CFR 1926, Subpart O.

3.0 INSPECTION REQUIREMENTS

- 3.1 Before any piece of heavy equipment or other diesel or gasoline powered equipment is used, it must be inspected by the equipment's operator and determined to be in a safe operating condition.
- 3.2 The equipment operator shall use the heavy equipment inspection form similar to the sample which is attached in Appendix A. Records of inspection shall be maintained at the project site and be available upon request of client representatives, regulatory agency officials, and OHM auditors. These records shall become part of the official project file.
- 3.3 All machinery and equipment shall be inspected daily (when in use) to ensure proper working order. A thorough weekly inspection will be performed and documented using the form in Appendix A. The equipment operator is designated as the competent person to conduct the daily inspections.
- 3.4 Any piece of equipment which have deficiencies found during the daily or weekly inspection which would create a hazardous condition for the operator or other personnel on the job must be removed from service and repaired before allowing it to operate. Examples of this type of deficiency would include brake problems; drifting hydraulics; broken, shut down, or dead man switches.

4.0 HEAVY EQUIPMENT REQUIREMENTS

The equipment operator is responsible to make daily inspections of their equipment and to note any deficiencies. These deficiencies, no matter how minor, should be reported immediately to the site supervisor. In this way, many potential breakdowns of the equipment or potential safety hazards can be avoided by corrective maintenance.

Test shall be made at the beginning of each shift during which the equipment is to be used to determine that the operating systems are in proper working condition and that all required safety devices are in place and functional.

4.1 Safety Checks:

- Check the engine oil level. If low, add enough to bring the level to the full mark.
- Check the coolant level. Add water coolant if level is low.
- Check fuel level. Refill if necessary.
- Check tires for proper inflation, worn spots, cuts or breaks and objects imbedded in or between the tires. Correct or report conditions when found.
- Check under the vehicle for signs of oil, water, fuel, or other leaks. If leaks are seen, report them to your supervisor.
- Check head, tail, and clearance lights. If any are burned out, damaged, or missing, report them at once.
- Check batteries at least once a week for proper electrolyte level, leaks, and loose connections.
- Report any change in steering play or vibration in the steering mechanisms.
- Check the horn. If inoperative, have it repaired.
- Check the condition of the windshield, rear view mirrors and other glass. Report broken, cracked or missing glass. Clean all dirty or wet glass. Adjust rear view mirrors.
- Check belts on air compressor, generator, water pump, and any other. If loose or torn, report to your supervisor.

- Check special equipment such as wrenches, jacks, fire extinguisher, etc. Report any that are missing or unserviceable.
- Check the tracks for any loose bolts, nuts, proper adjustment, unusual wear patterns, cracks etc.
- Check the boom and buckets for cracks, bent members, worn teeth and cutting edges.
- Check fluid level of the hydraulic system.
- Check for dirty or inoperative air cleaners and filters.
- Check for proper brake operation.
- Check to make sure the equipment is equipped with a back-up alarm and the alarm is working properly.
- Make a complete walk-around inspection of the unit. In this manner damage may be detected before the machine is put into operation.
- When walking up to or around the unit, observe its condition and notice if anyone or anything is on or under it. By checking now, you may prevent injury or damage when you start out.
- If applicable, drain water off of the lubricating oil sump daily.
- In cold weather, bleed the air tank and, if equipment is equipped, use the alcohol injector pump.
- All guards protecting rotating shafts, pulleys, and pinch points are in place.

4.2 **Unsafe or Deficient Equipment** Whenever any machinery or equipment is found to be unsafe, or whenever a deficiency which affects the safe operation of equipment is observed, the equipment shall be immediately taken out of service and its use prohibited until unsafe conditions have been corrected.

4.2.1 A tag indicating that the equipment shall not be operated, and that the tag shall not be removed, must be placed in a conspicuous location on the equipment. Where required, lockout procedures shall be used. On the back of the tag, the problem with the equipment, inspector's name, employee number and date should be written.

4.2.2 The tag must remain in its attached location until it is demonstrated that the equipment is safe to operate.

4.2.3 When corrections are complete, the machinery or equipment shall be retested and reinspected prior to being returned to service.

4.3 Equipment Requirements

4.3.1 Seats or equal protection must be provided for each person required to ride on equipment.

4.3.2 Equipment operated on the highway shall be equipped with headlights, taillights, brake lights, and backup lights and turn signals visible from the front and rear.

4.3.3 All equipment with windshields shall be equipped with powered wipers. Vehicles that operate under conditions that cause fogging or frosting of windshields shall be equipped with operable defogging or defrosting devices.

4.3.4 Mobile equipment, operating within an off-highway job site not open to public traffic, shall have a service brake system and a parking brake system capable of stopping and holding the equipment while fully loaded on the grade of operation.

4.3.5 All vehicles which will be parked or moving slower than normal traffic on haul roads shall have a yellow flashing light or four-way flashers visible from all directions.

4.3.6 No one shall be permitted in the truck cab during loading operations except the driver and then only if the truck has a cab protector.

4.3.7 Steering or spinner knobs shall not be attached to the steering wheel unless the steering mechanism prevents road reactions from causing the steering handwheel to spin: when permitted, the steering knob shall be mounted within the periphery of the wheel.

4.3.8 The controls of loaders, excavators, or similar equipment with folding booms or lift arms shall not be operated from a ground position unless so designed.

4.4 Parking

- 4.4.1 Whenever equipment is parked, the parking brake shall be set.
- 4.4.2 Equipment parked on an incline shall have the wheels chocked or track mechanism blocked and the parking brake set.
- 4.4.3 All equipment left unattended at night, adjacent to a highway in normal use or adjacent to construction areas where work is in progress, shall have lights or reflectors, or barricades equipped with lights or reflectors, to identify the location of the equipment.

4.5 Towing

- 4.5.1 In the event that a disabled piece of heavy equipment requires towing, towing devices used on any combination of equipment shall be structurally adequate for the weight drawn and securely mounted.
- 4.5.2 Persons shall not be permitted between a towing vehicle and the piece of towed equipment until both have been completely stopped with all brakes set and wheels chocked on both vehicle and equipment.

5.0 MAINTENANCE AND REPAIRS

- 5.1 Preventive Maintenance. Preventive maintenance procedures recommended by the manufacturer shall be followed.
- 5.2 Equipment Repairs. All machinery or equipment shall be shut down and positive means taken to prevent its operation while repairs or manual lubrications are being done. Equipment designed to be serviced while running are exempt from this requirement.
- 5.3 Repairs. All repairs on machinery or equipment shall be made at a location which will protect repair personnel from traffic.
- 5.4 Heavy machinery, equipment, or parts thereof which are suspended or held apart by slings, hoist, or jacks shall be substantially blocked or cribbed before personnel are permitted to work underneath or between them.
- 5.5 Bulldozer and scraper blades, end-loader buckets, dump bodies, and similar equipment shall be either fully lowered or blocked when being repaired or when

not in use. All controls shall be in a neutral position, with the engines stopped and brakes set, unless work being performed on the machine requires otherwise.

- 5.6 Mechanized Equipment. Mechanized equipment shall be shut down prior to fueling operations.
- 5.7 No modifications or additions which affect the capacity or safe operation of machinery or equipment shall be made without the manufacturer's written approval.
- 5.7.1 If such modifications or changes are made, the capacity, operation, and maintenance instruction plates, tags, or decals shall be changed accordingly.
- 5.7.2 In no case shall the original safety factor of the equipment be reduced.

6.0 GUARDING AND SAFETY DEVICES

- 6.1 Reverse Signal (Back-up) Alarm. All self-propelled construction and industrial equipment, whether moving alone or in combination, shall be equipped with a reverse signal alarm. Note: Equipment designed and operated so that the operator is always facing the direction of motion does not require a reverse signal alarm.
- 6.1.1 Reverse signal alarms shall be audible and sufficiently distinct to be heard under prevailing conditions.
- 6.1.2 Alarms shall operate automatically upon commencement of backward motion. Alarms may be continuous or intermittent (not to exceed 3-second intervals) and shall operate during the entire backward movement.
- 6.1.3 Reverse signal alarms shall be in addition to requirements for signal persons.
- 6.2 Warning Device. A warning device or signal person shall be provided where there is danger to persons from moving equipment, swinging loads, buckets, booms, etc.
- 6.3 Machinery Repair. No guard, safety appliance, or device shall be removed from machinery or equipment, or made ineffective except for making immediate repairs, lubrications, or adjustments, and then only after the power has been shut off. All guards and devices shall be replaced immediately after completion of repairs and adjustments and before power is turned on.

- 6.4 Seatbelts and Anchorage. Seatbelts and anchorages meeting the requirements of 49 CFR 571 shall be installed and worn in all motor vehicles (installation and usage on buses is optional); two-piece seat belts and anchorages for construction equipment shall comply with applicable federal specifications or SAE J 336a.
- 6.5 Protection. Suitable protection against the elements, falling or flying objects, swinging loads, and similar hazards shall be provided for operators of all machinery or equipment; glass used in windshields or cabs shall be safety glass.
- 6.6 Guarding
- 6.6.1 All belts, gears, shafts, pulleys, sprockets, spindles, drums, flywheels, chains, or other reciprocating, rotating or moving parts of equipment shall be guarded when exposed to contact by persons or when they otherwise create a hazard
- 6.6.2 All hot surfaces of equipment, including exhaust pipes or other lines, shall be guarded or insulated to prevent injury and fire.
- 6.6.3 Platforms, foot walks, steps, handholds, guardrails, and toeboards shall be designed, constructed, and installed on machinery and equipment to provide safe footing and access ways.
- 6.6.4 Substantial overhead protection shall be provided for the operators of fork lifts and similar material handling equipment.
- 6.6.5 Fuel tanks shall be located in a manner which will not allow spills or overflows to run onto engine, exhaust, or electrical equipment.
- 6.6.6 Exhaust or discharges from equipment shall be so directed that they do not endanger persons or obstruct view of operator.
- 6.7 Falling Object Protective Structures (FOPs). All bulldozers, tractors, or similar equipment used in clearing operations shall be provided with guards, canopies, or grills to protect the operator from falling and flying objects as appropriate to the nature of the clearing operations.
- 6.7.1 FOPs for other construction, industrial, and grounds-keeping equipment will be furnished when the operator is exposed to falling object hazards.
- 6.7.2 FOPs will be certified by either the manufacturer or a licensed engineer.

6.8 Rollover Protective Structures (ROPS).

6.8.1 Seat belts and rollover protective structures (ROPS) shall be installed on:

- Crawler and rubber-tire tractors including dozers, push and pull tractors, winch tractors, and mowers;
- Off-the-highway self-propelled pneumatic-tire earth movers such as trucks, pans, scrapers, bottom dumps and end dumps;
- Motor grades;
- Water tank trucks having a tank height less than the cab; and
- Other self-propelled construction equipment such as front-end loaders, backhoes, rollers, and compactors.

6.8.2 ROPS are not required on:

- Trucks designed for hauling on public highways,
- Crane-mounted dragline backhoes,
- Sections of rollers and compactors of the tandem steel-wheeled and self-propelled pneumatic tired type that do not have an operator's station,
- Self-propelled rubber-tired lawn and garden tractors and side boom pipe laying tractors operated solely on flat terrain, not exposed to rollover hazards, and
- Cranes, drag lines, or equipment on which the operator's cab and boom rotate as a unit.

7.0 RENTAL AND LEASED HEAVY EQUIPMENT

All equipment either rented or leased for use on OHM project sites and facilities must comply with all of the requirements in this procedure. In addition, before any piece of equipment is accepted for use on an OHM project site or facility, a competent person must perform a thorough inspection using the form in Appendix A to ensure that the equipment will be safe to use and operate within the requirement for that type of equipment.



DAILY HEAVY EQUIPMENT SAFETY INSPECTION CHECKLIST

EQUIPMENT I.D. NO.:

EQUIPMENT NAME:

WEEK OF:

ITEM INSPECTED	MONDAY	TUESDAY	WED.	THURSDAY	FRIDAY	SATURDAY	SUNDAY
Falling Object Protective Structure (FOP)							
Roll-Over Protective Structure (ROP)							
Seat Belts							
Operator Seat Bar(s)							
Side Shields, Screens or Cab							
Grab Handles							
Back-Up Alarm - Working							
Lights							
Guards							
Horn							
Anti-Skid Tread Steps Clear of Mud							
Safety Signs (i.e. counterbalance swing area)							
Fire Extinguisher							
Oil (full and no leaks)							
Clear Of Extra Materials							
Controls function properly							
Hydraulic System (full and no leaks)							
Parking brake							
Lift Arm and Bucket							
Tires/Tracks							
Steering							
Inspectors Name and Employee No.							

INSTRUCTIONS - Inspect all applicable items indicated, each shift. If an unsatisfactory condition is observed, suspend operation of the equipment and report the unsatisfactory condition to the site supervisor immediately.



OHM Remediation
Services Corp.

HEALTH & SAFETY PROCEDURES

FALL PROTECTION

PROCEDURE NUMBER 2-9

Page 1 of 10

LAST REVISED 6/96

APPROVED BY: GMR/FHH

1.0 OBJECTIVE

OHM Remediation Services Corp. (OHM) employees, subcontractors, and visitors will be protected from fall hazards, such as unprotected edges 6 feet or more above the next lower level, by learning to recognize fall hazards and implement controls including the appropriate selection, use, and maintenance of fall protection equipment. **Note: OSHA regulation requires fall protection at a height of 6 feet; however, a competent person (i.e. site supervisor, site safety officer) will evaluate fall hazards at OHM projects/facilities for work involving any potential fall of 4 feet or more, determine appropriate controls, document the hazard evaluation in the site safety log, and implement control measures. State OSHA programs may also impose more stringent fall protection requirements.**

2.0 PURPOSE

The purpose of this procedure is to address the elements of the Fall Protection Program and to conform to the requirements found in 29 CFR 1926.500 - .503 (Subpart M) - Fall Protection. In some cases this procedure incorporates specific OHM requirements, which are more stringent than the OSHA regulation.

3.0 DEFINITIONS

The following are common definitions used to describe fall protection systems.

- 3.1 Anchorage/Tie-Off Point. A secure point of attachment for lifelines, lanyards, or deceleration devices must have 5,000 pounds tensile strength per employee. Common examples of adequate anchor points include eye bolts, beams, confined space retrieval tripods, etc. Acceptable anchorage points should be selected under the advice of the site competent person. The site competent person may seek the advice of a structural engineer in any situation where the anchor point strength is in question.
- 3.2 Body Belt. A strap that can be both secured around the waist and attached to a lanyard, lifeline, or deceleration device. Body belts are intended to be used as a restraining device which in conjunction with a lanyard would keep an employee away from an unprotected edge or other fall hazard. Body belts must never be used in situations where personnel are actually exposed to a fall hazard situation.
- 3.3 Body Harness. Straps that can be secured around the employee to distribute the fall arrest forces over the thighs, pelvis, waist, chest, and shoulders with a dee-

ring in the middle of the back to attach it to other components of a personal fall arrest system.

- 3.4 **Competent Person.** A qualified individual (such as the site supervisor or site safety officer) will serve as the competent person to oversee all job activity involving fall hazards. The competent person will identify and evaluate fall hazards at work, and will select the appropriate fall protection system to eliminate or control the fall hazard.
- 3.5 **Deceleration Device.** Mechanism such as a rope grab, a self-retracting lifeline, or a shock absorbing lanyard that serves to dissipate a large amount of energy during a fall arrest.
- 3.6 **Guardrail System.** A fixed barrier erected in compliance with Section 5.1 of this procedure as an engineering control to prevent employees from falling to a lower level.
- 3.7 **Lanyard.** Flexible line of rope, wire rope, or synthetic web with a connector at each end to connect a body belt or harness to a deceleration device, lifeline, or anchorage. Lanyards must have double-locking snaphooks, 5,000 pounds of tensile strength, and are usually limited to 6 feet in length.
- 3.8 **Leading Edge.** Edge of a floor, roof, or framework that changes location as additional material is formed/constructed. The edge is considered an unprotected or leading side/edge when not actively and continuously under construction. The wall or bank of an excavation can be considered a leading edge during periods of non-activity. An acceptable anchorage point (5,000 pounds of tensile strength) is not required if personnel are not exposed to a fall hazard.
- 3.9 **Low Sloped Roof.** A roof having a slope less than or equal to 4:12 (vertical to horizontal).
- 3.10 **Personal Fall Arrest System.** A system used to arrest an employee in a fall from a working level. A complete system consists of an anchorage, connectors, body harness, and may include a lanyard, deceleration device, lifeline, or a combination of these. **OHM prohibits the use of body belts for a fall arrest system.**
- 3.11 **Portable Anchorage Point/Cross Arm Strap.** A synthetic web with metal Dee-rings which can be used in a choke hitch around a structural building member used to connect the lanyard to an anchorage member when there is no eye bolt or other means for direct attachment; must have 5,000 pound tensile strength per employee
- 3.12 **Positioning Device System.** A body belt/positioning belt or harness used in combination with an anchorage and connectors to support an employee on an

elevated surface with both hands free and/or prevent an employee from approaching a leading edge. A positioning device system must limit employee free fall to 2 feet or less. A positioning device must not be used in a fall arrest system.

- 3.13 Roll Out. The accidental disengagement or opening of a snaphook, which occurs when there is an improper use of a snaphook with an attachment point. The force of the fall arrest rebounds through the lanyard, the hook is driven up and around the attachment, the gate is depressed, and the snaphook opens or rolls out. This disengagement can be prevented by using locking snaphooks.
- 3.14 Roof. The exterior surface on the top of a building; not including floors or framework serving as the temporary top surface while building construction is being completed.
- 3.15 Rope Grab. A deceleration device that travels on a lifeline and automatically engages the lifeline and locks to arrest the employee's fall. Operates by friction and employs the principle of inertial locking and/or cam/lever locking.
- 3.16 Safety Monitoring System. A fall protection system that employs a competent person, the "safety monitor", to monitor the safety of employees during leading edge work at elevated heights. This system is administered as part of a fall protection plan, to be implemented only when the use of conventional fall protection equipment would create a greater hazard for the existing situation. Only personnel covered under the fall protection plan are allowed in an area where a safety monitoring system is being used.
- 3.17 Swing Fall. A pendulum-type swing resulting from a fall. A large swing arc is produced from lateral movement away from the anchorage point, momentum builds and the victim usually strikes an obstruction or sharp object, which stops the swing fall. Swing fall hazards can be controlled by maintaining an anchorage point, which at a minimum is at or above the employee's shoulders.
- 3.18 Warning Line System. A barrier erected on a roof to warn employees that they are approaching an unprotected roof side or edge, and which designates an area where roofing work may take place without the use of a guardrail, safety net, or fall arrest system to protect employees in the area.

4.0 RECOGNIZING FALL HAZARDS

Fall hazards and falling object hazards may be encountered by OHM personnel in the following situations:

- 4.1 Working on levels 6 feet or more above the next lower level/ground[→] with an open side. Common situations might include work on top of frac tanks, carbon cells,

pipe racks, open floors, excavations, wells, shafts, pits, tank trucks, rail cars, manlifts or other elevated platforms.

- 4.2 Falling object/overhead hazards such as those encountered during work in an excavation, during tank cleaning operations, working below scaffolds, or during demolition activities.
- 4.3 Trips, falls, or tangles in fall protection equipment.

5.0 GUARDRAIL SYSTEMS

Guardrail systems shall be used as an engineering control to eliminate hazards of unprotected edges or open holes, such as work near the edge of an excavation, well, shaft or pit. Note: OSHA prefers the use of engineering controls over personal protective equipment for controlling hazards at work.

5.1 System Specifications

- Height of the top rail edge must be 42 inches \pm 3 inches above the working level.
- Midrails shall be installed midway between the top rail and working level.
- Guardrail system must be capable of withstanding 200 pounds of force applied outward or downward within 2 inches of the top edge of the guardrail at any point. (Midrails must have 150 pound capacity.)
- Guardrail system shall be constructed to prevent puncture or laceration to personnel or equipment, or snagging of clothing.
- Top rails and midrails shall be at least one-quarter of an inch-thick to prevent cuts/lacerations. If wire rope is used, it must be flagged every 6 inches. Metal strapping and rope are not acceptable for use.
- Toeboards shall be installed whenever personnel are working above other personnel to prevent tools or debris from being kicked out, falling, and striking the people below.

5.2 System Use

- Personnel shall not lean on guardrails or rest equipment against guardrails.
- Inspect guardrails regularly for defects, and replace/rebuild defective components immediately.

6.0 COVERS

Holes (including skylights) in walking/working surfaces that present a potential for employees to fall 6 feet or more must be protected using guardrails, personal fall arrest systems, or covers. Holes that could permit objects to fall and strike personnel below must also be protected with covers.

- 6.1 Covers shall be capable of supporting at least twice the maximum axle load of the largest vehicle expected to drive over the cover.
- 6.2 Covers shall be capable of supporting at least twice the weight of employees expected to walk over the cover.
- 6.3 Covers shall be secured to prevent displacement by wind, equipment, or employees.
- 6.4 Covers shall be marked with signs or other hazard warnings such as "Do not remove - open hole."

7.0 PERSONAL FALL ARREST SYSTEMS

These systems shall be used when engineering controls are not feasible to control a fall hazard of 6 feet. Improper selection and use of fall protection equipment, or failure to use fall protection equipment can lead to serious accidents or fatalities resulting from unprotected falls, swing falls, rollout, or failure of fall arrest system components.

7.1 System Specifications

- Components of a personal fall arrest system include a body system (harness), connecting device (rope or web lanyard, shock absorbing lanyard, self-retracting lifeline), and a tie-off or anchorage point (5,000 pounds per worker; eye bolt or beam).
- Only ANSI approved fall protection equipment shall be used.
- Use lanyards with locking snaphooks only. Non-locking snaphooks are not acceptable, since they may contribute to roll out.
- Dec-rings, snap hooks, and attachment straps must have 5,000 pound tensile strength.

7.2 System Use

- Use a portable anchorage point (cross arm strap) to connect the lanyard to the anchorage point when there is no eye bolt for direct attachment. Hitching the lanyard onto itself as a choker is never allowed.
- Attach connecting devices to the dee-ring in the middle of the back.
- Locate anchorage points at or above the dee-ring attachment point in the middle of the back.
- Do not work above the tie-off anchor point. If it is necessary to work above the tie-off point, reposition the tie-off anchor point to a point above the middle of the back.
- Choose an anchor point that is located well above the lower level. A 6 foot man, with a 6 foot lanyard, plus 3.5 foot maximum shock absorbing extension requires a minimum clearance of 15.5 feet from anchor point to ground to avoid striking the ground during a fall.
- When no overhead structures exist or qualify as acceptable anchorage, a crane or forklift may be used if it has sufficient capacity.
- Do not tie off around sharp edges, which may cut anchorage straps and lanyards.
- Destroy and discard all components of a fall arrest system (e.g. harness, lanyard) after a fall, and replace them with new fall arrest equipment. NOTE: Specific fall arrest components like retractable lifelines may be sent to the manufacturer for testing and returned to service with approval of the regional health and safety director.
- Maintain fall arrest systems that are free of debris, rust, and corrosion; protect them from crushing and sharp surfaces. Appropriately clean and dry components before storing them in a safe place.
- Dispose of chemically contaminated components properly at the conclusion of a project or when the chemical contamination could have an adverse effect on the device.
- System components shall be used only for employee fall protection and not to hoist equipment or materials.

7.3 Inspecting Components

Inspect systems using the following guidelines:

Harnesses and Dee-Rings

- Hold with two hands, bend, and look for broken fibers, cuts, and pulled stitches.
- Dee-rings shall pivot freely. Inspect for distortion, cracks, and breaks.
- Inspect for wear, frayed or cut fibers, or distortion of buckles. Rivets must be tight and immovable with the fingers. Bent rivets may fail under stress.
- Inspect for frayed or broken strands. Look for tufts on webbing surface.
- Inspect for wear of repeated buckling and unbuckling on the tongue or billet.
- Look for loose, distorted grommets. There shall be no additional punched holes.

Lanyards

- Inspect for frays by twisting the rope.
- Inspect for failing hook latches, absence of locking latches, or a change in shape of the metal eye on lanyards or hooks.
- Examine for rips or tears in shock absorbing lanyard sections.
- Self-retracting lifelines must be inspected annually by the manufacturer.

8.0 WARNING LINE SYSTEMS

Warning line systems are often combined with other fall protection systems to provide fall protection for work on low-sloped roofs. Personnel working on low-sloped roofs with unprotected sides 6 feet or more above the next lower level must implement fall protection to include one of the following:

- Warning line and guardrail system
- Warning line and safety net system
- Warning line and personal fall arrest system
- Warning line and safety monitoring system, or
- Guardrail, safety net, or personal fall arrest system

8.1 System Specifications

- Warning lines consist of ropes, wires or chains, and supporting stanchions.
- Flag warning lines every 6 feet with high visibility material.
- With the warning line erected, stanchions shall be capable of resisting at least 16 pounds applied horizontally, perpendicular to the warning line, without tipping over.
- The lowest point (sag) of the lines must be at least 34 inches from the work surface and no more than 39 inches from the work surface.
- The warning line shall have a minimum tensile strength of 500 pounds.

8.2 System Use

- Erect warning lines around all sides of the roof work area.
- Erect warning lines at least 6 feet from the roof edge when mechanical equipment is not being used.
- When mechanical equipment is in use, erect warning lines at least 6 feet from the edge parallel to equipment operation, and at least 10 feet from the edge that is perpendicular to equipment operations.
- No employee is allowed in an area between a roof edge and a warning line unless performing designated work tasks in that area.
- Mechanical equipment can be used and stored only in areas where employees are protected by warning lines, guardrails, or a personal fall arrest system.
- Access points, storage and hoist areas shall be connected to the work area by a path formed with two warning lines. When this path is not in use, it shall be barricaded with rope, wire, or chain, equivalent in strength and height to the warning line, to prevent employees from walking directly into the work area.

9.0 SAFETY MONITORING SYSTEM

This system may be used in combination with a warning line system to provide fall protection during work on low-slope roofs. It may be used alone as a fall protection system during work on low-sloped roofs 50 feet or less in width, or as otherwise specified in a fall protection plan. Use of this system requires approval of the Regional Health and Safety Director.

- 9.1 A competent person such as the site safety officer or the site supervisor shall be designated as the "safety monitor" to recognize fall hazards and warn employees of these hazards or unsafe acts.
- 9.2 The safety monitor shall be on the same walking/working surface and within visual distance of the employees being monitored.
- 9.3 The safety monitor shall be close enough to communicate orally with employees.
- 9.4 The safety monitor shall not have other job responsibilities that would distract the safety monitor's attention.
- 9.5 Mechanical equipment shall not be used or stored in areas where safety monitoring systems are used for roofing operations on low-sloped roofs.
- 9.6 No employees other than those performing roofing work covered under the fall protection plan shall be allowed in an area covered by the safety monitoring system.

10.0 OVERHEAD PROTECTION

Employees are required to wear hardhats in areas where falling object hazards exist, and to implement one of the following:

- 10.1 Erect toeboards, screens or a guardrail system to prevent objects from falling from the work surface.
- 10.2 Erect a canopy structure or a debris net, to catch objects if they do fall, and keep objects away from the edge of the work surface.
- 10.3 Barricade areas where objects could fall, keep employees out of barricaded areas and keep objects away from the edge of the work surface.

11.0 OTHER FALL PROTECTION SYSTEMS

- 11.1 Work on manlifts or other elevated platforms can expose personnel to fall hazards. Guardrails, midrails and possibly toeboards shall be installed on manlifts or other elevated platforms, and personnel shall tie off to the boom or basket during work activities. A personal fall arrest system shall be used when the above engineering controls cannot be implemented due to clearance restrictions.
- 11.2 A number of other fall protection systems can be used with approval of the Regional Health and Safety Director. These systems include safety nets, controlled access zones, a fall protection plan, or a combination of these. These systems are less likely to be used on OHM projects due to the nature of the work

and the selection of guardrails, covers, and personal fall arrest systems to better provide fall protection.

- 11.3 Other industry standards that involve fall hazards are 29 CFR 1926 Subpart L, the Scaffolding standard, Subpart X, Floor and Wall Openings and Stairways and Ladders.
- 11.4 If a fall hazard situation arises at an OHM project site or facility, and is not addressed by this procedure, then it will be the responsibility of the site supervisor to contact the regional health and safety director to determine what method will be used to control the fall hazard.

12.0 TRAINING

The following statements describe the requirements of the OHM fall protection training program.

- 12.1 Training must be provided to all employees who may be exposed to fall hazards during the course of their work. Training will teach employees to recognize fall hazards and falling object hazards at work and to implement procedures to control these hazards.
- 12.2 The program shall address procedures for erecting, maintaining, disassembling, inspecting and storing fall protection equipment, as outlined in sections 5 through 11 of this procedure.
- 12.4 Retraining shall be conducted for situations where an employee is believed to lack the skill and understanding to recognize and control fall hazards at work, which may include changes in the workplace or changes in the types of fall protection systems or equipment to be used.



OHM Remediation
Services Corp.

HEALTH & SAFETY PROCEDURES

HEAT STRESS PREVENTION

PROCEDURE NUMBER 3-4

Page 1 of 3

LAST REVISED 10/95

APPROVED BY: JFK/FHH

1.0 OBJECTIVE

In work situations where heat stress may be a factor, OHM Remediation Services Corp. (OHM) will attempt to prevent heat related illness by use of work-rest schedules, physiological monitoring and/or personal cooling devices.

2.0 PURPOSE

This procedure describes the causes, symptoms, treatment, and prevention of heat-related illness.

3.0 GENERAL INFORMATION

3.1 Heat-related illnesses are caused by the body's inability to dissipate metabolic heat in conjunction with excessive environmental heat and wearing PPE.

3.2 A period of adjustment or acclimatization is necessary before maximum tolerance to heat is acquired. Most workers require 7 to 10 working days of gradually increasing workload to become fully acclimatized.

4.0 HEAT-RELATED ILLNESSES

4.1 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.

4.2 Heat cramps are caused by profuse perspiration with inadequate fluid intake and salt replacement. This often robs the larger muscle groups (stomach and quadriceps) of blood which can make them cramp.

Signs and Symptoms: Muscle spasm and pain in the extremities and abdomen.

Treatment: Remove affected person to a cool place and give sips of clear water or an electrolytic drink (for example, Gatorade). Manual pressure may also be applied to the cramped muscles.

- 4.3 **Heat exhaustion** is a mild form of shock caused by sustained physical activity in heat and profuse perspiration without adequate fluid and salt replacement.

Signs and Symptoms: Weak pulse; shallow breathing; pale, cool, moist (clammy) skin; profuse sweating; dizziness; fatigue

Treatment: Remove affected person 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.

- 4.4 **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 or higher; no perspiration; nausea; dizziness and confusion; strong, rapid pulse; coma

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 an ice/water bath (however, be careful not to over chill the victim once body temperature is reduced below 102 degrees Fahrenheit). If this is not possible, keep victim wrapped in a sheet and continuously douse with water and fan.

5.0 SPECIFIC REQUIREMENTS

- 5.1 The environmental hazards section of site health and safety plans will address heat stress if the ambient temperature is expected to exceed 65 degrees Fahrenheit. Guidance for heat stress prevention can be found in the American Council of Governmental Industrial Hygienists' (ACGIH) current year edition of the TLV (Threshold Limit Values).
- 5.2 The site health and safety plan will discuss work-rest cycles and provisions for monitoring the level of heat stress (i.e., pulse rate).

- 5.3 Workers are to be advised not to drink caffeinated or alcoholic beverages because they increase the rate of body water loss.
- 5.4 Increased dietary salt or lightly salted (0.2 percent) water is adequate to replace lost salt. Salt tablets are not to be used.
- 5.5 If juice or electrolyte drinks are used, they should be diluted prior to drinking.
- 5.6 Thirst is not an adequate indicator of body water loss. Workers are to drink at least small amounts of water on each break.
- 5.7 Workers are to rest when any of the symptoms described above are present. The buddy system is mandatory, as most often the potential victim will not be aware of any symptoms. Watch out for each other.



OHM Remediation
Services Corp.

HEALTH & SAFETY PROCEDURES

RESPIRATORY PROTECTION

PROCEDURE NUMBER 4-2

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LAST REVISED 8/96

APPROVED BY: DLM/FHH

1.0 OBJECTIVE

No individual will enter an area where the use of respiratory protective equipment is required unless the person has been trained in the selection, use, care and limitations of the respirators, and the proper respirator has been selected for the task, and the individual is fit tested for that respirator.

2.0 PURPOSE

The purpose of this procedure is to provide information and guidelines for the selection, use, and care of respiratory protective equipment for all OHM Remediation Services Corp. (OHM) and contractor personnel. This procedure complies with the requirements of 29 CFR 1910.134 Respiratory Protection.

3.0 GENERAL

- 3.1 The use of engineering controls should be the primary method to limit employee exposure to respiratory hazards.
- 3.2 Respirators shall be worn when engineering controls are unsuccessful and:
 - The established PEL (Permissible Exposure Limit) or TLV (Threshold Limit Value) for the particular material is approached or exceeded, as measured by direct reading and/or integrated air sampling applicable for the suspected contaminant.
 - As deemed appropriate by the regional health and safety director or designee.
- 3.3 Respirators can only be issued and worn by individuals who have been properly trained and fit tested.
- 3.4 The respirator program coordinator for each region will be the regional health and safety director.
- 3.5 The regional health and safety director will evaluate annually the effectiveness of the respirator program and denote deficiencies to the vice president of health and safety.

- 3.6 Only respirators approved by the National Institute for Occupational Safety and Health (NIOSH) and the Mine Safety and Health Administration (MSHA) which are appropriate for the potential hazard shall be worn when potential exposure involves a toxic material.

4.0 SELECTION OF RESPIRATORS

- 4.1 Engineering controls should always be the primary control method of employee exposure to airborne contaminants (i.e. elimination of contamination source, ventilation of area, barriers, remote handling methods, etc).
- 4.2 Once the need for respiratory protection has been established, the respirators shall be selected on the basis of the hazards to which the worker is exposed.

4.2.1 Selection criteria should include:

- Identity of airborne hazard
 - Physical form of contaminant
 - The current concentration of the contaminant
 - Potential maximum concentration of the contaminant
 - Whether the contaminant may be present in concentrations to be immediately dangerous to life or health (IDLH)
 - The possibility of oxygen deficiency
 - A suitable approved cartridge is available
 - The useful life of the respirator cartridge
 - The escape routes available
 - Whether the respiratory devices are intended for emergency use, for periodic use, or for stand-by purposes
- 4.3 Other relevant information based on site conditions may be considered to determine type of respirator to be used.
- 4.4 OHM does not routinely permit the use of one half face piece air purifying respirators and disposable dust masks. The regional health and safety director or designee must approve the use of either of these devices.

