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OHM Remediation
Services Corp.

REMEDIAL ACTION WORK PLAN
DEBRIS REMOVAL ACTION
OPERABLE UNIT 6, SITE 43
MCB CAMP LEJEUNE, NORTH CAROLINA

Prepared for:

DEPARTMENT OF THE NAVY
Contract No. N62470-93-D-3032
Delivery Order 0077

Prepared by

OHM Remediation Services Corp.
Norcross, Georgia

George E. Krauter, P.E.
Program Manager

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

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OHM Project No. 17417

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1.0 INTRODUCTION

This Remedial Action Work Plan (RAWP) reviews OHM Remediation Services Corp.'s (OHM) approach to implementation of the scope of work under Delivery Order No. 0077 of Navy Atlantic Division (LANTDIV) Contract N62470-93-D-3032. Several other plans have been developed for this delivery order and are to be considered as complementary components to this work plan. They include:

- Site Safety Plan (SSP)
- Environmental Protection Plan (EPP) (included herein as Section 3.0)
- Sampling and Analysis Plan (SAP)

This RAWP identifies and describes how OHM will implement the major tasks encompassing the remedial action for Site 43 in conformance with the contract requirements. It includes the following sections:

- Section 2.0 Remedial Action Objectives
- Section 3.0 Environmental Protection Plan
- Section 4.0 Mobilization
- Section 5.0 Debris Removal
- Section 6.0 Transportation and Disposal Plan
- Section 7.0 Site Restoration
- Section 8.0 Demobilization/Final Report

1.1 SITE BACKGROUND

MCB Camp Lejeune was placed on the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), National Priorities List (NPL) effective October 4, 1989 (54 Federal Register 41015, October 4, 1989). Subsequent to this listing, the United States Environmental Protection Agency (USEPA) Region IV, the North Carolina Department of Environment, Health and Natural Resources (NCDEHNR) and the United States Department of the Navy (DoN) entered into a Federal Facilities Agreement (FFA) for MCB Camp Lejeune. The primary purpose of the FFA was to ensure that environmental impacts associated with past and present activities at MCB Camp Lejeune were thoroughly investigated and appropriate CERCLA response/Resources Conservation and Recovery Act (RCRA) corrective action alternatives were developed and implemented as necessary to protect the public health and the environment.

An ASTDR review of the CERCLA Site investigation performed by Baker Environmental, Inc. (Baker) recommended that the Remedial Action Contractor (RAC), OHM Remediation Services Corp. (OHM) be tasked with a removal action for surficial metallic debris present on the site. This action was deemed necessary due to the proximity of a day care facility and to protect children frequenting the site who could come in contact with the debris.

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1.2 SITE DESCRIPTION

The information presented in is section was obtained from the 1991 Baker Site Investigation (SI) and the scope of work contained in the request for proposal from LANTDIV.

Camp Lejeune is a training base for the U.S. Marine Corps, located in Onslow County, North Carolina. The base covers approximately 170 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.

Site 43 is located at Marine Corps Air Station (MCAS) New River to the southeast of the Camp Geiger area (Figure 1). The site is located approximately 1 mile north of the main entrance to MCAS New River and 1 mile west of the main runway. It is a level area approximately 11 acres in size. Site 43 is located east of Agan Street and adjacent to an abandoned sewage disposal facility. Edwards Creek and Straw Thorn Creek form the northern, eastern, and southern boundaries of the site. Marshes are present in and around the site. The site is densely wooded and heavily overgrown and contains various narrow dirt roads as indicated on Figure 1.

The following provides a brief description of the field observations noted during a site visit conducted on March 22, 1995:

- The northern portion of the site between Edwards Creek and the northernmost access road contains numerous metal frames, grease cans, paint cans, and an old barbecue pit.
- Metallic debris is located east of and adjacent to the main ring road, south of the easternmost dirt road.
- To the north, east, and south of the small circular road are located numerous fence posts, drums, pails, poles, and other small metallic debris.
- An old military armored vehicle (tank) is located west of the small circular road and its turret is nearby. Additionally, a metal cabinet is located approximately 100 feet west of the tank. Concrete rubble near the tank has rebar extending out.

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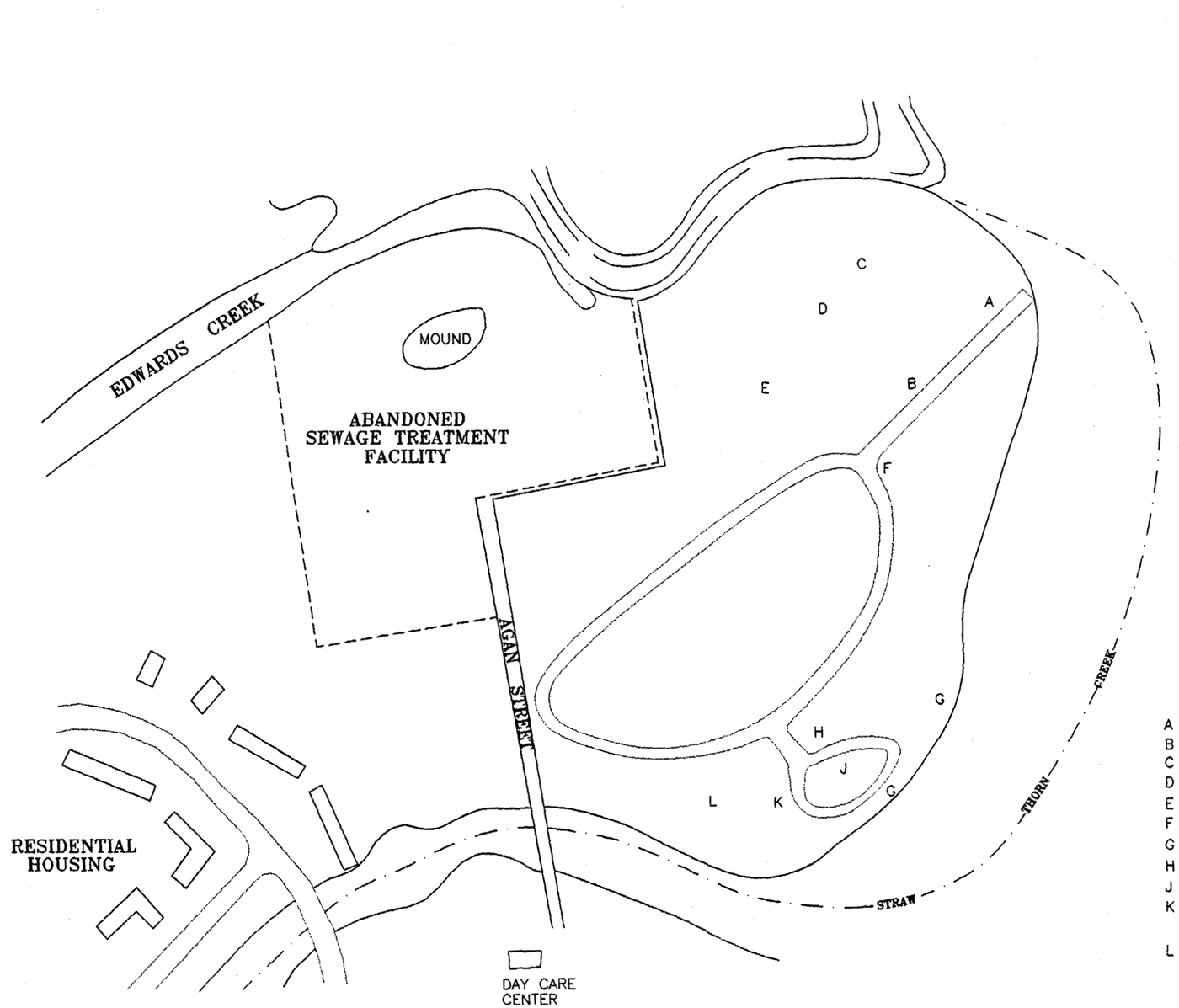

KNOWN METALLIC DEBRIS

- A METAL FRAMES, GREASE PAILS
- B PAINT PAILS
- C METAL FRAMES
- D METAL PAILS
- E BAR B QUE
- F METAL DEBRIS, DRUM
- G DRUM, PAILS, FENCE POST, POLES
- H DRUM
- J SMALL METAL DEBRIS
- K TRACKED VEHICLE (TANK) REBAR STICKING OUT OF CONCRETE RUBBLE
- L METAL CABINET

OHM Remediation Services Corp.
Norcross, Georgia
A Subsidiary of OHM Corporation

SUBMITTED: _____ PROJECT MANAGER: _____ DATE: _____
APPROVED: _____ DATE: _____

AT FULL SCALE (IF NOT 2" - SCALE ACCORDINGLY)
CADD FILE: SITE.DWG
DRAWN: J. COLLINS
DESIGNED: –
CHECKED: _____

REVISIONS

ZONE	REV.	DESCRIPTION	BY	DATE	APP.

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FIGURE 1
SITE PLAN
AREA 43
D.O. 77 WORK PLAN

01481EE012

DRAWING IS NOT TO SCALE

1.3 SITE HISTORY

Boards, trash, fiberglass and sewage treatment plant (STP) sludge reportedly were disposed on the ground surface. The years of operation are unknown (Halliburton/NUS, 1991). It is reported that minor quantities of solid wastes and possibly petroleum, oil, and lubricants (POL) wastes may also have been disposed on-site. However, the type and quantity of the wastes are not known.

A SI was conducted in 1991 by Baker Environmental; sampling and chemical analysis was performed on soil, groundwater, surface water and sediments. Five soil borings and three monitoring wells were installed at Site 43 during the Baker investigation. The maximum depth of drilling was 12 feet Below Ground Surface (BGS). The soils encountered generally consist of 1 foot of humic material underlain by gray to brown, medium-grained sand. The humic material may be a result of frequent flooding in the area. The estimated density, calculated from the hammer blows during drilling, ranged from very loose to medium dense, with the majority of the samples falling in the medium dense range. No debris was encountered in any of the soil samples.

Groundwater was encountered during drilling operations at depths ranging from 0.9 to 6.0 feet BGS. Based upon topographic conditions and static water levels, shallow groundwater flow migrates radially from the site in the direction of the Edwards and Straw Horn Creeks. Following is a summary of the contaminants that were detected in the media sampled.

Soil

Polynuclear aromatic hydrocarbons (PAHs) were detected in one surface soil sample [less than 2 parts per million (ppm)] at location 43GWO1. PAHs may be present in this area of the site since two downgradient sediment samples also exhibited low levels of PAHs. No other area of the site exhibited similar organic soil contamination. None of the chemicals detected exceeded USEPA Region III risk-based concentrations (RBCs); however, various inorganic contaminants such as barium, copper, manganese, nickel and calcium exceeded twice the base-specific background levels in one or more samples. No inorganic level exceeded regional background values.

Groundwater

Groundwater was not contaminated with PAHs even at the location where PAHs were observed in soil. This is likely due to the "immobile" nature of PAHs. The only organic contaminant present in groundwater is carbon disulfide. This contaminant was not detected in any other medium. Beryllium, cadmium, chromium, lead, iron, manganese, and nickel (all total metals) were detected in concentrations which exceeded either Federal MCLs and/or NCWQs.

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Surface Water

Copper, iron, lead, manganese, and zinc were detected in surface water above state and/or federal standards. Based on these standards, aquatic life could potentially be adversely impacted. Benzoic acid (a semi-volatile organic compound) was the only organic contaminant detected in the surface water samples. There is no state water quality standard, federal Ambient Water Quality Criteria (AWQC), or Freshwater Water Quality Screening Value (FWSV) for benzoic acid.

Sediments

PAHs may have migrated via surface run-off into Edwards Creek and the low-lying marsh areas. PAHs were detected at the confluence of Edwards Creek and Straw Horn Creek, just downgradient from the soil sample location where PAHs were detected at the surface. Along with the occurrences of PAHs at two of the five sediment sampling locations, the pesticides 4,4-DDE and 4,4-DDD were present in low concentrations (less than 580 micrograms per kilogram (µg/kg) at three locations. No pesticides were detected in soil, groundwater or surface water. The pesticides may be associated with historical mosquito control practices. (Low pesticide levels have been detected in most streams and creeks throughout MCB, Camp Lejeune.)

Sediment screening values for the protection of biota were exceeded by lead and zinc levels in sediment. The concentrations of these contaminants fall in the range as potentially causing "possible" adverse effects on biota. The pesticides detected in the sediment were at levels where adverse effects on biota are "probable."

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2.0 REMEDIAL ACTION OBJECTIVES

In accordance with Section 121(d)(1) of CERCLA, remedial actions must attain a degree of clean-up which assures protection of human health and the environment. Remedial goals have been based on meeting an Applicable or Relevant and Appropriate Requirement (ARAR), or a site-specific risk based action level.

The remedial objective for this specific action at Site 43 is to remove and dispose of surficial metallic debris which could pose a physical hazard to persons entering the site. This surficial metallic debris exists at locations depicted on Figure 1.

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3.0 ENVIRONMENTAL PROTECTION PLAN

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. 0077 Debris Removal Action, Site 43. The plan will provide site-specific information for:

- Land resources management
- Water resources management
- Air and noise pollution control
- Non-compliance/corrective action
- Post-evacuation cleanup

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 MCB Camp Lejeune, but outside the limits of permanent work, will be preserved in their condition or restored to a condition after completion of construction that does not detract from the appearance of the area. As much as is practical, construction activities will be limited to areas defined by the plans and specifications.

3.1 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 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.

3.2 TEMPORARY CONSTRUCTION ROADS

The construction of all 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. It is not expected that any new construction roads will be necessary for this removal action.

3.3 PROTECTION OF TREES AND SHRUBS

Prudent steps will be taken to protect trees and shrubs outside of the work zone as necessary. Those trees and shrubs within the work 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

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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

3.4 RESTORATION

Upon completion of the field construction activities, disturbed areas will be seeded. Prior to seeding and fertilization, lime will be applied as a soil amendment as needed for pH adjustment at a rate of approximately 40 pounds per acre.

Any trees or other landscape features damaged by equipment will be restored if practical by trimming of damaged limbs and application of tree dressing. Damaged trees which cannot be restored will be felled, limbed and left on-site. Soil will be placed and compacted around any root systems exposed during excavation activities.

3.5 WATER RESOURCES PROTECTION

Edwards and Straw Thorn Creeks Creek are located near Site 43 and 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 held at a minimum.

3.5.1 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

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grade. Fabric will be attached to the upslope 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.

3.5.2 Spill Control

Measures will be taken to prevent chemicals, fuels, oils, greases, bituminous materials and contaminated materials from entering streams, rivers or lakes. Absorbants 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.

3.6 DUST AND AIR POLLUTION CONTROL

3.6.1 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 noise pollution on off-site personnel. Noise exposure to off-site residents or personnel is expected to be minimal. Hearing protection will still be implemented if necessary as specified in the SSP.

3.6.2 Particulate Emission Controls

Specific measures to be taken to minimize particle emissions for major activities during site construction include the following:

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

3.6.3 Burning

No burning will be performed on-site. In the event of an unexpected fire on-site, work will stop immediately and the MCB Camp Lejeune fire department will be notified.

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3.7 CLEANUP

All equipment will be decontaminated prior to demobilizing from the site. Decontamination will consist of scraping and pressure-washing to remove visible soil and debris from tires and undercarriage of vehicles and heavy equipment. Decontamination fluids will be containerized and samples procured and analysis prior to disposal.

The site will then be turned over to the MCB.

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4.0 SITE PREPARATION AND MOBILIZATION

Prior to mobilization, OHM will arrange a pre-construction meeting at MCB Camp Lejeune with LANTDIV and other responsible parties. 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, 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
- Obtain photographs of the sites for pre-construction documentation of existing site conditions

OHM will submit the qualifications and licenses of subcontractors performing debris transportation and materials recovery. The qualifications of subcontractors including small and disadvantaged businesses proposed to perform work at the site will also be submitted. Additionally, other material/product submittals jointly identified as necessary will be submitted in accordance with the approved submittal register.

OHM will mobilize personnel and equipment from its Southern Region offices, including Morrisville, North Carolina; Covington, Georgia; and Gallatin, Tennessee offices. 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.

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. This area will serve as the control check point for contractor/subcontractor personnel entering the site.
- **Clearing and Grubbing** - Trees preventing removal of debris will be cut and staged in a convenient location for pickup by the Forestry Service.
- **Upgrade access roads** – Roads leading to the project site will be graded and if necessary stone will be placed in low, soft or water accumulating areas.

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- **Erosion and Sedimentation Control** - OHM will establish controls to prevent erosion and sedimentation through the use of sediment fencing and diversion berms. 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** - The OHM command trailer will serve as a security check point for the project site. 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. OHM health and safety personnel will provide continuous site air monitoring and will adjust work zone boundaries as appropriate.

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5.0 DEBRIS REMOVAL

During the site visit conducted on March 22, 1995, it became evident that several areas of the site contained numerous items of metallic debris which were scattered throughout the areas. As a result, this project has been divided into two distinct phases:

- Phase I – Debris Gathering and Removal
- Phase II – Tank Removal

Individual activities of each work phase are described in the ensuing paragraphs.

5.1 DEBRIS GATHERING AND REMOVAL

An extensive reconnaissance of the site will be performed to effect this phase of the work. Areas of the site found to contain the most metallic debris during the site visit are the area north of the east dirt road containing debris categories A through E and the area between the small circular road and Straw Creek containing debris category G (debris categories and locations are described on Figure 1). A winch truck equipped with gin poles will be employed to extract the heavier pieces of metallic debris from the wooded areas of the site. Loose soil or non-metallic material will be removed from the debris by shaking. If conditions warrant, wire brushes will be used to aid in soil removal. Gathered metallic debris will be loaded into bins or trucks for transportation to the recycling facility.

Grease pails will be collected and drummed. Drummed pails will be managed under the existing wastestream approval at the facilities of Laidlaw Environmental in Pinewood, South Carolina. Pails suspected of containing waste paint materials will be drummed. Waste characterization, sampling and analysis will be conducted on composite samples of this material. Preliminary indications are that this material will be routed to incineration disposal at the facilities of Therma Chem in Rock Hill, South Carolina.

5.2 TANK REMOVAL

Upon completion of the debris gathering phase of the project, OHM will mobilize a trackhoe equipped with a grappler to the project site. The tracked vehicle (tank) is located approximately 50 feet off a dirt access road. To provide access for the grappler and trackhoe and a route for removal of the tank, it may be necessary to remove up to six trees and various undergrowth. Trees will be removed and limbs and stumps cut off. Salvageable timber will be handled by the Forestry Division. Limbs will be routed to the Base landfill. Stumps will also be routed to the Base landfill after removal of all soils.

Necessary hot work permits will be secured prior to commencement of activities. The tank will be torch cut into manageable pieces. The grappler will be utilized to load the tank parts

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onto transport vehicles. Reinforcing steel protruding from the concrete rubble will be torch cut to render the rubble dull. Disturbed areas of soil will be regraded to match adjacent contours.

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6.0 TRANSPORTATION AND DISPOSAL PLAN

6.1 WASTE DISPOSAL

During the site visit, pails of spent materials were discovered at Site 43. Visual investigation revealed two basic types of materials contained within the pails – grease and suspected paint waste. The grease materials were found in pails labeled to be like grease materials previously characterized as nonhazardous. The suspected paint waste materials will be sampled and analyzed as indicated in the attached sampling and analysis plan.

OHM will assign a Transportation and Disposal (T&D) Coordinator to this project 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 analytical data and obtain approval from the appropriate disposal facilities. The T&D Coordinator will also be responsible for preparing waste profiles to the selected disposal facilities and coordinating disposal approvals.

Based on the materials identified that will require off-site disposal, the T&D Coordinator, in consultation with project management and procurement personnel, has reviewed and prequalified potential 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
- SB and SDB contract goals

At this time OHM has identified the following qualified vendors to provide transportation and disposal of wastes from this site:

Disposal
- Browning-Ferris Industries
  Charlotte, North Carolina
- Chemical Waste Management
  Morrow, Georgia
- Laidlaw Environmental
  Pinewood, South Carolina
- Therma Chem
  Rock Hill, South Carolina

Transportation
- Hilco Transport Inc. (SB, WBE)
  Wilmington, North Carolina
- Robbie D. Wood
  Dolomite, Alabama
- Terra First
  Jacksonville, FL

Recycling
- J&E Salvage
  Jacksonville, North Carolina
- Gollman Metals
  New Bern, North Carolina

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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. It is anticipated that decontamination liquids will be sent to the Base POTW for treatment.

6.2 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, as required, TSDF waste profiles, hazardous waste manifests, land disposal restriction 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 start of shipments.

Written verification that the proposed disposal sites are permitted to accept the contaminated materials specified is required for 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. A certificate of destruction will be provided within seven days of the date of actual waste disposal and for final payment of all invoices.

6.3 WASTE PACKAGING

OHM plans to drum all waste materials. Metallic debris will be directly loaded into roll-off boxes for shipment to the recycling facility. All temporary storage of hazardous waste containers will be in compliance with 40 CFR 262.34 and the applicable North Carolina regulations.

6.4 SHIPPING

All trucks used for transporting material will be decontaminated prior to leaving the project site. Personnel involved with debris removal will be attired in Level D Personal Protective Equipment (PPE).

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All metallic debris destined for off-site materials recycling will be transported by licensed material haulers. All trucks will pre-weigh at the base scales to establish their tare weight prior to being loaded. After loading and prior to exiting the controlled area, a pressure washer will be used to decontaminate the truck's tires and trailer sides. The trailer will then be tarped and weighed at the base scales. Each load will be properly manifested for the designated materials recovery facility. LANTDIV, or designated MCB Camp Lejeune personnel, will be responsible for signing manifests as the generator for each off-Base shipment.

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 attached Waste Disposal Activities Checklist. This checklist is to be completed for each waste shipment leaving the site. A copy of the completed form will be provided to the CO prior to waste transportation and with the Final 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.

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7.0 SITE RESTORATION

7.1 GRADING

Any areas which have been disturbed by debris removal activities will be regraded to meet existing contours of unaffected adjacent areas. Depressions resulting from stump or debris removal will be filled as required using Base borrow material.

7.2 SEEDING

Grass seed matching existing vegetation will be placed at the rate of 5 pounds per 1,000 square feet over topsoil areas. Fertilizer, Type I, Class 2, 10-10-10 analysis will be applied at the rate of 25 pounds per 1,000 square feet. Mulch and water will be applied as required to obtain an acceptable stand of grass.

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8.0 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.

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OHM Remediation
Services Corp.

SAMPLING AND ANALYSIS PLAN
FOR
DEBRIS REMOVAL ACTION
AT SITE 43
MCB CAMP LEJEUNE, NORTH CAROLINA

Prepared for:

DEPARTMENT OF THE NAVY
Contract No. N62470-93-D-3032
Delivery Order 0077

Prepared by

OHM Remediation Services Corp.
Norcross, Georgia

George E. Krauter, P.E.
Program Manager

5/18/95
Date

James A. Dunn, P.E.
Project Manager

5/18/95
Date

Terence A. Whitt
Senior Project Chemist

5-18-95
Date

Theresa D. Rojas
Project Chemical QA/QC Officer

5-18-95
Date

May 1995

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1.0 INTRODUCTION

This Sampling and Analysis Plan (SAP) presents, in specific terms, the policies, organization, functions, and QA/QC requirements designed to achieve the data quality goals for Delivery Order 0077 under the contract N62470-93-D-3032 for the Navy Atlantic Division (LANTDIV) at the Marine Corps Base (MCB), Camp Lejeune, Jacksonville, North Carolina. This SAP integrates the required components of a quality assurance project plan (QAPP) and a field sampling plan.

This document shall be read, understood, and implemented by the Project Manager, Project QC Manager, Project Chemist, Field Chemist/Scientist, and Sample Technicians. Any field changes shall be approved by the Navy's Technical Representative (NTR), Project Manager, and Project Chemist. These changes shall be documented by the Field Chemist/Scientist and distributed to the appropriate persons as amendments to the SAP.

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2.0 PROJECT MANAGEMENT

2.1 Project Background

The objective of this project is to remove and dispose of all scrap metallic debris, grease pails and possible paint waste from Site 43. The site is located about 1 mile north of the main entrance to MCAS, New River and 1 mile west of the runway. The site is a level area about 11 acres in size. Marshes are present in and around most of the site. Initial site investigations concluded that only construction debris was on the site and no hazardous waste activities occurred.

2.2 Project Task Descriptions

The project tasks applicable to the SAP are connected only to the disposal of the possible paint waste on the site. No environmental sampling is anticipated. Unknown pails (suspected paint waste) will be sampled, drummed, and disposed at the proper facilities.

2.3 Project Organization

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

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

Project Manager - James A. Dunn, Jr., P.E.
The project manager is responsible for the overall direction of this project executed under his/her 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

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- 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 basis, design parameters, drawings, and reports
- Approval of project remedial action/construction methodologies
- Dissemination of project-related information from the client such as design basis, 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

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 E. 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.

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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 day-to-day site activities in accordance with project and program requirements
- Preparing the Contractor Production Report
- Initiating corrective actions for non-conformance identified on-site

Project Chemical QA/QC Officer - Theresa D. Rojas
The chemical QA/QC 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:

- Determining if the project and data quality objectives are being met
- Reviewing subcontractor's QA Manuals and/or Laboratory Quality Management Plans (LQMPs) and if possible, performing audits on the labs
- Certifying the level of QA that has been achieved during the generation of analytical data
- Initiating and overseeing all audit functions
- Stopping work if quality objectives are not being met
- Initiating investigations for non-conformances, identifying appropriate corrective actions, and performing follow-up audits to ensure that the corrective actions were successful

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Project Chemist - Terence A. 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 coordination QA efforts with the contracted laboratory. His specific responsibilities include, but is not limited to, the following:

- Evaluating chemical data for technical validity and ensuring adherence to published guidelines
- Analyze and interpret 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 SAPs
- Implementing corrective actions as required by the QC engineer or chemical QC officer
- Ongoing QA/QC training of new and current personnel

Field Chemist - To Be Determined As Needed
The field chemist will:

- Implement the SAP 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
- 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 SAP

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Sample Technician - To Be Determined As Needed
The sample technician will be responsible for:

- Carrying out all sampling in accordance with approved procedures and methodologies as defined in the SAP
- Completing sampling logbooks, sampling forms, labels, custody seals, and chain-of-custody forms

2.4 Data Quality Objectives for Measurement Data

- change table 2

Project-specific quality objectives are listed in Appendix A, Table A-2. These include the quantitation, action, accuracy, precision, and completeness limits by which the data will be evaluated.

A NEESA-certified laboratory will be used for all waste 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.

The disposal samples will meet, at a minimum, NEESA 20.2-047B QA/QC Level E requirements, as directed by the ROICC. All other samples such as the "clean" soils and confirmation samples will meet, at a minimum, NEESA 20.2-047B QA/QC Level C requirements. All sampling and analytical activities will be in accordance with federal, state, and local regulations. The data will be reviewed by the Project Chemist before transmittal to the field or to T&D staff.

5% duplicates
1 field blank
1 equipment rinsate
1 per cooler

does not seem to be a high enough level. Level D would be more appropriate. LEVEL E under NEESA requires some blanks to be taken

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3.0 SAMPLING

3.1 Sampling Methods and Procedures

~ will one composite be sufficient to characterize entire waste stream? Is one truly representative? How much waste?

One composite sample of the unknown containers will be collected and sent to the off-site laboratory for all the analysis listed in Appendix A, Table A-1. Additional analysis may be required due to disposal facility requirements. These will be added when necessary. Each type of waste material will be sampled and mixed thoroughly in a clean stainless steel (ss) bowl or bucket to obtain a relatively homogeneous mixture. A composite sample will be placed into the appropriate containers and sent for off-site analysis.

how exactly will a piece of metal be sampled what tools etc.

3.2 Sample Identification

All samples collected on-site will be provided with a unique sample designation. The number will serve to identify the site, location, and specific sample number. The sample designation format will appear as follows:

CLJXX-YY-NNN

Where:

CLJ = Camp Lejeune

XX = D.O. for the project (77)

YY = Sample Task:
Characterization Disposal (CD)

NNN = Sequential number starting at 001

Additional information may be required in the sample identification (ID) column. This will include operable unit, site designation, and any grid coordinates or location designations associated with the sample.

3.3 Sample Preservation and Holding Times

When samples are collected for off-site analyses, they 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 of collection in the field.

All environmental samples, as well as QA/QC samples, will be preserved to a temperature of 4°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.

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3.4 Field QC Samples

No field QC samples will be required.

3.5 Decontamination

All sampling equipment (hand augers, spoons, stainless steel/glass mixing bowls, etc.) will be decontaminated before sampling commences, and prior to leaving the site. The procedures for decontamination of equipment are described below.

1) Remove gross contamination by scraping or brushing

2) Clean with tap water and phosphate-free laboratory detergent (liquinox or alconox), using a stiff brush to remove all surface contaminants

3) Rinse thoroughly with tap water

4) Rinse thoroughly with deionized/distilled water

5) Rinse twice with reagent grade isopropanol or methanol

6) Rinse thoroughly with organic-free (ASTM Type II reagent grade) 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.)

7) Wrap equipment with aluminum foil prior to storage or transportation to sample locations

Decontamination fluids will be collected in properly labelled 55-gallon drums or other suitable containers, and staged in a secure area until final disposal. on-site ? will these drums be sampled for disposal ??

3.6 Cross-Contamination Minimization

Cross-contamination is the introduction of contaminants into the sample through the sampling and/or sample-handling procedures. It can cause an otherwise representative sample to become non-representative. The most important means of minimizing cross-contamination are as follows:

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- Name of laboratories and contacts to which the samples were sent, 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 obtaining 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 party
- Details of QC samples obtained

These notes will be dated and signed (each page) for validity in a court of law. All logbooks will be bound and prenumbered. 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 into the database program that has been prepared for this site. It will be entered daily by the field chemist or sample tech. This person will be the point of contact for all sampling and analytical information. Report outputs from the database are acceptable substitutes for the sample log book.

3.8 Sample Labels

Any samples placed into a sample container will be identified by a sample label. Included on the label are the following information:

1) JOB NUMBER
2) DATE -- Month, day, year

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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 REQUESTED -- see Appendix A, Table A-1

The information described above will 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 included in Appendix B.

3.9 Custody Seals

Custody seals are narrow strips of adhesive tape of glass fiber used to demonstrate that no tampering has occurred. They may be used on sampling equipment, sample transport containers, and individual sample jars. They will be signed and dated by the sampler and placed from one side, across the top, and to the other side of the sample bottle or across the openings of the sample transport containers. An example custody seal is included in Appendix B.

3.10 Chain-of-Custody Procedures

Because of the evidentiary nature of 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.

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A copy of a COC form is included in Appendix B. The following information is required on the COC:

1) Project Name

2) Project Location -- City and State in which the project 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 given (Project Manager, Site Supervisor, or Project Chemist)

5) Site Telephone Number -- Telephone 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/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 parameters, method numbers, and specific compounds of interest, if applicable.

13) Airbill Number

14) Laboratory -- Laboratory where samples are to be sent

15) Laboratory Phone -- Telephone number of laboratory

16) Laboratory Contact -- Contact for laboratory

17) Relinquished By -- Signature of sender (OHM)

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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). An example COC is included in Appendix B.

3.11 Packaging, Handling, and Shipment of Samples

Samples will be packaged as to minimize shifting of the samples during shipment. An absorbent, such as vermiculite or kitty litter, will be placed at the bottom of the shipment container in order to absorb any liquids in the event of sample breakage. All samples will be individually placed into appropriately sized ziploc bags and sealed.

Samples which must be kept at 4°C will be shipped insulated containers with either freezer forms or ice. If ice is used, it will be placed in a container such as a trash bag and sealed so that water will not fill the shipping container as the ice melts.

Samples will be shipped via Federal Express 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 papers are included in Appendix B. These instructions are for shipping samples with unknown or limited hazards. NO CHANGES OR SUBSTITUTIONS TO THESE INSTRUCTIONS ARE ALLOWED – NO MATTER HOW INSIGNIFICANT THEY MAY SEEM. A copy of the OHM sample shipping label is included in Appendix B.

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4.0 DATA ACQUISITION

4.1 Analytical Method Requirements

Analytical requirements for this project are listed in Appendix A, Table A-1. All samples will be analyzed according to *USEPA SW-846 Test Methods for Evaluating Solid Waste, Physical/Chemical Methods* whenever possible. Alternative methods of analysis from other sources (ASTM, NIOSH, Standard Methods, etc.) may also be used, with NTR approval.

4.2 Quality Control Requirements

Project Quality Control (QC) requirements for precision, accuracy, completeness, and quantitation limits are listed in Appendix A, Table A-2. QC procedures and acceptance limits may not be met as specified in the individual methods due to the type of sample analyzed. These are guideline limits only and may not be attainable due to the matrix and analyte concentrations of the waste.

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5.0 DATA MANAGEMENT

Data management is the system by which data is reduced, reviewed, validated, reported, distributed, and finally archived. The criteria in this system are designed to meet the project objectives.

5.1 Laboratory Data Reduction

Data reduction includes the identifications and calculations necessary to convert the raw instrument readings to the final reported compounds and their respective concentrations.

Responsibilities of Analyst
Each analyst is responsible for converting raw data into reportable values. These specific duties include:

- Proper identification of the analyte
- Generation of calculations
- Checking all calibrations to ensure support of data
- All QA/QC checks are supportive of data
- All documentation is complete and accurate in respective log books
- All chromatograms and strip chart recordings are labeled with data, instrument number, run parameters and analyst

5.2 Laboratory Data Validation

All data generated within the laboratory will be extensively checked for accuracy, precision completion. The analyst who generates the raw data has the prime responsibility for the accuracy and completion of the data. All data generated and reduced follows protocols specified in the laboratory (SOP).

5.3 Project Data Review

The Project Chemist will review the data from the laboratory and consult with the laboratory if any problems are noted. The reviewed data will then be sent to the different users.

No data validation will be required on this project.

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5.4 Data 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 file documents are reviewed and submitted to the general 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
   - Intra-office
   - Client
   - Regulating agencies
   - Record of confidential material
G. Report notes, calculations, drafts
H. References, literature
I. Sample (on-hand) inventory
J. Check-out logs
K. Litigation documents
L. Miscellaneous – photographs, maps, drawings, etc.

Once deposited in the file, documents must be checked out.

The final report is usually generated by use of computer. A back-up copy of the report on diskette is filed along with the project file. The original report remains in the hard drive of the computer until such a time is required to download it on a diskette. This diskette is also archived.

All information under the corresponding project number is maintained in the archive system for five years. All archives are accessed by the archives file master list which is maintained in a separate location from the archives.

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6.0 DATA ASSESSMENT PROCEDURES

Reliability in analytical determination is maintained through strict adherence to quality control procedures. Procedures are designed to control both the accuracy and precision of analytical results. Depending on the level of certification 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 are entered on the control table. If a standard addition technique is used, a plot of instrument response versus added analyte concentration is made in order to determine analyte concentration in the original sample. These are further explained in the laboratory's QAM.

Replicate analyses will be performed on at least 10 percent of the samples processed by the laboratory. A record of the precision of most analyses is kept by calculating and plotting the industrial statistic I (which is equivalent to the coefficient of variation). Blanks are also run with each batch of samples or individual sample analyzed regardless of the level of certification of the data.

The purpose of spikes, blanks, and replicates is to provide a sound scientific basis from which the degree of certification of the resultant data can be objectively concluded. These are not management decisions, but follow naturally from the results of the above QC procedures.

6.1 Accuracy

Data accuracy is a reflection of the efficiency of the analytical procedure. It is determined by use of spiked samples and standard reference materials or laboratory control samples performed at the rate of one set every 20 samples. A control chart is generated using historical laboratory data where warning and control limits are established to assess data accuracy.

The accuracy (check standards) samples will have concentration values of the mid-standard. During analysis, a minimum of 10 percent of samples must be accuracy samples. The accuracy samples must be 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.

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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:

$$\text{Upper control limit} = p + 3SD$$
$$\text{Lower control limit} = p - 3SD$$

Where:

p = Average percent recovery
SD = Standard deviation

After the standard deviation, for the seven or more samples has been calculated, the accuracy control limits will be 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 must be calculated using the new accuracy check values. If the values fall between the upper and lower limits, then conditions are reported as "within limits."

6.1.1 Recovery Control

Recovery control is necessary to determine if the sample matrix is interfering with the constituent being analyzed. A minimum 5 percent of samples will be recovery check samples (matrix spikes). Samples involving different types of matrices must have at least one recovery check for each type.

Control limits will be determined for each matrix, determining the deviation for seven or more percent recovery values.

6.2 Precision

Duplicate and replicate samples analyzed by the laboratory assess the precision of the sampling effort. Control limits for duplicate/replicate RPDs are listed in Appendix A, Table A-2. Once a sufficient amount of replicate data becomes available, field precision control charts are constructed similar to the laboratory precision charts. For any given concentration, the mean and the standard deviation(s) of the replicates are calculated. The mean is the centerline of the control chart. Data from each sample set are pooled with the previous sample sets to generate control and warning limits for the next set. Warning and control limits for water samples are set at ±2s and ±3s, respectively. Control limits for solid samples are more liberally established due to matrix heterogeneity. Data outside any control limit are subject to QA review.

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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.

Present practice is to include MS and MSD samples on a per batch basis or a minimum frequency of 5 percent. Duplicate results are compared and the relative percent difference (RPD) is then determined. The RPD will be entered into the laboratory's data system and will be used to define the precision of the analysis. Minimum limits are listed in Appendix A, Table A-2.

6.3 Completeness

The field supervisor is responsible for ensuring that all field instrumentation and equipment are functioning properly and calibrated according to set procedures, and that all data are recorded accurately and legibly. In addition, the field supervisor must ensure all sites are sampled for all the specified analyses, that sufficient sample volume has been provided to complete those analyses, and that all of the QA samples have been included with each sample set. The goal for completeness for each sample set shipped to the laboratory is 100 percent. Minimum limits are listed in Appendix A, Table A-2.

Completeness is expressed as the percentage of the amount of valid data obtained to the amount of data expected. For a set of data to be considered complete, it must include all QC data verifying its accuracy and precision.

If samples analyzed do not meet all QC requirements in terms of accuracy and precision for any specific parameter, the sample preparation and analysis will be repeated pending adequate volume.

6.4 Criteria for Rejection of Outlying Measurements

There are many statistical tests for rejection of outlying data points obtained from a set of measurements from a single population. A test recommended in "Statistical Manual of the Associate of Official Analytical Chemists," 2nd Edition, W. J. Youden and E. H. Steiner, 1975, pg. 86, is the Dixon Test. This test is not dependent on the distribution of the data and can be used for as few as three measurements. A more complete description for this broadly applicable test can be found in the referenced text.

Another reference is the USEPA National Functional Guidelines for Data Validation of Organics and Inorganics. Also, specific programs may have quality objectives with criteria for rejection of outlying measurements.

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6.5 Method Detection Limits and Practical Quantitation Limits

Method detection limits (MDLs) will be established by the laboratory. This should, at a minimum, be established on a yearly basis. MDL is the minimum concentration of a substance that can be identified, measured, and reported with 99% confidence that the analyte concentration is greater than zero.

Practical quantitation limit (PQL) is the lowest level that can be reliably determined within specified limits of precision and accuracy during routine laboratory operating conditions. The PQLs are generally 5-10 times the MDL. The PQL is the most applicable limit of reporting for this program.

6.6 Laboratory and Field Contamination

It is not unusual to find the following analytes at trace levels in the samples:

NOT APPLICAB

- 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.

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7.0 PERFORMANCE AND SYSTEM AUDITS

Audit is defined as systematic check to determine the quality of operation of field and laboratory activities. It is comprised of the following:

- Performance audit
- System audits

These include a detailed review of each operating component of the network. Auditing will ultimately assist in determining if each element within a system is functioning appropriately per the QA program requirements.

7.1 Field Performance Audits

Field performance audits are performed on an ongoing basis during the project as field data is generated, reduced, and analyzed. All numerical analyses, including manual calculations are documented. All records of numerical analysis are legible, of reproduction quality, and supporting to complete permit logical reconstruction by a qualified individual other than the originator.

Other indicators of the level of field performance are the analytical results of the blank, duplicate, and replicate samples. Each blank analysis is an indirect audit of effectiveness of measures taken in the field to ensure sample integrity. The results of the field duplicate and replicate analysis is an indirect audit of the ability of each field team to collect representative sample portions of each matrix type.

7.2 Field System Audits

System audits of site activities are accomplished by an inspection of all field activities by the Project QC Officer. This audit is composed of comparisons between current field practices and standard procedures. The following is a list of criteria to be used in the evaluation of field activities:

- Overall level of organization and professionalism
- All activities conducted in accordance with work plan
- All procedures and analyses conducted according to procedures outlined in this document
- Sample collection techniques versus the site sampling and analysis plan or CDAP
- Level of activity and sample documentation

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- Working order of instruments and equipment
- Level of QC conducted by each field team
- Contingency plans in case of equipment failure or other event preventing the planned activity from proceeding
- Decontamination procedures
- Level of efficiency which each team conducts planned activities at the site
- Sample packaging and shipment

After the audit, any deficiencies are discussed with the field staff, and corrections are identified. If any of these deficiencies might affect the integrity of the samples being collected, the QA Officer informs the field staff immediately, so corrections can be made. The field performance audit will be conducted in coordination with the NTR, as directed by the Project Manager.

OHM will also submit to all requests by regulatory agencies, or other clients for external field systems audits.

7.3 Laboratory Performance Audit

The laboratory performance audit verifies the ability of the laboratory to correctly identify and quantitate compounds in blind check samples submitted by an auditing agency. If the laboratory participates in Performance Evaluation (PE) programs such as USEPA WS/WP studies, AIHA, PAT studies, etc., results from these studies will be generally acceptable by OHM. However, during the course of the project, it may be necessary for the Project QA/QC Officer to send PE samples to the laboratory to evaluate specific parameters.

The contracted laboratories will undergo performance audits throughout the project consisting of field QC samples. Occasionally PE samples will be supplied by the client or external organizations which will be spiked with the same analytical parameters that are being investigated on site. External laboratory performance audits by auditing agencies such as the USEPA, USACE-MRD, DOD, NFESC, etc, are not routinely scheduled. However OHM and its subcontracted laboratories will submit to any external audit upon request by the USEPA or the client.

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7.4 Laboratory System Audits

The laboratory system audit is a review of analytical laboratory operations to verify that the facility has the necessary equipment, staff, and procedures in place to generate acceptable data. It is also to determine that each element within an activity is functioning appropriately and within the guidelines of applicable methodology, approved procedures, and the site QAPP. An on-site inspection is routinely performed by the laboratory's QA Manager and may also be frequently performed by the OHM Project 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.

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8.0 CORRECTIVE ACTION

Corrective actions may be necessary as a result of the following QA activities:

- Field and laboratory performance audits
- Field and laboratory system audits
- Inter-laboratory comparison studies
- Calibration data fall out of specified limits
- Failure to adhere to the CQMP
- Failure to adhere to the site CDAP
- Failure to adhere to standard operating procedures and methods
- Data completeness below required limits
- Control limits are exceeded for QC samples

If, during system and performance audits, deficiencies or problems are discovered, corrective action will be initiated immediately. The appropriate field and laboratory personnel will be notified immediately an investigative process will be implemented immediately to find solutions to these issues. The investigative process will consist, but is not limited to, the following:

- Determining when the problem occurred
- Determining which systems were affected by the problem
- Determining the cause of the problem
- Determining a corrective action to eliminate the problem
- Assigning the responsibility for implementing the corrective action
- Implementing the corrective action
- Evaluating the effectiveness of the corrective action
- Investigating alternative corrective actions if the original action was not sufficient in eliminating the problem
- Documenting that the corrective action has eliminated the problem

The Project QC Officer has the authority to require that all site activities threatened by the problem be stopped or limited until the corrective action has been implemented and satisfactorily verified to eliminate the problem.

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Corrective actions may include, but is not limited to:

- Modifications to procedures
- Recalibration of instruments
- Replacement of solvents, reagents, and/or standards
- Additional training of personnel
- Reassignment of personnel

8.1 Corrective Action Report

A Corrective Action Report (CAR) is necessary documentation of the investigative process. Depending on the issues, the CAR may be generated by the laboratory or the field personnel. Copies of the CAR will be given to the Project QC Officer and Project Manager, who will distribute it to the client. A copy of the CAR will be placed in the project files for future reference.

The CAR should include, but is not limited to:

- A description of the problem, deficiency, or issue
- Proposed resolutions
- Resulting actions
- Effectiveness of the resolutions
- Personnel responsible for implementation of the corrective actions
- Personnel responsible for monitoring the effectiveness of the actions.

8.2 Quality Assurance Report

The Project Manager, Project QC Officer, and Project Chemist will converse on a regular basis to review possible and potential problem areas and to ensure that all QA/QC procedures are being carried out. It is important that all data abnormalities be investigated to ensure that they are not a result of operator or instrument deviation but are a true reflection of the methodology or task function. The project final report will contain a separate section that covers the data quality and validity. At a minimum, the following information will be included in the report:

- Assessment of measurement data precision, accuracy, and completeness
- System and performance audit results
- Significant QA problems and corrective actions implemented
- Copies of documentation such as memos, reports, etc.

The Project QC Officer will be responsible for preparing this report, as well as monthly written QA reports to OHM QA management. The Regional QA/QC Director will be responsible for

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reviewing and approving monthly reports. Verbal reports will be made on a more frequent basis. All reports will be made available to the Project Manager, client, and regulating agencies. If no project audits were performed and no significant QA/QC problems occurred, a letter stating these facts will be submitted to the referenced parties in lieu of a QA Report.

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Appendix A

Table A-1, Sampling Summary
Table A-2, Project Quality Control Objectives

Table A-1
Sampling Summary

Sample Type	Matrix	Sample Frequency	Approx. No. of Samples	Sampling Method	Sampling Equip.	Sample Containers	Preservatives	TAT	QC Level	Required Analysis	Analytical Method	Holding Time
Disposal	Unknown	Once	1	Composite	ss bucket or bowl ss spoons	(2) 4 oz. and (2) 16 oz. glass with teflon-lined lids	Cool to approximately 4°C	14 days	~~NFESC~~ Level E	Semi-volatiles	8270	14 days for organics, metals 180 days (except Hg is 28 days), cyanide 14 days
										Volatiles	8240	
										Pesticides /PCBs	8080	
										TCLP Semi-volatiles	1311/8270	
										TCLP Volatiles	1311/8040	
										TCLP Pesticides	1311/8080	
										TCLP Herbicides	1311/8150	
										TCLP Metals	1311/6010, 7060, 7740, 7470	
										TAL Metals	6010, 7060, 7740, 7470	
										Reactive CN	7.3.3.2	
										Reactive Sulfides	7.3.4.2	
										Flashpoint	1010	
										pH	9040	
										Paint filter	9095	
										Total Halides	ASTM Bomb Method	

Table A-2

Project Quality Control Objectives

Do not Type

Technique	Compound	Matrix	Reference	Method	Parameter	Surr Rec*	M			ield Dup RPD*	Completeness Percent*
GC/MS	Benzene	Soils/Sediments	SW-846	8240	VOA		37-151	<30	20-150	<50	90
GC/MS	Bromodichloromethane	Soils/Sediments	SW-846	8240	VOA		35-155	<30	20-150	<50	90
GC/MS	Bromoform	Soils/Sediments	SW-846	8240	VOA		45-169	<30	20-150	<50	90
GC/MS	Bromomethane	Soils/Sediments	SW-846	8240	VOA		10-242	<30	20-150	<50	90
GC/MS	Carbon tetrachloride	Soils/Sediments	SW-846	8240	VOA		70-140	<30	20-150	<50	90
GC/MS	Chlorobenzene	Soils/Sediments	SW-846	8240	VOA		37-160	<30	20-150	<50	90
GC/MS	2-Chloroethylvinyl ether	Soils/Sediments	SW-846	8240	VOA		10-305	<30	20-150	<50	90
GC/MS	Chloroform	Soils/Sediments	SW-846	8240	VOA		51-138	<30	20-150	<50	90
GC/MS	Chloromethane	Soils/Sediments	SW-846	8240	VOA		10-273	<30	20-150	<50	90
GC/MS	Dibromochloromethane	Soils/Sediments	SW-846	8240	VOA		53-149	<30	20-150	<50	90
GC/MS	1,2-Dichlorobenzene	Soils/Sediments	SW-846	8240	VOA		18-190	<30	20-150	<50	90
GC/MS	1,3-Dichlorobenzene	Soils/Sediments	SW-846	8240	VOA		59-156	<30	20-150	<50	90
GC/MS	1,4-Dichlorobenzene	Soils/Sediments	SW-846	8240	VOA		18-190	<30	20-150	<50	90
GC/MS	1,1-Dichloroethane	Soils/Sediments	SW-846	8240	VOA		59-155	<30	20-150	<50	90
GC/MS	1,2-Dichloroethane	Soils/Sediments	SW-846	8240	VOA		49-155	<30	20-150	<50	90
GC/MS	1,1-Dichloroethene	Soils/Sediments	SW-846	8240	VOA		10-234	<30	20-150	<50	90
GC/MS	trans-1,2-Dichloroethene	Soils/Sediments	SW-846	8240	VOA		54-156	<30	20-150	<50	90
GC/MS	1,2-Dichloropropane	Soils/Sediments	SW-846	8240	VOA		10-210	<30	20-150	<50	90
GC/MS	cis-1,3-Dichloropropene	Soils/Sediments	SW-846	8240	VOA		10-227	<30	20-150	<50	90
GC/MS	trans-1,3-Dichloropropene	Soils/Sediments	SW-846	8240	VOA		17-183	<30	20-150	<50	90
GC/MS	Ethylbenzene	Soils/Sediments	SW-846	8240	VOA		37-162	<30	20-150	<50	90
GC/MS	Methylene chloride	Soils/Sediments	SW-846	8240	VOA		10-221	<30	20-150	<50	90
GC/MS	1,1,2,2-Tetrachloroethane	Soils/Sediments	SW-846	8240	VOA		46-157	<30	20-150	<50	90
GC/MS	Tetrachloroethene	Soils/Sediments	SW-846	8240	VOA		64-148	<30	20-150	<50	90
GC/MS	Toluene	Soils/Sediments	SW-846	8240	VOA		47-150	<30	20-150	<50	90
GC/MS	1,1,1-Trichloroethane	Soils/Sediments	SW-846	8240	VOA		52-162	<30	20-150	<50	90
GC/MS	1,1,2-Trichloroethane	Soils/Sediments	SW-846	8240	VOA		52-150	<30	20-150	<50	90
GC/MS	Trichloroethene	Soils/Sediments	SW-846	8240	VOA		71-157	<30	20-150	<50	90
GC/MS	Trichlorofluoromethane	Soils/Sediments	SW-846	8240	VOA		17-181	<30	20-150	<50	90
GC/MS	Vinyl chloride	Soils/Sediments	SW-846	8240	VOA		10-251	<30	20-150	<50	90
GC/MS	1,4-Bromofluorobenzene	Soils/Sediments	SW-846	8240	VOA	75-125	75-125	<30	20-150	<50	90
GC/MS	1,2-Dichloroethane-d4	Soils/Sediments	SW-846	8240	VOA	75-125	75-125	<30	20-150	<50	90
GC/MS	Toluene-d8	Soils/Sediments	SW-846	8240	VOA	75-125	75-125	<30	20-150	<50	90