5.0 MEDICAL SCREENING

- 5.1 Prior to assigning personnel to perform tasks requiring the use of respirators, the employee shall be medically qualified in compliance with requirements of 29 CFR 1910.134(a)(10) and 29 CFR 1910.120(f).
- 5.2 Employees not physically and psychologically capable of wearing respirators shall not be assigned to work requiring the use of respirators.
- 5.3 The medical status of each employee is to be periodically evaluated as outlined in SOP 3-1, Occupational Health Examination Program. Additional evaluations may be deemed necessary if the physical/medical status of the employee changes.

6.0 FIT TESTING

- 6.1 Fit testing will be performed in accordance with accepted fit test procedures by the regional health and safety director or their designated employee who has been trained and qualified to do so. Fit testing will take place at least annually or as required by other specific OSHA standards (i.e. 29 CFR 1926.62). Additionally, fit testing will be performed whenever a new respirator has been issued; there is a change in facial features, for example, weight loss/gain, accident or dental changes; or difficulty in achieving a satisfactory positive/negative fit test. Site specific fit tests will take place when requested by the client. A copy of the Respirator Fit Test Record follows this procedure.
- 6.2 Records of fit testing shall be maintained by the employee's division office and/or the corporate health and safety department. These records will include the manufacturer, model, and size of respirator the employee used in the fit test and the procedures used to perform the fit test.

7.0 RESPIRATOR USE INSTRUCTIONS

- 7.1 Respirators must be used only by those employees who have been properly trained and qualified on the specific type of respirator to be worn.
- 7.2 All employees whose job assignment requires the use of respirators shall be given respirator training and be fit tested prior to being initially assigned to a field project or job requiring respirator usage. A review of operation and maintenance will be performed annually, typically during the HAZWOPER refresher, on each type of respirator worn by the individual. Documentation of this training will be maintained in the Corporate Health and Safety Office.
- 7.3 Only respirators and/or cartridges approved by NIOSH/MSHA and appropriate for the hazardous atmosphere to be encountered will be used.

- 7.4 CAUTION: Air-purifying respirators are not to be used where an oxygen deficiency (less than 19.5 percent) exists. Only air-supplied full face respirators with an emergency escape cylinder or self-contained breathing apparatus will be worn when an oxygen deficiency exists. The regional health and safety director must approve any entry into an oxygen deficient atmosphere.
- 7.5 OHM personnel will not enter atmospheres recognized exceeding the IDLH concentration for a particular material without approval of the regional health and safety director. Only air-supplied full face respirators with an emergency escape cylinder or self-contained breathing apparatus will be worn in IDLH atmospheres. CAUTION: A respirator does not protect against excessive heat or against hazardous substance that can attack the body through the skin.
- 7.6 Contact lenses shall not be worn in contaminated atmospheres requiring the use of respiratory protection.
- 7.7 A person wearing a respirator must be clean-shaven in the area of the face piece seal. Long hair, sideburns, and skull caps that extend under the seal are not allowed. Glasses with temple pieces extending under the seal are not allowed. Persons with facial conditions that prevent a proper seal are not allowed to wear respiratory protection until the condition is corrected. Facial conditions which may cause a seal problem include missing dentures, scars, severe acne, etc.
- 7.8 A minimum of three (3) people must be assigned to each operation involving use of airline egress systems. That two (2) people operating in a buddy system and one (1) person as a cylinder watch. This person may have collateral duties as long as they are in the same general vicinity and the duties would not interfere with monitoring the egress system.

8.0 RESPIRATOR INSPECTION

- 8.1 Respirators shall be inspected by the user before and after each day's use. Respirators not used routinely (e.g. emergency use respirators) shall be inspected once a month.
- 8.2 Inspection procedure for air purifying respirators (full-face piece and one half-face piece cartridge/canister respirators)
- 8.2.1 Examine the face piece for:
- Excessive dirt.
 - Cracks, tears, holes, or distortion from improper storage.
 - Inflexibility.

- Cracked or badly scratched lenses.
- Incorrectly mounted lens or broken or missing mounting clips.
- Cracked or broken air purifying element holder, badly worn threads, or missing gaskets.

8.2.2 Examine the head straps or head harness for:

- Breaks or cracks.
- Broken or malfunctioning buckles. Excessively worn serrations on the head harness which may permit slippage.

8.2.3 Examine exhalation valve for the following after removing cover:

- Foreign material.
- Cracks, tears, or distortion in the valve material.
- Improper insertion of the valve body into the face piece.
- Cracks, breaks, or chips in the valve body, particularly in the sealing surface.
- Missing or defective valve cover.
- Improper installation of the valve into the valve body.

8.2.4 Examine the air purifying elements (cartridge or canister) for:

- Missing cartridge adapter gasket
- Incorrect cartridge/canister, or filter for the hazard.
- Incorrect installation, loose connections, missing or worn gaskets, or cross threading in the cartridge adapter.
- Cracks or dents in outside case or threads of filter or cartridge /canister.

8.2.5 If the device has a corrugated breathing tube, examine it for:

- Broken or missing end connections.

- Missing or loose hose clamps.
 - Deterioration, determined by stretching the tube and looking for cracks.
- 8.3 Inspection procedure for air-supplied respirators (full face piece air line respirators and self contained breathing apparatus (SCBA)) should be as follows:
- 8.3.1 If the device has a tight-fitting face piece, follow the procedures outlined for air purifying respirators, except those pertaining to the air purifying elements.
- 8.3.2 The inspection of air-supplied respirators should include checks on the following items:
- Tightness of connections
 - Condition of all rubber parts
 - Air cylinder (SCBA & egress) must be fully charged and the hydrostatic test certification must be current (Fiberglass/ composite cylinders-3 years/steel cylinders-5 years).
 - Regulators and warning devices function properly.
 - Each unit (SCBA & egress units) must have a distinct identification number permanently affixed or engraved on the regulator. The manufacturer's serial number may be used.
- 8.4 A record of respirator inspections including date and inspectors initials and employee number will be maintained for all respiratory protective equipment designated for emergency response. Egress units and SCBAs shall be inspected on a monthly basis. The SCBA inspection form follows this procedure.
- 8.5 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.
- 8.5.1 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 damaged is repaired. Cylinders

abraded in excess of 0.0075 inch (0.191 mm) should be taken out of service until professionally inspected.

- 8.5.2 Cuts are damage inflicted by a sharp objects. 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 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.
- 8.5.3 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.
- 8.5.4 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 form service and condemned.
- 8.5.5 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.

9.0 CLEANING OF RESPIRATORS

- 9.1 Respirators assigned and worn by one individual must be cleaned after each day's use. Visitors' or multi-assigned respirators must be cleaned and disinfected after each use.
- 9.2 Extreme caution must be exercised to prevent damage from rough handling during the cleaning procedure.

- 9.3 After cleaning, respirators must be reassembled.
- 9.4 A respirator spray disinfectant is approved as disinfectant between continuous use but not for cleaning and sanitizing after each day's use.
- 9.5 Cleaning procedure for individually assigned respirators.
- 9.5.1 **Washing:** The respirator must be disassembled and washed with a mild liquid detergent in warm water. A brush should be used. To avoid damaging the rubber and plastic in respirator face pieces, use a soft bristle brush and a cleaner/water solution preferably between 90 and 100°F.
- 9.5.2 **Rinsing:** The respirator should be rinsed thoroughly in clean water (140°F maximum) to remove all traces of detergent. This is very important to prevent skin irritation from the detergent.
- 9.5.3 **Disinfection:** The respirator should be immersed in a solution of water and chlorine in a hypochlorite solution made from household bleach (50:1 ratio or approximately 2 cap fulls per gallon) to disinfect the respirator. The immersion should last for at least two minutes.
- 9.5.4 **Rinsing:** The respirator should be rinsed thoroughly in clean water (140° F maximum) to remove disinfectant solution. This step is important to prevent dermatitis.
- 9.5.5 **Drying:** The following drying methods may be used: draining and drying on a clean surface; draining and drying when hung from racks (take care to prevent damage); or towel drying with a soft cloth or paper towels.
- 9.6 Cleaning procedure for visitor or multi-assigned respirators
- 9.6.1 **Washing:** The respirator must be disassembled and washed with a brush in a cleaning solution in warm water. To avoid damaging the rubber and plastic in respirator face pieces, use a soft bristle brush and a cleaner/water solution preferably between 90 and 100°F.
- 9.6.2 **Rinsing:** The respirator should be rinsed thoroughly in clean water (140°F maximum) to remove all traces of detergent. This step is important to remove all traces of detergent.

- 9.6.3 Disinfection: The respirator should be immersed in a solution of water and chlorine in a hypochlorite solution made from household bleach (50:1 ratio) to disinfect the respirator. The immersion should last for a least two minutes.
- 9.6.4 Rinsing: The respirator should be rinsed thoroughly in clean water (140°F maximum) to remove disinfectant solution. This step is important to prevent dermatitis.
- 9.6.5 Drying: The following drying methods may be used: draining and drying on a clean surface; draining and drying when hung from racks (take care to prevent damage); and drying in steel storage cabinets with built-in circulation fans. (Solid shelves should be replaced with steel mesh).

10.0 MAINTENANCE OF RESPIRATORS

- 10.1 Respirator maintenance shall only be performed by trained personnel.
- 10.2 Manufacturer's approved replacement parts must be used. Substitution of parts from a different brand or type of respirator invalidates the technical approval of the respirator.
- 10.3 Maintenance performed on a self-contained breathing apparatus shall be done only by an individual who has been certified by the manufacturer.
- 10.4 Survivair air supplied respirators (SCBA and egress units) shall be flow tested on an annual basis and overhauled every three years by an authorized factory repair facility. It is OHM's policy to test all air supplied respirators, without regard to manufacture's requirement, on this basis unless the manufacturer's requirement is more strict.

11.0 STORAGE OF RESPIRATORS

- 11.1 When not in use, respirators must be stored to protect them from dust, sunlight, heat, extreme cold, excessive moisture, damaging chemicals, and physical damage.
- 11.2 Respirators must be stored in reusable plastic bags between shifts.
- 11.3 The respirator storage environment must be clean, dry and away from direct sunlight. Upright cabinets and wall-mounted cases are suggested.

12.0 BREATHING AIR

12.1 Breathing air 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.

12.1.1 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/m³ oil (condensed), a maximum of 10 ppm carbon monoxide, no pronounced odor, and a maximum of 1000 ppm carbon dioxide.

12.1.2 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/m³ 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).

12.1.3 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.

12.2 Quality Verification. Breathing air suppliers must provide certification of analysis stating conformance, as a minimum, to Grade D breathing air standards as referenced in 12.1.1 for each cylinder and/or air lot.

13.0 RECHARGING BREATHING AIR CYLINDERS

13.1 An egress cylinder is fully charged at a pressure of 2550 pounds per square inch (psi). A 45 cubic foot 30 minute low pressure SCBA unit is fully charged at a pressure of 2216 psi.

13.2 Recharge the cylinders with pure, respirable compressed air which as a minimum, conforms to ANSI/CGA G-7.1 - 1989 Grade D breathing air standards. Never recharge a cylinder with oxygen.

13.3 Block or otherwise stabilize a cylinder to be recharged so that it will not fall or forcibly strike another object, cracking the cylinder connection during charging.

Cylinders do not need to be submerged in water during charging.

- 13.4 A standard breathing connection should be used to recharge a cylinder. CGA connection No. 346 is used for SCBA units and CGA connection No. 1310 is used for egress cylinders.
- 13.5 Connect the filling hose and open the cylinder valve. Fill the cylinder slowly, at a rate not to exceed 600 psi per minute. Therefore, both types of cylinders (SCBA and egress) should take approximately 4 to 5 minutes to fill. Faster filling times may cause an excessive rise in temperature of the cylinder which results in a decrease of temperature when the cylinder cools. Cylinders may require a slight "top off" when the cylinder cools.
- 13.6 Close the cylinder valve.
- 13.7 Slowly bleed pressure from the filling lines.
- 13.8 Disconnect the filling line.

14.0 SUPPLIED AIR BREATHING AIR SYSTEMS

- 14.1 Air line couplings shall be incompatible with outlets for other gas systems to prevent inadvertent servicing of air line respirators with nonrespirable gases or oxygen.
- 14.2 OHM standard air line couplings for breathing air systems is a Foster quick connect fitting with a locking dot. 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 laying on the ground unless protected from disconnection by some other means.
- 14.3 Other air line couplings fittings may be used with the approval of the regional health and safety director.
- 14.4 The hose line length shall not exceed 300 feet from the air bank regulator to the user.
- 14.5 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.
- 14.6 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.

14.7 The breathing air regulator shall be adjusted to provide between 50 to 125 psi pressure.

15.0 COLOR CODE FOR RESPIRATOR CARTRIDGES

NIOSH recognizes the following standard color codes for respirator cartridges. The color codes can be used as a general guideline, however, personnel should refer to the NIOSH technical certification (TC) to verify adequate protection.

Acid gases	White
Organic vapors	Black
Ammonia gas	Green
Acid gases and organic vapors	Yellow
High Efficiency Particulate Air (HEPA)	Magenta (Purple)
Dust, fumes, and mists (including asbestos and radioactive materials)	
Particulates (dust, fumes, mists, fogs, or smokers in combination with any other of the above gases or vapors.	Canister color for contaminant above, with 1/2-inch gray stripe completely surrounding the canister near the top.

16.0 OHM RESPIRATORY PROTECTION SELECTION

OHM has designated the following respiratory protection devices for use on OHM projects, shops, and laboratories.

- 16.1 Air purifying respirators shall be the Mine Safety Appliance (MSA) full face piece twin cartridge silicon rubber Ultra-Twin respirator in sizes of small, medium, and large. The respirator should be issued with a nose cup.
- 16.2 For employees who do not satisfactorily fit in the MSA Ultra-Twin respirator, the secondary respirator shall be the Survivair full face piece twin cartridge respirator in the sizes of standard or small. The respirator should be issued with a nose cup.
- 16.3 Self-contained breathing apparatus (SCBA) shall be the Survivair Mark 2 low pressure 30 minute SCBA.
- 16.4 Egress breathing apparatus shall be the Survivair HIP-PAC to be used with a 5 or 10 minute emergency escape cylinder.

- 16.5 OHM shall not use one-half face piece air purifying respirators on hazardous waste sites without permission of the regional health and safety director.
- 16.6 The regional health and safety director may approve other types and manufacturers' NIOSH approved respiratory protection devices to be used based on the particular special requirements of a project site.
- 16.7 Subcontractors may use any NIOSH/MSHA approved respiratory protection as long as it provides an equivalent level of protection as described in the HASP. Subcontractors may not wear one-half facepiece respirators if OHM employees are using full facepiece respirators.
- 16.8 It is OHM company policy to provide either MSA or Survivair respiratory protection to OHM employees. Employees are not to use other manufacturers respirator without the approval of the regional health and safety director or his designee.
- 16.9 OHM may rent supplied air respiratory devices other than Survivair on a case by case basis. Rental can occur only with the approval of the regional health and safety director or designee.



OHM Remediation
Services Corp.

HEALTH & SAFETY PROCEDURES

DECONTAMINATION

PROCEDURE NUMBER 5-4

Page 1 of 2

LAST REVISED 6/96

APPROVED BY: DLM/FHH

1.0 OBJECTIVE

All personnel, tools and equipment which have entered the contaminated area (exclusion zone) on OHM Remediation Services Corp. (OHM) job sites involving hazardous materials require decontamination upon leaving the exclusion zone.

2.0 PURPOSE

The purpose of this procedure is to describe the minimum requirements for decontamination as required in 29 CFR 1910.120(k).

3.0 REQUIREMENTS

- 3.1 The Health and Safety Plan (HASP) will include a section on decontamination with specific requirements including procedures, methods, handling of used solutions, and disposal of used PPE.
- 3.2 Every exit from the exclusion zone requires decontamination with the exception of emergency situations. If an employee is injured, decontaminate to the extent possible given the nature of the injury.
- 3.3 Large equipment such as drill rigs and heavy equipment will be decontaminated by using a steam or hot water hose wash, high pressure water, or by detergent wash. The resulting water and material will be collected and disposed of in an acceptable manner.
- 3.4 Personnel decontamination will be specified in the HASP.
- 3.5 Personnel assigned to the decontamination process will assist workers and decontaminate equipment and reusable protective gear. Protection levels for decontamination personnel will be generally one level less than that of personnel exiting the exclusion zone. Specific levels of protection will be specified in the HASP.
- 3.6 An on-site shower facility will be provided when necessary.

- 3.7 During hazardous waste site activities, the site supervisor will verify that proper decontamination procedures are being followed. Verification of decontamination for personal protective equipment and large equipment may be accomplished by visual inspection and/or direct reading monitoring instruments as it is brought out of the contamination reduction zone. In some cases, wipe samples may be collected to document that the decontamination effort is effective.



OHM Remediation
Services Corp.

HEALTH & SAFETY PROCEDURES

EXCAVATION

PROCEDURE NUMBER 6-5

Page 1 of 12

LAST REVISED 6/96

APPROVED BY: JFK/FHH

1.0 OBJECTIVE

OHM Remediation Services Corp. (OHM) will control the hazards posed by open excavation through strict compliance with this procedure and the provisions of the excavation permit.

2.0 REGULATORY REQUIREMENTS

This procedure will follow the guidelines of 29 CFR 1926, Subpart P-Excavations. In the event of a conflict between these referenced standards and specific client requirements, the more stringent will prevail.

3.0 APPLICATION

Most sections of this procedure apply to all excavations, including trenches made in the earth's surface. The competent person must decide specifically which sections apply and how all hazards presented by the excavation are being controlled.

4.0 EXCAVATION COMPETENT PERSON

Before any excavation activity begins, OHM will designate an excavation competent person who will oversee all activity in and around the excavation. This procedure applies regardless of whether personnel will enter a trench or an excavation. The competent person will determine the safety measures needed at all OHM projects which involve excavation.

- 4.1 Competent Person Responsibilities. The competent person is defined as one 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 authorization to take prompt corrective measures to eliminate them.

Additionally the competent person must be on-site during any excavation activity for which he is responsible. The competent person must also perform or be capable of performing the following tasks:

- Application of 29 CFR 1926 Subpart P to the excavation activity;
- Daily inspections of the excavation including an inspection after a hazard increasing event such as a thunderstorm;
- Classifying soil at the excavation;

- Determining proper protective requirements;
- Determining the need for excavation de-watering operations and monitoring all de-watering activity;
- Complete the OHM excavation permit.

5.0 SOIL CLASSIFICATION

Appendix A of 29 CFR 1926 Subpart P outlines the minimum requirements for the classification of soil at OHM project sites. Upon determining the soil type, the competent person must then determine the protection system which will be used to protect any employee or subcontractor who may enter the excavation.

Note: The competent person has the option of following the requirements in section 5 of this procedure to determine soil type or assuming the soil to be Type C and following the protection requirements for Type C soil.

5.1 OSHA Soil Classifications. The following are the soil classifications recognized by OSHA in 29 CFR 1926 Subpart P. The competent person must classify the soil based on the manual and visual tests conducted at the excavation site.

5.1.1 Type A soil means:

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, no soil is Type A if:

- The soil is fissured; or
- The soil is subject to vibration from heavy traffic, pile driving, or similar effects; or
- The soil has been previously disturbed; or
- 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.

5.1.2 Type B soil means:

- Cohesive soil with an unconfined compressive strength greater than 0.5 tsf (48 kPa) but less than 1.5 tsf (144 kPa); or
- 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 classed by Type C soil.
- Soil that meets the unconfined compressive strength or cementation requirements for Type A, but is fissured or subjected to vibration; or
- 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.

5.1.3 Type C means:

- Cohesive soil with an unconfined compressive strength of 0.5 tsf (48 kPa) or less; or
- Granular soils including gravel, sand, and loamy sand; or
- Submerged soil or soil from which water is freely seeping; or
- 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.

5.2 **Soil Classification Requirements.** The competent person must be able to classify each soil and rock deposit associated with a trench or excavation as to stable rock, Type A, Type B, or Type C soil.

5.3 **Basis of Classification.** The classification of soil type must be accomplished by at least one visual and one manual test. There are several allowable tests that can be used to determine soil

type. This testing must be done by the competent person and performed prior to and during the job. Refer to Appendix A of Subpart P for manual and visual test procedures.

- 5.4 **Reclassification.** If, after the soil has been classified, conditions change, the competent person is responsible for evaluating the situation and, if necessary, change the classification.

5.5 **OSHA Soil Types**

5.5.1 **Stable Rock**

Stable rock is not one of the texture classes. However, it is one of the OSHA classifications of soil. Stable rock is solid mineral material which can be excavated; and the sides stand vertical and remain stable and vertical throughout construction. Coral is not considered stable rock.

5.5.2 **Cemented Soil**

Cemented soils are soils that are held together by a chemical agent such as calcium carbonate. Examples of cemented soils would include caliche and hardpan. Cemented soils are classified as Type A soils with an unconfined compressive strength greater than 1.5 tsf.

5.5.3 **Cohesive Soil**

Cohesive soils are basically fine grained soils. Cohesive soils range from clay through clay loam. A cohesive soil will stand unsupported when excavated and is plastic when moist. That is, cohesive soil can be rolled into a ribbon. A cohesive soil is hard to break up when it is dry. Cohesive soils are classified as Type A soils with an unconfined compressive strength greater than 1.5 tsf.

5.5.4 **Granular Soil**

Granular soils are composed of coarse grained material that have very little cohesive strength. Granular soils include loamy sand, sand and gravel. A soil is classified as granular if more than 65% of the grains are distinguishable with the unaided eye. Granular soils, when excavated will not stand and the walls of the excavation can crumble easily. Some granular soils will exhibit cohesion when wet, but when dry will fall apart. This type of soil is especially dangerous when found at a construction site because the walls of a trench appear to stand with no support, however, when they dry they could crumble and fall into the trench bottom. Granular soils are classified as soil Type B or C, and may require the highest degree of protection. Type C soils

would have an unconfined compressive strength of less than 0.5 tsf.

5.4.5 Granular Cohesionless

Soils that range from silt through sandy loam or are composed of angular particles are said to be granular cohesionless soils. These are difficult soils to work with because the group ranges from a very stable Type B to the unstable Type C soil. Course angular granular soils are classified as Type B soils and have an unconfined compressive strength range from 0.5 tsf to 1.5 tsf.

5.5.6 Layered Soil System

A layered soils system is composed of two or more distinctly different soil or rock types arranged in layers. Micaceous seams or weakened planes in rock or shale are considered layered. The layers may lay on a horizontal plane or be sloped. When they are sloped into the excavation they represent a collapse hazard to the trench wall. A slope greater than 4H:1V would classify any soil as Type C. Sloped layers less than 4H:1V would be classified as Type B soil. No layered system can be Type A soil.

6.0 SELECTION OF PROTECTIVE SYSTEMS

29 CFR 1926.652 requires that each employee in an excavation be protected from cave-ins by an adequate protective system unless excavations are made in stable rock or are less than five feet in depth and examination by the competent person provides no indication of potential cave-in.

Additionally, whichever protective system is chosen must have the capacity to resist without failure all loads that are intended or could reasonably be applied to the system.

6.1 Design of Sloping and Benching Systems. The slopes and configurations of sloping and benching systems must be determined by the competent person in accordance with the requirements of 29 CFR 1926(b)(1) through (b)(4) as well as 29 CFR 1926 Subpart P-Appendix B.

After the competent person has determined the soil type based on one visual and one manual test, he may design the sloping and benching system for excavations less than 20 feet deep using the following table.

MAXIMUM ALLOWABLE SLOPES
BASED ON SOIL CLASSIFICATION

Soil Line	Maximum Allowable Slope for Excavations Less Than 20 Feet Deep
Stable Rock	Vertical Sides (90°)
Type A Soil	3/4H:1V (53°)
Type B Soil	1H:1V (45°)
Type C Soil	1 1/2H:1V (34°)

Note: Sloping and benching for excavations greater than 20 feet deep must be designed by a registered professional engineer.

- 6.2 Design of support systems, shield systems and other protective systems. If the competent person determines that personnel will be protected from cave-ins by a protective system other than sloping and benching, the design of the support systems, shield systems, and other protective systems be based on the conditions at the project site and data provided by an OHM or subcontracted registered professional engineer or from tabulated data provided by the manufacturers of the protective systems.

The design of the protective system must be in accordance with the requirements of 29 CFR 1926.652(c)(1) through (c)(4) and 29 CFR 1926 Subpart P-Appendices C, D, E respectively.

In large/deep excavations where traditional shoring and sloping are not practical, alternate protective measures may be implemented to protect personnel in the excavation. Additionally, the top of the excavation must be protected with stop logs, earthen berms, or other types of protective barriers which will keep pedestrians and vehicles from approaching the edge of the excavation. Any deviations from traditional protective systems must be approved by the regional health and safety director.

7.0 EXCAVATION SAFETY REQUIREMENTS

Excavation activity exposes OHM personnel and subcontractors to many dangers which, if not recognized, can cause death or serious injury.

- 7.1 Surface Hazards. The excavation area should be inspected and any debris, structures, and surface protrusions that are located so as to create a hazard to employees shall be removed as necessary to safeguard employees. Any buildings on the site should be evaluated for structural integrity and supported if necessary.
- 7.2 Underground Installations/Utility Locations. Before conducting any excavation work, the location of utility installations, such as sewer, telephone, fuel, electric, water lines, or any other underground installations that reasonably may be expected to be encountered during excavation work, shall be determined. This requirement is in addition to the requirements in the procedure titled Buried Utility Location and Associated Subsurface Field Activity.

Utility companies or the state utility protection service shall be contacted at least two working days prior to excavation activities to be advised of the proposed work, and asked to establish the location of the utility, underground installations prior to the start of actual excavation.

OHM personnel and sub-contractors should be careful to protect and preserve the markings of approximate locations of facilities until the markings are no longer required for safe and proper excavations.

If the markings of utility locations are destroyed or removed before excavation commences or is completed, the OHM competent person must notify the utility company or utility protection service to inform them that the markings have been destroyed and need replaced. Normally, it will take two working days advance notice for the utility protection service to remark the locations.

OHM equipment operators shall maintain at least 3-foot clearance between any underground utility and the cutting edge or point of powered equipment. When excavating with powered equipment within 36 inches of the markings of underground facilities, personnel should conduct the excavation in a careful and prudent manner, excavating by hand to determine the precise location of the facility/utility and to prevent damage.

While the excavation is open, underground installations shall be protected, supported or removed as necessary to safeguard employees.

- 7.3 Access and Egress. OHM will provide a safe means of access to and egress from all excavations. The following are considered acceptable methods of entering and exiting excavations.

7.3.1 Structural Ramps

Structural ramps that are used solely by employees as a means of access or egress from excavations shall be designed by the competent person. Structural ramps used for access or egress of equipment shall be designed by a competent person qualified in structural design or structural engineering, and shall be constructed in accordance with the design.

Structural members used for ramps and runways shall be of uniform thickness. Cleats or other appropriate means used to connect runway structural members shall be attached to the bottom of the runway or shall be attached in a manner to prevent tripping. Structural ramps used in lieu of steps shall be provided with cleats or other surface treatments on the top surface to prevent slipping.

7.3.2 Means of Egress from Trench Excavations

A stairway, ladder, ramp or other safe means of egress shall be located in trench excavations that are 4 feet or more in depth so as to require no more than 25 feet of lateral travel for employees. Any ramp used for employee egress must be sloped at an angle which would allow employees to walk upright out of the excavation.

7.4 Exposure to Vehicular Traffic. OHM and subcontract personnel who may be exposed to vehicular traffic both on projects and public highways shall be provided with and shall wear warning vests or other suitable garments marked with or made of reflectorized or high-visibility material.

7.5 Exposure to Falling Loads. No OHM employee or subcontractor shall be permitted underneath loads handled by lifting or digging equipment. Personnel must stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling materials. Truck drivers may remain in the cabs of vehicles being loaded or unloaded when the vehicles are equipped with over-cab protective structures, in accordance with 29 CFR 1926.601(b)(6), to provide adequate protection for the operator from falling objects during loading and unloading operations.

7.6 Warning System for Mobile Equipment. When heavy equipment and trucks operate adjacent to an excavation or when such equipment is required to approach the edge of 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. If possible, the approach grade should be away from the excavation.

- 7.7 Hazardous Atmospheres. Because there is a likelihood that excavation activity at OHM project sites involve hazardous atmospheres, the OHM competent person must ensure that acceptable atmospheric conditions exist.

The OHM competent person or his designee shall perform direct reading atmospheric monitoring in all excavations of any depth into which OHM personnel or subcontractors must enter where a hazardous atmosphere exists or could reasonably be expected to exist. If there are any questions, the competent person should treat the excavation like a confined space and follow SOP 6-1, Confined Space Entry.

Based on the competent person's visual observation of the excavation and the soil and/or fill material, atmospheric monitoring may not be necessary. However, if conditions change, the competent person must re-evaluate whether atmospheric monitoring is required.

7.7.1 Atmospheric Monitoring

When atmospheric monitoring is required, the site safety officer must check the atmosphere for the following in the order shown:

- Oxygen Content--acceptable conditions: 21%
- Flammable Conditions--acceptable conditions: less than 10% LEL
- Toxic Atmospheres--based on established PEL or TLV

NOTE: Any oxygen reading other than 21% must be investigated prior to employees entering the excavation.

7.7.2 Ventilation

Adequate precautions shall be taken, for example providing ventilation to prevent employee exposure to harmful atmospheres. When controls are used that are intended to reduce the level of atmospheric contaminants to acceptable levels, direct reading air monitoring shall be conducted periodically as determined by the competent person or SSO to ensure that the atmosphere remains safe.

7.7.3 Emergency Rescue Equipment

Emergency rescue equipment, such as self-contained breathing apparatus (SCBA), a safety harness and line, or a basket stretcher, shall be readily available where hazardous atmospheric conditions exist or may reasonably be expected to develop during work in an excavation. This equipment shall be kept close to the excavation for use in an emergency.

- 7.8 Protection From Hazards Associated With Water Accumulation. 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. The precautions necessary to protect employees adequately vary with each situation, but could include special support or shield systems to protect from cave-ins, water removal to control the level of accumulating water, or use of a safety harness and lifeline.

If water is controlled or prevented from accumulating by the use of water removal equipment, the water removal equipment and operations shall be monitored by a competent person to ensure proper operation.

If excavation work interrupts the natural drainage of surface water (such as streams); 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 will require an inspection by a competent person.

- 7.9 Stability of Adjacent Structures. Where the stability of adjoining buildings, walls, or other structures is endangered by excavation operations, support systems such as shoring, bracing, or underpinning shall be provided to ensure the stability of such structures for the protection of employees.

Excavation below the level of the base or footing of any foundation or retaining wall that could be reasonably expected to pose a hazard to employees shall not be permitted except when:

- A registered professional engineer has approved the determination that such excavation work will not pose a hazard to employees.
- A support system, such as underpinning, designed by a registered professional engineer is provided to ensure the safety of employees and the stability of the structure; or
- The excavation is in stable rock; or
- A registered professional engineer has approved the determination that the structure is sufficiently removed from the excavation so as to be unaffected by the excavation activity; or
- If a support system has been put in place to stabilize an adjacent structure, it must be inspected for movement and structural integrity daily by the competent person.
- Sidewalks, pavements, and other 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.

- 7.10 **Protection of Employees From Loose Rock or Soil.** Adequate protection shall be provided to protect employees from loose rock or soil that could pose a hazard by falling or rolling from an excavation face. Such protection shall consist of scaling to remove loose material; installation of protective barricades at intervals as necessary on the excavation face to stop and contain falling material; or other means that provide equivalent protection.

Employees shall be protected from excavated or other materials or equipment that could pose a hazard by falling or rolling into excavations. Protection shall be provided by placing and keeping such materials or equipment at least 2 feet from the edge of excavations, or by the use of retaining devices that are sufficient to prevent materials or equipment from falling or rolling into excavations, or by a combination of both if necessary.

- 7.11 **Inspections.** Daily inspections of excavations, the adjacent areas, and protective systems shall be made by a competent person for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. An inspection shall be conducted by the competent person prior to the start of work and as needed throughout the shift. Inspections shall also be made after every rainstorm or other hazard-increasing occurrence. These inspections are required when employee exposure can be reasonably anticipated. An Excavation/Trenching Permit must be completed by the competent person to document the inspections. Canceled excavation/trenching permits should be placed in the project file upon completion of the project.

Where the competent person finds evidence of a situation that could result in a possible cave-in, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions, exposed employees shall be removed from the hazardous area until the necessary precautions have been taken to ensure their safety.

- 7.12 **Fall Protection.** Where employees or equipment are required or permitted to cross over excavations; walkways, or bridges with standard guardrails shall be provided.

Since open excavations are often an attractive nuisance to the public, adequate barrier for physical protection shall be provided at all excavations. Remotely located excavations may require special protection including, but not limited to, highly visible snow fence, concrete "jersey" barriers, chain link fence and flashing warning light. All wells, pits, shafts, etc., shall be barricaded or covered. Upon completion of exploration and similar operations, temporary wells, pits, shafts, etc., shall be covered or backfilled.

8.0 PERMITS

An Excavation/Trenching Permit must be completed by the competent person each day that an excavation is open and possesses safety hazards to personnel who work around or may have to enter the excavation.

If a project site has several excavations open, and active, each excavation must have its own permit completed. Conversely, a project site which has an open excavation that is not active does not require a daily Excavation/Trenching Permit if the competent person determines that the excavation is NOT posing hazards to site personnel or the public, and is adequately guarded. The competent person must determine what type of inspections and documentation will be required.

The Excavation/Trenching Permit should be retained in the project file and will serve as a record of daily excavation inspection.