Table A-2

Project Quality Control Objectives

Technique	Compound	Matrix	Reference	Method	Parameter	Surr Rec*	MS/MSD % Rec*	MS/MSD RPD*	LCS % Rec*	Field Dup RPD*	Completeness Percent*
GC/MS	Acenaphthene	Soils/Sediments	SW-846	8270	BNA		47-145	<30	40-120	<50	90
GC/MS	Acenaphthylene	Soils/Sediments	SW-846	8270	BNA		33-145	<30	40-120	<50	90
GC/MS	Aldrin	Soils/Sediments	SW-846	8270	BNA		10-166	<30	40-120	<50	90
GC/MS	Anthracene	Soils/Sediments	SW-846	8270	BNA		27-133	<30	40-120	<50	90
GC/MS	Benz(a)anthracene	Soils/Sediments	SW-846	8270	BNA		33-143	<30	40-120	<50	90
GC/MS	Benzo(b)fluoranthene	Soils/Sediments	SW-846	8270	BNA		24-159	<30	40-120	<50	90
GC/MS	Benzo(k)fluoranthene	Soils/Sediments	SW-846	8270	BNA		11-162	<30	40-120	<50	90
GC/MS	Benzo(a)pyrene	Soils/Sediments	SW-846	8270	BNA		17-163	<30	40-120	<50	90
GC/MS	Benzo(g,h,i)perylene	Soils/Sediments	SW-846	8270	BNA		10-219	<30	40-120	<50	90
GC/MS	Benzyl butyl phthalate	Soils/Sediments	SW-846	8270	BNA		10-152	<30	40-120	<50	90
GC/MS	beta-BHC	Soils/Sediments	SW-846	8270	BNA		24-149	<30	40-120	<50	90
GC/MS	gamma-BHC (Lindane)	Soils/Sediments	SW-846	8270	BNA		10-110	<30	40-120	<50	90
GC/MS	Bis(2-chloroethyl) ether	Soils/Sediments	SW-846	8270	BNA		12-158	<30	40-120	<50	90
GC/MS	Bis(2-chloroethoxy) methane	Soils/Sediments	SW-846	8270	BNA		33-184	<30	40-120	<50	90
GC/MS	Bis(2-chloroisopropyl) ether	Soils/Sediments	SW-846	8270	BNA		36-166	<30	40-120	<50	90
GC/MS	Bis(2-ethylhexyl) phthalate	Soils/Sediments	SW-846	8270	BNA		10-158	<30	40-120	<50	90
GC/MS	4-Bromophenyl phenyl ether	Soils/Sediments	SW-846	8270	BNA		53-127	<30	40-120	<50	90
GC/MS	2-Chloronaphthalene	Soils/Sediments	SW-846	8270	BNA		60-118	<30	40-120	<50	90
GC/MS	4-Chlorophenyl phenyl ether	Soils/Sediments	SW-846	8270	BNA		25-158	<30	40-120	<50	90
GC/MS	Chrysene	Soils/Sediments	SW-846	8270	BNA		17-168	<30	40-120	<50	90
GC/MS	4,4'-DDD	Soils/Sediments	SW-846	8270	BNA		10-145	<30	40-120	<50	90
GC/MS	4,4'-DDE	Soils/Sediments	SW-846	8270	BNA		10-136	<30	40-120	<50	90
GC/MS	4,4'-DDT	Soils/Sediments	SW-846	8270	BNA		10-203	<30	40-120	<50	90
GC/MS	Dibenzo(a,h) anthracene	Soils/Sediments	SW-846	8270	BNA		10-227	<30	40-120	<50	90
GC/MS	Di-n-butyl phthalate	Soils/Sediments	SW-846	8270	BNA		10-118	<30	40-120	<50	90
GC/MS	1,2-Dichlorobenzene	Soils/Sediments	SW-846	8270	BNA		32-129	<30	40-120	<50	90
GC/MS	1,3-Dichlorobenzene	Soils/Sediments	SW-846	8270	BNA		10-172	<30	40-120	<50	90
GC/MS	1,4-Dichlorobenzene	Soils/Sediments	SW-846	8270	BNA		20-124	<30	40-120	<50	90
GC/MS	3,3'-Dichlorobenzidine	Soils/Sediments	SW-846	8270	BNA		10-262	<30	40-120	<50	90
GC/MS	Dieldrin	Soils/Sediments	SW-846	8270	BNA		29-136	<30	40-120	<50	90
GC/MS	Diethyl phthalate	Soils/Sediments	SW-846	8270	BNA		10-114	<30	40-120	<50	90
GC/MS	Dimethyl phthalate	Soils/Sediments	SW-846	8270	BNA		10-112	<30	40-120	<50	90
GC/MS	2,4-Dinitrotoluene	Soils/Sediments	SW-846	8270	BNA		39-139	<30	40-120	<50	90
GC/MS	2,6-Dinitrotoluene	Soils/Sediments	SW-846	8270	BNA		50-158	<30	40-120	<50	90
GC/MS	Di-n-octylphthalate	Soils/Sediments	SW-846	8270	BNA		10-146	<30	40-120	<50	90
GC/MS	Endosulfan sulfate	Soils/Sediments	SW-846	8270	BNA		10-107	<30	40-120	<50	90
GC/MS	Endrin aldehyde	Soils/Sediments	SW-846	8270	BNA		10-209	<30	40-120	<50	90
GC/MS	Fluoranthene	Soils/Sediments	SW-846	8270	BNA		26-137	<30	40-120	<50	90
GC/MS	Fluorene	Soils/Sediments	SW-846	8270	BNA		59-121	<30	40-120	<50	90
GC/MS	Heptachlor	Soils/Sediments	SW-846	8270	BNA		10-192	<30	40-120	<50	90

Table A-2

Project Quality Control Objectives

Technique	Compound	Matrix	Reference	Method	Parameter	Surr Rec*	MS/MSD % Rec*	MS/MSD RPD*	LCS % Rec*	Field Dup RPD*	Completeness Percent*
GC/MS	Heptachlor epoxide	Soils/Sediments	SW-846	8270	BNA		26-155	<30	40-120	<50	90
GC/MS	Hexachlorobenzene	Soils/Sediments	SW-846	8270	BNA		10-152	<30	40-120	<50	90
GC/MS	Hexachlorobutadiene	Soils/Sediments	SW-846	8270	BNA		24-116	<30	40-120	<50	90
GC/MS	Hexachloroethane	Soils/Sediments	SW-846	8270	BNA		40-113	<30	40-120	<50	90
GC/MS	Indeno(1,2,3-cd) pyrene	Soils/Sediments	SW-846	8270	BNA		10-171	<30	40-120	<50	90
GC/MS	Isophorone	Soils/Sediments	SW-846	8270	BNA		21-196	<30	40-120	<50	90
GC/MS	Naphthalene	Soils/Sediments	SW-846	8270	BNA		21-133	<30	40-120	<50	90
GC/MS	Nitrobenzene	Soils/Sediments	SW-846	8270	BNA		35-180	<30	40-120	<50	90
GC/MS	N-Nitrosodi-n-propylamine	Soils/Sediments	SW-846	8270	BNA		10-230	<30	40-120	<50	90
GC/MS	PCB-1260	Soils/Sediments	SW-846	8270	BNA		10-164	<30	40-120	<50	90
GC/MS	Phenanthrene	Soils/Sediments	SW-846	8270	BNA		54-120	<30	40-120	<50	90
GC/MS	Pyrene	Soils/Sediments	SW-846	8270	BNA		52-115	<30	40-120	<50	90
GC/MS	1,2,4-Trichlorobenzene	Soils/Sediments	SW-846	8270	BNA		44-142	<30	40-120	<50	90
GC/MS	4-Chloro-3-methylphenol	Soils/Sediments	SW-846	8270	BNA		22-147	<30	40-120	<50	90
GC/MS	4-Chlorophenol	Soils/Sediments	SW-846	8270	BNA		23-134	<30	40-120	<50	90
GC/MS	2,4-Dichlorophenol	Soils/Sediments	SW-846	8270	BNA		39-135	<30	40-120	<50	90
GC/MS	2,4-Dimethylphenol	Soils/Sediments	SW-846	8270	BNA		32-119	<30	40-120	<50	90
GC/MS	2,4-Dinitrophenol	Soils/Sediments	SW-846	8270	BNA		10-191	<30	40-120	<50	90
GC/MS	2-Methyl-4,6-dinitrophenol	Soils/Sediments	SW-846	8270	BNA		10-181	<30	40-120	<50	90
GC/MS	2-Nitrophenol	Soils/Sediments	SW-846	8270	BNA		29-182	<30	40-120	<50	90
GC/MS	4-Nitrophenol	Soils/Sediments	SW-846	8270	BNA		10-132	<30	40-120	<50	90
GC/MS	Pentachlorophenol	Soils/Sediments	SW-846	8270	BNA		14-176	<30	40-120	<50	90
GC/MS	Phenol	Soils/Sediments	SW-846	8270	BNA		10-112	<30	40-120	<50	90
GC/MS	2,4,6-Trichlorophenol	Soils/Sediments	SW-846	8270	BNA		37-144	<30	40-120	<50	90
GC/MS	2-Fluorobiphenyl	Soils/Sediments	SW-846	8270	BNA	40-115	40-115	<30	40-120	<50	90
GC/MS	2-Fluorophenol	Soils/Sediments	SW-846	8270	BNA	20-110	20-110	<30	40-120	<50	90
GC/MS	Nitrobenzene-d5	Soils/Sediments	SW-846	8270	BNA	35-115	35-115	<30	40-120	<50	90
GC/MS	Phenol-d5	Soils/Sediments	SW-846	8270	BNA	10-125	10-125	<30	40-120	<50	90
GC/MS	1,4-Terphenyl-d14	Soils/Sediments	SW-846	8270	BNA	30-140	30-140	<30	40-120	<50	90
GC/MS	2,4,6-Tribromophenol	Soils/Sediments	SW-846	8270	BNA	10-125	10-125	<30	40-120	<50	90

Table A-2

Project Quality Control Objectives

Technique	Compound	Matrix	Reference	Method	Parameter	Surr Rec*	MS/MSD % Rec*	MS/MSD RPD*	LCS % Rec*	Field Dup RPD*	Completeness Percent*
GC	Aldrin	Soils/Sediments	SW-846	8080	Pest/PCB		42-122	<30	40-150	<50	90
GC	alpha-BHC	Soils/Sediments	SW-846	8080	Pest/PCB		37-134	<30	40-150	<50	90
GC	beta-BHC	Soils/Sediments	SW-846	8080	Pest/PCB		17-147	<30	40-150	<50	90
GC	delta-BHC	Soils/Sediments	SW-846	8080	Pest/PCB		19-140	<30	40-150	<50	90
GC	gamma-BHC (Lindane)	Soils/Sediments	SW-846	8080	Pest/PCB		32-127	<30	40-150	<50	90
GC	Chlordane	Soils/Sediments	SW-846	8080	Pest/PCB		45-119	<30	40-150	<50	90
GC	4,4'-DDD	Soils/Sediments	SW-846	8080	Pest/PCB		31-141	<30	40-150	<50	90
GC	4,4'-DDE	Soils/Sediments	SW-846	8080	Pest/PCB		30-145	<30	40-150	<50	90
GC	4,4'-DDT	Soils/Sediments	SW-846	8080	Pest/PCB		25-160	<30	40-150	<50	90
GC	Dieldrin	Soils/Sediments	SW-846	8080	Pest/PCB		36-146	<30	40-150	<50	90
GC	Endosulfan I	Soils/Sediments	SW-846	8080	Pest/PCB		45-153	<30	40-150	<50	90
GC	Endosulfan II	Soils/Sediments	SW-846	8080	Pest/PCB		10-202	<30	40-150	<50	90
GC	Endosulfan Sulfate	Soils/Sediments	SW-846	8080	Pest/PCB		26-144	<30	40-150	<50	90
GC	Endrin	Soils/Sediments	SW-846	8080	Pest/PCB		30-147	<30	40-150	<50	90
GC	Heptachlor	Soils/Sediments	SW-846	8080	Pest/PCB		34-111	<30	40-150	<50	90
GC	Heptachlor epoxide	Soils/Sediments	SW-846	8080	Pest/PCB		37-142	<30	40-150	<50	90
GC	Toxaphene	Soils/Sediments	SW-846	8080	Pest/PCB		41-126	<30	40-150	<50	90
GC	Arochlor-1016	Soils/Sediments	SW-846	8080	Pest/PCB		50-114	<30	40-150	<50	90
GC	Arochlor-1221	Soils/Sediments	SW-846	8080	Pest/PCB		15-178	<30	40-150	<50	90
GC	Arochlor-1232	Soils/Sediments	SW-846	8080	Pest/PCB		10-215	<30	40-150	<50	90
GC	Arochlor-1242	Soils/Sediments	SW-846	8080	Pest/PCB		39-150	<30	40-150	<50	90
GC	Arochlor-1248	Soils/Sediments	SW-846	8080	Pest/PCB		38-158	<30	40-150	<50	90
GC	Arochlor-1254	Soils/Sediments	SW-846	8080	Pest/PCB		29-131	<30	40-150	<50	90
GC	Arochlor-1260	Soils/Sediments	SW-846	8080	Pest/PCB		8-127	<30	40-150	<50	90
GC	TCMX	Soils/Sediments	SW-846	8080	Pest/PCB	50-150	50-150	<30	40-150	<50	90
GC	Decachlorobiphenyl	Soils/Sediments	SW-846	8080	Pest/PCB	50-150	50-150	<30	40-150	<50	90

Table A-2

Project Quality Control Objectives

Technique	Compound	Matrix	Reference	Method	Parameter	Surr Rec*	MS/MSD % Rec*	MS/MSD RPD*	LCS % Rec*	Field Dup RPD*	Completeness Percent*
ICPES	Metals	Soils/Sediments	SW-846	6010	Metals		75-125	<30	80-120	<50	90
ICPES	Arsenic	Soils/Sediments	SW-846	7060	Metals		75-125	<30	80-120	<50	90
ICPES	Lead	Soils/Sediments	SW-846	7421	Metals		75-125	<30	80-120	<50	90
ICPES	Mercury	Soils/Sediments	SW-846	7471	Metals		75-125	<30	80-120	<50	90
ICPES	Selenium	Soils/Sediments	SW-846	7740	Metals		75-125	<30	80-120	<50	90

Table A-2

Project Quality Control Objectives

Technique	Compound	Matrix	Reference	Method	Parameter	Surr Rec*	MS/MSD % Rec*	MS/MSD RPD*	LCS % Rec*	Field Dup RPD*	Completeness Percent*
	Cyanide, Reactive	ORG	SW-846	7.3.3.2	WET						
	Sulfide, Reactive	ORG	SW-846	7.3.4.2	WET						
	Flash Point, Pensky Martens	ORG	SW-846	1010	WET						
	pH, Electrometric	ORG	SW-846	9040	WET						
	Paint Filter Test	ORG	SW-846	9095	WET						
	TX	ORG	ASTM		WET						

Appendix B

Sample Label
Custody Seal
Chain-of-Custody Record
OHM Shipping Label
Shipping Instructions for Sending Samples to the Laboratory

Sample Label

Client _____

Sample ID _____

Location _____

Analysis _____

Preservative _____

Collection Date/Time _____

Collected By _____

Custody Seal

CUSTODY SEAL

Sample Collector's Signature _____ Sample No. _____

Date Collected _____ Time Collected _____

LAB COPY

OHM Corporation

CHAIN-OF-CUSTODY RECORD

Form 0019
Field Technical Services
Rev. 08/89

135218

O.H. MATERIALS CORP. • P.O. BOX 551 • FINDLAY, OH 45839-0551 • 419-423-3526

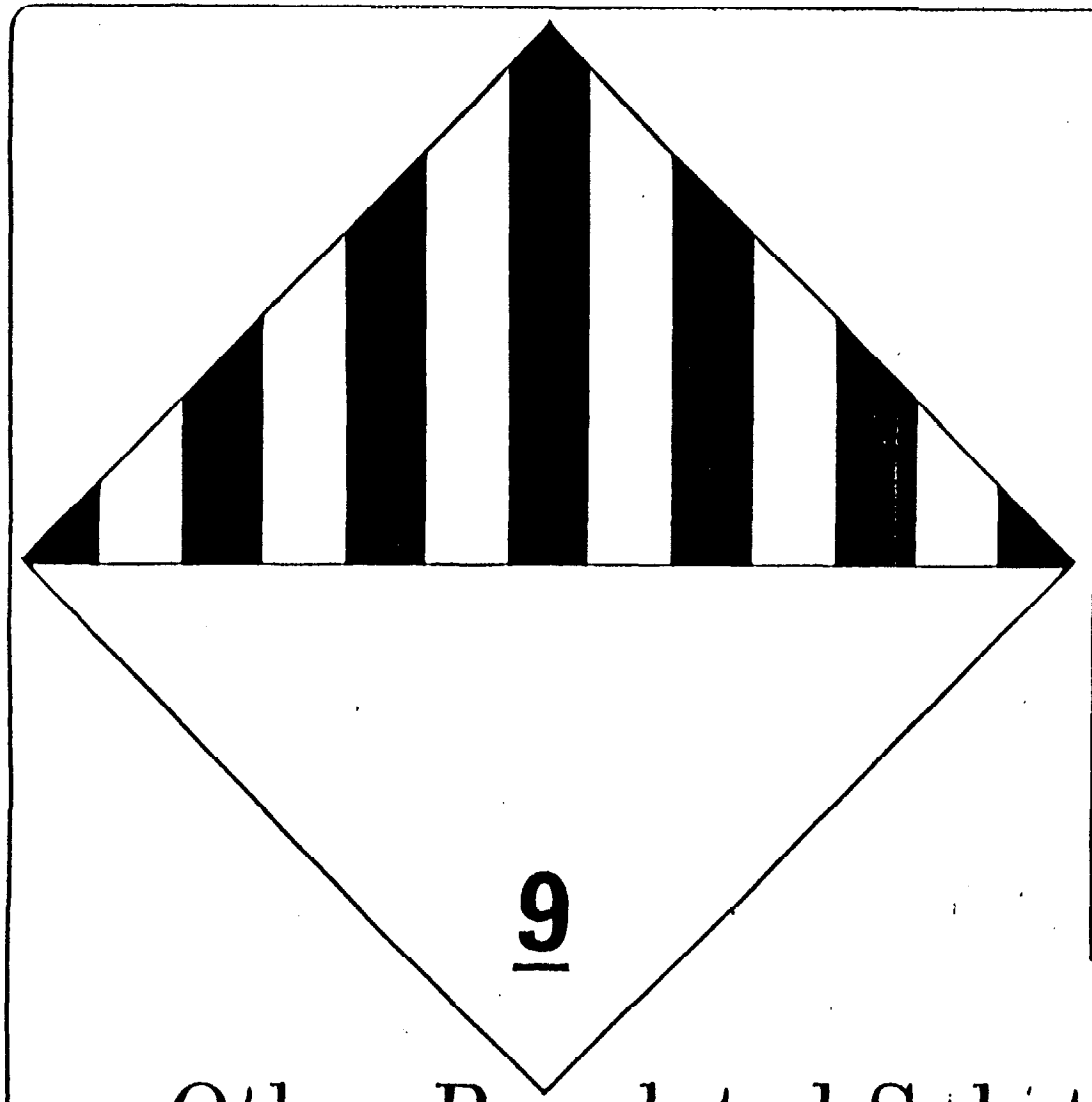
PROJECT NAME	PROJECT LOCATION
PROJ NO. / PROJECT CONTACT	PROJECT TELEPHONE NO.
CLIENT'S REPRESENTATIVE	PROJECT MANAGER/SUPERVISOR

ITEM NO.	SAMPLE NUMBER	DATE	TIME	COMP	GRAB	SAMPLE DESCRIPTION (INCLUDE MATRIX AND POINT OF SAMPLE)	NUMBER OF CONTAINERS	ANALYSIS DESIRED (INDICATE SEPARATE CONTAINERS)								REMARKS
1																
2																
3																
4																
5																
6																
7																
8																
9																
10																

TRANSFER NUMBER	ITEM NUMBER	TRANSFERS RELINQUISHED BY	TRANSFERS ACCEPTED BY	DATE	TIME
1					
2					
3					
4					

REMARKS

SAMPLER'S SIGNATURE



OHM Corporation

From:

Phone:

To:

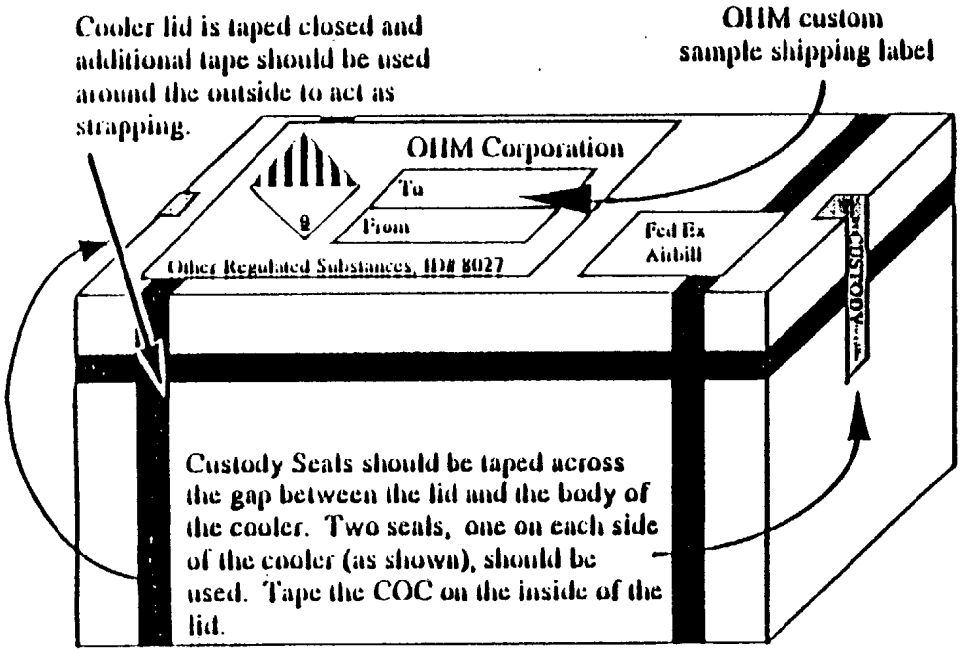
Phone:

Other Regulated Substances, ID# 8027

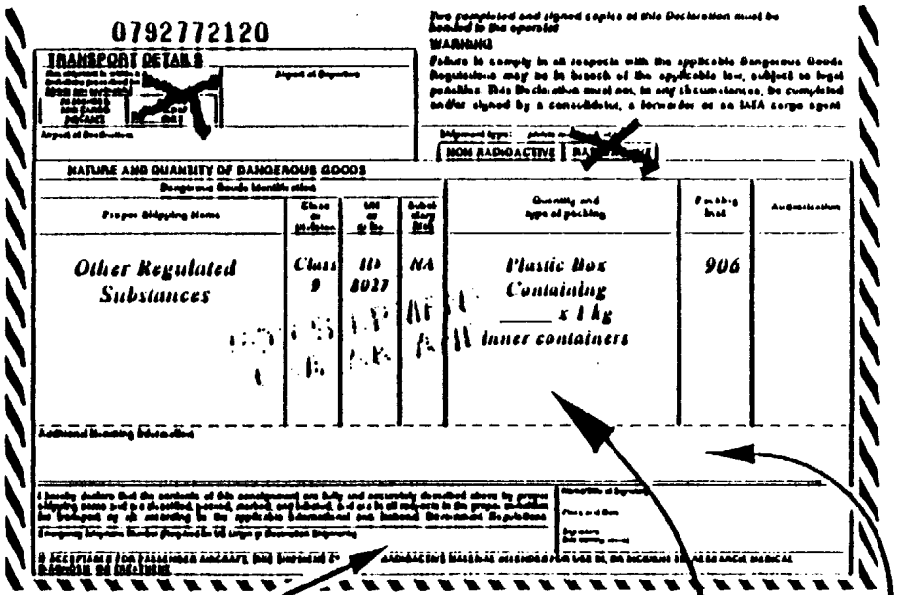
OHM Remediation Services Corp

Shipping Instructions for Sending Samples to the .

NOTE: These procedures are ONLY for shipping unknown wastes, sludge, soil, or water samples for laboratory analysis and ' ntification; Materials which are known to be explosive, compressed ., flammable, oxidizers, poisons, radioactive, or corrosive cannot be shipped by this method. Call the Regional T&D Coordinator for help in that case.



Lower Portion of Fed-Ex DANGEROUS GOODS airbill



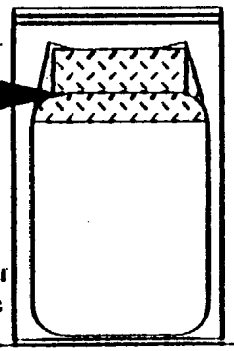
Don't forget to sign and include the 24-hr Emergency Response Phone number. Check with the Regional T&D Coordinator for this number

Fill in the blank with the number of containers

___ x 1 kg for quart jars
___ x 500 g for 8 oz jars
___ x 40 g for VOA vials

Fill in the Additional Handling space with:

Samples from OHM Job # _____ see attached chain of custody. In case of emergency refer to ICAO Emergency Response Guidance for Aircraft Incidents Involving Dangerous Goods drill #9A



Lids are taped to prevent leaks or loosening. Entire jar is sealed in a zip-lock baggie

1) Samples must be shipped in "Strong outer packaging". Fed-Ex stated that a rigid plastic cooler like we are currently using would be acceptable.

2) Use one of OHM's custom sample shipping labels. The To/From address portion of the label should be filled out completely including phone numbers. This label should be placed on last and cannot be covered by tape, the Fed-Ex airbill or anything else. This label should go on the TOP of the cooler.

3) Inner packages cannot exceed 1 gallon each, and the entire shipment (cooler & samples) cannot exceed 66 lb.

4) Coolers must be packed with absorbent material (vermiculite or kitty litter) which will absorb any spills or leaks, not react with the sample contents, and which will minimize the chance that inner containers will break. The coolers should also be fastened shut securely using tape or strapping.

5) Inner containers should have their lids securly closed and packed in a ziplock baggie to prevent leaks

6) The materials must be shipped using a Federal Express Hazardous Materials Airbill. Use the example above or call the Hazardous Materials group at Federal Express at (800) 238-5355 for more instructions on filling out this form.

7) The COC must be filled out completely, placed in a gallon zip-lock baggie, and taped to the inside lid of the cooler. A copy of the COC should be placed behind the airbill in the pouch on the outside of the cooler.

READ THE DIRECTIONS ON THE AIRBILL SO YOU UNDERSTAND WHAT YOU ARE FILLING OUT. Fill out the Fed-Ex airbill completely. Don't forget to sign the bottom and include the Emergency Response phone number. Changing even one thing from the example above may mean that Fed-Ex will refuse to accept the shipment. This procedure has been checked-out with Fed-Ex several times. If a driver refuses to pick it up make sure you have filled out the airbill right and followed ALL the instructions before you complain.

- 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 walk across a contaminated area and then take a surface soil sample where he has just stepped.

- 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 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 sample.

- Activities that could contaminate samples are prohibited in the sample handling and preparation area.

3.7 Sample Log Book

It is necessary for the sampling crew to maintain daily field notes. Items 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 will be knowledgeable about these activities and record pertinent details.

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, COC and airbill numbers, preservatives, and date samples were sent

Information herein is proprietary and confidential and to be used or released to others only with explicit written permission of OHM Remediation Services Corp.

OHM SITE SAFETY PLAN

PROJECT NAME: Site 43 Debris Removal **PROJECT NUMBER:** 17417

LOCATION: MCB Camp Lejeune, North Carolina **DATE:** May 5, 1995

I. SCOPE OF WORK

OHM will mobilize to the site, Gather and remove metal debris including old oil and paint cans and disassemble a tank for off site disposal as metal debris.

II. ORGANIZATION AND AUTHORITIES

The Project Supervisor is responsible for the safe implementation of field activities and is ultimately responsible for site safety. The Regional Health and Safety Manager is responsible for providing guidance to the Site Safety Officer (SSO) and Project Supervisor on the implementation of the site safety plan. The SSO is responsible for implementing the site safety plan onsite and enforces the plan by performing routine site inspections. The SSO has the authority to immediately shut down site operations where unsafe conditions or practices are observed and takes the lead during site emergencies. Site personnel are responsible for following the requirements of this plan and the directions of the SSO. OHM subcontractors may either develop and implement their own site safety plan or comply with the OHM site safety plan. The following personnel are designated to perform these job functions.

Project Supervisor: Randy Smith

Site Safety Officer: Steve Grant

Regional Health and Safety Director: J. Angelo Liberatore

III. HAZARD EVALUATION

CHEMICAL HAZARDS

Chemical: Used Oils (track oil) and residue **TLV:** N/A; 5 mg/m3*
***OSHA TWA for Mineral Oil Mist**
Exposure Routes: Inhalation, dermal contact, ingestion
Symptoms of Overexposure: None reported

Chemical: Dried paints and residues **TLV:** N/A
Exposure Routes: Inhalation, dermal contact, ingestion
Symptoms of Overexposure: None reported

PHYSICAL HAZARDS (Heat/Cold Stress, Noise, Fire, and Explosion)

Heat Stress; Terrain; Ticks, Abrasion hazards from sharp metal and brush; Fire, explosion

TASK SPECIFIC HAZARDS

Task No. 1: Mobilization/Site Preparation **Hazards:** Material handling, manual lifting; Slip, trip, fall; Operation of vehicles, mechanical and construction equipment; Electrical
Control Measures: Practice safe material handling, manual lifting techniques; Ensure personnel are constantly aware of terrain and secure footing; Follow OHM SOP for vehicle/equipment inspection and operation; Only qualified electrician to perform electrical installation, etc to site facilities

Task No. 2: Debris (oil and paint can) Gathering and Sampling **Hazards:** Inhalation, dermal contact; Heavy equipment operation; Material handling; Heat stress; Abrasions, cuts from sharp objects or debris; Back strains from manual lifting, dragging

Control Measures: Follow OHM SOPs for Heavy equipment operation and heat stress prevention and monitoring; Wear specified Level of protection and perform periodic monitoring with PID/LEL/O2 meters; Use buddy system for handling, sampling of containers suspected to contain paints or waste oils; Wear Level C with sarans and splash shield if liquids encountered in oil or paint cans; Locate all buried utilities and pipelines prior to initiating excavation operations; Practice safe material handling; Do not suspend loads over ground personnel; Use mechanical equipment to lift heavy, bulky or awkward shaped objects; Wear chaps and heavy work gloves when manually handling debris or clearing brush; Use proper manual lifting techniques

Task No. 3: Metal Debris Gathering and Removal **Hazards:** Heavy equipment operation; Material handling; Heat stress; Abrasions, cuts from sharp objects or debris; Back strains from manual lifting, dragging;

Control Measures: Follow OHM SOPs for Heavy equipment operation and heat stress prevention and monitoring; Wear specified protective equipment and perform periodic monitoring with PID/LEL/O2 meters to ensure protection is adequate; Use buddy system for handling, sampling of containers suspected to contain paints or waste oils; Wear Level C with sarans if liquids encountered in oil or paint cans; Locate all buried utilities and pipelines prior to initiating excavation operations; Practice safe material handling; Do not suspend loads over ground personnel; Use mechanical equipment to lift heavy, bulky or awkward shaped objects; Wear chaps and heavy work gloves when manually handling debris or clearing brush; Use proper manual lifting techniques

Task No. 4: Dismantle and remove tank **Hazards:** Cutting torch hazards; Heavy equipment operation and hoisting hazards; Material handling; Heat stress; Fire/explosion; Abrasions, cuts from metal and debris

Control Measures: Follow OHM SOPs for Hot Work and Heavy Equipment Operation; Wear specified protective equipment when cutting with torch and manually handling debris; Stage minimum 20 lb. fire extinguisher at work area; Inspect tank for presence of fuel tank prior to cutting; Do not cut fuel tank with cutting torch; Monitor engine with PID/LEL/O2 meters prior to cutting with torch; Practice safe material handling; Do not suspend loads over ground personnel; Follow OHM SOP for heat stress prevention and monitoring;

Task No. 5: Equipment Decontamination **Hazards:** Inhalation, dermal contact; Splash; Slips, trips, falls; Lifting/backstrain hazards; operation of high pressure washer;

Control Measures: Stand clear of decon operations exclusion zone or wear specified level of protection with splashshield over respirator facepiece; Employ buddy system and proper manual lifting techniques; Use mechanical equipment to lift heavy objects; Follow OHM SOP for operation of high pressure washer;

IV. SITE CONTROL

WORK ZONES

Site operations will be segregated in three work zones: an Exclusion Zone (EZ); where potential exposures to site contaminants exists; a Contamination Reduction Zone (CRZ) where personnel and equipment decontamination operations are performed; and a Support Zone (SZ) where site support facilities are located. The boundary of the EZ/CRZ will be marked with warning signs or barrier tape and access control points will be designated to restrict access to authorized personnel. A site map depicting these work zones will be developed during site mobilization and posted. The Buddy System will be implemented onsite for those tasks performed in the EZ.

SITE COMMUNICATIONS

Onsite communications will be established between site work zones and will consist of verbal communications, line of sight observations, or two-way radios. Off-site communications will be established in the support zone to summon off-site emergency services and will consist of either onsite cellular telephones or identifying the location of the nearest telephone to the site.

SAFE OPERATING PROCEDURES

OHM Health and Safety procedures apply to OHM's hazardous waste and emergency response operations. These procedures are contained in OHM's Health and Safety Procedures Manual that is reviewed with and provided to site supervisors during OSHA Supervisors Training. Questions on the applications of these procedures to site operations should be directed to the Regional Health and Safety Manager. Project-specific procedures are attached to this plan.

V. PERSONAL PROTECTIVE EQUIPMENT

The following Levels of Protection are designated for each task performed in site work zones, based on the hazards posed by each task. Modifications of these Levels of Protection are provided for those tasks with specific personal protective equipment requirements. An upgrade/downgrade in the designated Level of Protection may only be instituted after air monitoring procedures have been conducted and results justify the upgrade/downgrade, based on the action levels listed in this plan.

NO CHANGES TO THE DESIGNATED LEVEL OF PROTECTION BELOW WILL BE MADE BEFORE AIR MONITORING PROCEDURES ARE CONDUCTED WITHOUT THE APPROVAL OF THE REGIONAL HEALTH AND SAFETY MANAGER OR PLAN APPROVER.

Task: Mobilization/site preparation/visual inspection

Level of Protection: Level D with heavy cotton or denim coveralls or slacks with long sleeve shirts

Task: Gather and sample oil and paint cans

Level of Protection: Level C with tyvek or sarans, (chaps, and work gloves over sample gloves for manual handling of rough metal or debris during initial gathering

Task: Gather and remove metal debris

Level of Protection: Modified Level D with tyvek, chaps and leather gloves

Task: Dismantle and remove tank

Level of Protection: Modified Level D with Protective Equipment specified in Hot Work SOP and chaps

ask: Heavy equipment decontamination operations

Level of Protection: Modified Level D with sarans and splashshield

Task: Demobilization

Level of Protection: Level D

Personal protective equipment requirements for the above designated Levels of Protection is as follows:

LEVEL C

Respiratory Protection: Full Facepiece Respirator (MSA Ultra Twin)
Respirator Cartridge: GMC-H
Protective Clothing: Tyvek or sarans
Boots/Booties: Tingleys over steel toe/shank work boots
Gloves (inner/outer): Latex/nitrile ,
Head/Face Protection: Hard hat, splash shield as indicated by task

MODIFIED LEVEL D

Protective Clothing: Tyvek with chaps as indicated
Boots/Booties: Tingleys over steel toe/shank work boots
Gloves (inner/outer): Latex/nitrile or Leather work gloves as indicated
Head/Face Protection: Hard hat, face shield for wet conditions
Eye Protection: Safety glasses

LEVEL D

Protective Clothing: **Heavy cotton or denim coverall or long sleeve shirt and pants** with chaps and leather gloves as indicated
Boots: Steel Toe/Shank Boots
Head/Face Protection: Hard Hat
Eye Protection: Safety Glasses

OHM's Respiratory Protection Health and Safety Procedures apply to the use, maintenance, and care of air-purifying and supplied air respirators. When specifying air-purifying respirators, the selection criteria for their use in Level C Protection must be met which includes: air contaminants with adequate warning properties; adequate cartridge adsorption efficiency; adequate oxygen atmosphere (20.9%) present; and non-IDLH concentrations present. Respirator cartridges will be changed daily and when personnel experience increased breathing resistance or chemical breakthrough when wearing the respirator.

Respirators will be cleaned and inspected by the wearer at least daily. Wearers are prohibited: from having facial hair that interferes with the respirator's fit; from wearing eyeglasses under the facepiece (spectacle inserts required for prescription glasses wearers); and from wearing contact lenses with respirators. Respirator wearers must be medically qualified and fit tested before being issued a respirator and annually thereafter.

VI. DECONTAMINATION PROCEDURES

Personnel and equipment decontamination procedures will be developed, communicated to site personnel, and implemented onsite before work commences in the EZ. Standard work practices that minimize personnel and equipment contamination may include one or more of the following, where feasible: avoiding obvious areas of contamination onsite; using remote handling/sampling equipment; covering instruments/equipment; wearing disposable outer garments; and enclosing contaminant source with sheeting/overpacks.

All personnel exiting the EZ will perform personnel decontamination procedures. Contaminated disposable clothing will be bagged or drummed and disposed of accordingly. Contaminated equipment will be decontaminated using a high pressure washer, steam cleaner or other appropriate washing techniques. Wash water will be collected and disposed of accordingly. The SSO will monitor these decontamination procedures to determine their effectiveness and will take corrective measures when warranted. The following personnel decontamination sequence will apply for standard Level C/Modified D protection:

(1) Equipment Drop	(5) Remove Respirator Facepiece
(2) Outer Boot Wash/Removal	(6) Wash/Sanitize Respirator
(3) Outer Glove Wash/Removal	(7) Field Wash Hands, Face, Neck
(4) Remove Outer Coverall	(8) Remove inner latex gloves

VII. AIR MONITORING

Air monitoring will be conducted to identify potential overexposure and IDLH conditions onsite and to document that the proper level of protection is worn by personnel during site operations. IDLH conditions will be monitored during initial entries and paretically through the course of the project, when the potential for an IDLH condition exist. Potential overexposure conditions will be periodically monitored through the course of the project when: work begins in a uncharacterized portion of the site; additional contaminants are identified onsite; initiating tasks posing an overexposure potential; handling leaking drums or working in areas of obvious liquid contamination.

Site personnel with the greatest overexposure potential will be monitored in applying action levels for upgrading/downgrading the level of protection worn by personnel performing similar tasks. Air monitoring instruments will be calibrated and operated according to the manufacturer's instructions by the SSO. Daily background reading will be taken before site operations begin.

PID Action levels are readings above background in personnel breathing zone for a sustained 10 minute period of time. LEL/O2 Action Levels are readings taken inside confined spaces or tanks for the purpose of performing Hot Work or Confined Space Entries, with results recorded on the Hot Work/Confined Space Entry Permit. Air monitoring results will be recorded in the SSO's Logbook.

The following air monitoring procedures will be implemented onsite:

Task Monitored/Frequency: At start up and periodic during debris gathering and prior to hot work

Action Levels/Required Actions: Less than 20.8 % O2 and/or greater than 10% LEL: Stop operations and allow vapors to dissipate.

Instrument: PID/OVA

Task Monitored/Frequency: At start up and periodic during debris gathering and removal, prior to hot work

Action Levels/Required Actions: Greater than 1 ppm over background= upgrade to Level C Protection; Greater than 25 ppm sustained over background= stop operations and allow vapors to dissipate

VIII. EMERGENCY RESPONSE PLAN

PRE-EMERGENCY PLANNING

In addition to the below described procedures for OHM, the emergency plan detailed in the LANTDIV Program Health and Safety Plan and Plans prepared for Previous Camp Lejeune Site Delivery Orders shall be implemented.

Before starting site operations, the SSO will implement emergency procedures that include: identifying the location and route to emergency medical services; establishing site communications; designating emergency warning signal and evacuation routes; inventorying emergency equipment; and communicating emergency procedures to personnel.

PERSONNEL ROLES, LINES OF AUTHORITY AND COMMUNICATION

The SSO takes the lead during site emergencies until offsite emergency responders arrive onsite. In cases of major emergencies, OHM personnel will evacuate the site, contact local emergency responders, and rely on them to handle the emergency. Minor emergencies that are controllable onsite with emergency equipment located at the site will be addressed by OHM personnel with the approval of the SSO.

EMERGENCY RECOGNITION AND PREVENTION

The SSO will conduct an initial site safety briefing to review the requirements of the site safety plan with site personnel. This briefing will include discussions on the recognition, prevention and control of emergencies anticipated onsite. Daily safety meetings will be held to emphasize emergency prevention and control measures.

SAFE DISTANCE AND PLACES OF REFUGE

The onsite assembly point will be located in the SZ where site personnel are accounted for and emergency services are contacted. The SSO will evaluate the emergency situation based on the hazards posed to site personnel remaining at the onsite assembly point, then determine the need and location of further offsite evacuation and assembly points.

SITE SECURITY AND CONTROL

Access to the site will be controlled by the SSO until local emergency responders arrive. The SSO will then relinquish site security/control to the authorized emergency response organization.

EVACUATION ROUTES AND PROCEDURES

The emergency evacuation signal will be one long blast with an air horn. Evacuation routes will be designated that direct evacuation from the EZ in an upwind direction. In cases of uncontrollable emergencies such as fire, explosion, or toxic vapor release, a site evacuation shall be implemented as follows:

- Sound the emergency warning signal.
- Stop work activities and evacuate the EZ in an upwind direction.
- Assemble in the SZ and account for personnel. Dispatch a response team equipped with appropriate PPE (minimum Level B protection) and rescue unaccounted personnel.
- Contact offsite emergency response services.

EMERGENCY DECONTAMINATION PROCEDURES

Personnel will be decontaminated to the extent feasible (gross decon or deluge shower) but life saving and first aid procedures take priority over personnel decontamination efforts. Standard personnel decontamination procedures apply for those injuries deemed non-life threatening by the SSO.

EMERGENCY MEDICAL TREATMENT AND FIRST AID

In the absence of reasonably accessible medical services, an SSO trained in first aid by the American Red Cross or the equivalent will be available onsite to render first aid. An industrial first aid kit will available onsite, with it's contents approved by OHM's consulting physician. The contents of the first aid kit will be checked by the SSO weekly, with expendable items replaced when used.

EMERGENCY ACTIONS

If actual or suspected serious injury occurs onsite implement the following emergency actions:

- Remove the exposed/injured person(s) from immediate danger.
- Render first aid if necessary. Decontaminate injured after critical first-aid has been administered.
- Obtain paramedic services or ambulance transport to local hospital. This procedure shall be followed even if there is no visible injury.
- Other personnel in the work area shall be evacuated and assembled at the SZ until the SSO determines that it is safe to resume work.

RESPONSE FOLLOW-UP

The SSO must complete an incident investigation form for site emergencies within 24 hours of the incident and submit/fax it to their Division Manager. Incidents involving potential Lost Time Accident (LTA) injuries, overexposure incidents, or emergencies causing site evacuations must be reported within 24 hours after incident occurrence to:

Angelo Liberatore
Regional Health and Safety Manager
Phone: 404/729-3900 Ext 7671 (work)
404/476-0112 (home)
Fax: 404/729-3905

The SSO will identify the cause(s) of the incident and take action to prevent reoccurrence. The SSO will also evaluate the effectiveness of the site's emergency response procedures and institute corrective actions when warranted.

EMERGENCY EQUIPMENT ONSITE

The following emergency equipment are located onsite:

- o Fire Extinguishers @ _____
- o Industrial First Aid Kit @ _____
- o Portable Eye wash/Shower @ _____

EMERGENCY CONTACTS

The following emergency contacts will be identified during project mobilization and conspicuously posted in the SZ prior to starting operations.

	Name	Phone Number
Hospital:	_____	_____
Fire Dept.:	_____	_____
Police Dept.:	_____	_____

Location and Route to Hospital: _____

_____

NOSC/NOSCDR: _____

LANTDIV RPM: _____

ROICC: _____

IX. SITE SAFETY PLAN CERTIFICATIONS

This site safety plan complies with the appropriate sections of 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response". Only site personnel meeting the training and medical surveillance requirements of 29 CFR 1910.120 are authorized to perform hazardous waste operations or emergency response at this site. This Site Safety Plan has been approved by _____ on May 5, 1995.

The following site personnel acknowledge reading and understanding the contents of this Site Safety Plan:

	Name	Signature
Project Supervisor	_____	_____
Site Safety Officer	_____	_____
Site Personnel	_____	_____
	_____	_____
	_____	_____
	_____	_____
	_____	_____
	_____	_____

ATTACHMENTS: OHM Hazard Communication Program
Material Safety Data Sheets (MSDS)
Incident Investigation Form
Project-Specific Health and Safety Procedures
Biological Hazard Prevention

OHM HAZARD COMMUNICATION PROGRAM

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.

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 followup 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 no 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.

HAZARD COMMUNICATION CHEMICALS

MATERIAL SAFETY DATA SHEETS

Gasoline
Motor oil
Alconox
Anti-fog
Bleach/detergent
Diesel fuel
Fire extinguishers
Gear lube
Grease
Hand cleaner
Liquid detergent
Breathing air
Isobutylene (calibration gas)
Isopropyl alcohol
Methane (calibration gas)
Oil (hydraulic)
Pentane (calibration gas)
Starting fluid
WD-40

Marathon Oil Company

No. 1

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: PREMIUM UNLEADED GASOLINE
MARATHON MSDS NO: I14MAR001

THE FOLLOWING INFORMATION IS FURNISHED SUBJECT TO THE DISCLAIMER ON THE BOTTOM OF THIS FORM.

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME: PREMIUM UNLEADED GASOLINE

SYNONYMS:
GASOLINE, PREMIUM UNLEADED; PREMIUM UNLEADED GASOLINE; SUPER UNLEADED GASOLINE; SUPER-M LEAD FREE GASOLINE

MANUFACTURER / DISTRIBUTOR:
MARATHON OIL COMPANY
539 SOUTH MAIN STREET
FINDLAY, OH
45840

EMERGENCY PHONE NUMBERS:
(419) 422-2121 (MARATHON)
(800) 424-9300 (CHEMTREC)

CHEMICAL FAMILY: PETROLEUM HYDROCARBON
CHEMICAL FORMULA: MIXTURE

CAS NO: MIXTURE
PRODUCT CODE:

SECTION 2 - PHYSICAL PROPERTIES

BOILING POINT
90-437 F

MELTING POINT
N.A. F

SPECIFIC GRAVITY(H2O=1)
0.71-0.77

% SOLUBILITY IN WATER
NEGLIGIBLE

VAPOR DENSITY(AIR=1)
3-4

VAPOR PRESSURE
414-776 MM HG @ 100F

PH INFORMATION: PH: N.A. AT CONC.
APPEARANCE: RED OR CLEAR LIQUID

ODOR: GASOLINE ODOR

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT
-50 F

AUTOIGNITION TEMP
C.A. 495 F

EXPLOSIVE LIMITS (% BY VOLUME IN AIR)
LOWER/UPPER: 1.4/ 7.6

NFPA CLASSIFICATION: HEALTH: 2 FIRE: 4 REACTIVITY: 1 OTHER:

EXTINGUISHING MEDIA:

CLASS B FIRE EXTINGUISHING MEDIA SUCH AS HALON, CO2, OR DRY CHEMICAL CAN BE USED. FIRE FIGHTING SHOULD BE ATTEMPTED ONLY BY THOSE WHO ARE ADEQUATELY TRAINED.

SPECIAL FIRE FIGHTING INSTRUCTIONS:

FLASHBACK MAY OCCUR ALONG VAPOR TRAIL. AVOID USE OF SOLID WATER STREAMS. WATER MAY BE INEFFECTIVE IN EXTINGUISHING LOW FLASH POINT FIRES, BUT CAN BE USED TO COOL EXPOSED SURFACES. AVOID EXCESSIVE WATER SPRAY APPLICATION.