EXCAVATION/TRENCHING PERMIT

Project Name:	
Project Location:	Project Number:
Name of Competent Person:	Permit Good on This Date Only:

EMPLOYEE TRAINING AND PRE-EXCAVATION BRIEFING

1. Does this job require special training: YES ___ NO ___
2. Safe excavation and rescue training conducted on: _____ DATE
3. Mandatory pre-excavation briefing conducted on: _____ DATE

SOIL CLASSIFICATION

1. Will the competent person classify the soil based on its properties and site conditions? YES ___ NO ___

If yes, proceed to 2-6 of this section. If no, then soil is assumed to be Type C and the competent person will apply the requirements for Type C protective systems.
2. Based on visual observation, which best describes the soil in this excavation?
 Stable Rock Cemented Soil Cohesive Soil Granular Soil
 Granular Cohesionless Layered System
3. Based on visual observation, which best describes the moisture condition of the soil?
 Dry Soil Moist Soil Wet Soil Saturated Soil
4. Is a pocket penetrometer available for use on site? YES ___ NO ___ N/A ___

If yes, what is the average tons per square foot of the soil in this excavation? _____ tsf
5. Based on at least one manual test, what classification is the soil in this excavation?
 Stable Rock Type A Soil Type B Soil Type C Soil
6. What manual test was used to determine the soil type?
 Plasticity Dry Strength Thumb Penetration Other _____

ELECTRICAL SAFETY

1. Are all electrical devices grounded and/or GFCI protected? YES ___ NO ___ N/A ___

SURFACE ENCUMBRANCES

1. Have all surface encumbrances that are located so as to create a hazard to employees been removed or supported, as necessary, to safeguard employees? YES ___ NO ___ N/A ___

UNDERGROUND INSTALLATIONS

1. Have the estimated locations of all underground installations been determined prior to excavation? YES ___ NO ___ N/A ___
2. Have utility companies been contacted and advised of proposed work? YES ___ NO ___ N/A ___
3. If underground installations are exposed, are they protected, supported or removed while excavation is open? YES ___ NO ___ N/A ___

EXCAVATION/TRENCHING PERMIT

(continued)

ACCESS AND EGRESS

1. Are stairways, ladders, or ramps provided every 25 feet? YES ___ NO ___ N/A ___
2. Are structural ramps that are used for access and egress of equipment and/or personnel designed by a competent person qualified in structural design and constructed in accordance with the design? YES ___ NO ___ N/A ___

EXPOSURE TO VEHICULAR TRAFFIC

1. Are personnel exposed to public or project vehicular traffic wearing reflectorized or high visibility vests? YES ___ NO ___ N/A ___

EXPOSURE TO FALLING LOADS

1. Are employees prohibited from standing underneath loads handled by lifting or digging equipment? YES ___ NO ___ N/A ___

WARNING SYSTEMS FOR MOBILE EQUIPMENT

1. Are warning systems utilized when mobile equipment is operated adjacent to or at the edge of an excavation? YES ___ NO ___ N/A ___

If yes, which type is being used?

Hand Signals Stop Logs Earthen Berm Other _____

TESTING FOR HAZARDOUS ATMOSPHERES

1. Are the atmospheric hazards that can be reasonably expected to exist in excavations greater than 4 feet deep tested and controlled? YES ___ NO ___ N/A ___
2. Is testing conducted as often as necessary to ensure safety of personnel? YES ___ NO ___ N/A ___

TIMES & READINGS:	Time: _____ LEL: _____ % Oxygen: _____ % Toxic: _____ PPM of _____	Time: _____ LEL: _____ % Oxygen: _____ % Toxic: _____ PPM of _____	Time: _____ LEL: _____ % Oxygen: _____ % Toxic: _____ PPM of _____	Time: _____ LEL: _____ % Oxygen: _____ % Toxic: _____ PPM of _____	Time: _____ LEL: _____ % Oxygen: _____ % Toxic: _____ PPM of _____
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SPECIAL PRECAUTIONS:

EMERGENCY RESCUE EQUIPMENT

1. Is emergency rescue equipment such as SCBA, safety harness and line, or basket stretcher readily available and attended when hazardous atmospheric conditions exist? YES ___ NO ___ N/A ___

PROTECTION FROM HAZARDS ASSOCIATED WITH WATER ACCUMULATION

1. Is water being controlled or prevented from accumulating in excavation by the use of water removal equipment? YES ___ NO ___ N/A ___
2. Is water control equipment operation being monitored by a competent person? YES ___ NO ___ N/A ___

EXCAVATION/TRENCHING PERMIT
(continued)

STABILITY OF ADJACENT STRUCTURES

1. Are support systems such as shoring, bracing, or underpinning provided to ensure stability of adjoining structures (i.e., buildings, walls) endangered by excavation activities? YES___ NO___ N/A___
2. Has the support system been designed by a registered professional engineer? YES___ NO___ N/A___

PROTECTION OF EMPLOYEES FROM LOOSE ROCK OR SOIL

1. Are employees protected from excavated or other material and equipment by placing this material a minimum of two (2) feet from the edge of excavations or by the use of retaining devices? YES___ NO___ N/A___

INSPECTIONS

1. Are daily inspections of excavations where employee exposure can be reasonably anticipated being done by the competent person? YES___ NO___ N/A___
2. Are inspections being performed by a competent person at every rainstorm or other hazard increasing occurrence? YES___ NO___ N/A___
3. Are employees removed from the excavation if the competent person finds evidence at any time of a situation that could result in a possible cave-in, protective system failure, hazardous atmosphere or other hazardous condition? YES___ NO___ N/A___

FALL PROTECTION

1. Are standard guardrails provided on walkways and bridges that cross over excavations? YES___ NO___ N/A___
2. Are all remotely located excavations adequately barricaded or covered? YES___ NO___ N/A___

SHORING AND OTHER PROTECTIVE SYSTEM

1. Has all shoring and/or other protective system been designed by a registered professional engineer or accompanied by tabulated data from the manufacturer? YES___ NO___ N/A___
2. Is shoring and other protective system checked/measured each day to detect movement and possible failure? YES___ NO___ N/A___

I have inspected the excavation described in this permit:

(Signature of Competent Person)

(Date)

Copy: Project file



OHM Remediation
Services Corp.

HEALTH & SAFETY PROCEDURES

HIGH PRESSURE WASHERS

PROCEDURE NUMBER 7-1

Page 1 of 3

LAST REVISED 7/96

APPROVED BY: JFK/FHH

1.0 OBJECTIVE

OHM Remediation Services Corp. (OHM) personnel who have been trained in the proper set-up, use, and care of high pressure washers will be authorized to operate this equipment.

2.0 PURPOSE

This procedure describes requirements for the safe operation of the high-pressure washer.

3.0 PERSONAL PROTECTIVE EQUIPMENT

The following equipment will be worn by operators and assistants:

- Safety shoes or boots
- Metal foot and shin guards
- Eye protection (goggles and face shield)
- Hard hat
- Heavy duty PVC rain suit or equivalent
- Heavy chemical resistant gloves
- Hearing protection

4.0 OPERATION PROCEDURE

- The operator should review the operating manual for the unit and follow all instructions and precautions.
- Before use, the operator should inspect the pressure washer, the hoses, and the lance to ensure that all equipment is in acceptable operating condition. The operator should carefully inspect the relief device to ensure proper functioning.
- No modifications can be made to the equipment except those authorized by the manufacturer.

- Only trained, authorized personnel will operate the high-pressure washer.
- The lance must always be pointed at the work area and never at the operator or other personnel.
- The operator must maintain good footing.
- The operator must have an assistant to aid in moving the hose to different areas and backing up the operator. The assistant must remain in back of the operator.
- Non-operators must remain a safe distance from the operator. The distance must be a minimum of 25 feet.
- The operating pressure should never exceed that which is necessary to complete the job.
- No unauthorized attachment may be made to the unit. (The trigger should never be tied down.)
- The operator should be changed at frequent intervals to avoid fatigue (at least hourly).
- Equipment should be cleaned often to avoid oil or dirt build-up, especially around the trigger and guard area.
- Always increase pressure slowly to inspect for leaks. All leaks or malfunctioning equipment must be repaired immediately or the unit taken out-of-service.
- An assistant should always be standing by at the pressure generator to shut down the equipment and monitor the pressure.
- All users must be trained in emergency shut down procedures and general equipment maintenance.
- All lances must be made of seamless stainless steel. Do not use carbon steel which can corrode and result in weakening of the lance.
- **DO NOT MODIFY THE LANCE.** The lance barrel, from trigger block to the tip, should not be less than 48 inches as recommended by manufacturers of hydroblasting equipment. (This is to prevent the operator from inadvertently directing the lance at himself.)

- A serious risk of infection and further complications is possible from a hydroblasting laceration. If an injection injury is suspected, the treating physician should be informed so he/she can request a surgeon who specializes in injection injuries. The specialist may have to perform surgery on the affected body part in order to remove the material (oil, particles) that was injected directly through the skin.



OHM Corporation

HEALTH & SAFETY PROCEDURES

EQUIPMENT OPERATOR QUALIFICATION

PROCEDURE NUMBER 7-14

Page 1 of 3

LAST REVISED 7/96

APPROVED BY: JFK/FHH

1. OBJECTIVE

OHM Remediation Services Corp. (OHM) will qualify personnel who operate heavy equipment at field project sites and OHM facilities.

2. PURPOSE

This procedure outlines the minimum requirements for the field qualification of OHM personnel who may have the desire, or are required to operate OHM owned and rented heavy equipment. This procedure applies to the following pieces of heavy equipment:

- Rubber tire backhoes
- Tracked and rubber tire excavators
- Bulldozers
- Vacuum trucks
- Off-road dump trucks (straight body and articulating)
- Compactors
- Water trucks (straight body and articulating)
- Bobcats
- Tracked and rubber tire loaders
- Skid and truck mounted vacuum unit

This procedure does not allow for the field certification of personnel operating sit-down counter balanced (warehouse) and rough terrain forklifts and boom trucks or cranes. The operation of these pieces of equipment are regulated by OSHA and require more extensive training and certification. Refer to SOP 7-4, Fork Lifts, and SOP 7-2, Cranes and Hoisting, for specific operator requirements.

3. GENERAL REQUIREMENTS

No OHM personnel may become field qualified to operate a piece of heavy equipment until they have received instruction on the inspection, proper use, safety features, and maintenance requirements of the specific piece and/or type of heavy equipment which they wish to operate. This includes all pieces of equipment listed in section two of this procedure. For the purposes of this procedure, the following terms will be used for consistency:

- Supervisor - OHM representative who has the authority to field qualify OHM employees on various pieces of heavy equipment.
- Operator - OHM employee with a job title other than equipment operator who wishes to or is required to operate OHM owned or rented heavy equipment.

3.1 Personnel Who May Field Qualify Personnel to Operate Equipment. The project site supervisor or his/her designee (i.e., Senior Equipment Operator) will be the person responsible for the field qualification of OHM employees who wish to or are required to operate heavy equipment. The site supervisor is required to complete the following steps when qualifying personnel to operate equipment.

- 3.1.1 Determine if the potential operator is physically capable of operating the equipment safely.
- 3.1.2 Determine if the potential operator is willing to accept the responsibility which accompanies the operation of heavy equipment.
- 3.1.3 Provide instruction on the pre-startup as well as periodic inspection of the equipment which is required to ensure that the equipment is operating safely and within normal parameters.
- 3.1.4 Provide instruction on the safe operation of the equipment including all safety features built into the equipment. This should include as a minimum the following items:
 - Safe start-up
 - Use of safety disabling devices
 - Use and application of seat belt/harnesses
 - Location and inspection of horns, lights, and backup alarm
 - Normal operating parameters
 - Function and normal appearance of all gauges and meters
 - Equipment travel procedures
 - Approximate height and weight, including safe clearance heights
 - Safe procedure for loading and unloading of equipment
 - Normal shut-down procedures
 - Emergency shut-down procedures
 - Safe parking or storage of equipment

- 3.1.5 Provide instruction on the proper maintenance of the equipment required to keep it within safe and normal operating condition. This instruction should include, at a minimum, the following items:
- Location of the vital fluid check and fill ports.
 - Location of all lubrication points and procedure for proper lubrication including frequency.
 - Cleaning and housekeeping requirements (i.e., procedure and frequency of track cleaning)
 - Other equipment specific maintenance procedures
- 3.1.6 Observe the potential operator perform safe operations with the piece of heavy equipment including all tasks which are required to make the equipment operational including such items as traveling with the equipment and loading and unloading it into its travel trailer.
- 3.1.7 During the qualification of the potential operator, the supervisor should use the "Heavy Equipment Field Operator Qualification" form as a checklist to ensure that all points have been covered with the operator.
- 3.1.8 Once the supervisor has observed the potential operator demonstrate the safe operation of the specific piece of equipment, he/she must sign the Qualification form and forward it to Corporate Health and Safety for inclusion into the employee's training file.
- 3.2 Potential Operator Requirements. OHM employees who wish to or are required to operate heavy equipment must meet the following minimum qualifications.
- 3.2.1 Possess the physical capability (i.e., adequate vision and hearing) to operate the equipment safely.
- 3.2.2 Possess a valid and current drivers license.
- 3.2.3 Experienced no "At Fault" vehicle accidents with OHM owned or rented vehicles within the last 12 months.



Field Qualification of Personnel To Operate Heavy Equipment

Employee Name: _____

Division: _____

Employee No.: _____

Name of Equipment on which employee wishes to Qualify: _____

Inspection and Maintenance:

- Review location of all vital fluid reservoirs
- Review location of all lubrication points
- Review daily inspection checklist
- Review periodic maintenance requirements (e.g., oil change schedules)

Safety Devices and Start-up:

- Location and function of safety disabling device (if equipped)
- Location of fire extinguisher
- Location and function of back-up alarms
- Location and function of horn
- Location and function of lights
- Location and correct application of seat belts/safety harnesses
- Proper start-up sequence
- Function and appearance of all gauges and meters

Operation:

- Smooth and safe equipment travel procedures
- Smooth and safe operation
- Review weight and weight of equipment
- Demonstration of safe loading and binding of equipment for travel
- Normal shut-down procedures
- Emergency shut-down procedures
- Demonstration of safe parking or storage of equipment

Comments: _____

Operator Acknowledgement:

I have reviewed and understand all of the information listed above. I also understand that as an operator of the equipment, I am responsible for daily inspection and maintenance as well as the safe and efficient operation of the equipment.

Operator Signature

Employee No.

Date

Supervisor/Senior Equipment Operator Acknowledgement: I have reviewed all of the information listed above as well as any other safety or operational features of this equipment with the above signed. He/She has demonstrated competence in operating this piece of equipment safely.

Supervisor/Senior Equipment
Operator Signature

Employee No.

Date

Distribution:
Original - Employee Training File (Corporate Health and Safety)
Copy - Employee
Regional Training File

Approved

Angelo Liburdac
Department Head

Al Martin
Regional Vice President



OHM Remediation
Services Corp.
A Subsidiary of OHM Corporation

Southern Region

STANDARD OPERATING PROCEDURES

Effective Date

October 23, 1995

Page 1 of 2

Number

SOP-SHS-01

Revision 0

SUBJECT: BURIED UTILITY LOCATION AND ASSOCIATED SUBSURFACE FIELD ACTIVITIES

1.0 PURPOSE

This Standard Operating Procedure (SOP) defines the responsibilities and procedures for utility identification, location and associated subsurface field activities at project sites.

2.0 SCOPE

This procedure applies to all subsurface field activities performed by OHM, including excavation and subsurface field investigations involving mechanical equipment (i.e., drilling) at project sites.

3.0 REQUIREMENTS

All subsurface field activities performed by OHM require buried utilities to be identified and located prior to performing subsurface field activities at the project site. Buried utilities required to be identified and located include: pressurized utility lines, telephone and electrical cable. Once the buried utility is identified and located, all associated subsurface field activities must be performed in accordance with this SOP. Any deviations from these procedures must be approved by the Regional Health and Safety Director.

4.0 RESPONSIBILITIES

4.1 Project Manager

The project manager is responsible for allocating adequate resources to implement this SOP, for coordinating buried utility location procedures with the utility and for directing the site supervisor to implement this procedure at the project site. The project manager is also responsible for verifying that required documentation be maintained in the Site Safety Plan and project files.

4.2 Site Supervisor

The site supervisor is responsible for implementing this procedure at the project site. The site supervisor is also responsible for documenting the utility locations on the site map and listing the utility emergency contacts in the Site Safety Plan.

5.0 PROCEDURE

5.1 Buried Utility Location

1. Contact the local utility company or utility service locator in your geographic area and identify which underground utilities (i.e., electrical, gas, water, telephone, cable) need to be identified in your proposed excavation/drilling area.
2. Inform the utility company or utility service locator with the exact location of your proposed excavation/drilling area and depth. Provide suitable plans, drawings, and/or maps of the proposed excavation/drilling area and depth. Provide the utility company or locator service a realistic over-estimate of the area to be cleared of underground utilities when the excavation area or depth is in question. Obtain "as built" drawings from clients showing utility locations on-site when available. In some cases, ElectroMagnetic (EM) or Ground Penetrating Radar (GPR) surveys of the proposed work area may be appropriate when little or no information is available on the proposed excavation /drilling area at abandoned industrial facilities.
3. Where feasible, arrange for a responsible OHM person, familiar with proposed excavation/drilling activities, to meet each utility representative or locator service at the site prior to site mobilization.
4. At a minimum, follow up with each utility company or locator service that was provided with suitable plans, drawings or maps and confirm that the proposed excavation/drilling area to be cleared is correctly interpreted by the utility company or locator service.

BURIED UTILITY LOCATION AND
ASSOCIATED SUBSURFACE FIELD ACTIVITIES

Effective Date

Number

October 23, 1995

SOP-SHS-04

Page 2 of 2

Revision 0

5.0 PROCEDURE - CONTINUED

5. Once buried utilities have been identified by the utility company or locator service, document their location on the site map and attach to the site safety plan.
6. List the names and telephone numbers of each utility company and locator service representative used, attach to the site safety plan and use during site emergencies.

5.2 *Associated Subsurface Field Activities*

1. All identified buried utilities within 15 feet of subsurface field activities (i.e., excavations, drilling) will be manually exposed by hand excavation, hand augering or air knife techniques to verify the utility location.
2. For excavation activities adjacent to the utilities, hand excavation is required at 15 feet intervals along the utility length until the identified utility location is 15 feet outside the excavation area.
3. Hand excavations are required to expose 2 feet on either side of a low pressure line or telephone cable.
4. Hand excavations are required to expose 4 feet on either side of a high pressure line or electrical cable.
5. Heavy equipment/excavation operations must be prohibited 2 feet from a low pressure line or electrical cable and 4 feet from a high pressure line or electrical cable. A spotter is required in the immediate vicinity of these heavy equipment/excavation operations to warn operators as to their proximity to the utility.
6. For drilling activities, hand augering or hand excavation is required to the anticipated depth of the buried utility, but at least 5 feet, when drilling operations are within 15 feet of an identified and marked buried utility.
7. Excavation spotters and drillers must be made aware of the potential risk for encountering buried utilities, even after proper utility location procedures have been followed.

APPENDIX E

HEALTH AND SAFETY FORMS

Accident/Injury/Illness Report Form
Accident/Injury/Illness Status Report Form
First Aid Log
OHM Safety Rules
Daily Safety Meeting Log
Instrument Calibration Logs (LEL/PID)
Air Monitoring Instrument (Direct Reading) Logs
Heavy Equipment Inspection Forms
Fire Extinguisher Checklist/Inventory Form
SCBA/SAR Inspection Forms
Project Site Safety Inspection Checklist (weekly)
SSO Daily Report
Air Sampling and Analysis Log
Air Sampling Data Sheet
Chain-of-Custody Record
Activity Hazard Analysis



SUPERVISOR'S ACCIDENT INVESTIGATION REPORT

- Check all that apply: Injury/Illness Fatality Complaint Not Work Related
 Auto Liability Auto Physical Damage
 General Liability Property Damage Environmental

Exact Date and Time of Incident _____ a.m. _____ p.m. Shift 1st 2nd 3rd

OHM CORPORATION _____
 (Employee's Home Division/Regional Office/Subsidiary)

Address _____
 City _____ State _____

PROJECT IDENTIFICATION (Project Related Incidents Only)

Project No. _____ Project Start Date _____ Completion Date _____

Location (Full Address) _____

Telephone _____ Project Manager _____

EMPLOYEE INFORMATION

Employee's Full Name _____ Employee No. _____

- Regular Full Time Regular Part Time Temporary Non-Employee

Address _____

Date of Birth _____ Age _____ Social Security No. _____ - _____ - _____ Sex M F

Job Title _____ Department _____ Date Hired _____

Length of Employment In Training, _____ Mos. _____ Yrs. Time in Job Class In Training, _____ Mos. _____ Yrs.

Name of Employee's Direct Supervisor _____

- Supervision at Time of Accident Directly Supervised Indirectly Supervised Not Supervised

Specific Location Where Incident Occurred _____

_____ OHM Facility Project Site Other _____

To Whom Was Incident Reported? _____ When? _____

Witness Name/Address _____

Witness Job Title/Reason in Area _____

Describe Employee's Job Duties Being Performed When Injured _____

_____ Fully the Events Which Resulted in the Accident/Injury/Illness _____

(Use Extra Page if Needed)

Describe the Injury/Illness in Detail; Indicate Part of Body Affected _____

Name of Object/Substance Which Directly Injured Employee _____

Has/Will Employee Seek Treatment? Yes No Did Employee Die? Yes No

Name/Address of Hospital/Doctor _____

Describe Treatment Given _____

Was Employee Able To Return To Work? Yes No

If YES: Regular Work Work with Restricted Activities

Restriction _____

If NO: Date Last Time Began _____ Date/Est. Date To Return _____

Identify Personal Protective Equipment Used by Injured Employee _____

What Training or Instruction Had Been Given? _____

How Could This Accident Have Been Prevented? _____

Corrective Action _____

Signature _____ (Supvr/Manager)

Date _____

Signature _____ (Safety Officer)

Date _____

Signature _____ (Proj. Manager)

Date _____

DISTRIBUTION

Original To: Division Secretary at Employee's Home Office

Copy To: Corporate Health & Safety
 Project Manager

Regional Health & Safety Manager
 Site Safety File



OHM Remediation
Services Corp.

EMPLOYEE'S ACCIDENT REPORT

Check all that apply: Injury/Illness Fatality Complaint Not Work Related
 Auto Liability Auto Physical Damage
 General Liability Property Damage Environmental

Date, Day, and Time of Incident _____ am pm

Your Name: _____ Your Emp. No.: _____

Home Address: _____ Home Phone # _____

Birth Date: _____ Age: _____ Social Security No.: _____ Sex: _____

Job Title: _____ Dept.: _____ Date of Hire: _____

Accident location (If Project related, give Project #, Client, Address and Phone #): _____

On OHM premises? Yes No

Witness Name/Address _____

How did accident occur?: _____

Was medical attention required? Yes No

Did you return to work? Yes No Your usual Job? Yes No If not explain: _____

Was the accident reported to a supervisor? Yes No Supervisor's name: _____

Employee's Signature

Date



INJURY/ILLNESS STATUS REPORT

Employee _____ Social Security No. _____
 Home Address _____ Phone _____
 Job Title _____ Home Division _____
 Date of Injury/Illness _____ Description of Injury/Illness _____

AUTHORIZATION TO RELEASE INFORMATION

I hereby authorize all physicians, hospitals, clinics and all persons to discuss with, and release to OHM Remediation Services Corp. and its authorized agents, any information or copies thereof acquired in the course of my examination or treatment for the injury identified above. This authorization shall not extend to any other medical condition, past or present, unless the same is causally or historically relevant or related to the injury referred to above.

Employee Signature _____ Date _____

PHYSICIAN OR MEDICAL PERSONNEL TO COMPLETE REMAINDER OF FORM

WORK STATUS

- Employee may return to work with no limitations

 Date _____
- Employee may return to work on _____
 Date _____
 with limitations indicated. These restrictions are in effect until _____ or until Reevaluation
 Date _____
 on _____
 Date _____
 Employee may work _____ hours in a work day.
- Employee is totally incapacitated at this time.
- Patient will be reevaluated on _____
 Date _____

DEGREE

- Sedentary Work.** Lifting 10 pounds maximum and occasionally lifting and/or carrying such articles as dockets, ledgers, and small tools. Although a sedentary job is defined as one which involves sitting, a certain amount of walking and standing is often necessary in carrying out job duties. Jobs are sedentary if walking and standing are required only occasionally and other sedentary criteria are met.
- Light Work.** Lifting 20 pounds maximum with frequent lifting and/or carrying of objects weighing up to 10 pounds. Even though the weight lifted may be only a negligible amount, a job is in this category when it requires walking or standing to a significant degree or when it involves sitting most of the time with a degree of pushing and pulling of arm and/or leg controls.
- Medium Work.** Lifting 50 maximum with frequent lifting and/or carrying of objects weighing up to 25 pounds.
- Heavy Work.** Lifting 100 pounds maximum with frequent lifting and/or carrying of objects weighing up to 50 pounds.
- Very Heavy Work.** Lifting objects in excess of 100 pounds with frequent lifting and/or carrying of objects weighing 50 pounds or more.

LIMITATIONS

1. The Employee may:
 - a. Stand/walk
 - None 1-4 hours
 - 4-6 hours 6-8 hours
 - b. Sit
 - 1-3 hours 3-5 hours
 - 5-8 hours
 - c. Drive
 - 1-3 hours 3-5 hours
 - 5-8 hours
2. Employee may use hands for repetitive:
 - Single grasping Pushing & pulling
 - Fine manipulation
3. Employee may use feet for repetitive movement as in operating foot controls:
 - Yes No
4. Employee is able to:

	Frequently	Occasionally	Not all	All
a. Bend.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Squat.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Climb.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

PHYSICIAN'S REPORT

Diagnosis _____
 Treatment _____
 Other _____

Referred to company physician
 Employee referred/admitted to:
 Whom _____
 Address _____
 Phone _____
 Date _____ Time _____

Date of this Report _____
 Physician's Name _____ Print _____ Physician's Signature _____
 Address _____ Phone _____

OHM REMEDIATION SERVICES CORP
PROJECT SAFETY RULES
PROJECT NO. _____

- All unsafe acts/conditions must be corrected promptly and reported to supervisor at first opportunity
- Participate in the Safety Observer Program
- Good housekeeping standards must be maintained at all times
- Non-work injuries that could become aggravated on the job must be reported to supervisor within 1/2 hour of starting work
- Lockout/tagout procedures must be followed at all times
- Use fall protection where required
- Inspect all vehicles and equipment before use
- Know proper emergency response procedures and location of emergency equipment
- Use safety guards on all machinery where required
- Know what contaminants are present in the work area and their exposure routes and symptoms
- Only authorized personnel may operate equipment
- Use the "Buddy System" at all times when working in an Exclusion Zone area
- Any person present in or passing through an area must observe the rules of that area
- Suit up and de-suit according to OHM procedures
- Wear proper personal protective equipment for the task
- Inspect, wash, store and care for respirator properly
- Eat, drink, smoke, chew only in designated areas of Support Zone
- Sign in and out whenever entering or leaving Exclusion Zone
- Be clean shaven
- _____
- _____
- _____

Site Supervisor

Failure to comply with these rules will result in disciplinary action.



OHM Corporation

DAILY SAFETY MEETING LOG

Date: _____

Client: _____

Specific Location: _____

Job No.: _____

SAFETY TOPICS PRESENTED:

Protective Clothing/Equipment: _____

Chemical Hazards: _____

Physical Hazards: _____

Emergency Procedures: _____

Hospital/Clinic: _____

Phone: _____

Hospital Address: _____

EMS Phone: _____

Special Equipment: _____

Other: _____

ATTENDEES:

Name Printed

Signature

Meeting Conducted By:

Name Printed

Signature



COMBUSTIBLE GAS INDICATOR CALIBRATION DATA SHEET

PROJECT # _____

INSTRUMENT NO.: _____

CALIBRATION GAS % LEL: _____

CALIBRATION GAS: _____

CHEMICAL MONITORED: _____

CAL GAS O₂ CONCENTRATION: _____

CONVERSION FACTOR: _____

DATE	PERSON CALIBRATING	CGI READING (% LEL)	OXYGEN READING	TOX IN PPM	REMARKS

NOTE: METER READING x CONVERSION FACTOR = LEL OF ATMOSPHERE
(Conversion factor can be found in instrument manual)



DAILY HEAVY EQUIPMENT SAFETY INSPECTION CHECKLIST

OHM Corporation

EQUIPMENT I.D. NO.: _____

EQUIPMENT NAME: _____

WEEK OF: _____

ITEM INSPECTED	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
Falling Object Protective Structure (FOP)							
Roll-Over Protective Structure (ROP)							
Seat Belts							
Operator Seat Bar(s)							
Side Shields, Screens or Cab							
Lift Arm Restraining Device							
Grab Handles							
Back-Up Alarm - Working							
Lights							
Guards							
Horn							
Anti-Skid Tread Steps Clear of Mud							
Safety Signs (i.e. counterbalance swing area)							
Fire Extinguisher							
General Condition							
Fuel Connection							
Oil (full and no leaks)							
Clear Of Extra Materials							
Controls function properly							
Damaged Parts							
Hydraulic System (full and no leaks)							
Parking brake							
Lift Arm and Bucket							
Tires/Tracks							
Steering							
Inspectors Name and Employee No.							

INSTRUCTIONS - Inspect all applicable items indicated, each shift. If an unsatisfactory condition is observed, suspend operation of the equipment and report the unsatisfactory condition to the site supervisor immediately.



OHM Corporation

PORTABLE FIRE EXTINGUISHER CHECKLIST

Office/Shop Location _____

INVENTORY

Serial No.	Location	Serial No.	Location
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Inspection Points

1. Fire extinguisher is in assigned location
2. Access is not obstructed
3. Fire extinguisher is fully charged
4. Lock-pin in place
5. Test tag attached and current

INSPECTIONS COMPLETED

Month	Initials	Month	Initials
January	_____	July	_____
February	_____	August	_____
March	_____	September	_____
April	_____	October	_____
May	_____	November	_____
June	_____	December	_____



OHM Corporation

SCBA MONTHLY INSPECTION CHECKLIST

SCBA ID NO. _____

YEAR _____

ITEM INSPECTED	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Connections are tight												
Paco-piece in good condition												
Rubber parts pliable												
Regulator functions properly												
Alarm bell functions properly												
Cylinder fully charged												
Cylinder hydrotest current (within 3 years)												
Unit is clean												
Emergency bypass functions properly												
Inspector's initials and employee number												

DEFICIENCIES IN ABOVE ITEMS REQUIRE UNIT TO BE TAGGED AND REMOVED FROM SERVICE.