PRODUCT NAME: PREMIUM UNLEADED GASOLINE
MARATHON MSDS NO: 114MAR001

SECTION 3 - FIRE AND EXPLOSION HAZARD DATA (CON'T)

STABILITY: THE MATERIAL IS STABLE AT 70 F, 760MM PRESSURE
CONDITIONS TO AVOID:

HAZARDOUS DECOMPOSITION PRODUCTS:
CARBON MONOXIDE, ALDEHYDES, AROMATIC HYDROCARBONS

INCOMPATIBLE MATERIALS:
STRONG OXIDIZERS

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS

EXPOSURE LIMITS FOR PRODUCT:	TLV			SOURCE
PREMIUM UNLEADED GASOLINE	300.00	PPM	(8 HR TWA)	ACGIH
	500.00	PPM	(STEL)	ACGIH
	300.00	PPM	(8 HR TWA)	OSHA
	500.00	PPM	(STEL)	OSHA

COMPONENTS:	PERCENT RANGE	TLV			SOURCE
SATURATED HYDROCARBONS (PARAFFINS & CYCLOPARAFFINS)	55.00- 70.00	0.00		( )	
UNSATURATED HYDROCARBONS (OLEFINS)	1.00- 10.00	0.00		( )	
AROMATIC HYDROCARBONS (INCLUDING BENZENE, TOLUENE, XYLENES, ETHYLBENZENE AND TRIMETHYL BENZENES)	20.00- 40.00	0.00		( )	
ETHYL BENZENE	1.00- 3.00	100.00	PPM	(8 HR TWA)	ACGIH
		125.00	PPM	(STEL)	ACGIH
		100.00	PPM	(8 HR TWA)	OSHA
		125.00	PPM	(STEL)	OSHA
1,2,4-TRIMETHYLBENZENE	2.00- 5.00	25.00	PPM	(8 HR TWA)	ACGIH
		25.00	PPM	(8 HR TWA)	OSHA
TOLUENE	3.00- 15.00	100.00	PPM	(8 HR TWA)	ACGIH
		150.00	PPM	(STEL)	ACGIH
		100.00	PPM	(8 HR TWA)	OSHA
		150.00	PPM	(STEL)	OSHA
XYLENE	5.00- 15.00	100.00	PPM	(8 HR TWA)	ACGIH
		150.00	PPM	(STEL)	ACGIH
		100.00	PPM	(8 HR TWA)	OSHA
		150.00	PPM	(STEL)	OSHA

PRODUCT NAME: PREMIUM UNLEADED GASOLINE
MARATHON MSDS NO: 114MAR001

SECTION 4 - PRODUCT COMPOSITION AND EXPOSURE LIMITS (CON'T)

COMPONENTS:	PERCENT RANGE	TLV			SOURCE
METHYL TERTIARY BUTYL ETHER	.01- 15.00	0.00		( )	
BENZENE	.50- 3.50	10.00	PPM	(8 HR TWA)	ACGIH
		1.00	PPM	(8 HR TWA)	OSHA
		5.00	PPM	(STEL)	OSHA

OSHA ACTION LEVEL 0.50 PPM (8 HR TWA)

***
COMPLEX MIXTURE OF PARAFFINIC, CYCLOPARAFFINIC, OLEFINIC AND AROMATIC HYDROCARBONS (PREDOMINANTLY C4-C12).
***
CONTAINS SMALL AMOUNTS OF DYE AND OTHER ADDITIVES (<0.02%) WHICH ARE NOT CONSIDERED HAZARDOUS AT THE CONCENTRATIONS USED.

SECTION 5 - POTENTIAL HEALTH EFFECTS

EYE:

EYE IRRITATION MAY RESULT FROM CONTACT WITH THE LIQUID OR EXPOSURE TO VAPOR CONCENTRATIONS ABOVE THE TLV.

SKIN:

PROLONGED OR REPEATED LIQUID CONTACT CAN DEFAT THE SKIN AND LEAD TO IRRITATION AND/OR DERMATITIS.

INHALATION:

EXPOSURE TO VAPOR CONCENTRATIONS EXCEEDING 1000 PPM CAN CAUSE RESPIRATORY IRRITATION, HEADACHE, DIZZINESS, NAUSEA AND LOSS OF COORDINATION. HIGHER CONCENTRATIONS MAY CAUSE LOSS OF CONSCIOUSNESS, CARDIAC SENSITIZATION, COMA AND DEATH RESULTING FROM RESPIRATORY FAILURE.

INGESTION:

INGESTION MAY RESULT IN NAUSEA, VOMITING, DIARRHEA AND RESTLESSNESS. ASPIRATION (BREATHING) OF VOMITUS INTO THE LUNGS MUST BE AVOIDED AS EVEN SMALL QUANTITIES IN THE LUNGS CAN PRODUCE CHEMICAL PNEUMONITIS AND PULMONARY EDEMA/HEMORRHAGE.

PRODUCT NAME: PREMIUM UNLEADED GASOLINE
MARATHON MSDS NO: 114MAR001

SECTION 5 - POTENTIAL HEALTH EFFECTS (CON'T)

ADDITIONAL TOXICITY INFORMATION:

TWO YEAR INHALATION TOXICITY STUDIES WITH FULLY VAPORIZED GASOLINE (67, 292 & 2056 PPM) PRODUCED KIDNEY DAMAGE AND KIDNEY TUMORS IN MALE RATS BUT NOT IN FEMALE RATS OR MALE AND FEMALE MICE. FEMALE MICE DEVELOPED A SLIGHTLY HIGHER INCIDENCE OF LIVER TUMORS COMPARED TO CONTROLS AT THE HIGHEST EXPOSURE LEVEL. RESULTS FROM SUBSEQUENT SCIENTIFIC STUDIES SUGGEST THAT THE KIDNEY DAMAGE AND PROBABLY THE KIDNEY TUMOR RESPONSE ARE UNIQUE TO THE MALE RAT. THE BIOLOGIC SIGNIFICANCE OF THE MOUSE LIVER TUMOR RESPONSE IN TERMS OF HUMAN HEALTH IS QUESTIONABLE.

REPEATED OR PROLONGED EXPOSURE TO BENZENE EVEN AT RELATIVELY LOW CONCENTRATIONS MAY CAUSE SERIOUS INJURY TO BLOOD-FORMING ORGANS. SIGNIFICANT CHRONIC EXPOSURE TO BENZENE VAPOR HAS BEEN REPORTED TO PRODUCE VARIOUS BLOOD DISORDERS, RANGING FROM ANEMIA TO LEUKEMIA (CANCER) IN MAN. BENZENE PRODUCED TUMORS IN RATS AND MICE IN LIFETIME CHRONIC TOXICITY STUDIES, BUT THE RESPONSE HAS NOT BEEN CONSISTENT ACROSS SPECIES, STRAIN, SEX OR ROUTE OF EXPOSURE. ANIMAL STUDIES ON BENZENE HAVE DEMONSTRATED IMMUNE TOXICITY, TESTICULAR EFFECTS AND ALTERATIONS IN REPRODUCTIVE CYCLES, EVIDENCE OF CHROMOSOMAL DAMAGE OR OTHER CHROMOSOMAL CHANGES, AND EMBRYO/FETOTOXICITY, BUT NOT TERATOGENICITY.

EMERGENCY FIRST AID PROCEDURES

EYE:

FLUSH EYES WITH LARGE AMOUNTS OF WATER FOR AT LEAST 15 MINUTES. IF SYMPTOMS OR IRRITATION OCCUR, CALL A PHYSICIAN.

SKIN:

WASH WITH SOAP AND LARGE AMOUNTS OF WATER. REMOVE CONTAMINATED CLOTHING. IF SYMPTOMS OR IRRITATION OCCUR, CALL A PHYSICIAN.

INHALATION:

MOVE PERSON TO FRESH AIR. IF NOT BREATHING OR IF NO HEARTBEAT, GIVE ARTIFICIAL RESPIRATION OR CARDIOPULMONARY RESUSCITATION (CPR). IMMEDIATELY CALL A PHYSICIAN.

INGESTION:

DO NOT INDUCE VOMITING. DO NOT GIVE LIQUIDS. IMMEDIATELY CALL A PHYSICIAN.

SECTION 6 - SPECIAL PROTECTION INFORMATION

VENTILATION:

LOCAL OR GENERAL EXHAUST REQUIRED IN ENCLOSED AREAS OR WITH INADEQUATE VENTILATION.

PRODUCT NAME: PREMIUM UNLEADED GASOLINE
MARATHON MSDS NO: 114MAR001

SECTION 6 - SPECIAL PROTECTION INFORMATION (CON'T)

RESPIRATORY PROTECTION:

APPROVED ORGANIC VAPOR CHEMICAL CARTRIDGE OR SUPPLIED AIR RESPIRATORS SHOULD BE WORN FOR EXPOSURES EXCEEDING THE TLV OR STEL. OBSERVE RESPIRATOR PROTECTION FACTOR CRITERIA CITED IN ANSI Z88.2 (1980). SELF-CONTAINED BREATHING APPARATUS SHOULD BE USED FOR FIRE FIGHTING.

PROTECTIVE GLOVES:

NEOPRENE, NITRILE, VITON OR PVA GLOVES FOR REPEATED OR PROLONGED SKIN EXPOSURE.

OTHER PROTECTIVE EQUIPMENT:

USE EXPLOSION-PROOF EQUIPMENT.

SECTION 7 - SPILL OR LEAK PROCEDURES

ENVIRONMENTAL EFFECTS:

LIQUID CAN BE TOXIC TO AQUATIC LIFE.

STEPS TO BE TAKEN IN CASE OF SPILL, LEAK OR RELEASE:

KEEP PUBLIC AWAY. SHUT OFF SOURCE OF LEAK IF POSSIBLE TO DO SO WITHOUT HAZARD. ELIMINATE ALL IGNITION SOURCES. ADVISE NATIONAL RESPONSE CENTER (800-424-8802) IF PRODUCT HAS ENTERED A WATER COURSE. ADVISE LOCAL AND STATE EMERGENCY SERVICES AGENCIES, IF APPROPRIATE. CONTAIN LIQUID WITH SAND OR SOIL. RECOVER AND RETURN FREE LIQUID TO SOURCE. USE SUITABLE SORBENTS TO CLEAN UP RESIDUAL LIQUID.

WASTE DISPOSAL METHOD:

DISPOSE OF CLEANUP MATERIALS IN ACCORDANCE WITH APPLICABLE LOCAL, STATE AND FEDERAL REGULATIONS.

SECTION 8 - HANDLING AND STORAGE PRECAUTIONS

PRODUCT SHOULD BE HANDLED AND STORED IN ACCORDANCE WITH INDUSTRY ACCEPTED PRACTICES. IN THE ABSENCE OF SPECIFIC LOCAL CODE REQUIREMENTS, NFPA OR OSHA REQUIREMENTS SHOULD BE FOLLOWED. USE APPROPRIATE GROUNDING AND BONDING PRACTICES. STORE IN PROPERLY CLOSED CONTAINERS THAT ARE APPROPRIATELY LABELED. DO NOT EXPOSE TO HEAT, OPEN FLAME, OXIDIZERS OR OTHER SOURCES OF IGNITION. AVOID SKIN CONTACT. EXERCISE GOOD PERSONAL HYGIENE INCLUDING REMOVAL OF SOILED CLOTHING AND PROMPT WASHING WITH SOAP AND WATER.

PRODUCT NAME: PREMIUM UNLEADED GASOLINE
MARATHON MSDS NO: 114MAR301

SECTION 9 - HAZARD WARNING

DANGER!

EXTREMELY FLAMMABLE

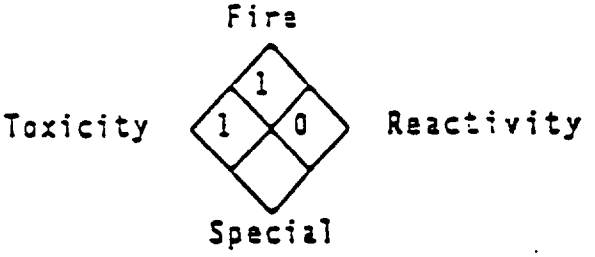
HARMFUL OR FATAL IF SWALLOWED

CONTAINS BENZENE WHICH MAY CAUSE
CANCER OR BE TOXIC TO BLOOD-FORMING ORGANS.

SECTION 10 - COMMENTS.

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 No.2

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) 368-5111
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)

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 CO_2 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/m^3 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(threshhold 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)

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)

(COMMENTS continued)

Prepared by: Robert Kellam
Title: Group Supervisor, Lubricants Testing, Maintenance, and Safety
Original Date: 05/18/81 Sent to: SCOTT DUNNBAR
Revision Date: 04/01/93 OHM
Supersedes : 04-05-90 53335 TRIANGLE PARK, SUITE 450
Date Sent : 10/21/93 NORCROSS GA 30092

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.

MSDS1011

No. 3

Material Safety Data Sheet
May be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Standard must be consulted for specific requirements.

U.S. Department of Labor
Occupational Safety and Health Administration
(Non-Mandatory Form)
Form Approved
OMB No. 1218-0072

IDENTITY (As Used on Label and List): ALCONOX

Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that.

Section I

Manufacturer's Name: ALCONOX, INC.	Emergency Telephone Number: (212) 473-1300
Address (Number, Street, City, State, and ZIP Code): 215 PARK AVENUE SOUTH	Telephone Number for Information: (212) 473-1300
NEW YORK, N.Y. 10003	Date Prepared: JULY 1, 1989
	Signature of Preparer (optional):

Section II — Hazardous Ingredients/Identity Information

Hazardous Components (Specific Chemical Identity; Common Name(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	% (optional)
THERE ARE NO INGREDIENTS IN ALCONOX WHICH APPEARED ON THE OSHA STANDARD 29 CFR 1910 SUBPART Z.				

Section III — Physical/Chemical Characteristics

Boiling Point	N.A.	Specific Gravity (H_2O = 1)	N.A.
Vapor Pressure (mm Hg.)	N.A.	Melting Point	N.A.
Vapor Density (AIR = 1)	N.A.	Evaporation Rate (Butyl Acetate = 1)	N.A.

Solubility in Water: APPRECIABLE (GREATER THAN 10 PER CENT)

Appearance and Odor: WHITE POWDER INTERSPERSED WITH GREEN COLORED FLAKES - ODORLESS

Section IV — Fire and Explosion Hazard Data

Flash Point (Method Used): NONE	Flammable Limits	LEL: N.A.	UEL: N.A.

Extinguishing Media: WATER, CO2, DRY CHEMICAL, FOAM, SAND/EARTH

Special Fire Fighting Procedures: FOR FIRES INVOLVING THIS MATERIAL DO NOT ENTER WITHOUT PROTECTIVE EQUIPMENT AND SELF CONTAINED BREATHING APPARATUS

Unusual Fire and Explosion Hazards: NONE

No. 3

Section V — Reactivity Data

Stability			Conditions to Avoid
	Unstable		NONE
	Stable	XX	

Incompatibility (Materials to Avoid) AVOID STRONG ACIDS

Hazardous Decomposition or Byproducts MAY RELEASE CO2 GAS ON BURNING

Hazardous Polymerization			Conditions to Avoid
	May Occur		NONE
	Will Not Occur	XX	

Section VI — Health Hazard Data

Route(s) of Entry: Inhalation? YES Skin? NO Ingestion? YES

Health Hazards (Acute and Chronic) INHALATION OF POWDER MAY PROVE LOCALLY IRRITATING TO MUCOUS MEMBRANES. INGESTION MAY CAUSE DISCOMFORT AND/OR DIARRHEA.

Carcinogenicity: NTP? NO IARC Monographs? NO OSHA Regulated? NO

Signs and Symptoms of Exposure EXPOSURE MAY IRRITATE MUCOUS MEMBRANES. MAY CAUSE SNEEZING.

Medical Conditions Generally Aggravated by Exposure RESPIRATORY CONDITIONS MAY BE AGGRAVATED BY POWDER

Emergency and First Aid Procedures
EYES-FLUSH WITH PLENTY OF WATER FOR 15 MINUTES SKIN-FLUSH WITH PLENTY OF WA
INGESTION-DRINK LARGE QUANTITIES OF WATER,GET MEDICAL ATTENTION FOR DISCOMF

Section VII — Precautions for Safe Handling and Use

Steps to Be Taken in Case Material is Released or Spilled MATERIAL FOAMS PROFUSELY. SHOVEL AND RECOVER AS MUCH AS POSSIBLE. RINSE REMAINDER TO SEWER. MATERIAL IS COMPLETELY BIODEGRADABLE.

Waste Disposal Method SMALL QUANTITIES MAY BE DISPOSED OF IN SEWER. LARGE QUANTITIES SHOULD BE DISPOSED OF ACCORDING TO LOCAL REQUIREMENTS FOR NON-HAZARDOUS DETERGENT

Precautions to Be Taken in Handling and Storing STORE IN A DRY AREA TO PREVENT CAKING.

Other Precautions NO SPECIAL REQUIREMENTS OTHER THAN THE GOOD INDUSTRIAL HYGIENE AND SAFETY PRACTICES EMPLOYED WITH ANY INDUSTRIAL CHEMICAL.

Section VIII — Control Measures

Respiratory Protection (Specify Type). DUST MASK

Ventilation			
	Local Exhaust	NORMAL	Special N.A.
	Mechanical (General)	N.A.	Other N.A.

Protective Gloves	Eye Protection
USEFUL-NOT REQUIRED	USEFUL-NOT REQUIRED

Other Protective Clothing or Equipment NOT REQUIRED

Work/Hygienic Practices NO SPECIAL PRACTICES REQUIRED

MATERIAL SAFETY DATA SHEET

IDENTITY: SIGHT SAVERS brand ANTI-FOG LIQUID

CATALOG #24, 25, 68, 69, 8565, 8570, 143060, 8569, 60103

SECTION 1: MANUFACTURER'S NAME AND ADDRESS

Bausch & Lomb
1400 N. Goodman St.
Rochester, NY 14609

(800) 553-5340 — MEDICAL EMERGENCY 8AM/4PM
MON.-FRI. 8AM/5PM
Other times: Call Local Poison Center

(800) 553-5340 — ALL OTHER QUESTIONS

Date Prepared: February 26, 1992

SECTION 2: HAZARDOUS INGREDIENTS

Ingredient	(CAS#)	%	PEL	UNITS	TLV	UNITS	STEL	UNITS	SKIN
Isopropanol	(67-63-0)	12	400	PPM	400	PPM	500	PPM	-
Sodium Lauryl Sulfate	(151-21-3)	2	None	-	None	-	None	-	-
Dipropylene Glycol Monomethyl Ether	(34590-94-8)	2	100	PPM	100	PPM	150	PPM	X

SECTION 3: PHYSICAL DATA

Boiling Point (C): 100
Vapor Pressure (mm Hg): 30
Vapor Density: (air=1):Not Determined
Solubility: soluble in water
ph: not determined
Appearance and Odor: Purple liquid, odor of rubbing alcohol

Specific Gravity: 1.0
Melting Point: N/A
Evaporation Rate: less/1
Percent Volatile by Weight: <16%

SECTION 4: FIRE AND EXPLOSION HAZARD DATA

Flash Point (F): 105 Open Cup Flammable Limits: not determined

Extinguishing Media: CO2, Foam, Dry Chemical, Water Fog

Fire Fighting Procedures: Use self contained breathing apparatus.

Unusual Fire and Explosion Hazards: None.

SECTION 5: REACTIVITY DATA

Stability: Stable

Incompatibility: Hydrogen & Palladium, Nitroform, Oleum, Potassium-Tert-Butoxide, Aluminum, Aluminum Isopropoxide, Crotonaldehyde, Oxidants, Phosgene

Hazardous Decomposition Products: CO, CO2, SiO2

Hazardous Polymerization: Will not occur

Conditions to avoid: Sources of ignition, heat, open flame

SECTION 6: HEALTH HAZARD DATA

Route(s) of Entry:
Inhalation: Irritation, central nervous system depression
Skin Contact: Defatting, dermatitis possible.
Ingestion: nausea, vomiting, headache, dizziness, coma possible, abdominal pain, vomiting, diarrhea

Health Hazards (Acute and Chronic):
Carcinogenicity: NTP: N/A IARC Monographs: N/A
OSHA Regulated: N/A
Signs and Symptoms of Exposure: N/A

Medical Conditions Generally Aggravated by Exposure: N/A

Emergency and First Aid Procedures:

Inhalation: Move to fresh air, get medical help.
Skin Contact: Wash with soap and water.
Ingestion: Gastric lavage, give fluids, get medical help.
Eye Contact: Flush with water for 15 minutes, get medical help.

SECTION 7: PRECAUTIONS FOR SAFE HANDLING AND USE

Spill Procedure: Remove sources of ignition, absorb with vermiculite.

Waste Disposal: As per local, state and Federal regulation.

Spill Reporting Information (49 CFR 171.8, 40 CFR 117)

Hazardous Substance: None
Reportable Quantity: None
Concentration of Hazardous Substance: N/A
Reportable Quantity of Product: N/A

Precautions to be taken in handling and storing:

Store in a cool, dry, well ventilated place.

SECTION 8: CONTROL MEASURES

Respiratory Protection: NIOSH Approved Respirator if exposure exceeds the permissible exposure limit (PEL)

Ventilation: Sufficient to keep exposure below the PEL, general room air circulation sufficient for normal use of product.

Eye and Face Protection: Safety Glasses and whatever is required by other occupational conditions.

Protective Clothing: None required for normal use of product.

Work/Hygienic Practices: N/A

Approved By: _____

The above information is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes.

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

Data Sheet No. 5

HEALTH	2
FLAMMABILITY	0
REACTIVITY	1
PERSONAL	B

Product: REGULAR CLOROX BLEACH

Description: CLEAR, LIGHT YELLOW LIQUID WITH CHLORINE ODOR

Other Designations	Manufacturer	Emergency Telephone No.
EPA Reg. No. 5813-1 Sodium hypochlorite solution Liquid chlorine bleach Clorox Liquid Bleach	The Clorox Company 1221 Broadway Oakland, CA 94612	Notify your Supervisor Rocky Mountain Poison Center (800) 446-1014 For Transportation Emergencies Chemtrec (800) 424-9300

II Health Hazard Data

*Causes severe 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.

FIRST AID: EYE CONTACT: Immediately flush eyes with plenty of water. If irritation persists, see a doctor. SKIN CONTACT: Remove contaminated clothing. Wash area with water. INGESTION: Drink a glass/ful of water and call a physician. INHALATION: If breathing problems develop remove to fresh air.

III Hazardous Ingredients

Ingredients	Concentration	Worker Exposure Limit
Sodium hypochlorite CAS # 7681-52-9	5.25%	not established

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.

IV Special Protection and Precautions

Hygienic Practices: Wear safety glasses. With repeated or prolonged contact, wear gloves.

Engineering Controls: Use general ventilation to minimize exposure to vapor or mist.

Work Practices: Avoid eye and skin contact and inhalation of vapor or mist.

Keep out of the reach of children.

V Transportation and Regulatory Data

U.S. DOT Hazard Class: Not restricted

U.S. DOT Proper Shipping Name: Hypochlorite solution with not more than 7% available chlorine. Not Restricted per 49CFR172.101(c)(12)(iv).

Section 313 (Title III Superfund Amendment and Reauthorization Act): As a consumer product, this product is exempt from supplier notification requirements under Section 313 Title III of the Superfund Amendment and Reauthorization Act of 1986 (reference 40 CFR Part 372).

VI Spill or Leak Procedures

Small Spills (<5 gallons)
1) Absorb, containerize, and landfill in accordance with local regulations.
(2) Wash down residual to sanitary sewer.*

Large Spills (>5 gallons)
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.*

* Contact the sanitary treatment facility in advance to assure ability to process washed-down material.

VII Reactivity Data

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.

VIII Fire and Explosion Data

Not flammable or explosive. In a fire, cool containers to prevent rupture and release of sodium chlorate.

IX Physical Data

Boiling point ..... 212°F(100°C decomposes)
Specific Gravity (H2O=1) 1.085
Solubility in Water ..... complete
pH 11.4

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DATE PREPARED 1/92

DATA PUBLISHED IS FOR USE ONLY IN CONNECTION WITH OCCUPATIONAL SAFETY AND HEALTH

EXXON COMPANY, U.S.A.
A DIVISION OF EXXON CORPORATION

DATE ISSUED: 09/11/92
SUPERSEDES DATE: 12/02/91

MATERIAL SAFETY DATA SHEET

EXXON COMPANY, U.S.A. P.O. BOX 2180 HOUSTON, TX 77252-2180

A. IDENTIFICATION AND EMERGENCY INFORMATION

PRODUCT NAME
EXXON DIESEL 2

PRODUCT CODE
072700 - 00787

PRODUCT CATEGORY
Petroleum Distillate Fuel

PRODUCT APPEARANCE AND ODOR
Clear liquid, yellow color
Faint petroleum hydrocarbon odor

MEDICAL EMERGENCY TELEPHONE NUMBER
(713) 656-3424

B. COMPONENTS AND HAZARD INFORMATION

COMPONENTS	CAS NO. OF COMPONENTS	APPROXIMATE CONCENTRATION
Fuels, diesel, no. 2	68476-34-6	100%

All components of this product are listed on the U.S. TSCA inventory.

See Section E for Health and Hazard Information.