OHM Corporation

OHM Corporation
Project Site Safety Inspection Checklist

Project Name: _____
Project Number: _____
Project Location: _____
Site Supervisor: _____
Inspector's Name: _____

MEDICAL AND FIRST AID

YES NO

- | | | |
|---|-------|-------|
| 1. Are First Aid Kits accessible and identified? | _____ | _____ |
| 2. Are emergency eye wash and safety showers available? | _____ | _____ |
| 3. Are daily logs for first aid present and up to date? | _____ | _____ |
| 4. Are First Aid Kits inspected weekly? | _____ | _____ |

PERSONAL PROTECTIVE EQUIPMENT

- | | | |
|---|-------|-------|
| 1. Have levels of personnel protection been established? | _____ | _____ |
| 2. Do all employees know their level of protection? | _____ | _____ |
| 3. Are respirators used decontaminated, inspected, and stored according to standard procedures? | _____ | _____ |
| 4. Have employees been fit-tested? | _____ | _____ |
| 5. Is defective personal protective equipment tagged? | _____ | _____ |
| 6. Does compressed breathing air meet CGA Grade 'D' minimum? | _____ | _____ |
| 7. Are there sufficient quantities of safety equipment and repair parts? | _____ | _____ |
| 8. Does Level D protection consist of safety glasses, hard hats, and steel toe boots? | _____ | _____ |

FIRE PREVENTION

- | | | |
|---|-------|-------|
| 1. Is smoking prohibited in flammable storage areas? | _____ | _____ |
| 2. Are fire lanes established and maintained? | _____ | _____ |
| 3. Are flammable dispensing systems grounded and 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 near refueling areas? | _____ | _____ |

AIR MONITORING

- | | | |
|---|-------|-------|
| 1. Is air monitoring being conducted as required by the site safety plan? | _____ | _____ |
| 2. Are air monitoring instruments calibrated daily? | _____ | _____ |
| 3. Is the air monitoring logbooks up to date? | _____ | _____ |
| 4. Are user manuals available? | _____ | _____ |
| 5. Are instruments clean and charged? | _____ | _____ |

WELDING AND CUTTING (29 CFR 1926 Subpart J)

- 1. Are fire extinguishers present at welding and cutting operations? _____
- 2. Are confined spaces; such as, tanks, pipelines, and trenches; tested prior to cutting and welding operations? _____
- 3. Are Hot Work Permits available? _____
- 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? _____

HAND AND POWER TOOLS (29 CFR 1926 Subpart I)

- 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 non-sparking tools available? _____

MOTOR VEHICLES

- 1. Are vehicles inspected daily? _____
- 2. Are personnel licensed for the equipment they operate? _____
- 3. Are unsafe vehicles tagged and reported to supervision? _____
- 4. Are vehicles shut down before fueling? _____
- 5. When backing vehicles, are spotters provided? _____
- 6. Is safety equipment on vehicles? _____
- 7. Are loads secure on vehicles? _____
- 8. Are vehicle occupants using safety belts if provided? _____

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? _____

MATERIALS HANDLING

- 1. Are materials stacked and stored as to prevent sliding or collapsing? _____
- 2. Are flammables and combustibles stored in non-smoking areas? _____
- 3. Is machinery braced when personnel are performing maintenance? _____
- 4. Are tripping hazards labeled? _____
- 5. Are semi-trailers chocked? _____
- 6. Are fixed jacks used under semi-trailers? _____
- 7. Are riders prohibited on materials handling equipment? _____
- 8. Are cranes inspected as prescribed and logged? _____
- 9. Are OSHA approved manlifts provided for the lifting of personnel? _____
- 10. Are personnel in manlifts wearing approved fall protection devices? _____

FIRE PROTECTION

- 1. Has a fire alarm been established? _____
- 2. Do employees know the location and use of all fire extinguishers? _____
- 3. Are fire extinguisher locations marked? _____

WALKING AND WORKING SURFACES

- 1. Are ladders a Type I or Type II? _____
- 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 up to OHM standards? _____
- 10. Are ladders tied off? _____

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 acknowledgement form? _____

SITE POSTERS

- 1. Are the following documents posted in a prominent and accessible area?
 - A. Minimum Wage _____
 - B. OSHA Health and Safety _____
 - C. Equal Employment Opportunity _____

SITE CONTROL

- 1. Are work zones clearly defined? _____
- 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? _____

HEAVY EQUIPMENT (29 CFR 1926 Subpart O)

- 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 back-up alarms installed and working on equipment? _____
- 6. Are designated operators only operating equipment? _____
- 7. Are riders prohibited on heavy equipment? _____
- 8. Are guards and safety appliances in place and used? _____

EXCAVATION (29 CFR 1926 Subpart P)

- 1. Has a "competent person" been designated to supervise this excavation activity? _____
- 2. Have utility companies been advised of excavation activities? _____
- 3. Prior to opening excavations, are utilities located and marked? _____
- 4. Has a professional engineer evaluated all excavations greater than 20 feet deep? _____
- 5. Is there rescue equipment on-site and accessible to excavation? _____
- 6. Is excavated material placed a minimum of 24 inches from the excavations? _____
- 7. Are the sides of excavations sloped or shored to prevent caving in on employees? _____

FIRE PROTECTION (Continued)

- 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 (29 CFR 1926 Subpart K)

- 1. Is electrical equipment and wiring properly guarded? _____
- 2. Are electrical lines, extension cords, and cables guarded and maintained in good conditions? _____
- 3. Are extension cords kept out of wet areas? _____
- 4. Is damaged electrical equipment tagged and taken out of service? _____
- 5. Have underground electrical lines been identified by proper authorities? _____
- 6. Has positive lock-out system been established by a certified project electrician? _____
- 7. Are GFCT's being used as needed? _____
- 8. Are extension cords being inspected daily for ground continuity and structural integrity? (i.e., group pin in place, no unapproved splices) _____
- 9. Are warning signs exhibited on high voltage equipment (250V or greater)? _____
- 10. Is extension cord inspection documented? _____

CRANES AND RIGGING (29 CFR 1926.550)

- 1. Are cranes inspected daily? _____
- 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 employees in the lift area wearing hard hats? _____

COMPRESSED GAS CYLINDERS

- 1. Are breathing air cylinders charged only to prescribed pressures? _____
- 2. Are like cylinders segregated 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 O2 cylinders stored a minimum of 20 feet apart? _____
- 8. Are propane cylinders stored and used outside the structure? _____

SCAFFOLDING (29 CFR 1926.451)

- 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. Does mobile scaffold height exceed 4 times the width or base dimension? _____
- 6. Does scaffold planking overlap a minimum of 12 inches? _____
- 7. Does scaffold planking extend over end supports between 6 to 18 inches? _____
- 8. Are employees restricted from working on scaffolds during storms and high winds? _____
- 9. Are all pins in place and wheels locked? _____
- 10. Is perimeter guarding (top rail, mid rail, and toe board) present? _____

EXCAVATION (29 CFR 1926 Subpart P - Continued)

- 8. Has excavation greater than 4-feet deep been monitored for hazardous atmospheres (i.e. LEL/O2 deficiency)? _____
- 9. Are ladders used in excavations over 4-feet deep? _____
- 10. Are ladders present every 25 feet? _____
- 11. Are barriers, i.e. guardrails or fences placed around excavations near pedestrian or vehicle thoroughfares? _____
- 12. Is excavation inspected daily by competent persons and documented? _____

CONFINED SPACES (Proposed Regulation 29 CFR 1910.146)

- 1. Have employees been trained in the hazards of confined spaces? _____
- 2. Are confined space permits available on project site? _____
- 3. Is the contractors confined space safety procedure on the project? _____
- 4. Has a rescue plan been established? _____

PERSONNEL DECONTAMINATION

- 1. Are decontamination stations set up on site? _____
- 2. Are waste receptacles available for contaminated clothing? _____
- 3. Are steps taken to contain liquids used for decontamination? _____
- 4. Have decontamination steps and procedures been covered by the site supervisor or safety official? _____
- 5. Is all personal protective equipment and respiratory equipment being cleaned on a daily basis? _____

EQUIPMENT DECONTAMINATION

- 1. Has equipment decontamination been established? _____
- 2. Is contamination wash water properly contained and disposed of? _____
- 3. Are all pieces of equipment inspected for proper decontamination before leaving the site? _____
- 4. Is all equipment being cleaned on a daily basis? _____

HAZARD COMMUNICATION (29 CFR 1926.59)

- 1. Is there a written program on-site? _____
- 2. Is there a MSDS FOR EACH CHEMICAL present on-site? _____
- 3. Are all containers properly labeled, as to content, hazard? _____
- 4. Have employees been trained on chemical hazards? _____
- 5. Are employee's trained on chemical hazards while doing non-routine tasks? _____
- 6. Do employees (including subcontractors) know and understand the acute and chemical effects of exposure from the chemicals on-site? _____
- 7. Have all subcontractors signed the Haz-Comm acknowledgement form? _____

I have reviewed this inspection checklist with the safety inspector and fully understand the recommendation and will make every attempt to correct them immediately.

Signature

Date

Site Supervisor: _____

Project Manager: _____

OHM Compliance Inspector: _____



SITE SAFETY OFFICER DAILY REPORT

DATE: _____

PROJECT NO. _____

SSO: _____

PROJECT NAME: _____

SITE SUPERVISOR: _____

Safety Meeting Topics:		
Air Monitoring Instruments	Calculated/Checked	Task Monitored
Other Activities		

EM Site Activities

Task Performed	Protection Level	Type Air Monitoring

Subcontractor Activities

Safety Observation/Issues

OHM REMEDIATION SERVICES CORP.

AIR SAMPLING DATA SHEET

Date: _____

Project No.: _____

Field Sample ID No. _____

Project Name: _____

Sampler _____

Personnel Monitoring Data:

Employee Name:	_____
Job Title / Work Duties:	_____
PPE Used:	_____
Work Location:	_____

Area Monitoring Data

Primary Activity:	_____
Location:	_____
Weather Conditions:	_____

Pump No.	_____	Sampling Media:	_____
Pre-Flow Rate (LPM)	_____		
Post-Flow Rate (LPM)	_____	Analyte:	_____
Avg-Flow Rate (LPM)	_____	Analytical Results:	_____
Start Time (Min)	_____		
Stop Time (Min)	_____	Notes:	_____
Total Time (Min)	_____		
Total Volume (L)	_____		



CHAIN-OF-CUSTODY RECORD

Form 0318
Field Technical Services
Rev. 03/88

No. 62119

O.H. MATERIALS CORP. • P.O. BOX 551 • FINDLAY, OH 46839-0551 • 419-423-3526

PROJECT NAME		PROJECT LOCATION				NUMBER OF CONTAINERS	ANALYSIS DESIRED (INDICATE SEPARATE CONTAINERS)										REMARKS																																																																													
PROJECT NO.		PROJECT CONTACT		PROJECT TELEPHONE NO.			<table border="1"> <tr> <th>ITEM NO.</th> <th>SAMPLE NUMBER</th> <th>DATE</th> <th>TIME</th> <th>CON.</th> <th>DRAG</th> <th>SAMPLE DESCRIPTION (INCLUDE MATRIX AND POINT OF SAMPLE)</th> </tr> <tr><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>2</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>3</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>4</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>5</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>6</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>7</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>8</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>9</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> <tr><td>10</td><td></td><td></td><td></td><td></td><td></td><td></td></tr> </table>											ITEM NO.	SAMPLE NUMBER	DATE	TIME	CON.	DRAG	SAMPLE DESCRIPTION (INCLUDE MATRIX AND POINT OF SAMPLE)	1							2							3							4							5							6							7							8							9							10						
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PLEASE PRESS HARD. ALL 4 PARTS MUST BE READABLE

FIGURE 7.2

CHAIN-OF-CUSTODY RECORD



OHM Corporation

APPENDIX D

HEALTH AND SAFETY FORMS

Accident/Injury/Illness Report Form
Accident/Injury/Illness Status Report Form
First Aid Log
OHM Safety Rules
Daily Safety Meeting Log
Instrument Calibration Logs (LEL/PID)
Air Monitoring Instrument (Direct Reading) Logs
Heavy Equipment Inspection Forms
Fire Extinguisher Checklist/Inventory Form
SCBA/SAR Inspection Forms
Project Site Safety Inspection Checklist (weekly)
SSO Daily Report
Air Sampling & Analysis Log
Air Sampling Data Sheet
Chain-of-Custody Record

SUPERVISOR'S ACCIDENT INVESTIGATION REPORT

Check all that apply: Injury/Illness Fatality Complaint Not Work Related
 Auto Liability Auto Physical Damage
 General Liability Property Damage Environmental

Exact Date and Time of Incident _____ a.m. _____ p.m. Shift 1st 2nd 3rd

OHM CORPORATION _____
(Employee's Home Division/Regional Office/Subsidiary)

Address _____
City _____ State _____

PROJECT IDENTIFICATION (Project Related Incidents Only)

Project No. _____ Project Start Date _____ Completion Date _____

Location (Full Address) _____

Telephone _____ Project Manager _____

EMPLOYEE INFORMATION

Employee's Full Name _____ Employee No. _____

Regular Full Time Regular Part Time Temporary Non-Employee

Address _____

Date of Birth _____ Age _____ Social Security No. _____ - _____ - _____ Sex M F

Job Title _____ Department _____ Date Hired _____

Length of Employment In Training, _____ Mos. _____ Yrs. Time in Job Class In Training, _____ Mos. _____ Yrs.

Name of Employee's Direct Supervisor _____

Supervision at Time of Accident Directly Supervised Indirectly Supervised Not Supervised

Specific Location Where Incident Occurred _____

_____ OHM Facility Project Site Other _____

To Whom Was Incident Reported? _____ When? _____

Witness Name/Address _____

Witness Job Title/Reason in Area _____

Describe Employee's Job Duties Being Performed When Injured _____

_____ Fully the Events Which Resulted in the Accident/Injury/Illness _____

(Use Extra Page if Needed)

Describe the injury/illness in detail; indicate part of body affected _____

Name of Object/Substance Which Directly Injured Employee _____

Has/Will Employee Seek Treatment? Yes No Did Employee Die? Yes No

Name/Address of Hospital/Doctor _____

Describe Treatment Given _____

Was Employee Able To Return To Work? Yes No

If YES: Regular Work Work with Restricted Activities

Restriction _____

If NO: Date Last Time Began _____

Date/Est. Date To Return _____

Identify Personal Protective Equipment Used by Injured Employee _____

What Training or Instruction Had Been Given? _____

How Could This Accident Have Been Prevented? _____

Corrective Action _____

Signature _____ (Supvr/Manager)

Date _____

Signature _____ (Safety Officer)

Date _____

Signature _____ (Proj. Manager)

Date _____

DISTRIBUTION

Original To: Division Secretary at Employee's Home Office

Copy To: Corporate Health & Safety
 Project Manager

Regional Health & Safety Manager
 Site Safety File



OHM Remediation
Services Corp.

EMPLOYEE'S ACCIDENT REPORT

Check all that apply: Injury/Illness Fatality Complaint Not Work Related
 Auto Liability Auto Physical Damage
 General Liability Property Damage Environmental

Date, Day, and Time of Incident _____ am pm

Your Name: _____ Your Emp. No.: _____

Home Address: _____ Home Phone # _____

Birth Date: _____ Age: _____ Social Security No.: _____ Sex: _____

Job Title: _____ Dept.: _____ Date of Hire: _____

Accident location (If Project related, give Project #, Client, Address and Phone #): _____

On OHM premises? Yes No

Witness Name/Address _____

How did accident occur?: _____

Was medical attention required? Yes No

Did you return to work? Yes No Your usual Job? Yes No If not explain: _____

Was the accident reported to a supervisor? Yes No Supervisor's name: _____

Employee's Signature

Date



INJURY/ILLNESS STATUS REPORT

Employee _____ Social Security No. _____

Home Address _____ Phone _____

Job Title _____ Home Division _____

Date of Injury/Illness _____ Description of Injury/Illness _____

AUTHORIZATION TO RELEASE INFORMATION

I hereby authorize all physicians, hospitals, clinics and all persons to discuss with, and release to OHM Remediation Services Corp. and its authorized agents, any information or copies thereof acquired in the course of my examination or treatment for the injury identified above. This authorization shall not extend to any other medical condition, past or present, unless the same is causally or historically relevant or related to the injury referred to above.

Employee Signature _____ Date _____

PHYSICIAN OR MEDICAL PERSONNEL TO COMPLETE REMAINDER OF FORM

WORK STATUS

Employee may return to work with no limitations

Date _____

Employee may return to work on _____ Date _____

with limitations indicated. These restrictions are in

effect until _____ or until Reevaluation

Date _____

on _____ Date _____

Employee may work _____ hours in a work day.

Employee is totally incapacitated at this time.

Patient will be reevaluated on _____ Date _____

DEGREE

Sedentary Work. Lifting 10 pounds maximum and occasionally lifting and/or carrying such articles as dockets, ledgers, and small tools. Although a sedentary job is defined as one which involves sitting, a certain amount of walking and standing is often necessary in carrying out job duties. Jobs are sedentary if walking and standing are required only occasionally and other sedentary criteria are met.

Light Work. Lifting 20 pounds maximum with frequent lifting and/or carrying of objects weighing up to 10 pounds. Even though the weight lifted may be only a negligible amount, a job is in this category when it requires walking or standing to a significant degree or when it involves sitting most of the time with a degree of pushing and pulling of arm and/or leg controls.

Medium Work. Lifting 50 maximum with frequent lifting and/or carrying of objects weighing up to 25 pounds.

Heavy Work. Lifting 100 pounds maximum with frequent lifting and/or carrying of objects weighing up to 50 pounds.

Very Heavy Work. Lifting objects in excess of 100 pounds with frequent lifting and/or carrying of objects weighing 50 pounds or more.

LIMITATIONS

1. The Employee may:

a. Stand/walk

- None 1-4 hours
 4-6 hours 6-8 hours

b. Sit

- 1-3 hours 3-5 hours
 5-8 hours

c. Drive

- 1-3 hours 3-5 hours
 5-8 hours

2. Employee may use hands for repetitive:

- Single grasping Pushing & pulling
 Fine manipulation

3. Employee may use feet for repetitive movement as in operating foot controls:

- Yes No

4. Employee is able to:

Frequently Occasionally Not all All

- a. Bend.....
b. Squat.....
c. Climb.....

PHYSICIAN'S REPORT

Diagnosis _____

Treatment _____

Other _____

Date of this Report _____

Physician's Name _____

Print

Physician's Signature _____

Address _____ Phone _____

- Referred to company physician
 Employee referred/admitted to:

Whom _____

Address _____

Phone _____

Date _____ Time _____

OHM REMEDIATION SERVICES CORP
PROJECT SAFETY RULES
PROJECT NO. _____

- All unsafe acts/conditions must be corrected promptly and reported to supervisor at first opportunity
- Participate in the Safety Observer Program
- Good housekeeping standards must be maintained at all times
- Non-work injuries that could become aggravated on the job must be reported to supervisor within 1/2 hour of starting work
- Lockout/tagout procedures must be followed at all times
- Use fall protection where required
- Inspect all vehicles and equipment before use
- Know proper emergency response procedures and location of emergency equipment
- Use safety guards on all machinery where required
- Know what contaminants are present in the work area and their exposure routes and symptoms
- Only authorized personnel may operate equipment
- Use the "Buddy System" at all times when working in an Exclusion Zone area
- Any person present in or passing through an area must observe the rules of that area
- Suit up and de-suit according to OHM procedures
- Wear proper personal protective equipment for the task
- Inspect, wash, store and care for respirator properly
- Eat, drink, smoke, chew only in designated areas of Support Zone
- Sign in and out whenever entering or leaving Exclusion Zone
- Be clean shaven
- _____
- _____
- _____

Site Supervisor

Failure to comply with these rules will result in disciplinary action.



OHM Corporation

DAILY SAFETY MEETING LOG

Date: _____

Client: _____

Specific Location: _____

Job No.: _____

SAFETY TOPICS PRESENTED:

Protective Clothing/Equipment: _____

Chemical Hazards: _____

Physical Hazards: _____

Emergency Procedures: _____

Hospital/Clinic: _____

Phone: _____

Hospital Address: _____

EMS Phone: _____

Special Equipment: _____

Other: _____

ATTENDEES:

Name Printed

Signature

Meeting Conducted By:

Name Printed

Signature



COMBUSTIBLE GAS INDICATOR CALIBRATION DATA SHEET

 PROJECT # _____

INSTRUMENT NO.: _____ CALIBRATION GAS % LEL: _____
 CALIBRATION GAS: _____ CHEMICAL MONITORED: _____
 CAL GAS O₂ CONCENTRATION: _____ CONVERSION FACTOR: _____

DATE	PERSON CALIBRATING	CGI READING (% LEL)	OXYGEN READING	TOX IN PPM	REMARKS

NOTE: METER READING x CONVERSION FACTOR = LEL OF ATMOSPHERE
(Conversion factor can be found in instrument manual)



DAILY HEAVY EQUIPMENT SAFETY INSPECTION CHECKLIST

MIM Corporation

EQUIPMENT I.D. NO.: _____

EQUIPMENT NAME: _____

WEEK OF: _____

ITEM INSPECTED	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
Falling Object Protective Structure (FOP)							
Roll-Over Protective Structure (ROP)							
Seat Belts							
Operator Seat Bar(s)							
Side Shields, Screens or Cab							
Lift Arm Restraining Device							
Grab Handles							
Back-Up Alarm - Working							
Lights							
Guards							
Horn							
Anti-Skid Tread Steps Clear of Mud							
Safety Signs (i.e. counterbalance swing area)							
Fire Extinguisher							
General Condition							
Fuel Connection							
Oil (full and no leaks)							
Clear Of Extra Materials							
Controls function properly							
Damaged Parts							
Hydraulic System (full and no leaks)							
Parking brake							
Lift Arm and Bucket							
Tires/Tracks							
Steering							
Inspectors Name and Employee No.							

INSTRUCTIONS - Inspect all applicable items indicated, each shift. If an unsatisfactory condition is observed, suspend operation of the equipment and report the unsatisfactory condition to the site supervisor immediately.



OHM Corporation

PORTABLE FIRE EXTINGUISHER CHECKLIST

Office/Shop Location _____

INVENTORY

Serial No.	Location	Serial No.	Location
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Inspection Points

1. Fire extinguisher is in assigned location
2. Access is not obstructed
3. Fire extinguisher is fully charged
4. Lock-pin in place
5. Test tag attached and current

INSPECTIONS COMPLETED

<u>Month</u>	<u>Initials</u>	<u>Month</u>	<u>Initials</u>
January	_____	July	_____
February	_____	August	_____
March	_____	September	_____
April	_____	October	_____
May	_____	November	_____
June	_____	December	_____



OHM Corporation

SCBA MONTHLY INSPECTION CHECKLIST

SCBA ID NO. _____

YEAR _____

ITEM INSPECTED	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Connections are tight												
Paco-piece in good condition												
Rubber parts pliable												
Regulator functions properly												
Alarm bell functions properly												
Cylinder fully charged												
Cylinder hydrotest current (within 3 years)												
Unit is clean												
Emergency bypass functions properly												
Inspector's initials and employee number												

DEFICIENCIES IN ABOVE ITEMS REQUIRE UNIT TO BE TAGGED AND REMOVED FROM SERVICE.



OHM Corporation

OHM Corporation
Project Site Safety Inspection Checklist

Project Name: _____
Project Number: _____
Project Location: _____
Site Supervisor: _____
Inspector's Name: _____

MEDICAL AND FIRST AID

YES NO

1. Are First Aid Kits accessible and identified? _____
2. Are emergency eye wash and safety showers available? _____
3. Are daily logs for first aid present and up to date? _____
4. Are First Aid Kits inspected weekly? _____

PERSONAL PROTECTIVE EQUIPMENT

1. Have levels of personnel protection been established? _____
2. Do all employees know their level of protection? _____
3. Are respirators used decontaminated, inspected, and stored according to standard procedures? _____
4. Have employees been fit-tested? _____
5. Is defective personal protective equipment tagged? _____
6. Does compressed breathing air meet CGA Grade "D" minimum? _____
7. Are there sufficient quantities of safety equipment and repair parts? _____
8. Does Level D protection consist of safety glasses, hard hats, and steel toe boots? _____

FIRE PREVENTION

1. Is smoking prohibited in flammable storage areas? _____
2. Are fire lanes established and maintained? _____
3. Are flammable dispensing systems grounded and 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 near refueling areas? _____

AIR MONITORING

1. Is air monitoring being conducted as required by the site safety plan? _____
2. Are air monitoring instruments calibrated daily? _____
3. Is the air monitoring logbooks up to date? _____
4. Are user manuals available? _____
5. Are instruments clean and charged? _____

WELDING AND CUTTING (29 CFR 1926 Subpart J)

- 1. Are fire extinguishers present at welding and cutting operations? _____
- 2. Are confined spaces; such as, tanks, pipelines, and trenches; tested prior to cutting and welding operations? _____
- 3. Are Hot Work Permits available? _____
- 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? _____

HAND AND POWER TOOLS (29 CFR 1926 Subpart I)

- 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 non-sparking tools available? _____

MOTOR VEHICLES

- 1. Are vehicles inspected daily? _____
- 2. Are personnel licensed for the equipment they operate? _____
- 3. Are unsafe vehicles tagged and reported to supervision? _____
- 4. Are vehicles shut down before fueling? _____
- 5. When backing vehicles, are spotters provided? _____
- 6. Is safety equipment on vehicles? _____
- 7. Are loads secure on vehicles? _____
- 8. Are vehicle occupants using safety belts if provided? _____

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? _____

MATERIALS HANDLING

- 1. Are materials stacked and stored as to prevent sliding or collapsing? _____
- 2. Are flammables and combustibles stored in non-smoking areas? _____
- 3. Is machinery braced when personnel are performing maintenance? _____
- 4. Are tripping hazards labeled? _____
- 5. Are semi-trailers chocked? _____
- 6. Are fixed jacks used under semi-trailers? _____
- 7. Are riders prohibited on materials handling equipment? _____
- 8. Are cranes inspected as prescribed and logged? _____
- 9. Are OSHA approved manlifts provided for the lifting of personnel? _____
- 10. Are personnel in manlifts wearing approved fall protection devices? _____

FIRE PROTECTION

- 1. Has a fire alarm been established? _____
- 2. Do employees know the location and use of all fire extinguishers? _____
- 3. Are fire extinguisher locations marked? _____

WALKING AND WORKING SURFACES

- 1. Are ladders a Type I or Type II? _____
- 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 up to OHM standards? _____
- 10. Are ladders tied off? _____

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 acknowledgement form? _____

SITE POSTERS

- 1. Are the following documents posted in a prominent and accessible area?
 - A. Minimum Wage _____
 - B. OSHA Health and Safety _____
 - C. Equal Employment Opportunity _____

SITE CONTROL

- 1. Are work zones clearly defined? _____
- 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? _____

HEAVY EQUIPMENT (29 CFR 1926 Subpart O)

- 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 back-up alarms installed and working on equipment? _____
- 6. Are designated operators only operating equipment? _____
- 7. Are riders prohibited on heavy equipment? _____
- 8. Are guards and safety appliances in place and used? _____

EXCAVATION (29 CFR 1926 Subpart P)

- 1. Has a "competent person" been designated to supervise this excavation activity? _____
- 2. Have utility companies been advised of excavation activities? _____
- 3. Prior to opening excavations, are utilities located and marked? _____
- 4. Has a professional engineer evaluated all excavations greater than 20 feet deep? _____
- 5. Is there rescue equipment on-site and accessible to excavation? _____
- 6. Is excavated material placed a minimum of 24 inches from the excavations? _____
- 7. Are the sides of excavations sloped or shored to prevent caving in on employees? _____

FIRE PROTECTION (Continued)

- 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 (29 CFR 1926 Subpart K)

- 1. Is electrical equipment and wiring properly guarded? _____
- 2. Are electrical lines, extension cords, and cables guarded and maintained in good conditions? _____
- 3. Are extension cords kept out of wet areas? _____
- 4. Is damaged electrical equipment tagged and taken out of service? _____
- 5. Have underground electrical lines been identified by proper authorities? _____
- 6. Has positive lock-out system been established by a certified project electrician? _____
- 7. Are GFCI's being used as needed? _____
- 8. Are extension cords being inspected daily for ground continuity and structural integrity? (i.e., group pin in place, no unapproved splices) _____
- 9. Are warning signs exhibited on high voltage equipment (250V or greater)? _____
- 10. Is extension cord inspection documented? _____

CRANES AND RIGGING (29 CFR 1926.550)

- 1. Are cranes inspected daily? _____
- 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 employees in the lift area wearing hard hats? _____

COMPRESSED GAS CYLINDERS

- 1. Are breathing air cylinders charged only to prescribed pressures? _____
- 2. Are like cylinders segregated 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 O2 cylinders stored a minimum of 20 feet apart? _____
- 8. Are propane cylinders stored and used outside the structure? _____

SCAFFOLDING (29 CFR 1926.451)

- 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. Does mobile scaffold height exceed 4 times the width or base dimension? _____
- 6. Does scaffold planking overlap a minimum of 12 inches? _____
- 7. Does scaffold planking extend over end supports between 6 to 18 inches? _____
- 8. Are employees restricted from working on scaffolds during storms and high winds? _____
- 9. Are all pins in place and wheels locked? _____
- 10. Is perimeter guarding (top rail, mid rail, and toe board) present? _____

EXCAVATION (29 CFR 1926 Subpart P - Continued)

- 8. Has excavation greater than 4-feet deep been monitored for hazardous atmospheres (i.e. LEL/O2 deficiency)? ____ ____
- 9. Are ladders used in excavations over 4-feet deep? ____ ____
- 10. Are ladders present every 25 feet? ____ ____
- 11. Are barriers, i.e. guardrails or fences placed around excavations near pedestrian or vehicle thoroughfares? ____ ____
- 12. Is excavation inspected daily by competent persons and documented? ____ ____

CONFINED SPACES (Proposed Regulation 29 CFR 1910.146)

- 1. Have employees been trained in the hazards of confined spaces? ____ ____
- 2. Are confined space permits available on project site? ____ ____
- 3. Is the contractors confined space safety procedure on the project? ____ ____
- 4. Has a rescue plan been established? ____ ____

PERSONNEL DECONTAMINATION

- 1. Are decontamination stations set up on site? ____ ____
- 2. Are waste receptacles available for contaminated clothing? ____ ____
- 3. Are steps taken to contain liquids used for decontamination? ____ ____
- 4. Have decontamination steps and procedures been covered by the site supervisor or safety official? ____ ____
- 5. Is all personal protective equipment and respiratory equipment being cleaned on a daily basis? ____ ____

EQUIPMENT DECONTAMINATION

- 1. Has equipment decontamination been established? ____ ____
- 2. Is contamination wash water properly contained and disposed of? ____ ____
- 3. Are all pieces of equipment inspected for proper decontamination before leaving the site? ____ ____
- 4. Is all equipment being cleaned on a daily basis? ____ ____

HAZARD COMMUNICATION (29 CFR 1926.59)

- 1. Is there a written program on-site? ____ ____
- 2. Is there a MSDS FOR EACH CHEMICAL present on-site? ____ ____
- 3. Are all containers properly labeled, as to content, hazard? ____ ____
- 4. Have employees been trained on chemical hazards? ____ ____
- 5. Are employee's trained on chemical hazards while doing non-routine tasks? ____ ____
- 6. Do employees (including subcontractors) know and understand the acute and chemical effects of exposure from the chemicals on-site? ____ ____
- 7. Have all subcontractors signed the Haz-Comm acknowledgement form? ____ ____

I have reviewed this inspection checklist with the safety inspector and fully understand the recommendation and will make every attempt to correct them immediately.

	<u>Signature</u>	<u>Date</u>
Site Supervisor:	_____	_____
Project Manager:	_____	_____
OHM Compliance Inspector:	_____	_____



OHM Remediation
Services Corp.

SITE SAFETY OFFICER DAILY REPORT

DATE: _____

PROJECT NO. _____

SSO: _____

PROJECT NAME: _____

SITE SUPERVISOR: _____

Safety Meeting Topics:		
Air Monitoring Instruments	Calculated/Checked	Task Monitored
Other Activities		

OHM Site Activities

Task Performed	Protection Level	Type Air Monitoring

Subcontractor Activities

Safety Observation/Issues

OHM REMEDIATION SERVICES CORP.

SAMPLING DATA SHEET

Date: _____

Project No.: _____

Field Sample ID No. _____

Project Name: _____

Sampler: _____

Personnel Monitoring Data:

Employee Name:	_____
Job Title / Work Duties:	_____
PPE Used:	_____
Work Location:	_____

Area Monitoring Data

Activity:	_____
Location:	_____
Weather Conditions:	_____

Pump No. _____	Sampling Media: _____
Pre-Flow Rate (LPM) _____	
Post-Flow Rate (LPM) _____	Analyte: _____
Avg-Flow Rate (LPM) _____	Analytical Results: _____
Start Time (Min) _____	
Stop Time (Min) _____	Notes: _____
Total Time (Min) _____	
Air Volume (L) _____	



OHM

CHAIN-OF-CUSTODY RECORD

Form 0318
Field Technical Services
Rev. 03/88

No. 62119

O H H MATERIALS CORP. • P.O. BOX 851 • FIDDLAY, OH 46830-0551 • 419-423-3528

PROJECT NAME		PROJECT LOCATION				ANALYSIS DESIRED (INDICATE SEPARATE CONTAINERS)												
PROJECT NO.	PROJECT CONTACT			PROJECT TELEPHONE NO.														
CLIENT REPRESENTATIVE		PROJECT MANAGER/OPERATOR																
CLIENT REPRESENTATIVE		PROJECT MANAGER/OPERATOR																
ITEM NO.	SAMPLE NUMBER	DATE	TIME	COMP.	QA/QC	SAMPLE DESCRIPTION (INCLUDE MATRIX AND POINT OF SAMPLE)	NUMBER OF CONTAINERS	REMARKS										
1																		
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		
ITEM NUMBER	TRANSFERS RELINQUISHED BY			TRANSFERS ACCEPTED BY			DATE	TIME	REMARKS									
1																		
2																		
3																		
4																		

PLEASE PRESS HARD. ALL 4 PARTS MUST BE READABLE

FIGURE 7.2

CHAIN-OF-CUSTODY RECORD



OHM Corporation

1 Oct 92

HAZARD ANALYSIS

ACTIVITY	ANALYZED BY/DATE	REVIEWED BY/DATE
Principal Steps	Potential Hazards	Recommended Controls
Identify the principal steps involved and the sequence of work activities	Analyze each principal step for its potential hazards	Develop specific controls for each potential hazard
Equipment To Be Used	Inspection Requirements	Training Requirements
List equipment/machinery to be used in conducting the work activities	List inspection requirements for the equipment/machinery listed	Determine requirements for worker training, including hazard communication

APPENDIX B

**QUALITY CONTROL PLAN
(INCLUDING SUBMITTAL REGISTER)**

**CONSTRUCTION QUALITY CONTROL PLAN
FOR
MAINTENANCE OF RANGES D-29 AND A-1
MCB CAMP LEJEUNE, NORTH CAROLINA**

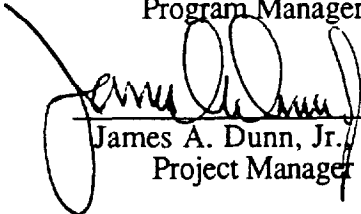
Prepared for:

DEPARTMENT OF THE NAVY
Contract No. N62470-93-D-3032
Atlantic Division
Naval Facilities Engineering Command
6500 Hampton Boulevard
Building A (South East Wing) 3rd Floor
Norfolk, Virginia 23508

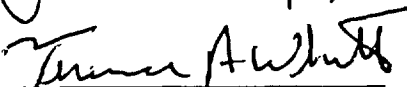
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May 1998
Delivery Order 0151 Modification No. 2
OHM Project No. 19668



**OHM Remediation
Services Corp.**

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1.0 INTRODUCTION

QUALITY STATEMENT

OHM Remediation Services Corp. (OHM) is committed to excellence in our work and will deliver quality products and services to our Customers. We will continually strive to anticipate and fully understand customer requirements, and will perform services that meet or exceed customer expectations in a cost competitive manner.

Achieving desired levels of quality requires the total commitment of all OHM employees to our ethic that quality, health and safety, and compliance must come before profits. The successful implementation of our quality policy and ethic requires a formal, documented quality system to ensure quality standards are established and achieved in all activities.

The following principles are the foundation and basis of our quality system.

- **Senior management takes full ownership of the quality system** and will create an environment that ensures quality objectives are met, standards are clearly established, and performance is measured and evaluated.
- **Line management is responsible for implementation of the quality system.** Each organization shall adhere to all requirements of the quality system (which includes requirements under this Standard Construction Quality Plan) that apply to their function.
- **Every employee is responsible for quality.** Each employee will be trained in the quality system as appropriate to their function and will be held responsible for the quality of their work.
- **Quality will be addressed and verified** during all phases of a contract or project, from proposal development through closeout.
- **Continuous quality improvement will be an ongoing process.**

Any activity not performed in accordance with the quality system requirements (and the requirements of this standard plan) must be corrected immediately. If an employee feels that his or her concerns are not being adequately addressed by management in regard to quality compliance, the employee is urged to contact his or her general manager.

Our quality ethic and these quality principles will constantly guide our actions. With vigilance, commitment, teamwork, and persistence, we can meet our own quality expectations and exceed those of our customers.



OHM will provide and maintain an effective Contractor Quality Control (CQC) Program as required by contract clauses. This program will be performed in conjunction with the Program Quality Control Plan (OHM, December 14, 1995) as applicable and in accordance with the requirements of Contract No. N62470-93-D-3032, Atlantic Division, Naval Facilities Engineering Command, dated August 1993. OHM will perform the inspection and test required to ensure that materials, workmanship, and construction conform to drawings, specifications, and contract requirements. OHM will perform each test or inspection specified, unless the required inspection and/or test is specifically designated to be performed by the Government.

2.0 PURPOSE AND CONTENT

This Quality Control Plan (QCP) presents, in specific terms, the policies, organization, function, and Quality Assurance/Quality Control (QA/QC) requirements designed to achieve the data quality objectives for the maintenance at the small arms target practice ranges D-29 and A-1 at Marine Corps Base (MCB) Camp Lejeune, North Carolina. This work will be performed under Delivery Order (D.O.) No. 0151, Modification (Mod) No. 02, of Contract Number N62470-93-D-3032 for the Navy Atlantic Division (LANTDIV) at the MCB Camp Lejeune, North Carolina.

The QCP is a tier three document to OHM's Corporate Quality Management Manual (CQMM). As such, this QCP is written to comply with policies set forth by the CQMM which incorporates the International Organization of Standards (ISO) Quality Systems Requirements that are issued as ISO 9001 and its United States equivalent ANSI/ASQC Q91-1994. The "Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs," ANSI/ASQC E4-1994 was used as a guideline to prepare this CQP.

The work plan for this project describes the remedial activities to be undertaken by OHM. This QCP serves to document, but does not repeat, project information or excavation requirements provided in this project documentation (e.g., work plan, contract specifications, drawings, site safety and health plan, and field sampling plan). This plan references these requirements and provides a record that those plans are being followed. As necessary, this plan may have attachments that provide further instructions, specifications, or requirements not provided in other project documents.

3.0 SCOPE AND OBJECTIVES

The ranges D-29 and A-1 are currently active ranges used for small-arms target practice at Camp Lejeune, North Carolina. General locations of each range are indicated on the attached maps. Both of these ranges are located immediately adjacent to the New River, and without adequate maintenance, may represent a potential source of contamination to the New River sediment. As specified in the Military Munitions rule (MMR), 40 CFR266, Subpart M of 12 February 1997, and as interpreted in the DoD Interim Policy developed to prepare the services for MMR implementation, munitions on an active range are not considered "discarded material" (thus not solid waste) for RCRA purposes until the range is closed or transferred. However, active ranges should participate in a range management program that addresses periodic small arms range maintenance in order to minimize the potential for environmental releases. The Scope Of Work (SOW) is defined to meet the requirements for cleanups in order to minimize the potential for environmental releases. prepare this CQP.

OHM has been tasked to perform maintenance of the berms at both ranges. In addition, a bullet trap is to be installed at Range A-1 to further prevent potential future releases of lead to the environment. Berm soils are to be screened to remove bulk lead and then processed on-site to stabilize residual metals and allow combined use of the range.

The following tasks will be performed at each site:

Range A-1

1. Based on Range D-30 results, lead particles will be screened to a 5 mm size.
2. Process 260 cubic yards of soil from existing berm, and recycle 08 cubic yards of lead bearing oversize material. (The processing of soil is based on excavation until no lead particles remain visible.) The amount of soil to be processed is for negotiations purposes only.
3. Existing berms will be raised 2 feet and made 100 feet in length (requiring approximately 100 cubic yards of fill).
4. Remove existing front retaining wall.
5. Hydroseed entire disturbed area. Provide erosion control netting on berm banks.
6. Provide 6-inch thick, 4,000 psi concrete pad for the bullet trap foundation.
7. Provide an Action Target Total Containment Trap (approximately 80 feet long) with active lead filtration/vacuum system with light weight roof system using GSA costs. Trap is designed for fourteen 5-foot wide shooting bays. (Trap manufacturer and model requested by station range personnel.) Provide approximately 1,000 feet of overhead electrical service (including transformers and poles) for the trap lead filtration motor.



In addition, the following sampling and analysis should be performed for each range upon completion of field work:

1. Determine lead content of the recovered lead
2. Determine total and leachate lead content of berm soil after completion of stabilization.

Range D-29

1. Two active ranges are to be built, with 14 firing bays 5 feet apart.
2. Based on Range D-30 results, lead particles will be screened to a 5 mm size.
3. Total amount of berm material to be processed is estimated to be 900 cubic yards. This includes processing 311 cubic yards of soil from existing berm in the active area (we will assume in the active area that the front face gets cleaned to a depth of 4 feet, and the top face gets cleaned to a depth of 3 feet) and processing of approximately 589 cubic yards in the intermittent area. (The processing of soil in the intermittent area is based on excavation until no lead particles remain visible. We will assume that the front face gets cleaned of 3 feet in the intermittent area and the top face gets cleaned of 2 feet in the intermittent area.) The amount of lead overbearing material to be recycled is estimated to be 11 cubic yards.
4. Raise the berm height from the 12 feet height to 14 feet high, with a 14 to 16 feet top access trail. Side slopes on the front of 1-1/2 to 1. This will require approximately 500 cubic yards of borrow material.
5. No repairs will be required to the existing retaining wall (perpendicular to front berm). Provide a new 3 feet high wood retaining wall parallel to the front berm at the front of the new active range (which used to be part of the old intermittent range).
6. Hydroseed entire disturbed area. Provide erosion control netting on berm slopes.

In conjunction with berm remediation at both ranges (and bullet trap installation at Range A-1), OHM has also been tasked to perform the following tasks to restore the site and provide minor improvements.

- Repair/replace retaining wall (railroad ties) between berm and drainage ditch (approximately 3 feet high).
- Repair/replace retaining walls (railroad ties) at right and left-hand limits of range
- Reconstructed berm must maintain integrity of original configuration (per drawing in Attachment 3 - this may not be the same as current configuration due to weathering)



- Range A-1 will have bullet trap installed in front of berm. Berm will remain in current location, but entire shooting area will be pushed back approximately 20 feet to allow for installation of bullet trap in front of berm. Trap will be placed between berm and drainage ditch. Trap will require construction of a concrete pad for support, per trap specifications.
- Remove large, visible lead fragments from debris and smaller screened soil particles less than 3/16 inch.
- Collect and analyze samples of screened soil which passed through a 5 mm screen to determine whether or not they can be used for backfill operations.
- Collect and analyze samples of soils stabilized with a suitable stabilization reagent based on the treatability test to determine whether or not they can be used for backfill.
- Collect and analyze recovered lead fragments for recycling purposes.

4.0 MANAGEMENT AND ORGANIZATION

The overall responsibility for implementation and enforcement of the QCP is assigned to the Project Manager and a Site Quality Control Officer (SQCO). Designated qualified individuals will assume execution responsibility of this plan. These individuals may include the Site Superintendent, Field Chemist, Field Engineer or QC personnel. The Program QA/QC Director has quality assurance responsibility for verification of the effectiveness of the project's quality control.

The project manager is the primary focal point for control of the project activities. The project manager will be supported by the regional support personnel who 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. Specific responsibilities may be assigned by the project manager to the deputy project manager and other members of the project staff. An organizational chart of the project team is shown on Figure 4.1. Positions are reflected to show organizational interface and lines of communication. Solid lines indicate direct reporting functions. Dashed lines represent indirect reporting functions. Depending on the scope, size, and complexity of the project, the Site Superintendent may also fulfill the duties of the SQCO when approved by the Navy.

4.1 DUTIES, RESPONSIBILITIES AND AUTHORITY

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

Project Manager - James Dunn, Jr.

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.

Some of these responsibilities may be assigned by the project manager to the Site Supervisor, who will remain on site throughout the project field activities.

Site Supervisor - Randy Smith

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 - Theresa D. Rojas

The chemical QA officer 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 is 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 nonconformances, identifying appropriate corrective actions, and performing follow-up audits to ensure that the corrective actions were successful.

Project Chemist - Terence Whitt

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 is also responsible for informing the chemical QA officer of any site-specific problems and for coordinating QA efforts with the contracted laboratory. His 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 evidence
- Working with the QC engineer to compile and submit required QA Reports (QARs).
- Compiling, revising, updating, and submitting the CQP and field sampling plan (FSP)
- 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.

Laboratory Coordinator - Elena Rodriguez

The laboratory coordinator is responsible for procuring a certified laboratory based on the requirements needed for the project. Her responsibilities include, but are not limited to, the following:

- 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 CQP and CSP and Purchase Orders

Field Chemist - Russel Henderson

The field chemist will:

- Implement the FSP and designated QA/QC procedures.
- Oversee all field sampling activities.
- Report all QC data to the project chemist for review.
- Implement corrective actions as required by the project chemist.
- 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 samples are handled, packaged, and shipped according to the FSP.
- Ensuring that the laboratory supplies the sample containers, shipping supplies, chain-of-custody records, and the required QC samples (i.e., trip blanks).

Sample Technician - TBD

The sample technician will be responsible for:

- Carrying out all sampling in accordance with approved procedures and methodologies as defined in the FSP.
- Generating field blanks, equipment rinsate blanks, and acquiring field duplicate samples as required by the FSP.
- Completing sampling logbooks, sampling forms, labels, custody seals, and chain-of-custody forms and other paperwork as required by the FSP.
- Packaging and Shipping of samples to appropriate laboratories.



Program QC Manager - Pete Hunter

The Program QC Manager will be responsible for developing, maintaining, and enforcing the quality control program.

Site QC Officer (SQCO) - TBD

The SQCO will be responsible for the management and implementation of the Program QC Plan and the delivery order specific C Plan for both on and off-site activities. Specific duties include: attend the Coordination and Mutual Understanding Meeting; conduct the schedule QC meetings; perform the three phases of control; perform submittal reviews; perform submittal approval except for submittals designed for Contracting Officer approval; ensure tests are performed; and prepare QC certifications and QC documentation as required by this plan. Except for managing and implementing the QC program, the SQCO will perform no other duties without the authorization of the Contracting Officer. The SQCO will also be responsible for delivering the following documentation to the Contracting Officer.

- Combined Contractor Production Report/Contractor Quality Control Report, original and one copy, by 10:00 a.m. the next working day after each day that work is performed.
- Testing Plan and log, three copies, at the end of each month.
- Monthly Summary Report of Field Tests, original and two copies attached to the Contractor Quality Control Report at the end of each month.
- QC meeting minutes, three copies within two calendar days of the meeting.
- Rework items list, three copies at the end of each month.
- Completion Certification attesting that "the work has been completed, inspected, tested and is in compliance with the contract."
- Attend the daily safety meetings and abide by all site rules and regulations.

4.2 APPOINTMENT LETTERS

The appointment letter for the SQCO is included in Appendix A. The appointment letter for the Program QC Manager can be found in the Program QC Plan.



4.3 PERSONNEL QUALIFICATIONS AND TRAINING

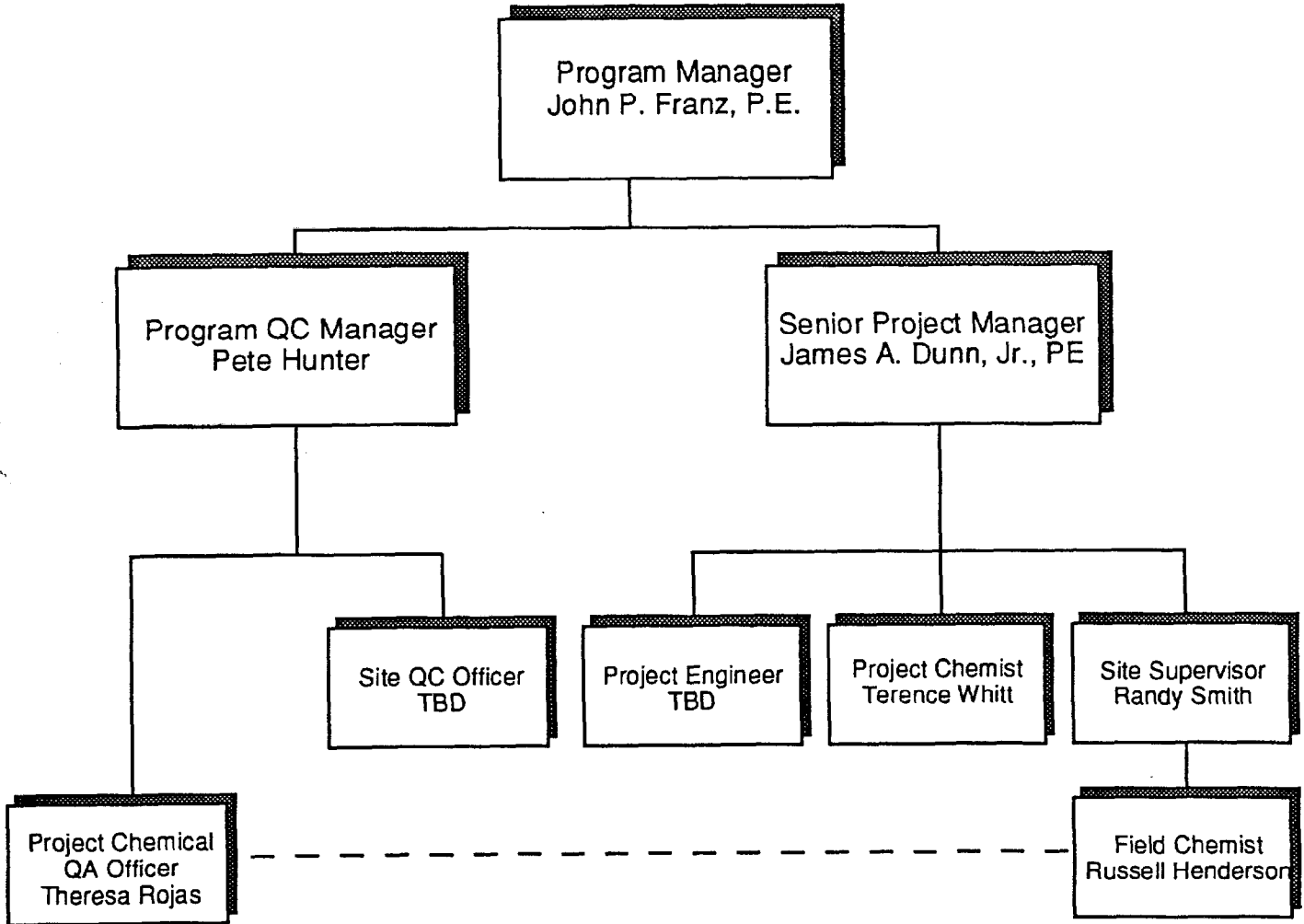
All key project personnel will be qualified to perform the task to which they are assigned. Appraisal of the qualifications of additional personnel assigned to the project will be made by the Project Manager.

Personnel responsible for environmental sampling must have undergone OHM's "Environmental Sampling Training" and have documented on-the-job training. Personnel responsible for evaluating analytical data must have undergone OHM's "Data Evaluation and Management Training."

Figure 4.1

OHM Remediation Services Corp.

QA/QC Organizational Chart



**OHM Remediation
Services Corp.**
A Subsidiary of OHM Corporation

5.0 PROCUREMENT OF ITEMS AND SERVICES

5.1 PROCUREMENT DOCUMENTS

The procurement of purchased items and services that directly affect the project quality program will be planned and controlled to ensure that the quality of the items and services is known, documented and meets the technical requirements and acceptance criteria of the client.

Procurement documents will contain information clearly describing the item or service needed and the associated technical and quality requirements. The procurement documents will specify the quality system elements for which the supplier is responsible and how the supplier's conformance to the project requirements will be verified.

5.2 QUALIFICATION OF SUPPLIERS

The financial and quality management systems of suppliers will be evaluated to ensure that they are able to meet the requirements of the project. The qualifications of these suppliers will be submitted to the Contracting Officer prior to their use on the project.

5.3 TESTING LABORATORY REQUIREMENTS

Testing services will be provided by an independent accredited testing laboratory qualified to perform sampling and tests. When the proposed testing laboratory is not accredited by an acceptable accreditation program, as described by the paragraph entitled "Accredited Laboratories," submit to the Contracting Officer for approval, certified statements signed by an official of the testing laboratory attesting that the proposed laboratory meets or conforms to the following requirements:

1. Sampling and testing will be under the technical direction of a registered professional engineer (PE) with at least five years of experience in sampling and testing.
2. Laboratories engaged in testing of concrete and concrete aggregates will meet the requirements of ASTM C 1077, 1990.
3. Laboratories engaged in testing of bituminous paving materials will meet the requirements of ASTM D 3666, 1990 (Rev. A).
4. Laboratories engaged in testing of soil and rock, as used in engineering design and construction, will meet the requirements of ASTM D 3740, 1988.
5. Laboratories engaged in nondestructive testing (NDT)/nondestructive examination (NDE) will meet the requirements of ASTM E 543, 1989 (Rev. A).
6. Laboratories performing work in connection with specific sampling and chemical analysis



of contaminated media according to the delivery order specification will be handled as defined in the Sampling and Analysis Plan (SAP).

7. 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 B. On-site air measurements will be non-definitive field screening analysis.

5.4 ACCREDITED LABORATORIES

Acceptable accreditation programs are the National Institute of Standards and Technology (NIST), National Voluntary Laboratory Accreditation Program (NVLAP), the American Association of State Highway and Transportation Officials (AASHTO) program, and the American Association for Laboratory Accreditation (AALA) program. Furnish to the Contracting Officer, a copy of the Certificate of Accreditation, Scope of Accreditation and latest directory of the accrediting organization for accredited laboratories. The scope of the laboratory's accreditation shall include the test methods required by the contract.

A Naval Facilities Engineering Service Center (NFESC)-certified or U. S. Army Corps of Engineers-Missouri River Division (USACE-MRD)-approved laboratory will be used for all environmental sample analyses. The laboratory will also be North Carolina-approved. A copy of the laboratory's QA Manual, statement of qualifications, and appropriate certificates of approval are kept on file in the Norcross office and are available upon request from the NTR, LANTDIV, or other regulatory agencies. A copy of this document and the approved Sampling and Analysis Plan will be forwarded to the laboratory selected to perform chemical analysis of the samples.

5.5 INSPECTION OF TESTING LABORATORIES

Prior to approval of non-accredited laboratories, the proposed testing laboratory facilities and records may be subject to inspection by the Contracting Officer. Records subject to inspection include equipment inventory, equipment calibration dates and procedures, library of test procedures, audit and inspection reports by agencies conducting laboratory evaluations and certifications, testing and management personnel qualifications, test report forms, and the internal QC procedures.

6.0 DOCUMENTS AND RECORDS

6.1 SUBMITTALS

OHM will control and schedule all submittals for the project. The following sections describe the submittal process.

6.1.1 Reviewing, Approving and Managing Submittals

A. OHM's Responsibility

The following tasks are included for the purpose of providing an understanding of the OHM's responsibility. While the QC organization is expected to assist OHM in fulfillment of its responsibilities, no part of these responsibilities shall be assumed by the QC organization without the expressed written permission of the Contracting Officer.

1. Coordinate preparation and processing of submittals with performance of work so that work will not be delayed by submittal processing. Allow for potential requirements to resubmit.
2. Except as specified otherwise, allow a review period, beginning with receipt by the approving authority, that includes at least 15 working days for submittals for SQCO approval and 20 working days for submittals requiring Contracting Officer approval. The period of review for submittals with Contracting Officer approval begins when the Government receives the submittal from the QC organization. The period of review for each resubmittal is the same as for the initial submittal.
3. Determine and verify field measurements, materials, field construction criteria; review each submittal; check and coordinate each submittal with requirements of the work and contract documents.
4. Transmit submittals to the QC organization in orderly sequence, in accordance with the submittal register, and to prevent delays in the work, delays to the Government, or delays to separate contractors.
5. Correct and resubmit submittals as directed by the approving authority. Direct specific attention, in writing or on resubmitted submittals, to revisions not requested by the approving authority on previous submissions.



6. Furnish additional copies of submittals when requested by the Contracting Officer, to a maximum limit of 20 copies.
7. Complete work that must be accomplished as a basis of a submittal in time to allow the submittal to occur as scheduled.
8. Ensure no work has begun until submittals for that work have been returned as "approved" or "approved as noted" except to the extent that a portion of the work must be accomplished as a basis of the submittal.

Format of Submittals

Transmittal Form. Transmit each submittal, except sample installations and sample panels, to the office of the approving authority utilizing transmittal forms standard for the project. The transmittal form shall identify the Contractor, indicate the date of the submittal, and include information prescribed by the transmittal form and required in the paragraph entitled "Identifying Submittals". Process transmittal forms to record actions regarding sample panels and sample installations. Transmittal forms for submittals of sample panels and sample installations shall record any actions and locations of the samples.

Identifying Submittals. Identifying submittals, except sample panel and sample installation, submittals shall be identified with the following information permanently adhered to or noted on each separate component of each submittal and noted on the transmittal form. Mark each copy of each identically, with the following:

1. Project title and location.
2. Construction contract number and delivery order number.
3. The section and paragraph number of the section for which the submittal is required.
4. The Submittal Description (SD) number (Table 6.1) of each component of the submittal.
5. If a resubmittal, add an alphabetic suffix to the submittal description, for example, SD-10A, to indicate the resubmission.



6. The name, address, and telephone number of the subcontractor, supplier, manufacturer, and any other second tier contractor associated with the submittal.
7. Product identification and location in project.

Format of Product Data

1. Present product data submittals for each section as a complete, bound volume. Include a table of contents listing page and catalog item numbers for product data.
2. Indicate, by prominent notation, each product that is being submitted, indicate the specification section number, and paragraph number to which it pertains.
3. Supplement product data with material prepared for the project to satisfy submittal requirements for which product data does not exist. Identify this material as developed specifically for the project.

Format of Shop Drawings

1. Shop drawings shall be not less than 8 1/2 by 11 inches nor more than 30 by 42 inches.
2. Present 8 1/2 by 11 inches sized shop drawings as a part of the bound volume for the submittals required by the section. Present larger drawings in the sets.
3. Include on each drawing the drawing title, number, date, and revision numbers and dates, in addition to the information required in the paragraph entitled "Identifying Submittals."
4. Dimension drawings, except diagrams and schematic drawings; prepare drawings demonstrating interface with other trades to scale. Identify materials and products for work shown.

Format of Samples

1. Furnish samples in the sizes below, unless otherwise specified or unless the manufacturer has prepackaged samples of approximately the same size as specified:
 - Sample of equipment or device: Full size.



- Sample of materials less than 2 by 3 inches: Built-up to 8 1/2 by 11 inches.
 - Sample of materials exceeding 8 1/2 by 11 inches: Cut down to 8 1/2 by 11 inches and adequate to indicate color, texture, and material variations.
 - Sample of linear devices or materials, such as conduit and handrails: 10-inch length or length to be supplied, if less than 10 inches.
 - Sample of non-solid naturals, (e.g., sand, paint, etc.): One pint, unless specified otherwise in technical sections.
 - Sample panel: 4 feet by 4 feet.
 - Sample Installation: 100 square feet.
2. Samples showing range of variation: Where unavoidable variations must be expected, submit sets of samples of not less than three units showing the extremes and middle of the range.
 3. Reusable samples: Incorporate returned samples into the work only if so specified or indicated. Incorporated samples shall be in an undamaged condition at the time of use.
 4. Recording of sample installation: Note and preserve the notation of the area constituting the sample installation but remove the notation at the final cleanup of the project.
 5. When a color, texture, or pattern is specified in naming a particular manufacturer and style, include one sample of that manufacturer and style, for comparison.

Format of Administrative Submittals

1. When the submittal includes a document which is to be used in the project or become a part of the project record, other than as a submittal, do not apply the Contractor's approval stamp to the document, but to a separate sheet accompanying the document.
2. Operation and Maintenance Manual Data: Submit in accordance with the section entitled "Operation and Maintenance Data" of the individual delivery order.

Number of Copies of Product Data

1. Submit six (6) copies of submittals of product data requiring review and approval only by the QC organization and seven (7) copies of product data requiring review and approval by the Contracting Officer.



Number of Copies of Shop Drawings

1. For shop drawings presented on sheets larger than 8 1/2 by 14 inches, submit seven (7) prints of each shop drawing prepared for this project.
2. For shop drawings presented on sheets 8 1/2 by 14 inches or less, conform to the quality requirements for the product data.

Number of Samples

1. Submit two (2) samples, or two (2) sets of samples showing range of variation of each required item. One (1) approved sample or set of samples will be retained by the approving authority and one will be returned to the Contractor.
2. Submit one (1) sample panel. Include components listed in the technical section or as directed.
3. Submit one (1) sample installation, where directed.
4. Submit one (1) sample of non-solid materials.

Number of Copies of Administrative Submittals

1. Unless otherwise specified, submit administrative submittals which are 8 1/2 by 14 inches or smaller in size in the quantity required for product data.
2. Unless otherwise specified, submit administrative submittals larger than 8 1/2 by 14 inches in size in the quantities required for shop drawings.

B. QC Organization Responsibilities

The Quality Control (QC) organization shall be responsible for reviewing and certifying that submittals are in compliance with contract requirements. The approving authority on submittals is the SQCO unless submission to the Contracting Officer is specified for the specific submittal. The specific QC responsibilities for submittals are as follows:



1. Note the date on which the submittal was received from the contractor on each submittal for which the SQCO is the approving authority.
2. Determine and verify field measurements, materials, field construction criteria; review each submittal; and check and coordinate each submittal with requirements of the work and contract documents.
3. Review submittals for conformance with project design concepts and compliance with the contract documents.
4. Act on submittals, determining the appropriate action based on the review of the submittal.
 - When the QC Manager is the approving authority, take the appropriate action on the submittal from the paragraph of "Possible Actions."
 - When the Contracting Officer is the approving authority or when a variation has been proposed, forward the submittal to the Contracting Officer with the certifying statement or return the submittal marked "Not Reviewed" or "Revise and Resubmit" as appropriate.
5. Ensure that the material is clearly legible.
6. Stamp each sheet of each submittal with the appropriate stamp, except that data submitted in bound volume or on one sheet printed on two sides may be stamped on the front of the first sheet only. When agreed to by the Contracting Officer, a single cover sheet containing the required certification wording (see submittal descriptions in Appendix A) may be utilized instead of the above. The stamp or cover sheet shall contain the following wording:
 - When the approval authority is the Contracting Officer, the QC organization will certify submittals forwarded to the Contracting Officer with the following certifying statement:

I hereby certify that the (equipment) (material) (article) shown and marked in this submittal is that proposed to be incorporated into Contract Number N62470-93-D-3032, is in compliance with the Contract drawings and specification, can be installed



in the allocated spaces, and is submitted for Government approval. Government approval of proposed variation, if any, is recommended.

Certified by Submittal Reviewer _____, Date _____

Certified by SQCO _____, Date _____

- When approving authority is the SQCO, the SQCO will use the following approval statement when returning submittals to the Contractor as "Approved" or "Approved as Noted":

I hereby certify that the (equipment) (material) (article) shown and marked in this submittal is that proposed to be incorporated into Contract Number N62470-93-D-3032, is in compliance with the Contract drawings and specification, can be installed in the allocated spaces, and is ___ approved for use, ___ approved for use subject to Government approval of proposed variation.

Certified by Submittal Reviewer _____, Date _____

Approved by SQCO _____, Date _____

7. Sign the certifying statement or approval statement. The signatures shall be in original ink. Stamped signatures are not acceptable.
8. Update the submittal register as submittal actions occur and maintain the submittal register at the project site until final acceptance by the Contracting Officer.
9. Retain a copy of approved submittals at the project site, including the contractor's copy of approved samples.
10. When the approving authority is the SQCO, forward two copies of each approved submittal, except "Samples", where only one set is required, to the Contracting Officer.

Actions Possible

Submittals returned to the contractor shall contain one of the following notations:



1. **“Not Reviewed”** shall indicate the submittal has been previously reviewed and approved, is not required as a submittal, does not have evidence of being reviewed and approved by the Contractor, or is not complete. A submittal marked **“Not Reviewed”** shall be returned with explanation of the reason it is not reviewed. Returned submittals deemed to lack review by the Contractor or to be incomplete shall be resubmitted with appropriate action, coordination, or change.
2. Submittals marked **“Approved”** or **“Approved as Submitted”** authorize the Contractor to proceed with the work covered.
3. Submittals marked **“Approved as Noted”** authorize the Contractor to proceed with the work as noted provided the Contractor takes no exception to the notations.
4. Submittals marked **“Revise and Resubmit”** or **“Disapproved”** indicates the submittal is incomplete or does not comply with the design concept or the requirements of the Contract documents and shall be resubmitted with appropriate changes.

6.1.2 Personnel Authorized To Review and Certify Submittals

In addition to the SQCO, the personnel listed in Table 6.2 are authorized to review and certify submittals as indicated. Any additional personnel required to review and certify submittals will be submitted in writing to the Contracting Officer for approval.

6.1.3 Submittal Register

The submittal register is shown in Table 6.1. The submittal register shall be maintained as follows:

1. Column (a): List each specification section in which a submittal is required.



Table 6.2 - List of Personnel Authorized to Review and Certify Submittals

<i>Specification Section</i>	<i>Submittal Type</i>	<i>Authorized Personnel</i>
01010	Equipment and materials All others	James A. Dunn, Jr., OHM Randy Smith, OHM OHM Project Engineer (TBD)



2. Column (b): List each submittal description (SD No. and type, e.g., SD-04, Drawings) required in each specification section. Follow each submittal description with the list of material of products to be addressed in each submittal description.
3. Column (c): List one principle paragraph in the specification section where a material or product is specified. This listing is only to facilitate submittal reviews. Do not consider entries in column © as limiting project requirements; do not consider that a blank must be filled in by the Contractor or the Government.
4. Column (d): Indicates approving authority for each submittal. A "G" indicates approval by the Contracting Officer; a blank indicates approval by the SQCO.
5. Column (e): Indicates for submittals to be approved by Contracting Officer, specific reviewers other than the QC organization. This column may or may not be filled out on the copy supplied by the Government.

Columns (f) through (o) will be completed by the QC organization as follows:

6. Column (f): As submittals are processed, list a consecutive number assigned by the Contractor for each group of submittals. Place this same number in the appropriate block on the "Submittal Transmittal Form". For a resubmission, repeat transmittal control number of the original submittal with a suffix; e.g., No. "100B" is second resubmission of material originally transmitted under No. "100".
7. Column (g): List dates scheduled for approving authority to receive submittals. These dates are the scheduled beginnings of submittal review period. The Contractor proposes these dates and the Contracting Officer approves them to establish the approved submittal register.
8. Columns (h) and (I): Use to record Contractor's review when forwarding submittals to the QC organization.
9. Column (j): Enter date QC organization receives submittal from contractor.
10. Columns (k) and (l): If approving authority is Contracting Officer, enter date QC organization forwards certified submittal to Contracting Officer.



11. Columns (m) and (n): If approving authority is Contracting Officer, enter the Government action and date of action as shown on returned submittal. If approving authority is SQCO, enter QC action and date of action.
12. Column (o): Enter date QC organization returns submittal to Contractor, regardless of who is approving authority. If QC Manager is approving authority, it is also the date the information is forwarded to the Government.

6.2 TESTING DATA

As tests are performed, the SQCO will record on the "Testing Plan and Log," the date the test was conducted, the date the test results were forwarded to the Contracting Officer, any remarks and acknowledgment that an accredited or Contracting Officer approved testing laboratory was used. Attach a copy of the updated testing plan and log to the last daily Contractor Quality Control Report of each month.

In development of the Testing Plan and Log, consideration will be given to the use of multiple Testing Plans and Logs subdivided by definable features of the specification and/or of different materials within a definable feature section of the specification. When materials are tested on a specific frequency, accumulated material totals will be recorded in the remarks section or on an attachment to each specific Testing Plan and Log to provide assurance that the tests are conducted at the required intervals.

Testing will be performed as stated in the SAP and the specifications.

Test reports will cite applicable contract requirements, tests or analytical procedures used. Provide actual results and include a statement that the item tested or analyzed conforms or fails to conform to specified requirements. Conspicuously stamp the cover sheet for each report in large red letters "CONFORMS" or "DOES NOT CONFORM" to the specification requirements, whichever is applicable. Test results will be signed by a testing laboratory representative authorized to sign certified test reports. Furnish the signed reports, certifications, and other documentation to the Contracting Officer via the SQCO. The SQCO will furnish a summary report of field tests by attaching a copy of the report to the last daily Contractor Quality Control Report of each month.



6.2.1 Sample Custody Records

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, chain-of-custody 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

Sample custody documents include, at a minimum, the following documents:

- Sample Log Book
- Sample Label
- Custody Seal
- Chain-of-Custody Form
- Sampling Map

These are described in the following sections.

6.2.1.1 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 number, locations, type, matrices, volumes, sample ID and descriptions, type and number of sample containers, names and signatures of individuals performing sampling tasks, Chain-Of-Custody (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 data base 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 is an acceptable substitute for the sample logbook.

6.2.1.2 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
- (5) SAMPLE DESCRIPTION
- (6) SAMPLER- Sampler's name
- (7) PRESERVATIVES
- (8) ANALYSIS REQUIRED

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 log book. An example of a sample label is presented in Appendix B.

6.2.1.3 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.

An example of a COC form is included in Appendix B. The following information is required on the COC.

Item No.	Heading	Project Information/Value
1	OHM's Lab Coordinator	Elena Rodriguez
2	Lab Coordinator's Phone	(770) 734-8060
3	Lab Coordinator's Fax	(770) 453-7716
4	Project Name	Camp Lejeune
5	Project Location	Camp Lejeune, NC
6	Project Number	19668 Mod. 2
7	Project Contact	Elena Rodriguez/Russell Henderson
8	Project Phone Number	(910) 451-2390
9	Project Fax	(910) 451-1809
10	Project Address	203 Holcomb Blvd.



Item No.	Heading	Project Information/Value
11	City, State and Zip Code	Camp Lejeune, NC 28542
12	Client	LANTDIV
13	Project Manager	James A. Dunn, Jr., P.E.
14	Project Manager's Phone	(770) 734-8072
15	Project Manager's Fax	(770) 453-7743
16	Laboratory's Service ID	(to be completed by the lab)
17	Laboratory Contact	
18	Laboratory Phone	
19	Laboratory Fax	
20	Laboratory Address	
21	City, State, and Zip Code	
22	Mail Report (Company Name)	OHM
23	Recipient Name	Elena Rodriguez
24	Address	5445 Triangle Parkway, Suite 400
25	City, State and Zip Code	Norcross, GA 30092
26	Sample Identifier	(Sample ID - must be a unique identifier for the project)
27	Matrix	(soil, water, air, sludge, product, etc.)
28	Date	(date sampled)
29	Time	(time samples)
30	Preserved	(check here if preserved)
31	Number of Containers	(number of sample containers)
32	QC Level	(OHM minimum, standard, maximum, etc.)
33	T.A.T.	(turnaround time requested)
34	Analyses	(include description and method (e.g., aromatic volatiles - 8021)
35	Comments	(include any field readings or screening results and any observations about the sample)
36	Samples Collected By	(print name and signature)
37	Courier and Air Bill Number	(required)



Item No.	Heading	Project Information/Value
38	Relinquished By	
39	Received By	(include the courier's name)
40	Date	(date relinquished to the receiver)
41	Time	(time relinquished to the receiver)
42	Sample Point Location	(information about the sample including the sample number for which the field duplicate or split is associated)
43	Sample Type	(check one for G or C and one of F or QC)
44	Comment	

6.3 DOCUMENT STORAGE/RECORD STORAGE AND ARCHIVE

After OHM has completed its work for the project, all documents generated will be assembled in the project file. Individuals may retain clean (no handwritten comments) copies of documents for their personal files but only after personally verifying that the original or similar copy is in the project file. The project manager/supervisor is responsible for ensuring the collection, assembly and inventory of all documents relative to the project at the time the objectives are met. The file then becomes accountable. Any records leaving the file must be signed out.