See Section H for additional Environmental Information.

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM (HMIS)

Health	Flammability	Reactivity	BASIS
1	2	0	Recommended by Exxon

EXPOSURE LIMIT FOR TOTAL PRODUCT	BASIS
100 ppm (500 mg/m3) for an 8-hour workday	Recommended by Exxon

C. PRIMARY ROUTES OF ENTRY AND EMERGENCY AND FIRST AID PROCEDURES

EYE CONTACT
If splashed into the eyes, flush with clear water for 15 minutes or until irritation subsides. If irritation persists, call a physician.

SKIN
In case of skin contact, remove any contaminated clothing and wash skin with soap and water. Launder or dry-clean clothing before reuse. If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

INHALATION
Overexposure may cause gasping, nausea and disorientation.

Vapor pressure is very low. Vapor inhalation under ambient conditions is normally not a problem. If overcome by vapor from hot product, remove from exposure and call a physician immediately. If breathing is irregular or has stopped, start resuscitation, administer oxygen, if available.

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INGESTION
If ingested, DO NOT induce vomiting; call a physician immediately.

D. FIRE AND EXPLOSION HAZARD INFORMATION

FLASH POINT (MINIMUM)
COMBUSTIBLE - Per DOT 49 CFR 173.115
60°C (140°F)
ASTM D 93, Pensky Martens Closed Cup

NOTE: Non-marine product may be 52°C (125°F) minimum flash to meet No. 2 Diesel Fuel Oil (ASTM D 975). Seasonal blends may be as low as 38°C (100°F).

AUTOIGNITION TEMPERATURE
Greater than 204°C (400°F)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) - HAZARD IDENTIFICATION

Health	Flammability	Reactivity	BASIS
0	2	0	Recommended by the National Fire Protection Association

HANDLING PRECAUTIONS
This liquid is volatile and gives off invisible vapors. Either the liquid or vapor may settle in low areas or travel some distance along the ground or surface to ignition sources where they may ignite or explode.

Keep product away from ignition sources, such as heat, sparks, pilot lights, static electricity, and open flames.

FLAMMABLE OR EXPLOSIVE LIMITS (APPROXIMATE PERCENT BY VOLUME IN AIR)
Estimated values: Lower Flammable Limit 0.9% Upper Flammable Limit 7%

EXTINGUISHING MEDIA AND FIRE FIGHTING PROCEDURES
Foam, water spray (fog), dry chemical, carbon dioxide and vaporizing liquid type extinguishing agents may all be suitable for extinguishing fires involving this type of product, depending on size or potential size of fire and circumstances related to the situation. Plan fire protection and response strategy through consultation with local fire protection authorities or appropriate specialists.

The following procedures for this type of product are based on the recommendations in the National Fire Protection Association's "Fire Protection Guide on Hazardous Materials", Eighth Edition (1984):

Use dry chemical, foam or carbon dioxide to extinguish the fire. Water may be ineffective, but water should be used to keep fire-exposed containers cool. If a leak or spill has ignited, use water spray to disperse the vapors and to protect men attempting to stop a leak. Water spray may be used to flush spills away from exposures. Minimize breathing of gases, vapor, fumes or decomposition products. Use supplied-air breathing equipment for enclosed or confined spaces or as otherwise needed.

NOTE: The inclusion of the phrase "water may be ineffective" is to indicate that although water can be used to cool and protect exposed material, water may not extinguish the fire unless used under favorable conditions by experienced fire fighters trained in fighting all types of flammable liquid fires.

DECOMPOSITION PRODUCTS UNDER FIRE CONDITIONS
Fumes, smoke, carbon monoxide, aldehydes and other decomposition products, in the case of incomplete combustion.

"EMPTY" CONTAINER WARNING
"Empty" containers retain residue (liquid and/or vapor) and can be dangerous. DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION; THEY MAY EXPLODE AND CAUSE INJURY OR DEATH. Do not attempt to clean since residue is difficult to remove. "Empty" drums should be completely drained, properly bunged and promptly returned to a drum reconditioner. All other containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations. For work on tanks refer to Occupational Safety and Health Administration regulations, ANSI Z49.1, and other governmental and industrial references pertaining to cleaning, repairing, welding, or other contemplated

operations.

E HEALTH AND HAZARD INFORMATION

VARIABILITY AMONG INDIVIDUALS
Health studies have shown that many petroleum hydrocarbons and synthetic lubricants pose potential human health risks which may vary from person to person. As a precaution, exposure to liquids, vapors, mists or fumes should be minimized.

EFFECTS OF OVEREXPOSURE (Signs and symptoms of exposure)
Prolonged or repeated liquid contact with the skin will dry and defat the skin, leading to possible irritation and dermatitis.
High vapor concentrations (greater than approximately 1000 ppm, attainable at temperatures well above ambient) are irritating to the eyes and the respiratory tract, and may cause headaches, dizziness, anesthesia, drowsiness, unconsciousness, and other central nervous system effects, including death.

NATURE OF HAZARD AND TOXICITY INFORMATION
Prolonged or repeated skin contact with this product tends to remove skin oils, possibly leading to irritation and dermatitis; however, based on human experience and available toxicological data, this product is judged to be neither a "corrosive" nor an "irritant" by OSHA criteria.

Product contacting the eyes may cause eye irritation.

Lifetime skin painting studies conducted by the American Petroleum Institute, Exxon and others have shown that similar products boiling between 175-370°C (350-700°F) usually produce skin tumors and/or skin cancer in laboratory mice. The degree of carcinogenic response was weak to moderate with a relatively long latent period. The implications of these results for humans have not been determined.

Limited studies on oils that are very active carcinogens have shown that washing the animals' skin with soap and water between applications greatly reduces tumor formation. These studies demonstrate the effectiveness of cleansing the skin after contact.

Potential risks to humans can be minimized by observing good work practices and personal hygiene procedures generally recommended for petroleum products. See Section I for recommended protection and precautions.

Contains light hydrocarbon components. Lifetime studies by the American Petroleum Institute have shown that kidney damage and kidney cancer can occur in male rats after prolonged inhalation exposures at elevated concentrations of total gasoline. Kidneys of mice and female rats were unaffected. The U.S. EPA Risk Assessment Forum has concluded that the male rat kidney tumor results are not relevant for humans. Total gasoline exposure also produced liver tumors in female mice only. The implication of these data for humans has not been determined. Certain components, such as normal hexane, may also affect the nervous system at high concentrations (e.g., 1000-1500 ppm).

Product has a low order of acute oral and dermal toxicity, but minute amounts aspirated into the lungs during ingestion or vomiting may cause mild to severe pulmonary injury and possibly death.

This product is judged to have an acute oral LD50 (rat) greater than 5 g/kg of body weight, and an acute dermal LD50 (rabbit) greater than 3.16 g/kg of body weight.

Inhalation of components of exhaust from burning, such as carbon monoxide, may cause death at high concentrations.
Long-term repeated exposure of laboratory animals to whole diesel exhaust has resulted in an increased incidence of lung cancer.
Exposure to exhaust from burning and diesel exhaust should be minimized.

PRE-EXISTING MEDICAL CONDITIONS WHICH MAY BE AGGRAVATED BY EXPOSURE
Petroleum Solvents/Petroleum Hydrocarbons - Skin contact may aggravate an existing dermatitis.

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F. PHYSICAL DATA

The following data are approximate or typical values and should not be used for precise design purposes.

BOILING RANGE
160-350°C (320-660°F)

SPECIFIC GRAVITY (15.6 C/15.6 C)
0.86

MOLECULAR WEIGHT
Approximately 212 average

pH
Essentially neutral

POUR, CONGEALING OR MELTING POINT
-18°C (0°F)
Pour Point by ASTM D 97

VISCOSITY
2.7 cSt @ 40°C

VAPOR PRESSURE
Less than 1 mm Hg @ 20°C

VAPOR DENSITY (AIR = 1)
Greater than 5

PERCENT VOLATILE BY VOLUME
100

EVAPORATION RATE @ 1 ATM. AND 25 C (77 F)
(n-BUTYL ACETATE = 1)
0.02

SOLUBILITY IN WATER @ 1 ATM. AND 25 C (77 F)
Negligible; less than 0.1%

G. REACTIVITY

This product is stable and will not react violently with water. Hazardous polymerization will not occur. Avoid contact with strong oxidants such as liquid chlorine, concentrated oxygen, sodium hypochlorite, calcium hypochlorite, etc., as this presents a serious explosion hazard.

H. ENVIRONMENTAL INFORMATION

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
Shut off and eliminate all ignition sources. Keep people away. Recover free product. Add sand, earth or other suitable absorbent to spill area. Minimize breathing vapors. Minimize skin contact. Ventilate confined spaces. Open all windows and doors. Keep product out of sewers and watercourses by diking or impounding. Advise authorities if product has entered or may enter sewers, watercourses, or extensive land areas.
Assure conformity with applicable governmental regulations. Continue to observe precautions for volatile, combustible vapors from absorbed material.

THE FOLLOWING INFORMATION MAY BE USEFUL IN COMPLYING WITH VARIOUS STATE AND FEDERAL LAWS AND REGULATIONS UNDER VARIOUS ENVIRONMENTAL STATUTES:

REPORTABLE QUANTITY (RQ), EPA REGULATION 40 CFR 302 (CERCLA Section 102)
No RQ for product or any constituent greater than 1% or 0.1% (carcinogen).

THRESHOLD PLANNING QUANTITY (TPQ), EPA REGULATION 40 CFR 355 (SARA Sections 301-304)
No TPQ for product or any constituent greater than 1% or 0.1% (carcinogen).

TOXIC CHEMICAL RELEASE REPORTING, EPA REGULATION 40 CFR 372 (SARA Section 313)
No toxic chemical is present greater than 1% or 0.1% (carcinogen).

HAZARDOUS CHEMICAL REPORTING, EPA REGULATION 40 CFR 370 (SARA Sections 311-312)

	Acute Hazard	Chronic Hazard	Fire Hazard	Pressure Hazard	Reactive Hazard	Not Applicable
EPA HAZARD CLASSIFICATION CODE:		XXX	XXX			

No 6

I. PROTECTION AND PRECAUTIONS

VENTILATION
Use only with ventilation sufficient to prevent exceeding recommended exposure limit or buildup of explosive concentrations of vapor in air.

RESPIRATORY PROTECTION
Use supplied-air respiratory protection in confined or enclosed spaces, if needed.

PROTECTIVE GLOVES
Use chemical-resistant gloves, if needed, to avoid prolonged or repeated skin contact.

EYE PROTECTION
Use splash goggles or face shield when eye contact may occur.

OTHER PROTECTIVE EQUIPMENT
Use chemical-resistant apron or other impervious clothing, if needed, to avoid contaminating regular clothing, which could result in prolonged or repeated skin contact.

WORK PRACTICES / ENGINEERING CONTROLS
Keep containers closed when not in use. Do not store near heat, sparks, flame or strong oxidants.

In order to prevent fire or explosion hazards, use appropriate equipment.

Information on electrical equipment appropriate for use with this product may be found in the latest edition of the National Electrical Code (NFPA-70). This document is available from the National Fire Protection Association, Batterymarch Park, Quincy, Massachusetts 02269.

PERSONAL HYGIENE
Minimize breathing vapor, mist or fumes. Avoid prolonged or repeated contact with skin. Remove contaminated clothing; launder or dry-clean before re-use. Remove contaminated shoes and thoroughly clean before re-use; discard if oil-soaked. Cleanse skin thoroughly after contact, before breaks and meals, and at end of work period. Product is readily removed from skin by waterless hand cleaners followed by washing thoroughly with soap and water.

J. TRANSPORTATION AND OSHA RELATED LABEL INFORMATION

TRANSPORTATION INCIDENT INFORMATION
For further information relative to spills resulting from transportation incidents, refer to latest Department of Transportation Emergency Response Guidebook for Hazardous Materials Incidents, DOT P 5800.3.

DOT IDENTIFICATION NUMBER
Fuel Oil, No. 2 / Combustible Liquid / NA 1993

OSHA REQUIRED LABEL INFORMATION
In compliance with hazard and right-to-know requirements, the following OSHA Hazard Warnings should be found on a label, bill of lading or invoice accompanying this shipment.

DANGER!

COMBUSTIBLE

LONG-TERM, REPEATED EXPOSURE MAY
CAUSE SKIN CANCER

Note: Product label will contain additional non-OSHA related information.

The information and recommendations contained herein are, to the best of Exxon's knowledge and

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belief, accurate and reliable as of the date issued. Exxon does not warrant or guarantee their accuracy or reliability, and Exxon shall not be liable for any loss or damage arising out of the use thereof.

The information and recommendations are offered for the user's consideration and examination, and it is the user's responsibility to satisfy itself that they are suitable and complete for its particular use. If buyer repackages this product, legal counsel should be consulted to insure proper health, safety and other necessary information is included on the container.

The Environmental Information included under Section H hereof as well as the Hazardous Materials Identification System (HMIS) and National Fire Protection Association (NFPA) ratings have been included by Exxon Company, U.S.A. in order to provide additional health and hazard classification information. The ratings recommended are based upon the criteria supplied by the developers of these rating systems, together with Exxon's interpretation of the available data.

FOR ADDITIONAL INFORMATION ON HEALTH EFFECTS CONTACT:
DIRECTOR OF INDUSTRIAL HYGIENE
EXXON COMPANY, U.S.A.
KELLOGG TOWER, ROOM 5E0
P. O. BOX 2180
HOUSTON, TX 77252-2180
(713) 656-2443

FOR OTHER PRODUCT INFORMATION CONTACT:
MANAGER, MARKETING TECHNICAL SERVICES
EXXON COMPANY, U.S.A.
ROOM 2355
P. O. BOX 2180
HOUSTON, TX 77252-2180
(713) 656-8349

17-325; 17-325-2; 17-325-3 No. 7

ANSUL® ANSUL FIRE PROTECTION MARINETTE, WI 54143-2542

MATERIAL SAFETY DATA SHEET

FORAY
QUICK IDENTIFIER (In Plant Common Name)

Manufacturer's Name:	ANSUL FIRE PROTECTION, WORMALD U.S., INC.	Emergency Telephone No.:	(715) 735-7411
Address:	One Stanton Street, Marinette, WI 54143-2542	Other Information Calls:	Same
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	12001-26-2	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_2O = 1):	N/A	Vapor Pressure (mm Hg):	N/A
Percent Volatile by Volume (%):	N/A	Vapor Density (Air = 1):	N/A	Evaporation Rate (= 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 ☐ Stable ☒	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:	May Occur ☐ Will Not Occur ☒	Conditions to Avoid:	N/A

No.7

SECTION 5 — HEALTH HAZARDS

Threshold Limit Value:	OSHA nuisance dust limit of 15 mg/M3 or ACGIH nuisance dust value of 10 mg/M3 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
Chemical Listed as Carcinogen or Potential:	National Toxicology Program: Yes ☐ No ☒ — I.A.R.C. Monographs: Yes ☐ No ☒ — OSHA: Yes ☐ No ☒

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
rotective 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	1 HEALTH
3 Serious Hazard	
2 Moderate Hazard	0 FLAMMABILITY
1 Slight Hazard	0 REACTIVITY
0 Minimal Hazard	

N/A = Not Applicable NDA = No Data Available

ANSUL and FORAY are registered trademarks.

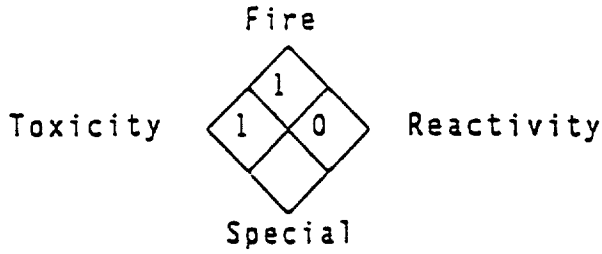
No. 8

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

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 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: 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)

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 applicable

Extinguishing agents:
Drychemical or Waterfog or CO_2 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/m^3 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(threshhold 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)

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: DAVID DABOIEN

Revision Date: 04-12-90 OHM CORP

Supersedes : 07-19-89 2910 WEST BEAVER ST

Date Sent : 10/30/92 JACKSONVILLE FL 32205

(Continued on next page)

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.

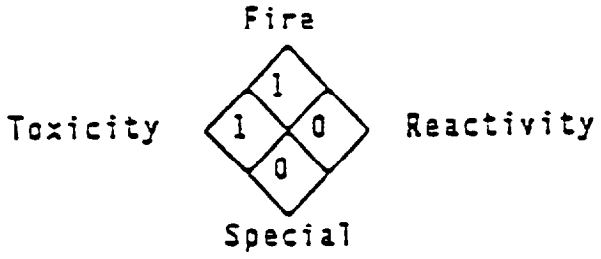
FE No. 9

WITCO MATERIAL SAFETY DATA SHEET

Kendall C-915 Grease

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

CHEMICAL AND PHYSICAL PROPERTIES---SECTION II

Chemical Name:
petroleum hydrocarbon and calcium stearate
Formula: not applicable
Hazardous 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-solid
Odor: mineral oil
Appearance: grease
Color: black
Specific Gravity (water=1): .94
Boiling Point: greater than 260°C (500°F)
Melting Point: not applicable
Solubility in Water (by weight %): negligible
Volatile (by weight %): negligible
Evaporation Rate: negligible
Vapor Pressure (mm Hg at 20°C): negligible
Vapor Density (air=1): not applicable
pH (as is): not applicable
Stability: Product is stable under normal conditions
Viscosity 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.
Usual Fire and Explosion Hazards:
none

(Continued on next page)

(Section III continued)

Flashpoint: (Method Used) ASTM D92 greater than 210°C (410°F)
Flammable limits %: not applicable
Extinguishing agents:
Drychemical or Waterfog or CO_2 or Foam or Sand/Earth
Water may cause frothing.
Closed containers exposed to fire may be cooled with water.

HEALTH HAZARD DATA---SECTION IV

Permissible 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 V

Ventilation 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 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.

(Continued on next page)

No. 9

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 Grease
Special Transportation Notes:

Robert Kellam

Prepared by: L.D.DROMGOLD
Title: MANAGER,NEW PRODUCTS
Original Date: 06/18/82 Sent to: CHRIS MCKEEMAN
Revision Date: 11/13/85 OHM CORPORATION
Supersedes : 05/11/84 16406 US ROUTE 224E
Date Sent : 07/28/89 FINDLAY OH 45840

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.

GO-JO® HAND CLEANER with Fine Italian PUMICE

HEALTH HAZARD DATA:

Routes of Entry:

___ Inhalation ___ Skin X Eye X Ingestion

Carcinogenicity:

X None Known ___ NTP ___ IARC ___ OSHA Regulated

Signs and Symptoms of Exposure:

EYE CONTACT - Irritation. SKIN CONTACT - Prolonged contact may result in contact dermatitis which is characterized by dryness, chapping, and reddening. INGESTION - Ingestion of small quantities is usually nonfatal unless aspiration occurs. Aspiration may lead to chemical pneumonitis which is characterized by pulmonary edema, and hemorrhage and may be fatal.

Medical Conditions Generally Aggravated by Exposure:

None Known

Emergency and First Aid Procedures:

EYE CONTACT - DO NOT RUB EYES. Flush with water for 15 minutes. If irritation persists, contact physician.
INGESTION - DO NOT INDUCE VOMITING. Contains Mineral Oil. Contact Physician or Poison Control Center immediately.

PRECAUTIONS FOR SAFE HANDLING AND USE:

Steps to be Taken in Case Material is Released or Spilled:

Absorb and collect for disposal. Flush area with water to reduce possible slippery floor hazard.

Waste Disposal Method:

According to all local, state, and federal regulations.

Precautions to be Taken in Handling and Storage:

Avoid eye contact and store at ambient conditions.

Other Precautions:

KEEP OUT OF REACH OF CHILDREN!

CONTROL MEASURES:

Respiratory & Ventilation / Gloves & Eye Protection:

None Required if used as directed.

Other Protective Clothing or Equipment:

None Required if used as directed.

Work/Hygienic Practices:

Routine

PREPARED BY: Ronald A. Williams

Ronald A. Williams,
Administrative Scientist

DATE: 9/23/91

SUPERSEDES: 8/30/90

NOTICE: The information herein is based on data considered to be accurate as of the date of preparation of this Material Safety Data Sheet. However, no warranty or representation, expressed or implied, is made as to the accuracy or completeness of the foregoing data and safety information. The user assumes all liability for any damage or injury resulting from abnormal use, from any failure to adhere to recommended practices, or from any hazards inherent in the nature of the product.

= Not Applicable NO = No Data NE = Not Established

This form complies with OSHA Form 174.

MATERIAL SAFETY DATA SHEET NO. C024 ISSUE DATE: 11/2/90

No. 11

MATERIAL NAME: DOVE LIGHT DUTY LIQUID DISHWASHING DETERGENT
SUPPLIER: LEVER BROTHERS COMPANY 390 PARK AVENUE NY, NY 10022
EMERGENCY PHONE: 212 688-6000
SYNONYMS: N.A.
COMPONENTS: Confidential
EPA/TSCA STATUS: N.A. CAS NO.: N.A.
DOT HAZARD CLASS: N.A.
DOT SHIPPING NAME: N.A.

NFPA CODE	EXPOSURE LIMITS
HEALTH: 2	
FLAMM: 0	OSHA PEL: N.A. ACGIH TWA: N.A.
REACT: 0	LEVER TLV: N.A. ACGIH STEL: N.A.

HAZARDOUS COMPONENTS	CAS NUMBER	%	OSHA PEL	ACGIH: TWA	STEL
None					

PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AND ODOR: Liquid
pH: 6.2-6.6 SOLUBILITY: Soluble in Water
BOILING POINT: N.D. FREEZING POINT: N.D.
SPECIFIC GRAVITY: 1.035-1.055 VAPOR PRESSURE: N.D.
MELTING POINT: N.A. VAPOR DENSITY: N.D.
SPILL OR LEAK PROCEDURES: Flush small amounts to sanitary sewer. For 5 gallons or more, use absorbent material.

FIRE, EXPLOSION, REACTIVITY DATA

FLASH POINT: N.A.
FLAMMABLE LIMITS: N.A.
UNUSUAL FIRE AND EXPLOSION HAZARDS: None
EXTINGUISHING MEDIA: Normal
HAZARDOUS DECOMPOSITION PRODUCTS: Oxides of nitrogen and sulfur
FIRE FIGHTING PROCEDURES: Normal
NFPA CLASS: N.D.
SPECIAL PRECAUTIONS: N.D.
INCOMPATIBILITIES (materials to avoid): Chlorine containing compounds
STABILITY: Stable

DISPOSAL DATA

DISPOSAL SHIPPING NAME: N.A.
EPA HAZARD CODE: N.A.
EPA HAZARD WASTE #: N.A.
DOT HAZARD WASTE ID #: N.A.
DISPOSAL: Dispose in accordance with Federal, State and Local Regulations.

N.A. = NOT APPLICABLE N.D. = NOT DETERMINED

MATERIAL SAFETY DATA SHEET NO. C024 ISSUE DATE: 11/2/90
MATERIAL NAME: DOVE LIGHT DUTY LIQUID DISHWASHING DETERGENT

No. 11

ACUTE TOXICITY INFORMATION

AL:	Nontoxic
HALATION:	N.D.
AL:	N.D.
E IRRITATION:	Irritant to eyes by FHSA test standards. Minimal eye effects in humans with similar products.
SKIN IRRITATION:	Nonirritant
SKIN SENSITIZATION:	Nonsensitizer
PRIMARY ROUTES OF ENTRY:	Eye

CHRONIC EXPOSURE EFFECTS

TARGET ORGANS: Eye

CARCINOGEN: (NTP, IARC & OSHA LIST) None

MEDICAL CONDITION AGGRAVATED BY EXPOSURE: None Known

SYMPTOMS AND EFFECTS OF EXPOSURE

EYE:	May cause discomfort, lacrimation and erythema.
SKIN:	Possible irritation from prolonged or repeated contact.
INGESTION:	May produce nausea, abdominal discomfort and diarrhea. Spontaneous emesis may occur if ingested in sufficient amount.
INHALATION:	May produce irritation of respiratory tract.

EMERGENCY AND FIRST AID TREATMENT

:	Immediately rinse eyes with water. Remove contact lenses, if any, then continue rinsing for 5 to 10 minutes.
SKIN:	Remove contaminated clothing and rinse skin with water.
INGESTION:	Drink a glass of water or milk. Vomiting need not be induced, but ingestion of large quantities may produce spontaneous vomiting.
INHALATION:	Move person to fresh air.
COMMENTS:	Call a physician if symptoms persist or amount swallowed was large.

PERSONAL SAFETY MEASURES AND EQUIPMENT

EYES:	Safety glasses with side shields.
RESPIRATOR:	Not normally needed.
GLOVES:	Impermeable gloves if needed.
VENTILATION:	Local exhaust if needed.

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

AGA

AGA Gas Inc.
6225 Oaktree Blvd.
P.O. Box 94737
Cleveland, Ohio 44101-4737

Telephone
(216) 642-6600

MATERIAL SAFETY DATA SHEET No. 12

PRODUCT NAME Compressed Air	CAS # N/A
TRADE NAME AND SYNONYMS Compressed Air; Air; Compressed Air, Breathing Quality	DOT I D No. UN 1002
CHEMICAL NAME AND SYNONYMS See last page.	DOT Hazard Class Nonflammable gas
	Formula. See last page.
ISSUE DATE AND REVISIONS 25 November 1985	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 of matter or 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		CONDITIONS TO AVOID
Unstable		
Stable	X	N/A

INCOMPATIBILITY (Materials to avoid)

None

HAZARDOUS DECOMPOSITION PRODUCTS

None

HAZARDOUS POLYMERIZATION		CONDITIONS TO AVOID
May Occur		
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

SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type)
N/A

VENTILATION	LOCAL EXHAUST	SPECIAL
N/A	N/A	N/A
	MECHANICAL (Gen.)	OTHER
	N/A	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 Shipping Label: Nonflammable gas
DOT Hazard Class: 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 excesssive 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 SO_2, Cl_2, 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).

*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 will not be reflected in this data sheet. The customer should review these regulations to ensure that he is in full compliance.

CHEMICAL FORMULA: (Continued)

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

Gas	Molar %
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.

No. 13

Material Safety Data Sheet

from Genium's Reference Collection
Genium Publishing Corporation
1145 Catalyn Street
Schenectady, NY 12303-1836 USA
(518) 377-8855

GENIUM PUBLISHING CORP.

No. 674

ISOBUTYLENE

Issued: November 1988

SECTION 1. MATERIAL IDENTIFICATION

27

Material Name: ISOBUTYLENE

Description (Origin/Uses): Obtained from refinery steams by absorption on 65% sulfuric acid (H_2SO_4) at 59°F (15°C). Used primarily to produce diisobutylene, trimers, butyl rubber, and other polymers; also used to produce antioxidants for foods, plastics, and packaging food supplements.

Other Designations: Isobutene; 2-Methylpropene; *gamma*-Butylene; $CH_2=C(CH_3)_2$; CAS No. 0115-11-7

Manufacturer: Contact your supplier or distributor. Consult the latest edition of the *Chemicalweek Buyers' Guide* (Genium ref. 73) for a list of suppliers.

NFPA: 4 / 1 / 0 / -

HMIS
H 1
F 4
R 0
PPG*
*See sect. 8

R 1
I 1
S 1
K 4

SECTION 2. INGREDIENTS AND HAZARDS

	%	EXPOSURE LIMITS
Isobutylene, CAS No. 0115-11-57	Ca 100	OSHA PEL None Established ACGIH TLV, 1988-89 None Established NIOSH REL None Established Toxicity Data* Rat, Inhalation, LC_{50}: 620 g/m³ (4 Hrs) Mouse, Inhalation, LC_{50}: 415 g/m³ (2 Hrs)

*Monitor NIOSH, *RTECS* (UD0890000), for additional data.

SECTION 3. PHYSICAL DATA

Boiling Point: -19.6°F (-6.9°C)
Melting Point: -220°F (-140°C)
Vapor Density (Air = 1): 1.9
Specific Gravity (H_2O = 1): Ca 0.6

Molecular Weight: 56 Grams/Mole
Solubility in Water (%): Insoluble*
% Volatile by Volume: 100

Appearance and Odor: A colorless, extremely flammable gas; odor not listed.

*Isobutylene is very soluble in alcohol, ether, and sulfuric acid.

SECTION 4. FIRE AND EXPLOSION DATA

Flash Point*	Autoignition Temperature: 869°F (465°C)	LEL: 1.8% v/v	UEL: 9.6% v/v

Extinguishing Media: Isobutylene gas is an extremely flammable gas that has a substantial explosive air-gas range. For isobutylene fires, the recommended fire-fighting technique is to stop the flow of gas instead of extinguishing the fire. If the flames are extinguished and the isobutylene gas continues to escape or leak, an explosive air-gas mixture can form quickly and ignite without warning. A resulting explosion could cause greater damage than that which would be caused by allowing the fire to burn itself out. If the fire must be extinguished to allow safe access to shutoff valves, recommended extinguishing agents include CO_2 and dry chemical. Unusual Fire or Explosion Hazards: In many cases, the preferred strategy is to allow the flames to continue to burn and to cool the surroundings with water spray to prevent ignition of nearby combustibles. Isobutylene gas is heavier than air and can collect in low-lying, confined spaces. Potentially explosive air-gas mixtures are especially likely to build up in such an area, so enter it with extreme caution whether or not it is presently involved in a fire. Possible sources of ignition must not be brought into any area suspected of containing substantial concentrations of isobutylene gas. Special Fire-fighting Procedures: Wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode.

* Sax (Genium ref. 6) reports a flash point of -105°F (-76°C) for isobutylene.

SECTION 5. REACTIVITY DATA

Stability/Polymerization: Isobutylene is stable in closed, pressurized containers during routine operations at room temperature. Hazardous polymerization cannot occur. Chemical Incompatibilities: Isobutylene can react dangerously with strong oxidizing materials. Conditions to Avoid: Prevent exposing isobutylene to any source of ignition such as an open flame, sparks, lighted tobacco products, or steam lines. Hazardous Products of Decomposition: Isobutylene fires can produce toxic gases such as carbon monoxide (CO) or lower-molecular-weight hydrocarbons. Comments: The extreme flammability of isobutylene means that any reactions involving this material, including nonhazardous ones, must be performed carefully in order to prevent fires and/or explosions.

SECTION 6. HEALTH HAZARD INFORMATION

Carcinogenicity: Isobutylene is not listed as a carcinogen by the NTP, IARC, or OSHA.
Summary of Risks: Isobutylene is a simple asphyxiant. As such it will not cause significant physiological responses, but it can displace the minimum required atmospheric oxygen level. Significant displacement by isobutylene results in an oxygen-deficient atmosphere with no adequate warning properties. Asphyxiation fatalities can occur especially in confined, low-lying, poorly ventilated spaces because isobuty-

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SECTION 6. HEALTH HAZARD INFORMATION, cont.

lene gas is almost twice as dense as air itself (see sect. 3). Medical Conditions Aggravated by Long-Term Exposure: None reported. Target Organs: None reported. Primary Entry: Inhalation. Acute Effects: Initial symptoms of the effects of simple asphyxiant ies are rapid respiration and air hunger, diminished mental alertness, and impaired muscular coordination. Continuing lack of oxygen causes faulty judgment, depression of all sensations, rapid fatigue, and emotional instability. As the asphyxia continues, nausea; vomiting; prostration; loss of consciousness; and, finally, convulsions; deep coma; and death can occur. Chronic Effects: None reported. FIRST AID: Inhalation. Would-be rescuers need to be concerned about their own safety when entering confined, poorly ventilated, oxygen-deficient areas. Self-contained breathing equipment must be readily available for rescuers. Station standby workers outside the immediate area so that they can summon additional help if it is needed. Remove the exposed person to fresh air; restore and/or support his or her breathing as needed. Have qualified medical personnel administer oxygen as required. Comments: The extreme flammability of isobutylene gas warrants special attention even during rescue operations. Rescue personnel must not smoke. All emergency lamps and floodlights that must be lowered into enclosed areas for rescue operations must be explosion proof. Obtain this equipment before any emergency occurs and make it accessible to emergency-response personnel. Get medical help (in plant, paramedic, community) for all exposures. Seek prompt medical assistance for further treatment, observation, and support after first aid.

SECTION 7. SPILL, LEAK, AND DISPOSAL PROCEDURES

Spill/Leak: *Treat any isobutylene gas leak as an emergency.* If the leaking gas has not yet ignited, use water spray to direct flammable gas-air mixtures away from sources of ignition. Extinguish all sources of ignition as quickly as possible; however, if the leaking gas is burning, do not attempt to extinguish the flames until the source of the isobutylene gas is located and sealed. Otherwise, flammable isobutylene gas-air mixtures can explode without warning and cause widespread damage that might not have occurred if the original fire had been allowed to burn itself out. If it is necessary to extinguish isobutylene flames in order to gain access to a shutoff valve, use dry chemical or carbon dioxide as extinguishing agents. Waste Disposal: Contact your supplier or a licensed contractor for detailed recommendations. Follow Federal, state, and local regulations.

OSHA Designations

Air Contaminant (29 CFR 1910.1000 Subpart Z): Not Listed

EPA Designations (40 CFR 302.4): Not Listed

SECTION 8. SPECIAL PROTECTION INFORMATION

Respirator: Follow OSHA respirator regulations (29 CFR 1910.134). For emergency or nonroutine operations (leaks or cleaning reactor vessels and storage tanks), wear an SCBA. Warning: Air-purifying respirators will *not* protect workers in oxygen-deficient atmospheres, which lack warning properties; to work in them safely requires that an SCBA be worn. Ventilation: Install and operate general and local aximum, explosion-proof ventilation systems powerful enough to maintain airborne levels of this material below the lower explosive limit d in section 4. Local exhaust ventilation is preferred because it prevents dispersion of the contaminant into the general work area by eliminating it at its source. Consult the latest edition of Genium reference 103 for detailed recommendations. Safety Stations: Make emergency eyewash stations, safety/quick-drench showers, and washing facilities available in work areas. Contaminated Equipment: Contact lenses pose a special hazard; soft lenses may absorb irritants, and all lenses concentrate them. Do *not* wear contact lenses in any work area. Comments: Practice good personal hygiene; always wash thoroughly after using this material and before eating, drinking, smoking, using the toilet, or applying cosmetics. Keep it off your clothing and equipment. Avoid transferring it from your hands to your mouth while eating, drinking, or smoking. Do *not* eat, drink, or smoke in any work area. Do not inhale isobutylene vapor.

SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

Storage/Segregation: Store isobutylene in closed, pressurized containers in a cool, dry, well-ventilated area away from sources of ignition, combustible materials, and strong oxidizers. Protect containers from physical damage. Engineering Controls: Make sure all engineering systems (production, transportation) are of maximum explosion-proof design. Electrically ground and bond all containers, pipelines, etc., used in shipping, transferring, reacting, production, and sampling operations to prevent static sparks. Comments: Isobutylene is an extremely explosive and flammable gas. It must not be exposed to any possible source of ignition in work or storage areas.

Transportation Data (49 CFR 172.101-2)

DOT Shipping Name: Liquefied Petroleum Gas
DOT Hazard Class: Flammable Gas
ID No. UN1055
DOT Label: Flammable Gas
DOT Packaging Requirements: 49 CFR 173.304, .314, .315
DOT Packaging Exceptions: 49 CFR 173.306

IMO Shipping Name: Isobutylene
IMO Hazard Class: 2.1
IMO Label: Flammable Gas

ferences: 1, 6, 84-94, 116, 117, 120, 122.

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Prepared by PJ Igoe, BS

Industrial Hygiene Review: DJ Wilson, CIH

Medical Review: W Silverman, MD

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No. 14

Genium Publishing Corp.
One Genium Plaza
Schenectady, NY 12304-4690
(518) 377-8854

Material Safety Data Sheets Collection

Isopropyl Alcohol MSDS No. 324
**Note: 2 pages
Date of Preparation: 9/85 Revision: A, 10/93

Section 1 - Chemical Product and Company Identification 42

Product/Chemical Name: Isopropyl Alcohol
Chemical Formula: $(CH_3)_2CHOH$
CAS No.: 67-63-0
Synonyms: Dimethyl carbinol, 2-hydroxypropane, IPA, Isohol, Lutosol, isopropanol, Petrohol, 2-propanol, *sec*-propyl alcohol, rubbing alcohol, Spectrar.
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) *

ACGIH TLVs
TWA: 400 ppm (983 mg/m^3)
STEL: 500 ppm (1230 mg/m^3)

* Vacated 1989 Final Rule Limits

NIOSH REL
10-hr TWA: 400 ppm (980 mg/m^3)
STEL: 500 ppm (1225 mg/m^3)

IDLH Level
12,000 ppm

DFG (Germany) MAK
TWA: 400 ppm (980 mg/m^3)
Category II: Substances with systemic effects
Half-life: < 2 hr

Peak Exposure Limit: 800 ppm, 30 min. average value, 4/shift

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.

Wilson Risk Scale
R 1
I 2
S 2*
K 3
*Skin absorption

HMIS
H 1
F 3
R 0

PPE†
†Sec. 8

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 parasinus 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.

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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.

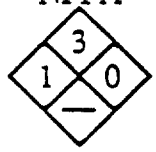
Section 4 - First Aid Measures

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 1B Flammable Liquid

NFPA



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 1, 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 > 8 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.

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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 cartridge(s). For < 10,000 ppm, use any supplied-air respirator (SAR) operated in continuous-flow mode. For < 12,000 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
Appearance and Odor: Colorless with a slight odor and bitter taste.
Odor Threshold: 22 ppm*
Vapor Pressure: 44 mm Hg at 25 °F (77 °C)
Saturated Vapor Density(Air = 1.2 kg/m^3, 0.075 lb/ft^3): 1.274 kg/m^3 or 0.080 lb/ft^3
Formula Weight: 60.09
Density (H_2O=1, at 4 °C): 0.78505 at 68°F (20 °C)
Water Solubility : > 10 %
Ionization Potential: 10.10 eV

Other Solubilities: Soluble in alcohol, ether, chloroform, and benzene. Insoluble in salt solutions.
Boiling Point: 180.5 °F (82.5 °C)
Freezing Point: -129.1 °F (-89.5 °C)
Viscosity: 2.1 cP at 77 °F (25 °C)
Refraction Index: 1.375 at 68 °F (20 °C)
Surface Tension: 20.8 dyne/cm at 77 °F (25 °C)
Critical Temperature: 455 °F (235 °C)
Critical Pressure: 47 atm
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 acrid 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, TD_{Lo}: 223 mg/kg caused hallucinations, distorted perceptions, lowered blood pressure, and a change in pulse rate.
Human, oral, LD_{Lo}: 3570 mg/kg caused coma, respiratory depression, nausea, and vomiting.
Rat, oral, LD_{50}: 5045 mg/kg caused a change in righting reflex, and somnolence (general depressed activity).

* See NIOSH, *RTECS* (NT8050000), for additional toxicity data.

Section 12 - Ecological Information

Ecotoxicity: Guppies (*Poeciliia reticulata*) LC_{50} = 7,060 ppm/7 days; fathead minnow (*Pimephales promelas*) LC_{50} = 11,830 mg/L/1 hr. BOD = 133 %/5 days.

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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 ys. 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 *Desulfovibrio*. 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
Shipping Symbols: –
Hazard Class: 3
ID No.: UN1219
Packing Group: II
Label: Flammable Liquid
Special Provisions (172.102): T1

Packaging Authorizations
a) Exceptions: 173.150
b) Non-bulk Packaging: 173.202
c) Bulk Packaging: 173.242

Quantity Limitations
a) Passenger, Aircraft, or Railcar: 5 L
b) Cargo Aircraft Only: 60 L

Vessel Stowage Requirements
a) Vessel Stowage: B
b) Other: –

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
Listed (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

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No. 15

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

Material Safety Data Sheets Collection:

Sheet No. 440
Methane

Issued: 7/80 Revision: A. 8/89

Section 1. Material Identification

29

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; CH_4; 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

NFPA
4 / 1 / 0 / -

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

Section 2. Ingredients and Occupational Exposure Limits

Methane, ca 100%*

OSHA PEL	ACGIH TLV, 1988-89	NIOSH REL	Toxicity Data†
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 (C_2H_6), propane (C_3H_8), butane (C_4H_{10}), higher molecular weight alkanes, carbon dioxide (CO_2), nitrogen (N_2), and oxygen(O_2).
† Monitor NIOSH, *RTECS* (PA1490000), for future toxicity data.

Section 3. Physical Data

Boiling Point: -259 °F (161.6 °C)
Vapor Density (Air = 1): 0.544 at 32 °F (0 °C)
Molecular Weight: 16 g/mol
Water Solubility: Slight*
Melting Point: -296.5 °F (-182.5 °C)

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).

No. 15

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 shutoff. 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 MT (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
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

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) exits. Recommended storage containers include steel.

Transportation Data (49 CFR 172.101-2)

DOT Shipping Name: Methane
DOT Hazard Class: Flammable gas
DOT ID No.: UN1971
DOT Label: Flammable gas
DOT Packaging Requirements: 49 CFR 173.302
DOT Packaging Exceptions: 49 CFR 173.306

IMO Shipping Name: Methane, compressed
IMO Hazard Class: 2.1
IMO Label: Flammable gas

MSDS Collection References: 1, 6, 7, 84-94, 100, 116, 117, 119, 120, 122
Prepared by: PJ Igoe, BS; Industrial Hygiene Review: DJ Wilson, CIH; Medical Review: MJ Hardies, MD

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LUBRIPLATE®

MATERIAL SAFETY DATA SHEET

No. 16

Section I

PRODUCT NAME OR NUMBER HO-2A, HO-3, HO-4, HO-5 LUBRIPLATE Hydraulic Oils - HO-0, HO-1, HO-2,	FORMULA Mineral Oil and Additives
Manufacturer's Name Fiske Brothers Refining Co.	Emergency Telephone Number 201-589-9150
Address (Number, Street, City, State, and ZIP Code) 129 Lockwood St., Newark, NJ 07105	Telephone Number for Information 201-589-9150

Section II — Hazardous Ingredients/Identity Information

Hazardous Components (Specific Chemical Identity; Common Name(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	% (optional)
Oil Mist in Air (Not Encountered in Normal Usage)	5mg/m^3	5mg/m^3		

Hazardous Material Identification System (HMIS): Health-1, Flammability-1, Reactivity-0

Section III — Physical/Chemical Characteristics

Boiling Point	> 550°F	Specific Gravity (H_2O = 1)	0.8708 0.8894
Vapor Pressure (mm Hg.)	< 0.01	Melting Point	Liquid
Vapor Density (AIR = 1)	> 5	Evaporation Rate (Butyl Acetate = 1)	< 0.01

Solubility in Water
Negligible

Appearance and Odor
Transparent amber liquid with mineral oil odor

Section IV — Fire and Explosion Hazard Data

Flash Point (Method Used) C.O.C. - 415°F - 565°F	Flammable Limits	LEL 0.9%	UEL 7.0%

Extinguishing Media
Foam, Dry Chemical, Carbon Dioxide or Water Spray (Fog)

Special Fire Fighting Procedures
Cool exposed containers with water. Use air-supplied breathing equipment for enclosed or confined spaces.

Unusual Fire and Explosion Hazards
Do not store or mix with strong oxidants. Empty containers retain residue.

Do not cut, drill, grind, or weld, as they may explode.

Section V — Reactivity Data

Stability	Unstable		Conditions to Avoid N/A
	Stable	x	

Incompatibility (Materials to Avoid)
Avoid contact with strong oxidants like liquid chlorine, concentrated oxygen.

Hazardous Decomposition or Byproducts
May form SO_2. If incomplete combustion, carbon monoxide.

Hazardous Polymerization	May Occur		Conditions to Avoid N/A
	Will Not Occur	x	

No. 17

Material Safety Data Sheet

From Genium's Reference Collection
Genium Publishing Corporation
1145 Catalyn Street
Schenectady, NY 12303-1836 USA
(518) 377-8855

GENIUM PUBLISHING CORP.

No. 523
n-PENTANE
(Revision A)

Issued: October 1986
Revised: August 1987

SECTION 1. MATERIAL IDENTIFICATION

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MATERIAL NAME: *n*-PENTANE

DESCRIPTION (Origin/Uses): Prepared by dehydration and subsequent hydrogenation of 2- and 3-pentanol. Found in petroleum and is a constituent of petroleum ether. Used as an industrial solvent.

OTHER DESIGNATIONS: Amyl Hydride; C_5H_{12}; NIOSH *RTECS* #RZ9450000; CAS #0109-66-0

MANUFACTURER/SUPPLIER: Available from several suppliers, including: Ashland Chemical Co., Industrial Chemicals & Solvents Division, PO Box 2219, Columbus, OH 43216; Telephone: (614) 889-3844

COMMENTS: *n*-Pentane is a serious fire and explosion hazard.

HMIS	
H 1	
F 4	R 1
R 0	I -
PPE*	S 1
*See sect. 8	K 4

SECTION 2. INGREDIENTS AND HAZARDS

	%	HAZARD DATA
n-Pentane, CAS #0109-66-0; NIOSH *RTECS* #RZ9450000 $H_3C-CH_2-CH_2-CH_2-CH_3$ NIOSH REL 1986 10-Hr TWA: 120 ppm, 350 mg/m^3 15-Min Ceiling: 610 ppm, 1800 mg/m^3 Current OSHA PEL-TWA: 1000 ppm (2950 mg/m^3). The 1987-88 ACGIH TLVs are TWA = 600 ppm (1800 mg/m^3) and STEL = 750 ppm (2250 mg/m^3). *Immediately dangerous to life and health	>99	TOXICITY DATA Human, Inhalation, LC_{Lo}: 130000 ppm Human, Inhalation, TC_{Lo}: 90000 ppm/5 Min. Mouse, Intravenous, LD_{50}: 446 mg/kg IDLH* Level: 15000 ppm

SECTION 3. PHYSICAL DATA

Boiling Point ... 97°F (36.1°C)
Vapor Pressure ... 400 Torr at 65.3°F (18.5°C)
Vapor Density (Air = 1) ... 2.5
Solubility in Water ... 0.04% at 68°F (20°C)
Viscosity ... 0.43 at 32°F (0°C)
Specific Gravity ... 0.626 at 68°F (20°C)
Melting Point ... -202°F (-130°C)
Evaporation Rate (n-BuAc = 1) ... 28.6
Volatiles, % ... 100
Molecular Weight ... 72.15 Grams/Mole

Appearance and odor: Clear, colorless, mobile liquid. Mild gasolinelike odor. Threshold odor concentration: 50% recognition at 990 ppm.

COMMENTS: *n*-Pentane's high vapor density, volatility, and evaporation rate will generate explosive and flammable concentrations of vapor.

SECTION 4. FIRE AND EXPLOSION DATA

Flash Point and Method	Autoignition Temperature	Flammability Limits in Air	LOWER	UPPER
<-40°F (<-40°C)	500°F (260°C)	% by Volume	1.5%	7.8%

EXTINGUISHING MEDIA: Use carbon dioxide, dry chemical, or foam. Water is ineffective in putting out a fire involving *n*-pentane, and a water stream will spread flames; but a water spray should be used to cool fire-exposed containers to prevent pressure rupture. Also, water spray may be used to flush spills away from exposures to sources of ignition. This flammable liquid is a dangerous fire hazard and a dangerous explosion hazard. Fight fire from a safe distance. UNUSUAL FIRE/EXPLOSION HAZARDS: The heavier-than-air vapors of *n*-pentane may travel along low-lying surfaces to distant sources of ignition and then flash back to the original source of the material. SPECIAL FIRE-FIGHTING PROCEDURES: *n*-Pentane is an OSHA class IA flammable liquid. Wear a self-contained breathing apparatus with a full facepiece operated in a pressure-demand or other positive-pressure mode. This material is extremely flammable. Exercise due caution to protect against flashbacks.

SECTION 5. REACTIVITY DATA

n-Pentane is stable. Hazardous polymerization cannot occur.

CHEMICAL INCOMPATIBILITIES: *n*-Pentane is incompatible with oxidizing agents.

CONDITIONS TO AVOID: Avoid sources of ignition such as sparks, excessive heat, open flame, and lighted tobacco products.

PRODUCTS OF HAZARDOUS DECOMPOSITION can include oxides of carbons.

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SECTION 6. HEALTH HAZARD INFORMATION

n-Pentane is not listed as a carcinogen by the NTP, IARC, or OSHA.

SUMMARY OF RISKS: Vapors of this material are mildly narcotic and may cause irritation to the respiratory passages. (It was been reported that human exposures at 5000 ppm for 10 minutes did not cause mucous membrane irritation.) Extremely high and sustained concentrations may cause central nervous system depression and narcosis. This material is a defatting agent; repeated or prolonged skin contact with its liquid may result in drying, cracking, and dermatitis. Eye contact can be irritating. Swallowed liquid can vaporize (BP 97°F [36.1°C]) in the trachea. Aspiration into the lungs will cause dilution of alveolar air (asphyxiation hazard). TARGET ORGANS: Eyes, skin, respiratory system. PRIMARY ENTRY: Inhalation. ACUTE EFFECTS: Eyes, skin, and respiratory tract irritation; and possibly central nervous system depression. CHRONIC EFFECTS: Unknown. MEDICAL CONDITIONS AGGRAVATED BY LONG-TERM EXPOSURE: None reported.

FIRST AID: EYE CONTACT: Immediately flush eyes, including under the eyelids, gently but thoroughly with plenty of running water for at least 15 minutes. Get medical help.* SKIN CONTACT: Remove contaminated clothing. Flush affected area with water; wash with soap and water. Get medical help.* INHALATION: Remove victim to fresh air. Restore and/or support his breathing as required. Get medical help.* INGESTION: Do not induce vomiting. Never give anything by mouth to someone who is unconscious or convulsing. Get medical help.*

* GET MEDICAL ASSISTANCE = IN PLANT, PARAMEDIC, COMMUNITY. Get medical help for further treatment, observation, and support after first aid.