When the project objectives have been met, all documents will be 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. Chain-of-custody records
- E. Analytical logbooks, laboratory data, calculations, graphs, etc.
- F. Correspondence
 - Inter-office
 - 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 time is required to download onto a diskette. This diskette is also archived.

All information under the corresponding project number is maintained in the archive system for a minimum of five years. All archives are accessed by the archives file master list which is maintained in a separate location from the archives.

Table 6.1 - Submittal Register - Ranges D-29 and A-1

Spec. No.	SD No. and Type of Submittal Material or Product	Spec. Para. No.	Approval by CO	Gov. or A/E Reviewer	Trans. Control No.	Planned Sub. Date	Action Code	Date of Action	Date Forwarded to Appr. Auth./Date Received from Contr.	Date Forwarded to Other Reviewer	Date Received from Other Reviewer	Action Code	Date of Action	Mailed to Contr./Recd. from Appr. Auth.	Remarks
01010	CQC Plan	3.6.7				WP 11/7/97									
01010	Testing Lab Qualifications	3.6.8				Prior to mobilization									
01010	Electrical Site Layout and Details	1.2	G			WP 11/7/97									
01010	MIS Reports	3.6.6				Monthly Reports									
01010	Submittal Log	3.6.14				CR									

CR - Closeout Report
 WP - Work Plan
 A - Approved
 AN - Approved as noted

7.0 PLANNING

7.1 COORDINATION AND MUTUAL UNDERSTANDING MEETING

After submission of the QCP and prior to start of construction, a meeting will be arranged with the Contracting Officer to discuss the QC program required for this contract. The purpose of this meeting is to develop a mutual understanding of the QC details, including forms to be used; administration of on-site and off-site work, and coordination of the Contractor's management, production and the SQCO's duties. A sample agenda is included in Appendix A. As a minimum, the Contractor's personnel required to attend shall include the Project Manager, Project Superintendent and SQCO. Minutes of the meeting shall be prepared by the QC Manager and signed by both the Project Manager and the Contracting Officer.

7.2 QC MEETINGS

After the start of construction, the SQCO shall conduct QC meetings once every two weeks or as required scheduled by the SQCO or delivery order. The meetings will be held at the work site, or where specified, with the project superintendent and the foreman responsible for the upcoming work in attendance. The SQCO shall take steps as may be necessary to prevent the QC Meeting from becoming a production meeting. Often it is convenient to hold a production meeting following the QC meeting, however the minutes of these meetings shall be maintained separately. The SQCO shall notify the Contracting Officer at least 48 hours in advance of each meeting. The SQCO shall prepare the minutes of the meeting and provide a copy to the Contracting Officer within two working days after the meeting. As a minimum, the following shall be accomplished at each meeting:

1. Review the minutes of the previous meeting.
2. Review the schedule and the status of work.
 - Work or testing accomplished since last meeting.
 - Rework items identified since last meeting.
 - Rework items completed since last meeting.
3. Review the status of submittals.
 - Submittals reviewed and approved since last meeting.
 - Submittals required in the near future.



4. Review the work to be accomplished in the next two weeks and documentation required. Schedule the three phases of control and testing:
 - Establish completion dates for rework items.
 - Identify Preparatory Phases required.
 - Identify Initial Phases required.
 - Identify Follow-up Phases required.
 - Identify Testing required.
 - Identify status of off-site work or testing.
 - Identify documentation required.
5. Resolve QC and production problems.
6. Address items that may require revising the QC plan such as or changes in procedures.

In addition to the normal project distribution which includes the Contracting Officer, a copy shall be forwarded to the C.O.T.R., LANTDIV, the Program QC Manager, and the OHM Program Manager.

8.0 IMPLEMENTATION OF WORK PROCESSES

Table 8.1 contains a list of definable features of work for this delivery order. A definable feature of work is a task that is separate and distinct from other tasks and requires separate control requirements. As a minimum, each division of the specification is considered a definable feature of work. However, at times there may be more than one definable feature of work in each division of the specification or a definable feature of work may include several specification sections. The SQCO shall discuss the list with the Contracting Officer for possible expansion of the list.

All sampling and analytical activities will be performed in accordance with federal, state and location regulations. Sample tasks, procedures, handling and shipping protocols are defined in the Field Sampling Plan (FSP) included in Appendix C.

Table 8.1 - Definable Features of Work

<i>Specification Section</i>	<i>Definable Feature of Work</i>
01010 - 1.2	Work Plan Submission
01010 - 1.2	Mobilization
01010 - 1.2	Berm excavation Soil stabilization Recycle lead
01010 - 1.2	Bullet trap and dust collector installation
01010 - 1.2	Contractor's closeout report

9.0 ASSESSMENT AND RESPONSE

Site activities and materials will be assessed using the three phases of control. Data will be assessed using the three tiers of review. Overall performance of the project tasks will be assessed by executing system and performance audits. These are discussed in the following sections.

9.1 THREE PHASES OF CONTROL

The SQCO shall perform the three phases of control to ensure that work complies with contract requirements. The three phases of control shall adequately cover both on-site and off-site work and shall include the Inspection Plan activities (see Table 9.1) of each definable feature of work as listed in Table 8.1.

9.1.1 Preparatory Phase

Notify the Contracting Officer at least two working days in advance of each preparatory phase. Conduct the preparatory phase meeting with the superintendent and the foreman responsible for the definable feature of work. Document the results of the preparatory phase actions in the daily Contractor Quality Control Report (Appendix A). Perform the following prior to beginning work on each definable feature of work:

- Review each paragraph of the applicable specification sections.
- Review the contract drawings.
- Verify that appropriate shop drawings and submittals for materials and equipment have been submitted and approved. Verify receipt of approved factory test results, when required.
- Review the testing plan and ensure that provisions have been made to provide the required QC testing.
- Examine the work area to ensure that the required preliminary work has been completed.
- Examine the required materials, equipment and sample work to ensure that they are on hand and conform to the approved shop drawings and submitted data.
- Review the safety plan and appropriate activity hazard analysis to ensure that applicable safety requirements are met, and that required Material Safety Data Sheets (MSDS) are submitted.
- Discuss construction methods.



Table 9.1 - Inspection Plan

MCB Camp Lejeune DO 0151 Modification No. 2	Maintenance of Ranges D-29 and A-1 Project No. 19886
Three Phase QC Inspection Checklists (Check each applicable checklist in Appendix A and complete according to the three phase QC inspection instructions. Checklist items that do not apply to the work and/or to the particular inspection phase shall be indicated as not applicable by checking the NA block.)	c h e c k a p p l i c a b l e c h e c k l i s t s
Clearing and grubbing	X
Cast in place concrete	X
Decontamination	X
Berm excavation	X
General earthwork	X
Electrical	X
Bullet trap and dust collector installation	X
Erosion and sediment control	X
Site restoration/landscaping	X
Surveying	X
Soil stabilization	X
Dismantling/demolition	X
Project closeout	X
Other:	X



9.1.2 Initial Phase

Notify the Contracting Officer at least two working days in advance of each initial phase meeting. When crews are ready to start work on an a definable feature of work, conduct the initial phase meeting with the personnel responsible for that definable feature of work. Observe the initial segment of the definable feature of work to ensure that the work complies with contract requirements. Document the results of the initial phase in the daily Contractor Quality Control Report. Repeat the initial phase for changes in personnel assigned responsibility for the work, or when acceptable levels of specified quality are not being met. Perform the following for each definable feature of work:

- Establish the quality of workmanship required.
- Resolve conflicts.
- Review the Safety Plan and the appropriate activity hazard analysis to ensure that applicable safety requirements are met.
- Ensure that testing is performed.

9.1.3 Follow-up Phase

Perform the following for ongoing work daily, or more frequently as necessary, until the completion of each definable feature of work and document in the daily Contractor Quality Control Report:

- Ensure the work is in compliance with contract requirements.
- Maintain the quality of workmanship required.
- Ensure that testing is performed.
- Ensure that rework items are being corrected.

9.1.4 Notification of Three Phases of Control for Off-site Work

Notify the Contracting Officer at least two weeks prior to the start of the preparatory and initial phases.

9.1.5 Receipt Inspection

The QC organization shall conduct Receipt Inspection of materials and equipment procured in accordance with the delivery order specification. In addition to the submittal documentation,



which will be reviewed and approved as required under Section 6.1, Submittals, the following attributes will be inspected for each order/shipment as applicable:

- Material is same as specified by the Delivery Order Specification
- Quantity as specified by the procurement document
- Dimensions as required by the procurement document
- Shipping Damage
- Physical Damage
- Identification and Marking
- Protective Covers and Seals
- Cleanliness
- Workmanship

Materials and equipment found to be unacceptable at receipt inspection shall be rejected and "RED Tagged" (see Appendix A) until correction or replacement can be made. This material/equipment shall not be used until the corrective action results in satisfactory reinspection.

The results of the receipt inspection, by attribute, will be included in the Contractor Quality Control Report (Exhibit 8.1) for the date of inspection.

9.1.6 Inspection Report

Included in Appendix A are the applicable inspection reports for this project. These reports will be utilized to ensure that tests are performed and definable tasks are implemented in accordance with the specifications and project plans.

9.1.7 Contractor Quality Report

Reports are required for each day that work is performed and for every seven consecutive calendar days of no work and on the last day of no work periods. Account for each calendar day throughout the life of the contract. The reporting of work shall be identified by terminology consistent with the construction schedule. Contractor Quality Control Reports are to be prepared, signed and dated by the SQCO and shall contain the following information:

- Identify the control phase and the definable feature of work.
- Results of the preparatory phase meetings held, including the location of the definable



feature of work and a list of personnel present at the meeting. Indicate in the report that for this definable feature of work, the drawings and specifications have been reviewed, submittals have been approved, materials comply with approved submittals, materials are stored properly, preliminary work was done correctly, the testing plan has been reviewed, and work methods and schedules have been discussed.

- Results of the initial phase meetings held, including the location of the definable features of work and a list of personnel present at the meeting. Indicate in the report that for this definable feature of work, the preliminary work was done correctly, samples have been prepared and approved, the workmanship is satisfactory, test results are acceptable, work is in compliance with the contract, and the required testing has been performed and include a list of who performed the tests.
- Results of the follow-up phase inspections held, including the location of the definable features of work. Indicate in the report that for this definable feature of work that the work complies with the contract as approved and that required testing has been performed and include a list of who performed the tests.
- Results of the three phases of control for off-site work, if applicable, including actions taken.
- List the rework items identified, but not corrected by close of business.
- As rework items are corrected, provide a revised rework items list along with the corrective action taken.
- Include in the remarks section of the report pertinent information including directions received, quality control problem areas, deviations from the QC Plan, construction deficiencies encountered, QC meetings held, acknowledgment that as-built drawings have been updated, corrective direction given by the QC Manager and corrective action taken by the contractor.
- When the SQCO believes that an attribute list type inspection is more appropriate for the inspection of specific definable features of work, he/she may use any type of form desired for this purpose. However, this or any other form utilized shall become an attachment to the daily Contractor Quality Control Report and shall not preclude any other requirements of the contract or this plan.

9.2 THREE TIERS OF DATA ASSESSMENT

Data will be assessed by the three tiers of data assessment: 1) laboratory data reduction, 2) laboratory data, and 3) validation and project data review. These tiers are discussed in the following sections.



9.2.1 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

9.2.2 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 next level of review is performed by the section supervisor or data review specialist. 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.

9.2.3 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.

9.2.4 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.

9.2.5 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. The minimum project quality control objectives are included in Appendix B.

9.2.5.1 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:

$$\text{Upper control limit} = p + 3 \text{ SD}$$

$$\text{Lower control limit} = p - 3 \text{ SD}$$

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."

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.

9.2.5.2 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 $\pm 2s$ and $\pm 3s$, 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.

9.2.5.3 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.

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.

9.2.5.4 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.

9.2.5.5 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.

9.2.5.6 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.

9.3 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.



9.3.1 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.

9.3.2 Field System Audits

System audits of site activities are accomplished by an inspection of all field activities by the QC organization. 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 SQCO 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.

9.3.3 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.

9.3.4 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.

10.0 QUALITY IMPROVEMENT

In order to continuously develop and improve, the quality system procedures have been established and implemented to prevent as well as detect and correct problems that adversely affect quality during all phases of technical and management activities.

10.1 INSTRUMENT CALIBRATION

To ensure that measuring equipment are operating properly, calibrations are performed and compared to acceptable operating limits.

All calibrations on field instruments will be performed , as a minimum, on a daily basis. Every calibration will be recorded in the maintenance logbook for each instrument. Quality control check standards from a separate source will be used to check initial calibration, and acceptance and rejection criteria.

Testing instruments at subcontracted of off-site laboratories will be calibrated in accordance with the standard methods. The acceptance and rejection criteria are as specified in the methods.

10.2 PREVENTIVE 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.

10.3 CORRECTIVE ACTION

If deficiencies or problems are discovered through the assessment activities described in Section 9.0, 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 SQCO 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:

- Replacement of products
- Modifications to procedures
- Recalibration of instruments
- Replacement of solvents, reagents, and/or standards
- Additional training of personnel
- Reassignment of personnel
- Rework

10.3.1 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 SQCO 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.

A copy of the CAR form is included in Appendix B.

10.4 REWORK DOCUMENTATION REQUIREMENTS

The SQCO shall maintain a list of work that does not comply with the contract, identifying what items need to be reworked, the date the item was originally discovered, and the date the item was corrected. There is no requirement to report a rework item that is corrected the same day it is discovered. Attach a copy of the Rework Items List (Appendix A) to the last daily Contractor Quality Control Report of each month. The Contractor shall also be responsible for including items needing rework including those identified by the Contracting Officer.

10.5 QUALITY ASSURANCE REPORT

The Project Manager, SQCO, 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 SQCO will be responsible for preparing this report weekly or daily, as well as monthly written QA reports to OHM QA management. The Program QC Manager 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, LANTDIV, 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.

APPENDIX A

LETTER OF APPOINTMENT OF SQCO

SUBMITTAL DESCRIPTIONS

TESTING PLAN AND LOG

**SAMPLE DOCUMENT: COORDINATION AND MUTUAL
UNDERSTANDING MEETING AGENDA**

CONTRACTOR QUALITY CONTROL REPORT

“REJECT TAG”

INSPECTION REPORTS

REWORK ITEMS LIST

September 1997

TBD
OHM Remediation Services Corp.
P. O. Box 8116
Camp Lejeune, NC 28547

Re: Site QC Officer, Maintenance at Ranges D-29 and A-1
Camp Lejeune, North Carolina
Contract N62470-93-D-3032
Delivery Order 0151, Modification No. 2

Dear TBD:

This letter will serve as your appointment as the Site Quality Control Officer (SQCO) 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 Delivery Order Quality Control Plans.

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, Site Supervisor 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 SQCO.

If you have any questions in this matter, please call me at (609) 584-8900.

Sincerely,

Pete Hunter
Program QC Manager
LANTDIV RAC Program

SUBMITTAL DESCRIPTIONS

Exhibit 3.1

Page 1 of 3

SD-01. Data

Submittals that provide calculations, descriptions, or other documentation regarding the work.

SD-02. Manufacturer's Catalog Data

Data composed of catalog cuts, brochures, circulars, specifications and product data, printed information in sufficient detail and scope to verify compliance with requirements of the contract documents. A type of product data.

SD-03. Manufacturer's Standard Color Charts

Preprinted illustrations displaying choices of color and finish for a material or product. A type of product data.

SD-04. Drawings

Submittals that graphically show relationship of various components of the work, schematic diagrams of systems detail of fabrications, layout of particular elements, connections, and other relational aspects of the work. A type of shop drawing.

SD-05. Design Data

Design calculations, mix design, analyses, or other data written in nature and pertaining to a part of the work. A type of shop drawings.

SD-06. Instructions

Preprinted material describing installation of a product, system, or material, including special notices and Material Safety Data Sheets, if any, concerning impedances, hazards, and safety precautions. A type of product data.

SD-07. Schedules

A tabular list of data or tabular list including location, features, or other pertinent information regarding products, materials, equipment, or components to be used in the work. A type of shop drawing.

SD-08. Statements

A document, required of the Contractor, or through the Contractor by way of a supplier, installer, manufacturer, or other lower tier contractor, the purpose of which is to further the quality or orderly progression of a portion of the work by documenting procedures, acceptability of method or personnel, qualifications, or other verification of quality. A type of shop drawing.

SD-09. Reports

Reports of inspection and laboratory test, including analysis and interpretation of test results. Each report shall be properly identified. Test method used and compliance with recognized test standards shall be described.

SUBMITTAL DESCRIPTIONS

Exhibit 3.1

Page 2 of 3

SD-10. Test Reports

A report signed by an authorized official of a testing laboratory that a material, product, or system identical to the material, product or system to be provided has been tested in accordance with requirements specified by naming the test method and material. The test report must state the test was performed in accordance with the test requirements; state the test results; and indicate whether the material, product, or system has passed or failed the test. Testing must have been within three years of the date of Contract award. A type of product data.

SD-11. Factory Test Reports

A written report that includes the findings of a test required to be performed by the Contractor on an actual portion of the work or prototype prepared for this project before it is shipped to the job site. The report must be signed by an authorized official of a testing laboratory and must state the test was performed in accordance with the test requirements; state the test results; and indicate whether the material, product, or system has passed or failed the test. A type of shop drawing.

SD-12. Field Test Reports

A written report that includes the findings of a test made at the job site, in the vicinity of the job site, or on a sample taken from the job site, on a portion of the work, during or after installation. The report must be signed by an authorized official of a testing laboratory or agency and must state the test was performed in accordance with the test requirements; state the test results; and indicate whether the material, product, or system has passed or failed the test. A type of shop drawing.

SD-13. Certificates

Statements signed by responsible officials of a manufacturer of a product, system, or material attesting that the product, system, or material meet specified requirements. The statements must be dated after the award of this contract, name the project, and list the specific requirements that it is intended to address. A type of shop drawing.

SD-14. Samples

Samples, including both fabricated and unfabricated physical examples of materials, products, and units of work as complete units or as portions of units of work. A type of sample.

SD-15. Color Selection Samples

Samples of the available choice of colors, textures, and finishes of a product or material, presented over substrates identical in texture to that proposed for the work. A type of sample.

SD-16. Sample Panels

An assembly constructed at the product site in a location acceptable to the Contracting Officer and using materials and methods to be employed in the work; completely finished; maintained during construction; and removed at the conclusion of the work or when authorized by the Contracting Officer. A type of sample.

SD-17. Sample Installations

SUBMITTAL DESCRIPTIONS

Exhibit 3.1

Page 3 of 3

A portion of an assembly or material constructed where directed and, if approved, retained as a part of the work. A type of sample.

SD-18. Records

Documentation to ensure compliance with an administrative requirement or to establish an administrative mechanism. A type of administrative and close-out submittal.

SD-19. Operation and Maintenance Manuals

Data intended to be incorporated in an operations and maintenance manual. A type of administrative and close-out submittal.

SAMPLE DOCUMENT
COORDINATION AND MUTUAL UNDERSTANDING MEETING AGENDA
FOR
DELIVERY ORDER No. _____
AT THE
U.S. NAVAL STATION,
_____, 1996

The purpose of this meeting is to develop a mutual understanding of the QC details, including forms to be used; administration of on-site and off-site work, and coordination of the Contractor's management, production and the QC Manager's duties with the Contracting Officer.

The QC program consists of a QC Organization, QC Manager, a QC Plan for this Delivery Order, this Coordination and Mutual Understanding Meeting, QC meetings, three phases of control, submittal review, submittal approval except for submittals designated for Contracting Officer approval, testing, and QC certifications and documentation necessary to provide materials, equipment, workmanship, fabrication, construction and operations which comply with requirements of this contract.

QC Manager duties (contract para. 6.6.1)

- Attend this meeting
- Conduct the QC Meetings
- Perform the three phases of control
- Perform submittal review
- Perform submittal approval
- Ensure testing is performed
- Prepare QC certifications and documentation
- Perform other activities when approved by the Contracting Officer

Submittal Reviewers Duties and Qualifications (contract para. 6.7)

- Provide submittal reviewers qualified in the disciplines being reviewed other than the QC Manager, to review and certify that the submittals meet the requirements of the contract.

QC Plan (contract para. 6.8)

- (as specified therein)

SAMPLE DOCUMENT

Coordination and Mutual Understanding Meeting (contract para. 6.9)

- (see purpose above)

QC meetings (contract para. 6.10)

- The QC Manager shall conduct QC meetings once every two weeks or as otherwise directed by the Contracting Officer.
- Meeting minutes to be prepared by the QC Manager in accordance with the contract outline and a copy provided to the Contracting Officer within two working days of the meeting.
- A copy will be distributed to the Program QC Manager.

Three phases of control (contract para. 6.11)

- Preparatory Phase Meeting
- Initial Phase Meeting
- Follow-up Phase Inspection

Submittal review and approval (contract para. 6.12 and Part 7.0, "Submittals")

- Review
- Approval
- Certification
- Submittal Register

Testing (contract para. 6.13)

- Testing Laboratory Requirements
- Accredited Laboratories
- Inspection and Testing Laboratories
- Capability Checks
- Test Results

QC certifications (contract para. 6.14)

- Contractor Quality Control Report Certification
- Invoice Certification
- Completion certification

Documentation (contract para. 6.15)

SAMPLE DOCUMENT

- Contractor Production Report
- Contractor Quality Control Report
- Testing Plan and Log
- Rework Items List
- As-built Records
- Report Forms

1. Contractor Production Report
2. Contractor Quality Control Report
3. Testing Plan and Log
4. Rework Items List

CONTRACTOR QUALITY CONTROL REPORT

DATE _____

(ATTACH ADDITIONAL SHEETS IF NECESSARY)

PHASE	BLANK	NOT APP. DATE	YES	NO	IDENTIFY SPECIFICATION SECTION	ABLE FEAT. RE OF WORK	LOCATION AND LIST PERSONNEL PRESENT
PREPARATORY	PLANS AND SPECS		<input type="checkbox"/>	<input type="checkbox"/>			
	HAVE BEEN REVIEWED		<input type="checkbox"/>	<input type="checkbox"/>			
	THE SUBMITTALS HAVE		<input type="checkbox"/>	<input type="checkbox"/>			
	BEEN APPROVED		<input type="checkbox"/>	<input type="checkbox"/>			
	MATERIALS COMPLY WITH		<input type="checkbox"/>	<input type="checkbox"/>			
	APPROVED SUBMITTALS		<input type="checkbox"/>	<input type="checkbox"/>			
	MATERIALS STORED		<input type="checkbox"/>	<input type="checkbox"/>			
	PROPERLY		<input type="checkbox"/>	<input type="checkbox"/>			
INITIAL	PRELIMINARY WORK WAS		<input type="checkbox"/>	<input type="checkbox"/>			
	DONE CORRECTLY		<input type="checkbox"/>	<input type="checkbox"/>			
	SAMPLE HAS BEEN		<input type="checkbox"/>	<input type="checkbox"/>			
	PREPARED/APPROVED		<input type="checkbox"/>	<input type="checkbox"/>			
	WORKMANSHIP IS		<input type="checkbox"/>	<input type="checkbox"/>			
	SATISFACTORY		<input type="checkbox"/>	<input type="checkbox"/>			
	TEST RESULTS ARE		<input type="checkbox"/>	<input type="checkbox"/>			
ACCEPTABLE.		<input type="checkbox"/>	<input type="checkbox"/>				
FOLLOW-UP	WORK COMPLIES WITH		<input type="checkbox"/>	<input type="checkbox"/>			
	CONTRACT AS APPROVED		<input type="checkbox"/>	<input type="checkbox"/>			
	INITIAL PHASE		<input type="checkbox"/>	<input type="checkbox"/>			
	WORK COMPLIES WITH		<input type="checkbox"/>	<input type="checkbox"/>			
	SAFETY REQUIREMENTS		<input type="checkbox"/>	<input type="checkbox"/>			

Exhibit 3.1
Page 1 of 3

REWORK ITEMS IDENTIFIED TODAY (NOT CORRECTED BY CLOSE OF BUSINESS)	REWORK ITEMS CORRECTED TODAY (FROM REWORK ITEMS LIST)
--	---

REMARKS

On behalf of the contractor, I certify that the report is completed and correct and represents the actual work and work performed during the reporting period to an extent consistent with the contract drawings and specifications to the best of my knowledge without omission or error on this report.

AUTHORIZED QC MANAGER AT SITE	DATE
-------------------------------	------

GOVERNMENT QUALITY ASSURANCE REPORT	DATE
QUALITY ASSURANCE REPRESENTATIVE'S REMARKS AND/OR EXCEPTIONS TO THE REPORT	
GOVERNMENT QUALITY ASSURANCE MANAGER	DATE

CONTRACTOR QUALITY CONTROL REPORT CONTINUATION SHEET

DATE

(ATTACH ADDITIONAL SHEETS IF NECESSARY)

PHASE SCALE NOT APPLICABLE YES NO IDENTIFY SPECIFICATION SECTION DEFINABLE FEATURES OF WORK LOCATION AND PERSONNEL PRESENT

PREPARATORY

PLANS AND SPECS HAVE BEEN REVIEWED	<input type="checkbox"/>	<input type="checkbox"/>
THE SUBMITTALS HAVE BEEN APPROVED	<input type="checkbox"/>	<input type="checkbox"/>
MATERIALS COMPLY WITH APPROVED SUBMITTALS	<input type="checkbox"/>	<input type="checkbox"/>
MATERIALS STORED PROPERLY	<input type="checkbox"/>	<input type="checkbox"/>
PRELIMINARY WORK WAS DONE CORRECTLY	<input type="checkbox"/>	<input type="checkbox"/>
TESTING PLAN HAS BEEN REVIEWED	<input type="checkbox"/>	<input type="checkbox"/>
WORK METHOD AND SCHEDULE DISCUSSED	<input type="checkbox"/>	<input type="checkbox"/>
JOB SAFETY / HAZARD ANALYSIS ADDRESSED	<input type="checkbox"/>	<input type="checkbox"/>

Exhibit 3.1
Page 2 of 3

INITIAL

PRELIMINARY WORK WAS DONE CORRECTLY	<input type="checkbox"/>	<input type="checkbox"/>
SAMPLE HAS BEEN PREPARED/APPROVED	<input type="checkbox"/>	<input type="checkbox"/>
WORKMANSHIP IS SATISFACTORY	<input type="checkbox"/>	<input type="checkbox"/>
TEST RESULTS ARE ACCEPTABLE	<input type="checkbox"/>	<input type="checkbox"/>
WORK IS IN COMPLIANCE WITH THE CONTRACT	<input type="checkbox"/>	<input type="checkbox"/>
WORK COMPLIES WITH SAFETY REQUIREMENTS	<input type="checkbox"/>	<input type="checkbox"/>

TESTING PERFORMED & WHO PERFORMED TEST

CONTRACTOR QUALITY CONTROL REPORT CONTINUATION SHEET
 (ATTACH ADDITIONAL SHEETS IF NECESSARY)

DATE

PHASE BLANK NOT APPLICABLE YES NO DENSITY SPECIFICATION SECTION DEFINABLE FEATURE OF WORK LOCATION AND LIST PERSONNEL PRESENT

WORK COMPLES WITH CONTRACT AS APPROVED INITIAL PHASE	<input type="checkbox"/>	<input type="checkbox"/>
WORK COMPLES WITH SAFETY REQUIREMENTS	<input type="checkbox"/>	<input type="checkbox"/>

FOLLOW-UP

Exhibit 3 :
Page 3 of 3

CONTRACTOR PRODUCTION REPORT

DATE _____

ATTACH ADDITIONAL SHEETS IF NECESSARY

CONTRACT NO. _____

TITLE AND LOCATION _____

REPORT NO. _____

CONTRACTOR _____

SUPERINTENDENT _____

AM WEATHER _____

PM WEATHER _____

MAX TEMP _____ °F

°F

MIN TEMP _____ °F

°F

WORK PERFORMED TODAY

WORK LOCATION AND DESCRIPTION	EMPLOYER	NUMBER	TRACE	HRS

Exhibit 10 1a _____

JOB SAFETY

WAS A JOB SAFETY MEETING HELD THIS DATE? YES NO
(If YES, attach copy of the meeting minutes)
 WERE THERE ANY LOST TIME ACCIDENTS THIS DATE? YES NO
(If YES, attach copy of completed OSHA report)

TOTAL WORK HOURS ON JOB SITE THIS DATE

WAS TRENCHING/SCAFFOLD/HV ELECTRICAL/HIGH WORK DONE? YES NO
(If YES, attachment statement or checklist showing inspection performed)

CUMULATIVE TOTAL OF WORK HOURS FROM PREVIOUS REPORT

WAS HAZARDOUS MATERIAL/WASTE RELEASED INTO THE ENVIRONMENT? YES NO
(If YES, attach description of incident and proposed action)

TOTAL WORK HOURS FROM START OF CONSTRUCTION

LIST SAFETY ACTIONS TAKEN TODAY/SAFETY INSPECTIONS CONDUCTED

SAFETY REQUIREMENTS HAVE BEEN MET

EQUIPMENT MATERIAL RECEIVED TODAY TO BE INCORPORATED ON JOB

CONSTRUCTION AND PLANT EQUIPMENT ON JOB SITE TODAY INCLUDE NUMBER OF HOURS USED TODAY

REMARKS

CONTRACTOR SUPERINTENDENT

DATE



OHM Remediation Services Corp.

Rolling Date Num
Proj Mgr
Site Supv
Proj Asst
CSE
QC
Ico File

Project Name: _____
Delivery Order: _____
Contract Purchase Order N62470-93-D-3032
OHM Project Order _____

OVERTIME AUTHORIZATION (OTA)

Date of Request: _____ WBS Code: _____ OTA No: _____

Reason for request	Explanation: _____
<input type="checkbox"/> Emergency	_____
<input type="checkbox"/> Equipment Maintenance	_____
<input type="checkbox"/> Keep critical activities on schedule	_____
<input type="checkbox"/> Accelerate schedule	_____ Exhibit 10.1b _____
<input type="checkbox"/> Other	_____
Initiated by:	_____
<input type="checkbox"/> Navy	_____
<input type="checkbox"/> OHM	_____
<input type="checkbox"/> Other	_____

Estimated period of overtime work _____ Start Date: _____ End Date: _____
ROM Cost Estimate _____

Requested By: _____ Date: _____
OHM Project Manager

APPROVALS

Approved Modified Rejected

Modification (if any)

RPM: _____ Date: _____
ROICCNTR: _____ Date: _____



O&H Remediation
Services Corp.

Revised: _____
Date: _____
Site: _____
Page: _____
CSE
QC
Job File

Project Name: _____
Delivery Order: _____
Contract Purchase Order: N62470-93-D-3032
OHM Project Order: _____

REQUEST FOR INFORMATION (RFI)

Date of Request: _____ Suspense Date: _____ VR No: _____

SITUATION/CONDITION
REQUIRING CLARIFICATION

Dwg Ref: _____ Spec Sec: _____
Site Location: _____

DESCRIPTION:

_____ Exhibit 10.1c _____

DATE RECEIVED BY:
Certifying Engineer: _____ Tech. Rep: _____ ROICC: _____

RESPONSE:

Note: This is a clarification and does not create additional work that could be considered as a change to the contract drawings and/or specification.

RPM: _____ Date: _____
ROICC/NTR: _____ Date: _____



OHM Remediation Services Corp.

Routing: Contr. Adm.
Site Supv.
Proj. Acct.
CSE
QC
Job File

Project Name: _____
Delivery Order: _____
Contract Purchase Order N62470-93-D-3032
OHM Project Order _____

VARIANCE REQUEST (VR)

Date of Request: _____ Suspense Date: _____ VR No: _____

PROPOSED VARIANCE Dwg Ref.: _____ Spec Sec: _____
Site Location _____

DESCRIPTION:

Note: Approval of this variance will not result in an increase in cost or in time of performance to this contract.
Initiated By Navy
 OHM
 Regulatory Agency
 Other

On-Site Engineer: _____ Date: _____
OHM Project Engineer: _____ Date: _____
Site Quality Control Manager: _____ Date: _____
OHM Project Manager: _____ Date: _____

APPROVALS Approved Modified (see below) Reje

Note: This is a clarification and does not create additional work that could be considered as a change to the _____ of the project.

RPM: _____ Date: _____
ROICC/TR: _____ Date: _____



OHM Remediation Services Corp.

Routing: Contr. Adm.
Proj. Mgr.
Site Subv.
Proj. Acct.
OSE
SC
Job File
John Franz-Prog
COTR- ... waste

Project Name: _____

Delivery Order: _____

Contract Purchase Order N62470-93-D-3032

OHM Project No. _____

WORK DIRECTIVE (WD)

Date of Request: _____ WBS Code: _____ [] new code WD No: _____
WBS Description: _____

TITLE OF WORK DIRECTIVE: _____

DESCRIPTION OF WORK: _____

WORK DIRECTIVE TYPE

- Technical direction Explanation: _____
- Scope Growth (Mod to follow)
 - Quantity Increase _____
 - New Scope Item _____
 - Other _____
- Scope Reduction (Mod to follow)
 - Quantity Decrease _____
 - Scope Reduction _____
 - Other _____

Attachments: _____

Initiated By:

- Navy _____
- OHM _____
- Regulatory Agency _____
- Other _____

COST IMPACT Rough order of Magnitude (ROM) Estimated value of item: _____

NOTE: This estimate includes direct costs, fringes and mark-ups. No fee.

SCHEDULE IMPACT Estimated Duration of Item _____ Work Days
Estimated Schedule Impact: _____ Calendar days

Is approval date critical [] yes [] no Reason for critical approval date: _____
If yes, indicate date: _____

OHM Representative: _____ Date: _____
On-Site Engineer: _____ Date: _____
OHM Project Manager: _____ Date: _____

APPROVALS Note: Failure to approve by the critical date may result in additional cost and/or schedule impact.

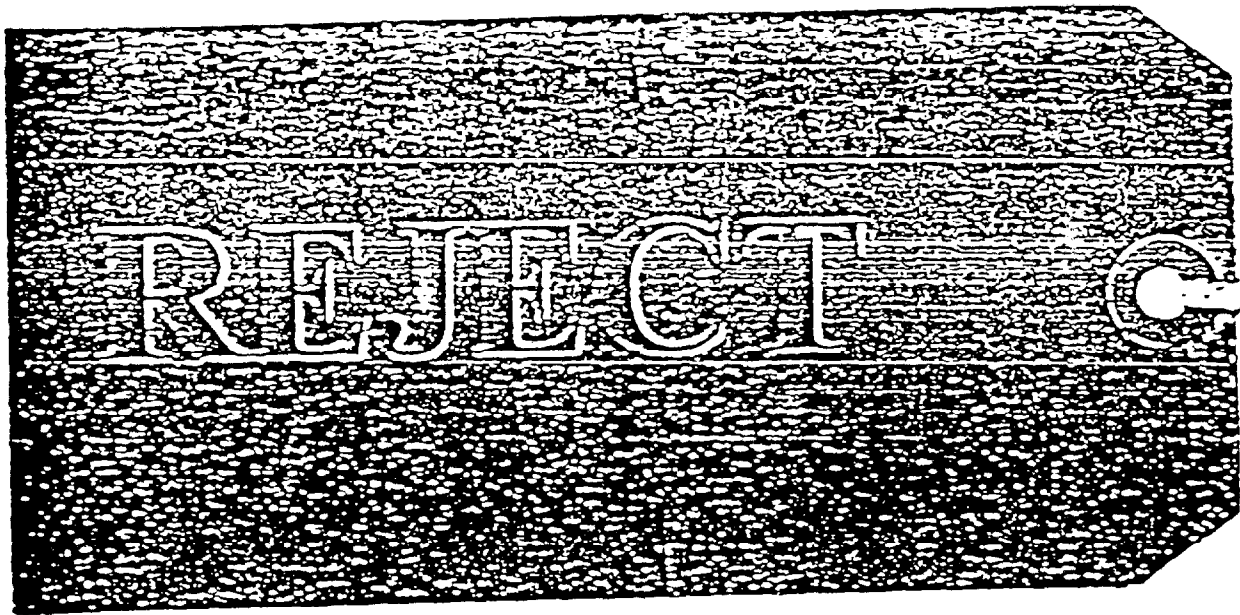
[] Approved [] Modified (see attached) [] Rejected

RPV: _____ Date: _____

140 140

IN 3/19/98

Print State





OHM Remediation Services Corp.

Inspection Report

Site: _____
Feature: _____
Document ID: _____
Page _____ of _____

Check appropriate box

Preparatory
Initial
Followup

Specifications Section

Contract No. _____

OHM Job No. _____

Inspector: _____
Date: _____ Time: _____

	Yes	No	N/A	Comments, Notes, and/or QC Testing Criteria
Submittals received and approved	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Comments: _____

Inspection Passed Yes No

OHM Inspector _____ Date _____

summary

Test	Test Method	Frequency	Acceptance Criteria

APPENDIX B

SOP QP-650

CUSTODY SEAL AND SAMPLE LABEL

COC FORM

PROJECT QUALITY CONTROL OBJECTIVES

CAR FORM

OHM Corporation

STANDARD OPERATING PROCEDURE

Title: Standard Analytical Data Deliverable Document #: QP-650

Date Issued: June 20, 1996

Rev: 0

Date:

1.0 PURPOSE

- 1.1 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 include when a minimum data packages, standard data packages and maximum data packages is requested by OHM employees.

2.0 SCOPE

- 2.1 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

- 3.1 HAZWRAP, July 1990. Quality Control Requirements for Field Methods DOE/HWP69/R1.
- 3.2 HAZWRAP, July 1988. Requirements for Quality Assurance of Analytical Data. DOE HWP-65, Rev. 0, July 1988.
- 3.3 USEPA , Test Methods for Evaluating Solid Waste Physical/Chemical Methods SW-846
- 3.4 United States Environmental Protection Agency, 1984. User's Guide to the Contract Laboratory Program, Office of Emergency and Remedial Response, Washington, D.C.

- 5.9 Data Assessment - A systematic review of the analytical data to assure all method specific requirement were performed.
- 5.10 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.
- 5.11 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.
- 5.12 Deliverables - Analytical Report Package provide by the analytical laboratory which includes the analytical data and a specified set of supporting documentation.
- 5.13 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.
- 5.14 ICP - Inductively coupled argon plasma (also referred to ICAP). An instrument used for metals analysis.
- 5.15 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.
- 5.16 Initial Calibration - Instrument calibration performed before any samples are analyzed.
- 5.17 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.
- 5.18 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.

- 5.19 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..
- 5.20 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.
- 5.21 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.
- 5.22 Precision - a measure of the analytical method's ability to reproduce analytical results.
- 5.23 Preparation Logs - An official laboratory record of the sample preparation procedures used in processing a sample prior to analysis.
- 5.24 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.
- 5.25 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.
- 5.26 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.
- 5.27 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

- 6.1 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

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

- 8.1 Data Deliverables Package Requirements Table

ATTACHMENT 8.1

DATA DELIVERABLE PACKAGE REQUIREMENTS TABLE

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 OIIM 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
pH					X (Note 2)

DATA DELIVERABLE PACKAGE REQUIREMENTS TABLE

Method	Deliverable Requirement	Equivalent EPA Form	OIIM Minimum Level	OIIM Standard Level	OIIM Maximum Level
Organics by GC or HPLC	Case Narrative		X	X	X
	Corrective Action Report		X	X	X
	Cross-reference of OIIM 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 acceptance limits)		X	X	X
	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

DATA DELIVERABLE PACKAGE REQUIREMENTS TABLE

Method	Deliverable Requirement	Equivalent EPA Form	OHM Minimum Level	OIIM Standard Level	OIIM Maximum Level
Organics by GC/MS	Case Narrative		X	X	X
	Corrective Action Report		X	X	X
	Cross-reference of OIIM sample numbers, Lab IDs, and analytical QC batches	IV		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
	Tentatively Identified Compounds (TICs) for each sample (ten peaks)	I,TIC		X	X
	Blank Spike or Lab Control Sample (LCS) results (including concentration spiked, percent recovered, percent recovery acceptance limits)		X	X	X
	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
	Instrument Performance Check (Tuning) Report	V		X	X
	Initial Calibration Data (including acceptance limits)	VI		X	X
	Continuing Calibration Data (including acceptance limits)	VII		X	X
	Internal Standard Areas and Retention Times Reports (including acceptance limits and out-of-control flags)	VIII		X	X
	Reconstructed Ion Chromatogram for each sample and rerun, blank, spike, duplicate, and standard				X
	Raw Quantitation Report				X
	Raw and background subtracted mass spectra for each target analyte found				X
	Mass spectra of TICs with library spectra of 5 best-fit matches				X
	Copies of Sample Preparation Bench Sheets			X	X
	Copies of Standard Preparation Logs				X
	Copies of Run Logs				X
Percent Moisture			X	X	X
pH					X (Note 3)

DATA DELIVERABLE PACKAGE REQUIREMENTS TABLE

Method	Deliverable Requirement	Equivalent EPA Form	OIIM Minimum Level	OIIM Standard Level	OIIM Maximum Level	
Inorganic Chemistry (Note 2)	Corrective Action Report		X	X	X	
	Cross-reference of OIIM 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 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: OIIM 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: OIIM 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.
- 5) Deliverables depend on method's QC.

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

PROJECT DATA MANAGER'S COPY

206847

FORM 1010N REV. 3/97

OWN LAB COORDINATOR	LAB COORDINATOR'S PHONE	LAB COORDINATOR'S FAX	LABORATORY SERVICE ID	LABORATORY CONTACT	MAIL REPORT (COMPANY NAME)
1	2	3	16	17	22
PROJECT NAME	PROJECT LOCATION	PROJECT NUMBER	LABORATORY PHONE	LABORATORY FAX	RECIPIENT NAME
4	5	6	18	19	23
PROJECT ELEMENT	PROJECT PHONE NUMBER	PROJECT FAX	LABORATORY ADDRESS		ADDRESS
7	8	9	20		24
PROJECT ADDRESS	CITY, STATE AND ZIP CODE	CLIENT	CITY, STATE AND ZIP CODE	CITY, STATE AND ZIP CODE	
10	11	12	21	25	
PROJECT MANAGER	PROJECT MANAGER'S PHONE	PROJECT MANAGER'S FAX	Analyses 34		
13	14	15			

Item	Sample Identifier	Matrix	Date	Time	Preserved	# of Cont.	QC Level	T.A.T.	Analyses 34												Comments
									34	35	36	37	38	39	40	41	42	43	44	45	
1	26	27	28	29	30	31	32	33													35
2																					
3																					
4																					
5																					
6																					
7																					
8																					
9																					
10																					

DATE RECEIVED BY	LABOR AND ANALYST NUMBER	LABORATORY	LABORATORY	LABORATORY	LABORATORY
36	37				

DATE RECEIVED BY	LABORATORY	LABORATORY	LABORATORY	LABORATORY	LABORATORY
38	39	40	41		

Distribution: White - Laboratory (To be returned with Analytical Report); Goldenrod - Project File; Yellow - Project Data Manager

Project Information Section
For Project Personnel Only
Do Not Submit to Laboratory

Sample Point Location	Sample Type			
	G	C	F	QC
42				
Comments				
44				
Sample Type G - Grab C - Composite F - Field Sample QC - Quality Control Sample				

PROJECT QUALITY CONTROL OBJECTIVES

Method No	Analyte / Component	Project Action Limits	Minimum PQL	Accuracy Limits	Precision Limits	Accuracy Limits	Precision Limits	Completeness Limits
		TCLP	TCLP	MS/MSD Recoveries	MS/MSD Deviation	LCS Recoveries	Field Dup Deviation	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

PROJECT QUALITY CONTROL OBJECTIVES

Method No	Analyte / Component	Project Action Limits *	Minimum PQL	Accuracy Limits	Precision Limits	Accuracy Limits	Precision Limits	Completeness Limits
		TCLP	TCLP	MS/MSD Recoveries	MS/MSD Deviation	LCS Recoveries	Field Dup Deviation	
		TCLP	TCLP	TCLP	TCLP	TCLP	TCLP	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 (Setflash)	< 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
Miscellaneous				(%)	(%)	(%)	(%)	(%)
9095A	Paint Filter	Pass	Pass/Fail	N/A	N/A	N/A	N/A	90

Notes:

* Since there are no action levels required for other analysis, only TCLP action limits are applicable to this project



DEFICIENCY/NONCONFORMANCE AND CORRECTIVE ACTIONS REPORT

Southern Region

CAR No:	_____	DNR No:	_____	Date Submitted:	_____
Submitted to:	_____	Title/Position:	_____		
Submitted by:	_____	Title/Position:	_____		
Project Name:	_____	Project No:	_____		

Description of Problem:

Personnel Responsible for Investigative Process:

Investigative Process Findings:

Recommended Corrective Actions:

Personnel Responsible for Implementation of Corrective Actions:

Resulting Actions and Effectiveness of those Actions:

Personnel Responsible for Monitoring Effectiveness of Corrective Actions:

Corrective Actions Report—continued

Page 2

Personnel Responsible for Follow-up of Corrective Actions:

Final Disposition Accepted by:

Name: _____ Title: _____ Date: _____

Name: _____ Title: _____ Date: _____

Name: _____ Title: _____ Date: _____

Name: _____ Title: _____ Date: _____

Name: _____ Title: _____ Date: _____

Copies Distributed to:

Copy Filed _____ Entered into Database _____

4.0 GENERAL INFORMATION

- 3.1 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

- 5.1 Accuracy - A measure of how close a measured value is to a known true value.
- 5.2 Aliquot - A measured portion of a sample taken for analysis.
- 5.3 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).
- 5.4 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
- 5.5 Blank - An artificial sample designed to monitor the introduction of artifacts into the measurement process.
- 5.6 Calibration - The systematic determination of the relationship of the response of the measurement system to the concentration of a analyte of interest
- 5.7 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.
- 5.8 Continuing Calibration - Subsequent checks on the instrument calibration performed throughout the analysis of samples.

APPENDIX C

SAMPLING AND ANALYSIS PLAN

**SAMPLING AND ANALYSIS PLAN
FOR
RANGES D-29 AND A-1
MCB CAMP LEJEUNE, NORTH CAROLINA**

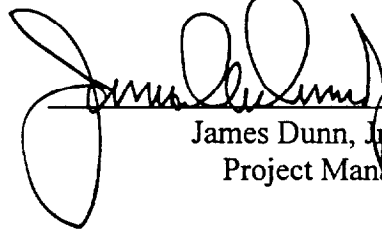
Prepared for:

DEPARTMENT OF THE NAVY
Contract No. N62470-93-D-3032
Atlantic Division
Naval Facilities Engineering Command
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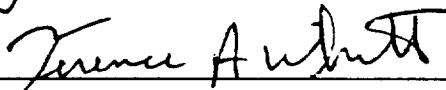
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May 1998
Delivery Order 0151
OHM Project No. 19668, Modification 2

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APPENDIX A

1.0 SAMPLING METHODS AND PROCEDURES

The following sections describe sampling locations, frequencies, sample matrices, and measurements of parameters of interest. Table 1.0 " Sampling Summary " presents a summary of these items.

Non-disposable sampling equipment will be thoroughly cleaned between samples using the decontamination procedures described in Section 5.0. 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.

1.1 BERM SOIL EXCAVATION AND SCREENING

The soil on the top and side face of the berm adjacent to the range will be excavated until no lead particles remain visible in the soil. Excavation will proceed with the removal of soil in layers of berm soil on the top and front surface of the berms. After each layer of berm soil is excavated, a visual inspection will be performed for metal bullet fragments. Additional layers will be excavated until no visible fragments are encountered.

Excavated soils will be screened as indicated in the work plan. Sampling will be performed as indicated below.

1.2 SOIL SAMPLE COLLECTION

A five point composite soil sample will be collected from the soils that are passed through the 3/16-inch screen. Each composite sample will consist of five grab samples collected every 100 yards of the excavated screened soils. Soil samples will be collected by the following procedures:

- 1) Using a stainless steel hand auger, auger down to 1 foot, collecting the contents of the bucket into a stainless steel bowl.
- 2) Repeat until five grab samples have been collected in the stainless steel bowl.
- 3) Using the stainless steel spoon, homogenize the soil in the stainless steel bowl thoroughly using the quartering technique. Fill the sample container with the homogenized soil. Cap and label the containers

The soil samples will be sent to an off-site laboratory for TCLP analyses. Soils containing lead at levels exceeding the TCLP criterion (5 mg/L) will be considered contaminated. Soils with lead concentrations below TCLP criteria will not be considered contaminated and will be used for backfilling excavations.

1.3 SOIL SAMPLE COLLECTION AFTER CHEMICAL TREATMENT

Soils containing lead at levels exceeding TCLP criteria will be considered contaminated and treated with triple super phosphate (TSP) or other equivalent reagent for stabilization. One five point composite sample will be collected from every 100 yards of the treated soil following stabilization. The sample will be collected from the stockpile to verify that characteristically hazardous lead soils have been decharacterized to below 5.0 mg/L lead. Soil samples will be collected by the following procedures and analyzed for the parameters listed in Table 1.0.

- 1) Using a stainless steel spoon collect a sample from each corner and put in a stainless steel bowl. Remove the top 6 inches of the surface soil before collecting the grab sample.
- 2) With a bucket auger, collect one sample from the inside of the 100-cubic yard pile (4 to 5 feet deep into the pile) and add to the stainless steel bowl.
- 3) Using the stainless steel spoon, homogenize the soil in the stainless steel bowl thoroughly using the quartering technique. Fill the sample container with the homogenized soil. Cap and label the containers

1.4 COLLECTED LEAD METAL SAMPLE COLLECTION

The metal fragments collected during the entire screening operation will be sampled for the total lead content assay determination. One five point composite sample will be collected from the metal fragments collected during the operation. The metal fragment sample will be analyzed for the parameters as required by the recycling facility. Metal fragment samples will be collected manually. Collect representative fragments from the screened container of metal. These fragments should represent the different caliber and types of projectiles recovered. Fill the sample container with the selected fragments.

1.5 CONTRACTOR GENERATED WASTE SAMPLING - SOLIDS

Personal Protective Equipment (PPE) like Tyvek, disposable sampling gloves will be sampled to select disposal options. The samples will be collected using scissors, and analyzed for the parameters listed in Table 1.0. Depending on the disposal facility, additional analysis may be required.

1.6 CONTRACTOR GENERATED WASTE SAMPLE: WOOD CHIPS ETC.

Wood chips and other debris will be sampled to select disposal options. The samples will be collected using scissors, knives or stainless steel spoons, homogenized in a stainless steel bowl using

quartering technique, and sent to an off-site laboratory for analysis for the parameters listed in Table 1.0. Depending on the disposal facility, additional analysis may be required.

2.0 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:

CLJXXX-2-NNN-DD

where:

CLJ = Camp Lejeune

XXX-2 = Delivery Order and Mod No. 2 for the project (151-2)

NNN = Sequential number starting at 001

DD = QC identifier

If sample is a field QC sample, the following designations will be added as a suffix

FB - Field Blank

RB- Equipment Rinsate Blank

(Duplicates must not to be identified to the laboratory)

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.

3.0 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 $4^{\circ}\pm 2^{\circ}\text{C}$ 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 Table 1.0.

4.0 FIELD QC SAMPLES

The appropriate number of field QC samples, as specified in the NFESC, 1996 document will be collected during this project. These samples will include field blanks, equipment rinsate blanks and field duplicate samples. These samples will be collected at the following frequencies and analyzed for the parameters listed in Table 1.0.

- **Field Blanks (Ambient Blanks) –** Field blanks , sometimes referred to as ambient blanks, are samples of contaminant-free media (reagent grade water) witch are prepared at the site and handled in the field in the same manner as all other field samples. Field blanks are collected during the course of field sampling and, to the extent possible, in the actual sampling locations. Field blanks are collected by placing contaminant-free medium (reagent grade water) in the same type of container as field sample. Field blanks are preserved and stored in the same manner as field samples. At a minimum, one field blank per contiguous site from each sampling event is collected and is analyzed for those interfering contaminants that could potentially be present in ambient air at the sampling site. Approximate number of field blank samples planned to be collected is presented in Table 1.0.
- **Equipment Rinsate Blank –** Equipment rinsate blanks are the final analyte-free water rinse from equipment cleaning collected daily for each matrix sampled. An equipment rinsate blank is collected in the same type of sample containers, and in all other ways is handled in the same manner as other field samples. The equipment rinsate blank must be collected during the sampling event (after collection of at least one field sample) after the sampling equipment has been decontaminated and prior to collection of the next field sample. All equipment that comes into contact with field samples must be decontaminated prior to use. The use of disposable equipment is acceptable, but does not obviate the requirement for decontamination prior to use, or the requirement for collection of equipment rinsate blanks. Equipment rinsate blanks for disposable equipment are collected by passing contaminant-free medium through or over the decontaminated equipment. One equipment rinsate blank is collected per day, per sampling event for each matrix sampled that day. Equipment rinsates are analyzed for the same parameters as the sample collected that day. Approximate number of equipment blank samples planned to be collected is presented in Table 1.0.
- **Field Duplicate –** Duplicates for soil samples are collected, homogenized, and split. All samples except volatiles are homogenized and split. Volatiles are not mixed, but select segments of soil are taken from the length of the core and placed in 4 oz glass jars. The duplicates for water samples are collected simultaneously. Field duplicates must be collected at a frequency of one sample per day per matrix or 10% of the field samples per matrix. All the duplicates should be sent to the primary laboratory responsible for analysis, along with the samples. Approximate number of field duplicates

planned to be collected are presented in Table A-1, Appendix A. Duplicates will be sent to the off-site laboratory blind.

- Trip Blank -- Trip blanks are defined as samples which originate from analyte-free water taken from the laboratory to the sampling site and returned to the laboratory with the volatile samples. One trip blank should accompany each cooler containing aqueous and non-aqueous volatile samples, should be stored at the laboratory with the samples, and analyzed by the laboratory. Trip blanks are only analyzed for volatile organic compounds and may not be required for this project if disposal samples are not taken. Approximate number of trip blank samples planned to be analyzed is presented in Table 1.0.

5.0 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.

6.0 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:

<i>Activity</i>	<i>Possible Contaminants</i>
Smoking	Poly Aromatic Hydrocarbons
Spraying for insects	Pesticides, oils, solvents
Spraying for weeds	Herbicides, oils, solvents
Refueling	BTEX, hydrocarbons
Painting and paint stripping	Solvents

6.1 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 number, locations, type, matrices, volumes, sample ID and descriptions, type and number of sample containers, names and signatures of individuals performing sampling tasks, Chain-Of-Custody (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 data base 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 is an acceptable substitute for the sample logbook.

6.2 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 log book.

6.3 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.

6.4 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, chain-of-custody 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

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).

7.0 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 $4^{\circ}\pm 2^{\circ}\text{C}$, 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 Figure 7.1. These instructions are for shipping samples with unknown or limited hazards. All information will be entered as directed. No changes or substitutions to these instruction will be made irrespective of their significance. A copy of the OHM sample shipping label is included in Figure 7.2.

**TRANSPORTATION AND DISPOSAL PLAN
FOR
MAINTENANCE AT RANGES D-29 AND A-1
MCB CAMP LEJEUNE, NORTH CAROLINA**

Prepared for:

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APPENDICES

APPENDIX A DRUM INVENTORY LOG

APPENDIX B WASTE DISPOSAL ACTIVITIES CHECKLIST

APPENDIX A
DRUM INVENTORY LOG

APPENDIX B

WASTE DISPOSAL ACTIVITIES CHECKLIST

1.0 INTRODUCTION

This Materials Handling, Transportation and Disposal Plan (MHTDP) was prepared for use during maintenance activities at Ranges D-29 and A-1 which are located within the Marin Corps Base (MCB), Camp Lejeune, North Carolina.

The MHTDP objective is to specify the methods and procedures to be implemented by OHM to ensure that wastes generated during site remediation activities will be transported, stored, treated, and disposed of in full compliance with applicable federal, state, and local rules and regulations.

2.0 CHARACTERIZATION OF WASTESTREAMS

Based on the information provided to OHM in the Statement of Work Design Package, OHM will generate various types of waste during performance of range maintenance activities which will require recycling, treatment, or disposal. These materials are listed in Table 1. OHM will collect samples and complete characterization and disposal analysis of the waste to be disposed of off-site or recycled in accordance with the Sampling and Analysis Plan. Final characterization and disposal alternatives are contingent upon these analyses. An addendum to this plan will be prepared if required when analyses are available.

<i>Waste</i>	<i>Description</i>	<i>Estimated Quantity</i>	<i>Disposal Method</i>
PPE	Personal protective equipment generated during onsite berm excavation	4 drums	Subtitle D landfill
Decontamination liquids	Decontamination water from equipment cleanup	4 drums	Water treatment plan at Lot 203
Timber with lead	Timber from the demolition of range retaining wall containing high levels of bullet fragments	900 cubic feet	Subtitle C landfill Microencapsulation or macroencapsulation
Bullet fragments	Metal fragments and particles in the excavated range berm soil that will not pass through a 5 mm screen	40 tons	Recycling center
Construction debris	Concrete debris, timber with few bullet fragments, rocks, roots, vegetation, tree branches, and other noncontaminated debris generated during range maintenance	60 tons	Subtitle D landfill

All trucks used for transporting material will be decontaminated prior to leaving the project site to prevent the off-site spread of contaminants. Prior to removing the excavation from the range site, OHM will remove residual soils from the excavator by scraping and brushing. The excavator will then be moved to the decontamination area for final decontamination by an air brush. Personnel involved with excavation will be attired in Personal Protective Equipment (PPE) as required by the site Health and Safety Plan. Used PPE will be placed in drums for off-site disposal.



All hazardous waste destined for off-site treatment/disposal will be transported by licensed hazardous waste haulers. All trucks will pre-weigh at the base scales to establish their tare weight prior to being loaded with contaminated soil. After loading and prior to exiting the controlled area, an air brush will be used to decontaminate the truck's tires and trailer sides. The timbers with bullet fragments shall be cover with a tarp or plastic. The trailer will then be weighed at the base scales. Each load will be properly manifested for the designated hazardous waste disposal facility. The Base will be responsible for signing manifests as the generator for each off-Base shipment.

3.0 WASTE DISPOSAL APPROVAL

OHM will assign a Transportation and Disposal (T&D) Coordinator to this project who will report to the Project Manager acting as a single point-of-contact for all waste management activities. The individual assigned to this project will be familiar with all the applicable portions of RCRA, CERCLA, and SARA regulations--especially 40 CFR 261 (Identification and Listing of Hazardous Wastes). In addition, this individual will be familiar with the North Carolina regulations relating to hazardous and solid waste handling, treatment, storage, disposal, and transportation. This individual will review the existing analytical data as well as additional data collected by OHM and obtain pre-approval from the appropriate disposal facilities to allow direct load out of excavated soils. The T&D Coordinator will also be responsible for preparing waste profiles to be sent to the selected disposal facilities and coordinating disposal approvals.

Based on the materials identified that will require off-site disposal, the T&D Coordinator, and the project manager and procurement personnel, have reviewed potential vendors to pre-qualify transportation and disposal vendors based on:

- Notice of Violation (NOV) status
- Ability to handle the wastes identified
- Cost effectiveness of the available transportation and disposal options
- Past experience

At this time OHM has identified the following qualified vendors to provide transportation and disposal of wastes from this site:

Disposal

- Browning-Ferris Industries
Roseboro, North Carolina
- Chemical Waste Management
Emelle, Alabama
- Evotech Management Services, Inc.
Belleville, Michigan
- Laidlaw Environmental Services
Pinewood, South Carolina
- Waste Management
Kernersville, North Carolina

Transportation

- Hilco Transport Inc. (SB, WBE)
Wilmington, North Carolina
- Robbie D. Wood
Dolomite, Alabama
- SouthCo Enterprises Inc
Greensboro, North Carolina
- Terra First
Jacksonville, FL
- WTI
Columbia, South Carolina

All bids will be obtained based on a written solicitation and all bid responses will be in writing. All bids will be made in conjunction with OHM's procurement department. A condition of OHM's purchase order will be that the selected vendors must provide OHM with addresses, the name of a single point of contact, EPA ID numbers, permit verification, insurance verification, NOV status, and any other qualifying data necessary.

4.0 PREPARATION OF REQUIRED DOCUMENTATION

OHM will prepare (or oversee the preparation of) all paperwork associated with off-site disposal for review and signature by LANTDIV and Camp Lejeune representatives. This will include TSDf waste profiles, hazardous waste manifests, land disposal restriction (LDR) forms, labels and all other paperwork. The selected vendor(s) will be required to provide all labels, manifests, LDR forms, and other shipping paperwork. A completed example of these forms will be provided for OHM's review and approval at least one week in advance of the scheduled start of shipments. After these documents are reviewed by OHM, they will be provided to the Navy's representative for review and signature. Final copies of all labels, manifests, LDR forms and other shipping paperwork will be received by OHM's on-site personnel at least 5 days in advance of the scheduled shipment dates.

Written verification that the proposed disposal sites are permitted to accept the contaminated materials specified is required from the disposal vendors with their approvals. A written verification that all vehicles and containers were decontaminated prior to leaving the disposal site will be provided within three days of receipt of the waste materials. A written verification that wastes were actually delivered to the disposal site will be provided within seven days of receipt of waste materials.

5.0 WASTE PACKAGING

All drummed waste of personal protective equipment (PPE) that is collected in 55-gallon (17H open-top) steel drums will be labeled and logged using OHM's standard drum inventory procedures and Drum Inventory Log included as Appendix A. OHM will maintain these drum logs and a database summary of the type and quantity of wastes generated each day. Appropriate measures will be taken to keep off-site back-up copies of this data as well.

Miscellaneous non-hazardous materials will be accumulated on-site until sufficient quantities are available for shipment of a full load (80 drums or 20-30 cubic yards). OHM will conduct weekly inspections of the waste storage areas. All temporary storage will be in compliance with the applicable North Carolina regulations.

Any decontamination water generated by this project will be stored in drums or storage tanks. OHM plans to transport these liquids via truck to the groundwater treatment plant adjacent to Lot 203 at Camp Lejeune for treatment and discharge.

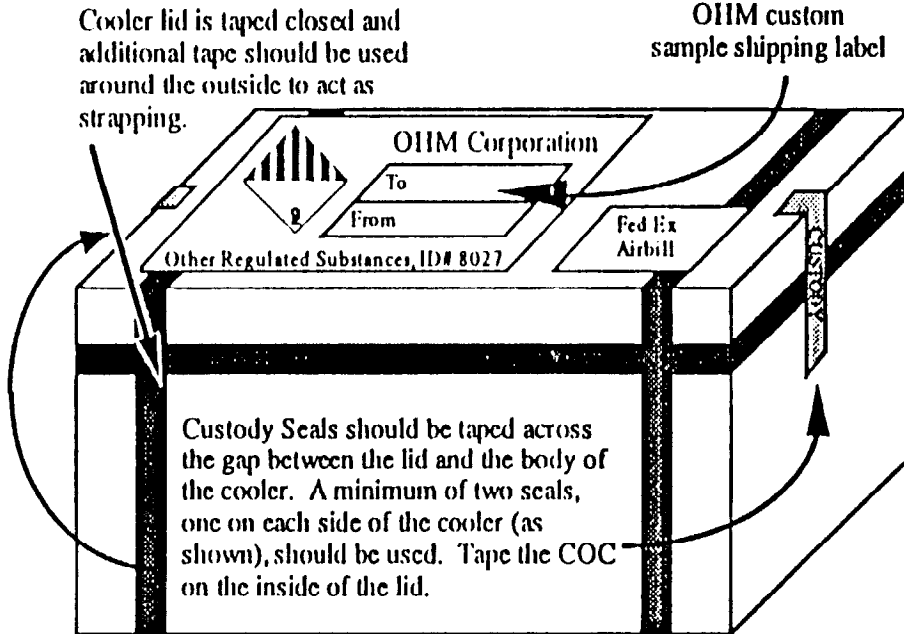
6.0 SHIPPING

The Site Supervisor will contact the selected vendor and schedule waste pick-ups in a timely manner to coordinate with the project schedule. Prior to shipment of wastes, OHM's on-site personnel, in conjunction with the T&D coordinator, will complete the Waste Disposal Activities Checklist included as Appendix B. This checklist is to be completed for each waste shipment leaving the site. A copy of the completed form will be provided to the NTR prior to waste transportation and with the Contractor's Closeout Report.

OHM will maintain chronological organized files of weight tickets, manifest copies, LDR forms and other shipping paperwork for each shipment. OHM will also maintain a database of all pertinent information regarding each off-site shipment. Copies of the manifest file and database printouts will be provided to the LANTDIV and Camp Lejeune representatives upon request and at the completion of the project.

FIGURE 7.1

NOTE: These procedures are **ONLY** for shipping **unknown** environmental samples such as sludge, soil, or water samples for laboratory analysis and identification; 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.



Lower Portion of Fed-Ex
DANGEROUS GOODS airbill

0792772120

The completed and signed copies of this Declaration must be provided to the operator

WARNING
Failure to comply in all respects with the applicable Dangerous Goods Regulations may be in breach of the applicable law, subject to legal penalties. This Declaration must not, in any circumstances, be completed and/or signed by a consolidator, a forwarder or an IATA cargo agent.

Transport Details
 Description of Goods: **Other Regulated Substances**
 Class: **9**
 ID: **8027**
 Packing Group: **NA**
 Quantity and type of packing: **Plastic Box Containing x 1 kg inner containers**
 Packing Unit: **906**

NON-RADIOACTIVE

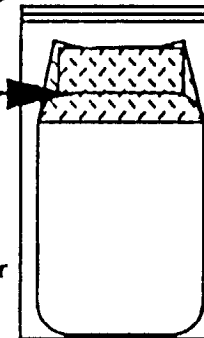
Additional Handling Information

I hereby declare that the contents of this arrangement are fully and accurately described above by proper shipping name and are classified, marked, and labeled, and are in compliance with the applicable international and national Government Regulations.

- 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 securely 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.

Don't forget to sign and include the 24-hr Emergency Response Phone number. Check with the Regional T&D Coordinator for this number

Lids are taped to prevent leaks or loosening. Entire jar is sealed in a zip-lock baggie



Fill in the Additional Handling space with:

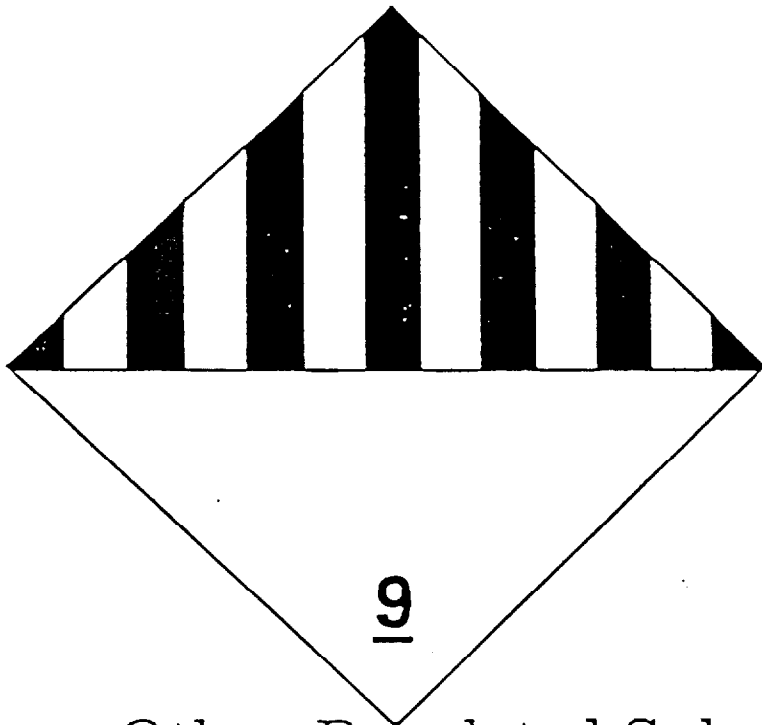
Fill in the blank with the number of containers

- ___ x 1 kg for quart jars
- ___ x 500 g for 8 oz jars
- ___ x 40 g for VOA vials

"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"

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.

FIGURE 7.2



OHM Corporation



From:
Phone:
To:
Phone:

Other Regulated Substances, ID# 8027

Class 9 Shipping Label



OHM Remediation
Services Corp.

APPENDIX D

ENVIRONMENTAL PROTECTION PLAN

**ENVIRONMENTAL PROTECTION PLAN
FOR
MAINTENANCE AT RANGES D-29 AND A-1
MCB CAMP LEJEUNE, NORTH CAROLINA**

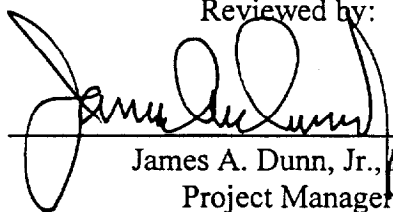
Prepared for:

DEPARTMENT OF THE NAVY
Contract No. N62470-93-D-3032
Atlantic Division
Naval Facilities Engineering Command
6500 Hampton Boulevard
Building A (South East Wing) 3rd Floor
Norfolk, VA 23508

Prepared by:

OHM Remediation Services Corp.
5445 Triangle Parkway, Suite 400
Norcross, GA 30092

Reviewed by:


James A. Dunn, Jr., P.E.
Project Manager

John P. Franz, P.E.
Program Manager

May 1998
Delivery Order 0151
OHM Project No. 19668

 OHM Remediation
Services Corp.

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1.0 INTRODUCTION

This Environmental Protection Plan (EPP) has been prepared in accordance with standard OHM policies and procedures. The EPP provides specific information relating to the scope of work under Delivery Order No. 0151 Modification No. 2, Maintenance at Ranges D-29 and A-1, MCB Camp Lejeune, North Carolina. The plan will provide site-specific information for:

- Land resources management
- Water resources management
- Air and noise pollution control
- Non-compliance/corrective action
- Post-excavation clean-up

The control of environmental pollution will consider air, water and land impacts, as well as noise and solid waste management. The land resources within the property of Range D-29 and A-1 at MCB Camp LeJeune, but outside the limits of permanent work, will be preserved in their condition or restored to a condition that does not detract from the appearance of the area after completion of construction. As much as is practical, construction activities will be limited to areas defined by the plans and specifications.

2.0 HISTORICAL AND ARCHAEOLOGICAL FINDS

Although the presence of historical artifacts is not anticipated, if a historical artifact is encountered during field operations, OHM will stop work and notify the Navy Technical Representative (NTR). The NTR will be responsible for contracting federal, state, and local authorities to determine if the site may contain other important historical artifacts, and whether this site qualifies for possible placement on the National Registrar of Historical Places. Field operations will not resume until the NTR issues a written authorization to proceed.

3.0 TEMPORARY CONSTRUCTION ROADS

If required, the construction of any temporary construction roads in and around the project site will be performed in a manner as to minimize the impact to the natural environment. Water will be used for dust control, as necessary.

4.0 PROTECTION OF TREES AND SHRUBS

Prudent steps will be taken to protect trees and shrubs outside of the excavation zone as necessary. The trees and shrubs within the excavation zone will be removed by OHM. All trees and shrubs removed as a result of the construction activities will be cut into manageable pieces and moved from the project site so as not to interfere with operations. Precautions will be taken to minimize the construction activities' impact on existing vegetation and will include but not be limited to:

- Utilization of existing or temporary construction roads only
- Closely supervised equipment operators with an emphasis placed on preservation of vegetation in non-work areas
- Proper guidance of heavy equipment and truck operators by site personnel to minimize damage to adjacent vegetation not directly affected by construction activities
- Utilization of equipment appropriately designed and sized for precise excavation

5.0 STORM PROTECTION

If a warning of gale force winds is issued, OHM will take precautions to minimize any danger to persons, and protect the work and nearby Government property. Precautions shall include removing loose materials, tools, and equipment from exposed locations; and removing or securing temporary work and structures.

6.0 RESTORATION

Upon completion of the field construction activities, disturbed areas will be graded and compacted for proper site drainage. The ground surface will be restored to original conditions.

7.0 WATER RESOURCES PROTECTION

The precipitation at the site drains into the adjacent New River. The New River could possibly be impacted by construction activities if proper sediment and erosion protection measures are not taken. To protect against damage, stormwater surface run-off leaving the site will be controlled by temporary erosion/sediment control techniques such as berms, silt fencing and grading. The area of bare soil exposed at any one time by construction activities will be minimized.

7.1 EROSION SEDIMENT CONTROL

Prior to disturbance of native vegetation and soils, temporary erosion/sediment control will be established on the down gradient side of each excavation. Control techniques to be utilized will involve silt fencing.

Silt fencing will be installed with the fabric a minimum of 6 inches below grade and extending 36 inches above grade and fastened to posts no more than 6 feet apart. The posts will be installed with a minimum of 24 inches below grade and extend a minimum of 36 inches above grade. Fabric will be attached to the up-slope side of the posts using 1-inch staples or tie wires. Silt fences will be inspected after every rain and daily during extended rain fall. Accumulated sediment will be removed before the depth reaches 12 inches.

7.2 SPILL CONTROL

Measures will be taken to prevent chemicals, fuels, oils, greases, bituminous materials and contaminated materials from entering streams, rivers or lakes. Absorbents will be available to solidify any leaks outside containment and any soil contaminated with fuel spills will be immediately removed and placed into appropriate containers and sampled to determine proper disposition.

8.0 DUST AND AIR POLLUTION CONTROL

8.1 AIR AND NOISE MONITORING

Personnel and ambient air monitoring will be conducted as necessary in order to determine airborne dust and contaminant levels. Ambient air monitoring will be conducted at working locations and on occasion at the perimeter of the project site. This ensures that respiratory protection is adequate to protect personnel against the contaminants that are encountered as well as ensuring that harmful levels of airborne contaminants are not leaving the site.

OHM will only perform operations of heavy equipment during daylight hours to minimize the impact of off-site noise pollution. Noise exposure to off-site residents or personnel is expected to be minimal. Hearing protection for on-site workers will still be implemented if necessary as specified in the SHSP.

8.2 PARTICULATE EMISSION CONTROLS

Specific measures to be taken to minimize particle emissions for major activities during site construction include the following:

Soil Excavation, Handling, Site Grading and Transportation

- Apply water to work and traffic areas as necessary to minimize dust emissions
- Cover stockpiles with sheeting to minimize wind and/or stormwater erosion
- Move and load soil for transport within the site that limits free fall of material and is least likely to generate dust emissions
- Halt dust-generating work when on-site wind conditions exceed 35 miles per hour

Movement of Equipment

- Water traffic areas as required to minimize dust emissions
- Designate equipment traffic patterns to minimize travel distance and vehicular dust emissions
- Limit vehicle speed to minimize dust emissions

8.3 BURNING

No burning will be performed on-site. In the event of an expected fire on-site, work will stop immediately and the MCB Camp LeJeune fire department will be notified.

9.0 POST-EXCAVATION CLEANUP

All excavation equipment will be decontaminated prior to demobilizing from the site. Decontamination will consist of scraping and air brushing to remove visible soil and debris from tires and undercarriage of vehicles and heavy equipment. Decontamination fluids if required will be containerized for disposal. The site will then be turned over to the MCB.

APPENDIX E

TRANSPORTATION AND DISPOSAL PLAN

**TRANSPORTATION AND DISPOSAL PLAN
FOR
MAINTENANCE AT RANGES D-29 AND A-1
MCB CAMP LEJEUNE, NORTH CAROLINA**

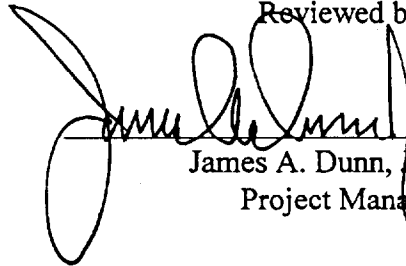
Prepared for:

DEPARTMENT OF THE NAVY
Contract No. N62470-93-D-3032
Atlantic Division
Naval Facilities Engineering Command
6500 Hampton Boulevard
Building A (South East Wing) 3rd Floor
Norfolk, VA 23508

Prepared by:

OHM Remediation Services Corp.
5445 Triangle Parkway, Suite 400
Norcross, GA 30092

Reviewed by:


James A. Dunn, Jr., P.E.
Project Manager

John P. Franz, P.E.
Program Manager

May 1998
Delivery Order 0151
OHM Project No. 19668

 OHM Remediation
Services Corp.

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APPENDIX B WASTE DISPOSAL ACTIVITIES CHECKLIST

1.0 INTRODUCTION

This Materials Handling, Transportation and Disposal Plan (MHTDP) was prepared for use during maintenance activities at Ranges D-29 and A-1 which are located within the Marine Corps Base (MCB), Camp Lejeune, North Carolina.

The MHTDP objective is to specify the methods and procedures to be implemented by OHM to ensure that wastes generated during site remediation activities will be transported, stored, treated, and disposed of in full compliance with applicable federal, state, and local rules and regulations.

2.0 CHARACTERIZATION OF WASTESTREAMS

Based on the information provided to OHM in the Statement of Work Design Package, OHM will generate various types of waste during performance of range maintenance activities which will require recycling, treatment, or disposal. These materials are listed in Table 1. OHM will collect samples and complete characterization and disposal analysis of the waste to be disposed of off-site or recycled in accordance with the Sampling and Analysis Plan. Final characterization and disposal alternatives are contingent upon these analyses. An addendum to this plan will be prepared if required when analyses are available.

<i>Waste</i>	<i>Description</i>	<i>Estimated Quantity</i>	<i>Disposal Method</i>
PPE	Personal protective equipment generated during onsite berm excavation	4 drums	Subtitle D landfill
Decontamination liquids	Decontamination water from equipment cleanup	4 drums	Water treatment plan at Lot 203
Timber with lead	Timber from the demolition of range retaining wall containing high levels of bullet fragments	900 cubic feet	Subtitle C landfill Microencapsulation or macroencapsulation
Bullet fragments	Metal fragments and particles in the excavated range berm soil that will not pass through a 5 mm screen	40 tons	Recycling center
Construction debris	Concrete debris, timber with few bullet fragments, rocks, roots, vegetation, tree branches, and other noncontaminated debris generated during range maintenance	60 tons	Subtitle D landfill

All trucks used for transporting material will be decontaminated prior to leaving the project site to prevent the off-site spread of contaminants. Prior to removing the excavation from the range site, OHM will remove residual soils from the excavator by scraping and brushing. The excavator will then be moved to the decontamination area for final decontamination by an air brush. Personnel involved with excavation will be attired in Personal Protective Equipment (PPE) as required by the site Health and Safety Plan. Used PPE will be placed in drums for off-site disposal.

All hazardous waste destined for off-site treatment/disposal will be transported by licensed hazardous waste haulers. All trucks will pre-weigh at the base scales to establish their tare weight prior to being loaded with contaminated soil. After loading and prior to exiting the controlled area, an air brush will be used to decontaminate the truck's tires and trailer sides. The timbers with bullet fragments shall be cover with a tarp or plastic. The trailer will then be weighed at the base scales. Each load will be properly manifested for the designated hazardous waste disposal facility. The Base will be responsible for signing manifests as the generator for each off-Base shipment.

3.0 WASTE DISPOSAL APPROVAL

OHM will assign a Transportation and Disposal (T&D) Coordinator to this project who will report to the Project Manager acting as a single point-of-contact for all waste management activities. The individual assigned to this project will be familiar with all the applicable portions of RCRA, CERCLA, and SARA regulations--especially 40 CFR 261 (Identification and Listing of Hazardous Wastes). In addition, this individual will be familiar with the North Carolina regulations relating to hazardous and solid waste handling, treatment, storage, disposal, and transportation. This individual will review the existing analytical data as well as additional data collected by OHM and obtain pre-approval from the appropriate disposal facilities to allow direct load out of excavated soils. The T&D Coordinator will also be responsible for preparing waste profiles to be sent to the selected disposal facilities and coordinating disposal approvals.

Based on the materials identified that will require off-site disposal, the T&D Coordinator, and the project manager and procurement personnel, have reviewed potential vendors to pre-qualify transportation and disposal vendors based on:

- Notice of Violation (NOV) status
- Ability to handle the wastes identified
- Cost effectiveness of the available transportation and disposal options
- Past experience

At this time OHM has identified the following qualified vendors to provide transportation and disposal of wastes from this site:

Disposal

- Browning-Ferris Industries
Roseboro, North Carolina
- Chemical Waste Management
Emelle, Alabama
- Evotech Management Services, Inc.
Belleville, Michigan
- Laidlaw Environmental Services
Pinewood, South Carolina
- Waste Management
Kernersville, North Carolina

Transportation

- Hilco Transport Inc. (SB, WBE)
Wilmington, North Carolina
- Robbie D. Wood
Dolomite, Alabama
- SouthCo Enterprises Inc
Greensboro, North Carolina
- Terra First
Jacksonville, FL
- WTI
Columbia, South Carolina

All bids will be obtained based on a written solicitation and all bid responses will be in writing. All bids will be made in conjunction with OHM's procurement department. A condition of OHM's purchase order will be that the selected vendors must provide OHM with addresses, the name of a single point of contact, EPA ID numbers, permit verification, insurance verification, NOV status, and any other qualifying data necessary.

4.0 PREPARATION OF REQUIRED DOCUMENTATION

OHM will prepare (or oversee the preparation of) all paperwork associated with off-site disposal for review and signature by LANTDIV and Camp Lejeune representatives. This will include TSDf waste profiles, hazardous waste manifests, land disposal restriction (LDR) forms, labels and all other paperwork. The selected vendor(s) will be required to provide all labels, manifests, LDR forms, and other shipping paperwork. A completed example of these forms will be provided for OHM's review and approval at least one week in advance of the scheduled start of shipments. After these documents are reviewed by OHM, they will be provided to the Navy's representative for review and signature. Final copies of all labels, manifests, LDR forms and other shipping paperwork will be received by OHM's on-site personnel at least 5 days in advance of the scheduled shipment dates.

Written verification that the proposed disposal sites are permitted to accept the contaminated materials specified is required from the disposal vendors with their approvals. A written verification that all vehicles and containers were decontaminated prior to leaving the disposal site will be provided within three days of receipt of the waste materials. A written verification that wastes were actually delivered to the disposal site will be provided within seven days of receipt of waste materials.

5.0 WASTE PACKAGING

All drummed waste of personal protective equipment (PPE) that is collected in 55-gallon (17H open-top) steel drums will be labeled and logged using OHM's standard drum inventory procedures and Drum Inventory Log included as Appendix A. OHM will maintain these drum logs and a database summary of the type and quantity of wastes generated each day. Appropriate measures will be taken to keep off-site back-up copies of this data as well.

Miscellaneous non-hazardous materials will be accumulated on-site until sufficient quantities are available for shipment of a full load (80 drums or 20-30 cubic yards). OHM will conduct weekly inspections of the waste storage areas. All temporary storage will be in compliance with the applicable North Carolina regulations.

Any decontamination water generated by this project will be stored in drums or storage tanks. OHM plans to transport these liquids via truck to the groundwater treatment plant adjacent to Lot 203 at Camp Lejeune for treatment and discharge.

6.0 SHIPPING

The Site Supervisor will contact the selected vendor and schedule waste pick-ups in a timely manner to coordinate with the project schedule. Prior to shipment of wastes, OHM's on-site personnel, in conjunction with the T&D coordinator, will complete the Waste Disposal Activities Checklist included as Appendix B. This checklist is to be completed for each waste shipment leaving the site. A copy of the completed form will be provided to the NTR prior to waste transportation and with the Contractor's Closeout Report.

OHM will maintain chronological organized files of weight tickets, manifest copies, LDR forms and other shipping paperwork for each shipment. OHM will also maintain a database of all pertinent information regarding each off-site shipment. Copies of the manifest file and database printouts will be provided to the LANTDIV and Camp Lejeune representatives upon request and at the completion of the project.

APPENDIX A
DRUM INVENTORY LOG



OHM Corporation

DRUM INVENTORY LOG

DRUM NO. _____

PROJECT NUMBER _____

PAGE _____ OF _____

PROJECT LOCATION _____ LOGGER _____ DATE _____

PROJECT CONTACT _____ SAMPLER _____ TIME _____

PHONE _____ WEATHER _____

DRUM TYPE: FIBER POLY-LINED STEEL POLY STAINLESS STEEL NICKEL

UD TYPE: RINGTOP CLOSED TOP

DRUM CONDITION: MEET DOT SPEC. GOOD FAIR POOR

DRUM SIZE: 110 85 55 42 30 16 10 5 OTHER _____

DRUM CONTENTS: VOLUME FULL 3/4 1/2 1/4 <1/4 MT

OVERPACKED: NO YES Overpack Type: FIBER STEEL POLY

PHYS. STATE					COLOR	CLARITY			LAYER THICKNESS	FIELD ANALYSIS				
L	L	S	G	S	USE STD COLORS	C	C	O	INCHES	pH _____ SU _____ PID _____ ppm	DOSIMETER _____	OTHER _____	DRUM LABELS/MARKINGS	
A	I	O	E	L		L	L	P						
T														
M														
B													DOT HAZ _____ UN/NA _____	

MFG NAME _____

CHEMICAL NAME _____

ADDITIONAL INFORMATION _____

LABORATORY COMPATIBILITY DATA
 MARK IF PHYSICAL STATE AND COLOR MATCHES THE ABOVE INFORMATION. IF NOT, STOP ANALYSIS AND NOTIFY PROJECT CONTACT. FURTHER WORK WILL NOT BE PAID FOR.

COMPATIBILITY CAT: _____
 ANALYSTS: _____
 DATE PERFORMED: _____

RADIATION: POS NEG _____ MREM/HR

PHYS. STATE					COLOR	CLARITY	WATER SOL	REACT	pH	HEX. SOL	PER	OXID	CN	SUL	BIEL-STEIN	FLASH POINT	PCB _s (25ppm)	PCB TEST COMP
L	L	S	G	S	USE STD COLORS	C	C	O	SOLUBILITY SPSI DENSITY H OR L	A=AIR W=WATER STD. UNIT	S OR I	+ OR -	+ OR -	+ OR -	+ OR -	<60°C + OR -	+ OR -	NUMBER
A	I	O	E	L		L	L	P										
T																		
M																		
B																		

COMMENTS: _____

PCB CONC. _____ PPM FLASH POINT _____ °C COMPATIBILITY COMP. BULK # _____

DATA REVIEWER: _____ DATA REVIEW DATE: _____

FIELD REVIEWER: _____ FIELD REVIEW DATE: _____

TRANSFER NUMBER	TRANSFERS RELINQUISHED BY	TRANSFERS ACCEPTED BY	DATE	TIME
1				
2				
3				

APPENDIX B

WASTE DISPOSAL ACTIVITIES CHECKLIST



Job Name: _____ No. _____
Waste Name: _____
Profile Number: _____
Work Order: _____

Waste Type: Dry solid
 Wet solid / sludge
 Liquid
 Other (specify _____)

Shipment Form: Drums (size/type _____)
 Tankers
 Dump trailers
 Rolloffs
 Other (specify _____)

Estimated Quantity: _____

Number of Loads: _____

Disposal Facility: _____
Address _____

Phone _____

EPA ID# _____

Contacts _____

Transporter: _____
Phone _____

EPA ID# _____

Contacts _____

See attached pages for: Checklists
Drum labeling instructions (if applicable)
Example manifests & LDR forms
Drum or container lists
Shipping tracking forms
Special instructions

The site supervisor should review this material and the attached pages prior to performing work.



Notifications, Forms,
Manifests & other Shipping
Papers Checklist

Checklist of forms, notifications, manifests, and other paperwork associated with various federal, state and facility requirements & regulations. These items will be started by the T&D Coordinator but the site supervisor should review each for completion & inclusion with the shipment.

Checked off
on

- Determine if special state manifests are required. (AL, AR, LA, SC, & TX in the south) _/_/_
- Verify current manifests are being used? Get current ones if not. _/_/_
- Land Disposal Restriction notification(s) _/_/_
 - Facility LDR form required YES NO
 - State LDR form required YES NO
 - Current forms available and attached?
 - Background information & data to complete form(s) in place?
 - Forms completed & reviewed for accuracy
 - Forms signed by OSC/Client?
 - Forms included with material to be sent with shipment (i.e. manifest, etc.)

-
- Verify information or examples for manifests & labels is compiled & attached. _/_/_
 - Prepare manifests & LDR forms, and have them checked for accuracy. (The disposal facility will review and verify the accuracy and completeness of these forms.—SEND THEM ADVANCED COPIES!!!) _/_/_
 - Prepare drum labels, hazard class labels, & compile list of drum markings required. Labeling instruction sheets attached? _/_/_
 - Arrange for client/OSC signatures on manifests & LDR forms. _/_/_



Disposal Facility & Transporter Checklist

Activities conducted by the T&D Coordinator relating to scheduling and transporting waste to disposal facilities. These items will be started by the T&D Coordinator but the site supervisor should review each for completion.

Checked off
on

- All approvals in place, or all facilities chosen? / /
- Disposal windows lined up? Facilities have agreed to a specific receipt date, or have agreed to allow transporter to schedule material. Spoke with _____ / /

-
- Project management informed of final scheduling plans? / /
 - Client/OSC informed of final scheduling plans? / /
 - Field personnel informed of final scheduling plans? / /

-
- Three bids obtained for all disposal facility? / /
 - Disposal 3-bid approved & signed by client? / /
 - PO requisition for disposal completed & submitted? / /
 - Disposal vendor(s) given POs? / /

-
- Three bids obtained for all transportation? / /
 - Transportation 3-bid approved & signed by client? / /
 - PO requisition for transportation completed & submitted? / /
 - Transportation vendor(s) given POs? / /

-
- Transporter(s) are clear on the following: / /
 - Arrival times & dates
 - Delivery times & dates
 - Equipment required
 - Types of trucks expected
 - Directions to site
 - Road & driving conditions at site
 - Site contacts & phone numbers
 - Subs are OK provided OHM informed
 - Billing and contracting details



Drum Checklist

The site supervisor should review each of these for completion before loading drums on the truck.

- | | Checked off
on |
|--|-------------------|
| <input type="checkbox"/> Drums have been checked against inventory--there are no extra or missing drums? | _/_/_ |
| <input type="checkbox"/> Drums are in good shape--or they have been overpacked? | _/_/_ |
| <input type="checkbox"/> No leaks | |
| <input type="checkbox"/> No dents greater than silver dollar size | |
| <input type="checkbox"/> No creases greater than six inches | |
| <input type="checkbox"/> No lid, ring or bung damage | |
| <input type="checkbox"/> No damage to the seams or chimes | |
| <input type="checkbox"/> No waste on the outside of the drum | |
| <input type="checkbox"/> No large discolored areas on the drum | |
| <input type="checkbox"/> ALL drums are numbered with the numbers on the top AND side? | _/_/_ |
| <input type="checkbox"/> ALL drums have a complete waste label--either a yellow & red hazardous waste label or green non-hazardous label | _/_/_ |
| <input type="checkbox"/> Drums have hazard class labels (if required) on their tops AND sides? | _/_/_ |
| <input type="checkbox"/> Drums have approval numbers written on the top AND side | _/_/_ |
| <input type="checkbox"/> Drums have the TSD name written on the side? | _/_/_ |
| <input type="checkbox"/> If multiple trucks are used, an inventory record of which drums were loaded onto each truck is being made? | _/_/_ |



Drum Labeling Checklist

The site supervisor should review each of these for completion before loading drums on the truck.

- Checked off
on
//_
- [] Site supervisor has sufficient quantities of the appropriate drum labels?
 - [] Hazardous waste labels (yellow & red)
 - [] Non-hazardous labels (green)
 - [] Hazard class labels (i.e. flammable liquid, etc)
 - (which _____)
 - (_____)

 - [] Site supervisor has completed drum labels or has reviewed drum labeling instructions? _/_/_

 - [] Information on the drum labels is complete and matches the information on the manifest--This particularly important to double check when more than one manifest or truck is being used. Manifest numbers and other information will vary from truck to truck and manifest to manifest. Drum labels must match the specific manifest and the specific truck they are loaded onto. _/_/_
 - [] Generator's name
 - [] Generator's address
 - [] Generator's EPA ID number
 - [] DOT shipping name (Hazardous waste labels only)
 - [] EPA waste codes (Hazardous waste labels only)
 - [] Manifest number(s) (Hazardous waste labels only)
 - [] Accumulation Start Date (Hazardous waste labels only)



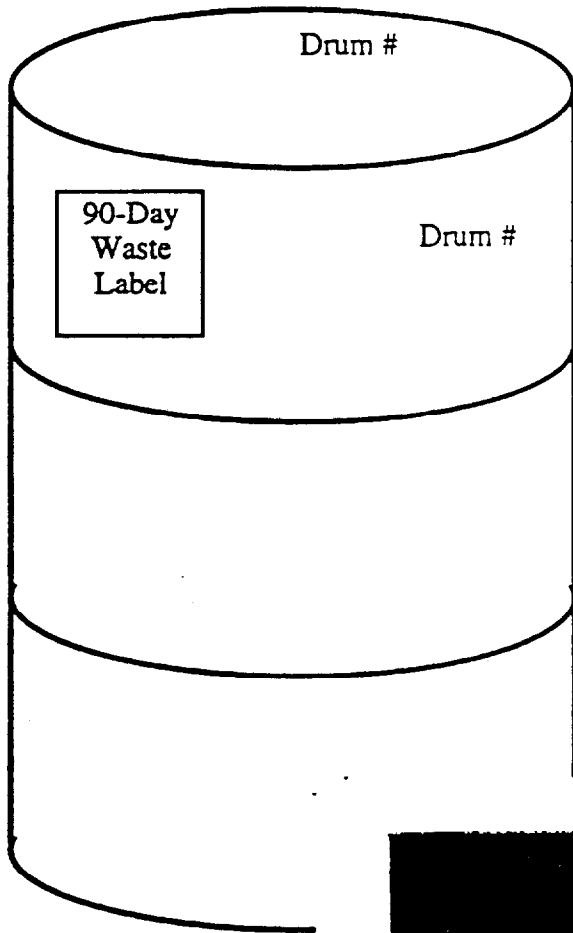
Manifest Checklist

Activities conducted by the Site Supervisor relating to manifests, LDR forms and other pre-shipment paperwork.

	Where to look	Checked off on
<input type="checkbox"/> Site supervisor has sufficient quantities of the appropriate manifests?		___/___/___
<input type="checkbox"/> Site supervisor has completed manifests or has reviewed manifest preparation instructions?		___/___/___
<input type="checkbox"/> Is a unique manifest number assigned to each manifest?	Section 1.	___/___/___
<input type="checkbox"/> Generator, Transporter, and Disposal facility information (including EPA id numbers, addresses, & phone numbers) complete & accurate--does it match sample manifests or manifest preparation instructions?	Sections 3-9 & A-H	___/___/___
<input type="checkbox"/> DOT description complete & accurate?	Section 11 lines a-d	___/___/___
<input type="checkbox"/> Number of containers, quantities, unites complete & accurate? Have the correct abbreviations been used?	Sections 12-14 lines a-d	___/___/___
<input type="checkbox"/> "Additional Description" section (including approval numbers and work order numbers) is complete & accurate?	Section J	___/___/___
<input type="checkbox"/> "Handling Codes" section (including emergency response guidebook codes) is complete & accurate?	Section K	___/___/___
<input type="checkbox"/> "Special Handling" section (including emergency phone number, and other special instructions) is complete & accurate?	Section 15.	___/___/___
<input type="checkbox"/> Client has signed manifest?	Section 16	___/___/___
<input type="checkbox"/> Transporter has signed manifest?	Section 17	___/___/___
<input type="checkbox"/> OHM has retained last page or a copy of manifest for our records?		___/___/___
<hr/>		
<input type="checkbox"/> LDR form is complete & included with manifest?		___/___/___
<input type="checkbox"/> LDR form has been signed by client?		___/___/___

90-DAY WASTE ACCUMULATION LABELING INSTRUCTIONS

(THESE LABELS ARE REQUIRED WHILE DRUMS ARE STORED ON SITE BEFORE TRANSPORTATION.)



SEE EXAMPLE LABEL BELOW...

NOTE: Label layouts may differ

40 CFR 262.34 states that a generator may accumulate hazardous waste on-site for 90-days or less provided that:

- (1) The waste is placed in containers and the generator complies with subpart I of 40 CFR 265 (See OHM's drum inspection log);
- (2) The "Accumulation Start Date" is clearly marked on each container; and
- (3) Each container is labeled clearly with the words "Hazardous Waste".

These labels comply with this rule and will be required on ALL drums OHM leaves on-site while conducting analysis and arranging disposal unless the drums are KNOWN to be non-regulated.

Drum Numbers for these instructions:

Comments:

HAZARDOUS

CONTENTS

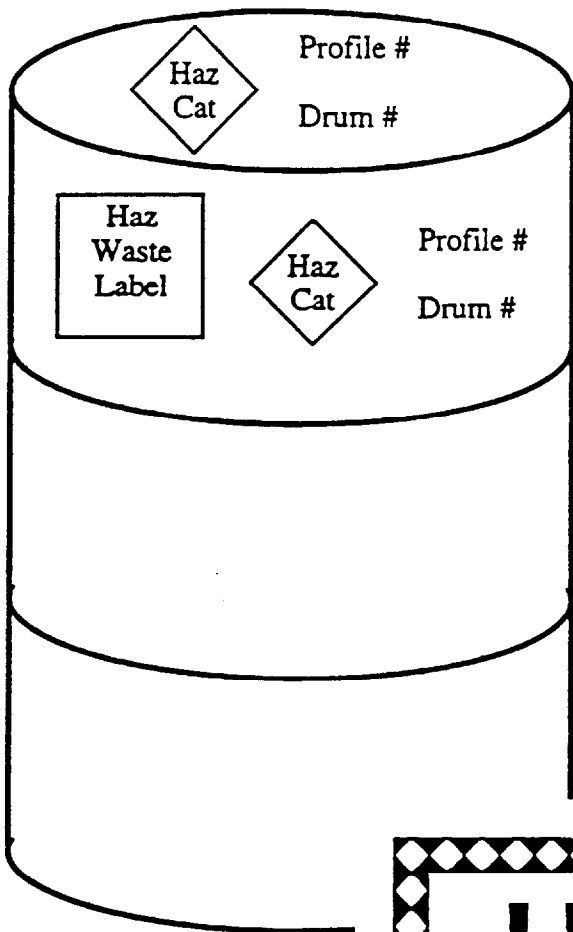
ACCUMULATION
START DATE

HANDLE WITH CARE !

WASTE

HAZARDOUS WASTE DRUM LABELING INSTRUCTIONS

(THESE LABELS ARE REQUIRED TO TRANSPORT WASTE DRUMS)



Waste Group _____

Profile Number _____

Hazard Category (check all applicable)

- Flammable Liquids (Class 3)
- Oxidizers (Class 5.1)
- Poison (Class 6.1)
- Corrosive (Class 8)
- Miscellaneous (Class 9)
- Other _____

SEE EXAMPLE LABEL BELOW...

NOTE: Label layouts may differ

Drums must be in good condition, this means:

- No leaks
- No dents greater than silver dollar size
- No creases greater than six inches
- No lid, ring or bung damage
- No damage to the seams or chimes
- No waste on outside of drum

Drum Numbers for these instructions:

Comments:

HAZARDOUS WASTE

FEDERAL LAW PROHIBITS IMPROPER DISPOSAL.

IF FOUND, CONTACT THE NEAREST POLICE OR PUBLIC SAFETY AUTHORITY OR THE U.S. ENVIRONMENTAL PROTECTION AGENCY.

GENERATOR INFORMATION:

NAME _____

ADDRESS _____ PHONE _____

CITY _____ STATE _____ ZIP _____

EPA / MANIFEST ID NO. / DOCUMENT NO. _____ / _____

ACCUMULATION START DATE _____ EPA WASTE NO. _____

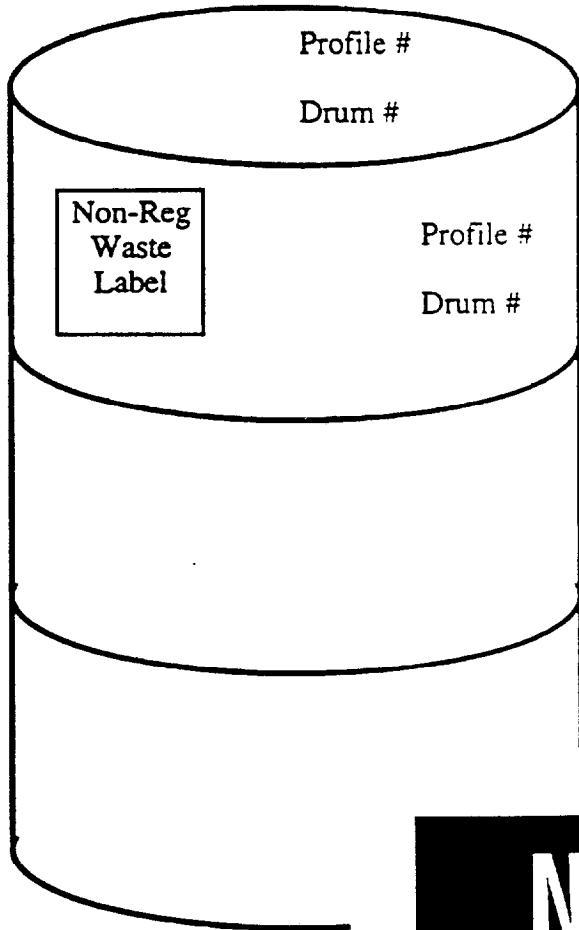
D.O.T. PROPER SHIPPING NAME AND UN OR NA NO. WITH PREFIX

HANDLE WITH CARE!

STYLE CFWM6

NON-HAZARDOUS WASTE DRUM LABELING INSTRUCTIONS

(THESE LABELS ARE REQUIRED TO TRANSPORT WASTE DRUMS)



Waste Group _____

Profile Number _____

SEE EXAMPLE LABEL BELOW...

NOTE: Label layouts may differ

Drums must be in good condition, this means:

- No leaks
- No dents greater than silver dollar size
- No creases greater than six inches
- No lid, ring or bung damage
- No damage to the seams or chimes
- No waste on outside of drum

Drum Numbers for these instructions:

Comments:

NON-REGULATED WASTE

OPTIONAL GENERATOR INFORMATION

SHIPPER _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

CONTENTS _____

NON-REGULATED WASTE

THIS WASTE IS NOT REGULATED BY THE U.S. ENVIRONMENTAL PROTECTION AGENCY.