SECTION 7. SPILL, LEAK, AND DISPOSAL PROCEDURES

SPILL/LEAK: Notify safety personnel of n-pentane spills or leaks. If a spill or leak has not ignited, use water spray to disperse the gas or vapor and to protect those who are attempting to stop a leak. Keep upwind of a leak or spill. Remove sources of heat or ignition. Provide maximum explosion-proof ventilation. Cleanup personnel need protection against inhalation of vapors and contact with liquid. Flush waste to the ground and away from sensitive areas with a cold water spray. Small spills can be absorbed with vermiculite, picked up with nonsparking tools, or allowed to evaporate with good ventilation or in a hood or open area. Pick up large spills if it is safe to do so and place them into an appropriate container for recovery or disposal. Keep waste out of sewers or places where it can vaporize into confined spaces. DISPOSAL: Burn properly (because of material's low flash point) in an approved incinerator. Follow Federal, state, and local regulations. Aquatic Toxicity, TLm 96: 100-10 ppm. n-Pentane is reported in the 1980 EPA TSCA Inventory. EPA Hazardous Waste Number (40 CFR 261.21, Ignitability): D001. n-Pentane is not designated as a hazardous substance by the EPA (40 CFR 116.4). EPA Reportable Quantity (40 CFR 117.3): Not Listed.

SECTION 8. SPECIAL PROTECTION INFORMATION

GOGGLES: Wear chemical safety goggles or eyeglasses to prevent eye contact where splashing is possible.

GLOVES: Wear rubber or neoprene gloves to prevent skin contact.

RESPIRATOR: For emergency or nonroutine exposures above the TLV, use a NIOSH-approved respirator with an organic vapor canister or air-supplied or self-contained breathing apparatus below 5000 ppm.

VENTILATION: Provide general and local explosion-proof exhaust ventilation to meet TLV requirements. The ventilation systems must be explosion proof and nonsparking.

SAFETY STATIONS: Make eyewash stations, washing facilities, and safety showers available in areas of use and handling.

CONTAMINATED EQUIPMENT: Contact lenses pose a special hazard; soft lenses may absorb irritants, and all lenses concentrate them.

OTHER PERSONAL PROTECTIVE EQUIPMENT: Wear protective clothing appropriate to the work situation to prevent skin contact. Remove soiled clothing and launder it before wearing it again, because it is a health and fire hazard.

COMMENTS: Practice good personal hygiene. Keep materials off of your clothes and equipment. Avoid transferring materials from hands to mouth while eating, drinking, or smoking.

SECTION 9. SPECIAL PRECAUTIONS AND COMMENTS

STORAGE SEGREGATION: Store n-pentane in tightly closed containers in a cool, well-ventilated area away from oxidizing agents and sources of heat and ignition. Protect containers from physical damage. SPECIAL HANDLING/STORAGE: Ground and bond containers during transfers to prevent the generation of static sparks. Use nonsparking tools. Use metal safety cans for handling small amounts. Storage and handling must be suitable for an OSHA Class IA flammable liquid. Do not smoke where this material is stored or used. ENGINEERING CONTROLS: The heavier-than-air n-pentane vapors may travel to distant sources of ignition and flash back. These vapors collect in low-lying areas; minimize sources of ignition there.

OTHER PRECAUTIONS: Avoid breathing n-pentane vapors! Prevent its contact with skin and eyes! Do not eat this material! Institute exposure-monitoring and record-keeping requirements that have been proposed by NIOSH for alkanes.

TRANSPORTATION DATA (per 49 CFR 172.101-2):

DOT Shipping Name: Pentane	DOT Hazard Class: Flammable Liquid
DOT Required Label: Flammable Liquid	DOT ID No. UN1265
IMO Class: 3.1	IMO Label: Flammable Liquid

References: 1-12, 14, 16, 23, 25, 27, 31, 34, 38, 42, 45, 47, 49, 54, 55, 58, 59, 63, 73, 75, 82, 87-94. CK

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Approvals

Indust. Hygiene/Safety

Medical Review

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No. 18

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)728-6181

No. 18

FIRST BRANDS

Material Safety Data Sheet
PRESTONE® Engine Starting Fluid

Any questions, please call:	EMERGENCY TELEPHONE (24 Hours)	NFPA HAZARD CODE
First Brands Corporation 83 Wooster Heights Road Building 301 Danbury, CT 06813-1911 Telephone: (203) 731-2300	CHEMTREC (800) 424-9300 483-7616 in District of Columbia	4 = Extreme 3 = High 2 = Moderate 1 = Slight 0 = Insignificant

I. IDENTIFICATION

PRODUCT NAME	PRESTONE® Engine Starting Fluid
TYPE	Automotive Engine Starting Fluid (Aerosol)
STOCK	AS237
FORMULA	13374-84

II. PHYSICAL DATA

BOILING POINT, 760 mm Hg	95°F
FREEZING POINT	less than -30°F
DENSITY (at 68°F)	5.6 lbs/gal
VAPOR DENSITY (Air = 1)	2.6
VAPOR PRESSURE (at 68°F)	305 mm Hg
AEROSOL CONTAINER PRESSURE (at 70°F psig)	85
VOLATILES BY VOLUME	99%
SOLUBILITY IN WATER, by Wgt.	4.5%
EVAPORATION RATE (Butyl Acetate = 1)	23
APPEARANCE AND ODOR	Clear liquid, ether odor

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No. 18

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	(3)
			500 ppm STEL	(3)
n-heptane	25-60	142-82-5	400 ppm TWA	(3)
			500 ppm STEL	(3)
Methylcyclohexane	25-60	108-87-2	400 ppm TWA	(3)
Carbon dioxide	5-10	124-38-9	10000 ppm TWA	(1)
			5000 ppm TWA	(2)
			30000 ppm STEL	(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

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

FLAMMABLE LIMITS IN AIR, % BY VOLUME
LOWER: 1.85
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.

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.

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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.

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No. 19

WD-40®

MATERIAL SAFETY DATA SHEET

NFPA

I. PRODUCT IDENTIFICATION

Manufacturer:	WD-40 Company	Telephone:	
Address:	1061 Cudahy Place (92110) P.O. Box 80607 San Diego, California 92138-9021	Emergency Only:	1 (800) 424-9300 (CHEMTREC)
		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	64742-65-0	> 20	5 mg/M³ (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_2O = 1):	.800 @ 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 pneumonitis. Do not induce vomiting. Call Physician immediately.

Suspected Cancer Agent

Yes_____ No_X_ The components in this mixture have been found to be noncarcinogenic by NTP, IARC and OSHA.

VI. REACTIVITY DATA

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

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 1268
Label Required:	NONE, for containers less than 100 Gallons

Domestic Air

Description:	Petroleum Distillate Mixture
Hazard Class:	Combustible Liquid
Label Required:	NONE, for containers less than 110 Gallons

SIGNATURE: R. Miles R Miles TITLE: Technical Director

REVISION DATE: March 1990 SUPERSEDES: April 1988

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

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

INCIDENT INVESTIGATION FORMS

OHM Remediation Services Corp.

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

Home 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 _____

_____

_____

Describe Fully the Events Which Resulted in the Accident/Injury/Illness _____

_____

_____

PLEASE CONTINUE ON BACK OF THIS FORM

(Use Extra Page If Needed)

cribe 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 Lost 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 ☐ Regional Health & Safety Manager
☐ Project 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

PROJECT-SPECIFIC
HEALTH AND SAFETY PROCEDURES

1. 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. PURPOSE

This procedure describes the causes, symptoms, treatment, and prevention of heat-related illness.

3. 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. 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 (Gatorade). It should be recommended to the person experiencing heat cramps to lightly salt their food to make up for the sodium lost when sweating. 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. 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.

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.

1. OBJECTIVE

OHM Remediation Services Corp. (OHM) personnel performing hot work outside of rooms specifically designed for spark producing operations such as welding are required to obtain a hot work permit and comply with all provisions described in the permit.

2. PURPOSE

This procedure establishes requirements for cutting or burning operations performed at OHM Remediation Services Corp. (OHM) project sites in accordance with 29 CFR 1910.252 (d)(2)(iv) and .252 (d)(xiii)(b).

3. REQUIREMENTS

3.1 The site safety officer (SSO) or other qualified person will issue the hot work permit for any flame or spark producing operation that requires such a permit. This procedure is to be repeated for each shift when such operations occur.

3.2.1 Conduct a visual inspection of area. Remove any combustible material surrounding the work area for a minimum of 50 feet. Special attention will be paid to areas where hot slag can fall or spatter. Any combustible material which cannot be readily removed will be covered or otherwise protected from the hot materials. For example, covering a combustible surface with one inch of soil or wetting it may be sufficient.

3.2.2 Designate a fire watch. This person's (or persons') sole responsibility will be to monitor the welding or burning operation and have immediate access to a fire extinguisher or sufficient size and type for the potential combustible material. In addition, this person(s) shall be trained in the proper use of the appropriate fire extinguisher and be knowledgeable of the emergency signal and evacuation procedures as well as emergency shutdown procedures.

3.2.3 A qualified person must test the atmosphere. Do not begin until all spaces, pipes, and sumps affected have been opened and tested for the presence of flammables. If any flammable or combustible vapors exceed 10 percent lower explosive limit (LEL), no work will begin until levels are reduced. As a rule, no hot work will begin when any combustible vapor is present. All sewers in the vicinity of the hot work must be covered.

3.2.4 Notify personnel. Personnel working in the area of the hot work will be alerted to the fact that hot work is taking place.

3.2.5 Complete a hot work permit. A hot work permit will be completed and posted. The OHM Hot Work Permit follows this procedure.

4. BURNING OPERATION SAFETY RULES

4.1 Wear adequate flame and heat resistant clothing and appropriate eye protection. This includes chipping operations.

4.2 Ensure that the area below is roped off and posted if work is overhead.

4.3 Protect personnel and equipment in near vicinity against exposure from arc or sparks.

4.4 Observe good housekeeping practices; keep excess hoses, cables, and equipment out of aisle ways, stairways, and your work station.

4.5 Never use oil, grease, or pipe fitting compounds to make up connections on oxy-acetylene welding equipment.

4.6 Store torch fittings in a manner to prevent contamination.

4.7 Do not interchange oxygen and acetylene hoses; oxygen is coded green and acetylene is coded red.

4.8 Do not force connections or strike or force valve wheels.

4.8.1 Before connecting cylinders, read the label to ensure that the proper gas is being used.

4.8.2 Cylinders must not be placed where they might form part of an electrical circuit. Keep cylinders away form grating, layout tables and piping systems that may be used for the grounding or electrical welding circuits.

4.9 Open oxygen valves momentarily to remove dust or dirt; stand on one side of the valve and avoid contact of gas with any combustible material.

4.9.1 Pressure-adjusting screws on regulators will be fully released before the regulator is attached to a cylinder and the cylinder valve opened. Open the cylinder valve slowly; stand to one side, not in front of pressure regulator gauge faces when opening cylinder valves.

4.9.2 Do not use adjustable wrenches on acetylene cylinders; use the T-wrench provided. Keep it in place at the cylinder.

4.9.3 Never open an acetylene cylinder valve more than one and one half turns.

4.10 Do not store tools or equipment in the recessed top of an acetylene cylinder, and do not allow water to accumulate there.

4.11 Inspect the welding hose for defects before each use. Keep hoses clear of equipment and hot slag.

4.12 Do not use oxygen for cleaning, pressurization, or for ventilation.

4.13 Do not relight the flame on hot work when in an enclosed space. Allow time for gases to escape and then use a friction lighter.

4.14 A metal part which is suspiciously light probably has a void inside and an opening should be drilled before heating. Electrical boxes at the end of a conduit should be opened prior to cutting the conduit. Valves on both ends of piping should be opened.

4.15 Never lay work that is to be heated or welded on a concrete floor because when sufficiently heated, concrete may spall and fly with danger of injury.

4.16 Do not cut material in such a position that severed parts will fall striking legs or feet of the operator or assistant, or damage gas lines.

4.17 When a flashback occurs, both gases should be shut off - first oxygen, then acetylene. Before lighting the torch again, see that it is cool and that no damage has been done to the torch, hose, or regulator.

4.18 Mark work "HOT" if left unattended or where others may come in contact with hot surfaces.

4.19 When burning operations are to be stopped for a few minutes during the course of the work, it is permitted to close torch valves only. When work is stopped for a longer period, (5 minutes) or is left unattended, the following steps must be taken:

4.19.1 Close oxygen and acetylene cylinder valves

4.19.2 Open torch valves to relieve pressure, then close again

4.19.3 Release regulator pressure adjusting screws

4.20 Before regulator is removed from a cylinder, the cylinder valve will be closed and the gas released from the regulator.

4.21 Back flow protection shall be provided by an approved device that will protect O_2 from flowing into the fuel-gas system or fuel-gas from flowing into the O_2 systems.

5. PERSONAL PROTECTIVE EQUIPMENT

The normal personal protective equipment worn when working generally provides inadequate protection from flames or heat. The person performing the work shall supplement the existing equipment with the following:

5.1 Welding gloves fashioned from leather or other fire-resistant material

5.2 Apron or jacket fashioned from leather or other fire-resistant material

5.3 Chaps, if necessary, for leg protection

5.4 Eye protection and face protection with appropriate ANSI approved darkened lenses

5.5 If necessary, flash-fire protection.

5.6 Respiratory protection must be used during hot work that will produce fumes and gases hazardous to health. Such gases and fumes may be caused by the filling agent or material being worked on.

6. TRAINING

6.1 Employees designated to operate welding equipment shall have been properly instructed and judged competent to operate such equipment.

7. OHM HOT WORK PERMIT

7.1 No employee or subcontractor of OHM is to begin hot work unless an OHM Hot Work Permit has been requested and provided. It is the responsibility of the supervisor to make the determination if a permit is required. The permit shall be signed by the Site Supervisor or SSO and explained to each affected employee.

7.2 It is the responsibility of the Site Supervisor to see that workers comply with all safety practices of the OHM Hot Work Permit.

7.3 The permit will be valid for a single work shift only. For work requiring more than a single work shift, a new permit shall be completed at the start of each shift. The permit shall be displayed at the work site.

7.4 At the conclusion of the work, permits will be placed in the project file.

OHM Corporation

HOT WORK PERMIT

Date:_____ Time:_____

Project Name:_____ Project Number:_____

Location:_____

Issued to:_____

Site Safety Officer:_____

Supervisor:_____

Do not cut or use other open-flame or spark producing equipment until the following precautions have been been taken.

Protective Equipment used:_____

_____

(Initial Each Item)

_____ The location where the work is to be done has been personally examined.

_____ Any available fire protection systems are in service.

_____ There are no flammable dusts, vapors, liquids, or unpurged tanks (empty) in the area.

_____ Explosimeter reading <10% LEL

_____ All combustibles have been moved away from the operation, or otherwise protected with fire curtains or equivalent.

_____ Ample portable fire extinguishing equipment has been provided.

_____ Arrangements have been made to patrol the area for a least ½ hour after the work has been completed.

_____ The phone number for the local Fire Department is:_____

This form must be filled out daily whenever HOT WORK is being conducted and posted at the job site.

OHM Corporation

HOT WORK PERMIT

Date:_____ Time:_____

Project Name:_____ Project Number:_____

Location:_____

Issued to:_____

Site Safety Officer:_____

Supervisor:_____

Do not cut or use other open-flame or spark producing equipment until the following precautions have been been taken.

Protective Equipment used:_____

_____

(Initial Each Item)

_____ The location where the work is to be done has been personally examined.

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_____ Ample portable fire extinguishing equipment has been provided.

_____ Arrangements have been made to patrol the area for a least ½ hour after the work has been completed.

_____ The phone number for the local Fire Department is:_____

This form must be filled out daily whenever HOT WORK is being conducted and posted at the job site.

1. 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. SCOPE, APPLICATION AND PURPOSE

This procedure outlines requirements for all open excavations made in the earth's surface. Excavations are defined to include trenches. This policy is intended to protect personnel from the hazards of collapse.

3. REGULATORY REQUIREMENTS

This procedure will follow the guidelines of 29 CFR 1926, Subpart P - Excavations. In the case of United States Army Corp of Engineers projects, the requirements of EM 385-1-1, Section 23 will be observed. In the event of a conflict between these referenced standards, the more stringent will prevail.

4. GENERAL REQUIREMENTS

Safety operations while working in and around excavations involve many factors. Factors to be evaluated and discussed before starting work at daily safety meetings include:

4.1 Surface Encumbrances

All surface encumbrances that are located so as to create a hazard to employees shall be removed or supported, as necessary to safeguard employees.

4.2 Underground Installations/Utility Locations

The estimated 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 prior to opening an excavation.

4.2.1 Utility companies or the state utility protection service shall be contacted at least two (2) 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.

4.2.2 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.

4.2.3 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. Normally, it will take two (2) working days of the notice for the utility protection service to remark the locations.

4.2.4 OHM equipment operators shall maintain a reasonable clearance between any underground utility and the cutting edge or point of powered equipment.

4.2.5 When excavating with powered equipment within 18 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.

4.2.6 While the excavation is open, underground installations shall be protected, supported or removed as necessary to safeguard employees.

4.3 ACCESS AND EGRESS

4.3.1 Structural Ramps

Structural ramps that are used solely by employees as a means of access or egress from excavations shall be designed by a competent person. Structural ramps used for access or egress of equipment shall be designed by a competent person qualified in structural design, and shall be constructed in accordance with the design.

Ramps and runways constructed of two or more structural members shall have the structural members connected together to prevent displacement.

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.

4.3.2 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.

4.4 EXPOSURE TO VEHICULAR TRAFFIC

Employees exposed to public vehicular traffic shall be provided with and shall wear, warning vests or other suitable garments marked with or made of reflectorized or high-visibility material.

4.5 EXPOSURE TO FALLING LOADS

No employee shall be permitted underneath loads handled by lifting or digging equipment. Employees shall be required to stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling materials. Operators may remain in the cabs of vehicles being loaded or unloaded when the vehicles are equipped, in accordance with 29 CFR 1926.601(b)(6), to provide adequate protection for the operator from falling objects during loading and unloading operations.

4.6 WARNING SYSTEM FOR MOBILE EQUIPMENT

When mobile equipment is operated 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 grade should be away from the excavation.

4.7 HAZARDOUS ATMOSPHERES

4.7.1 Testing and Controls

In addition to the requirements set forth, 29 CFR 1926.50 - 1926.107; to prevent exposure to harmful levels of atmospheric contaminants and to assure acceptable atmospheric conditions, the following requirements shall apply:

Where oxygen deficiency (atmospheres containing less than 19.5 percent oxygen) or a hazardous atmosphere exists or could reasonably be expected to exist, such as in excavations in landfill areas or excavations in areas where hazardous substances are suspected, the atmospheres in the excavation shall be tested before employees enter excavations greater than 4 feet in depth.

Adequate precautions shall be taken, to prevent employee exposure to atmospheres containing less than 19.5 percent oxygen and other hazardous atmospheres. These precautions include providing proper respiratory protection or ventilation as needed.

Adequate precaution shall be taken such as providing ventilation, to prevent employee exposure to an atmosphere containing a concentration of a flammable gas in excess of 10 percent of the lower explosive limit (LEL) of the gas or vapor. When controls are used that are intended to reduce the level of atmospheric contaminants to acceptable levels, testing shall be conducted as often as necessary to ensure that the atmosphere remains safe.

4.7.2 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 attended when in use.

Employees entering bell-bottom pier holes or other similar deep and confined excavations, shall wear a harness with a life-line securely attached to it. The lifeline shall be separate from any line used to handle materials, and shall be individually attended at all times while the employee wearing the lifeline is in the excavation.

4.8 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.

4.9 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:

4.9.1 A support system, such as underpinning, is provided to ensure the safety of employees and the stability of the structure; or

4.9.2 The excavation is in stable rock; or

4.9.3 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

4.9.4 A registered professional engineer has approved the determination that such excavation work will not pose a hazard to employees.

4.9.5 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.

4.10 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.

4.11 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.

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.

4.12 FALL PROTECTION

Where employees or equipment are required or permitted to cross over excavations; walkways, or bridges with standard guardrails shall be provided.

Adequate barrier for physical protection shall be provided at all remotely located excavations. 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.

5. SOIL CLASSIFICATION

OSHA Soil Classification (Appendix A to Subpart P)

5.1 Type A means:

Cohesive soils with an unconfined compressive strength of 1.5 ton per square foot (tsf) (144 kPa) 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:

5.1.1 The soil is fissured; or

5.1.2 The soil is subject to vibration from heavy traffic, pile driving, or similar effects; or

5.1.3 The soil has been previously disturbed; or

5.1.4 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

5.1.5 The material is subjected to other factors that would require it to be classified as a less stable material.

5.2 Type B means:

5.2.1 Cohesive soil with an unconfined compressive strength greater than 0.5 tsf (48 kPa) but less than 1.5 tsf (144 kPa); or

5.2.2 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.

5.2.3 Previously disturbed soils except those which would otherwise be classed by Type C soil.

5.2.4 Soil that meets the unconfined compressive strength or cementation requirements for Type A, but is fissured or subjected to vibration; or

5.2.5 Dry rock that is not stable; or

5.2.6 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:1H), but only if the material would otherwise be classified as Type B.

5.3 Type C means:

5.3.1 Cohesive soil with an unconfined compressive strength of 0.5 tsf (48 kPa) or less; or

5.3.2 Granular soils including gravel, sand, and loamy sand; or

5.3.3 Submerged soil or soil from which water is freely seeping; or

5.3.4 Submerged rock that is not stable; or

5.3.5 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.

6. TIMBER SHORING, ALUMINUM HYDRAULIC AND ALTERNATIVES TO SHORING

Refer to 29 CFR 1926 Subpart P (Appendices C, D, and E) for details on shoring, shields, and trench boxes.

7. SELECTION OF PROTECTIVE SYSTEMS

Refer to 29 CFR 1926 Subpart P (Appendix F) for the decision logic in selecting protective systems.

8. PERMITS

An Excavation/Trenching Permit must be completed by the competent person each day that an excavation is open and personnel may be required to enter the excavation. The excavation permit follows this procedure.

OHM Corporation

EXCAVATION/TRENCHING PERMIT

PERMIT NO.____

Good on This Date Only:_____ From:_____ AM___ PM___
Project Name:_____ Project Number:_____
Project Location:_____
Name of Competent Person:_____ – A competent person means 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. The competent person shall also be capable of classifying soil types.

Description of Job or Special Procedures:_____

_____

EMPLOYEE TRAINING AND PRE-EXCAVATION BRIEFING

1. Safe Excavation and Rescue Training Conducted on: _____ (DATE)
2. Mandatory pre-excavation briefing conducted on: _____ (DATE)
3. Does this job require special training: YES___ NO___

ELECTRICAL SAFETY

1. Are all electrical devices grounded, double insulated, or GFCI protected? YES___ NO___ N/A___
2. Have all power cords and tools been visually inspected? YES___ NO___ N/A___

SURFACE ENCUMBRANCES

1. Have all surface encumbrances that are located so as to create a hazardto employees been removed or supported, as necessary, to safeguard employees? YES___ NO___ N/A___

UNDERGROUND INSTALLATIONS

1. Have the estimated locations of all underground installation 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. Are underground installations protected, supported or removed while excavations are open? YES___ NO___ N/A___

ACCESS AND EGRESS

1. Are structural ramps that are used solely by personnel as a means of access or egress from excavations designed by a competent person? YES___ NO___ N/A___
2. Are structural ramps that are used for access and egress of equipment designed by a competent person qualified in structural design and constructed in accordance with the design? YES___ NO___ N/A___
3. Are ramps and runways constructed so structural members are connected to prevent displacement? YES___ NO___ N/A___

4. Are structural members used for ramps and runways of uniform thickness? YES___ NO___ N/A___
5. Are cleats used in connecting runway structural members attached in a manner to prevent tripping? YES___ NO___ N/A___
6. Are structural ramps used in lieu of steps provided with cleats or other surface treatment to prevent slipping? YES___ NO___ N/A___

MEANS OF EGRESS FOR TRENCHES DEEPER THAN 4 FEET

1. Are stairways, ladders, or ramps provided every 25 feet? YES___ NO___ N/A___

EXPOSURE TO VEHICULAR TRAFFIC

1. Are personnel exposed to public 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___
2. Are employees prohibited from standing next to vehicles being loaded or unloaded? YES___ NO___ N/A___

WARNING SYSTEMS FOR MOBILE EQUIPMENT

1. Are warning systems such as barricades, hand or mechanical signals, or stop logs utilized when mobile equipment is operated adjacent to or at the edge of an excavation? YES___ NO___ N/A___

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___

	READING:	TIME:	INITIAL:
2. Test for Oxygen Content:	_____ % 02 (19.5% Minimum)	_____	_____
3. Test for Flammable Concentrations:	_____ % LEL (10% Maximum)	_____	_____
4. Test for Toxic Concentration:	_____ PPM of _____	_____	_____

5. Is testing conducted as often as necessary to ensure safety or personnel? YES___ NO___ N/A___

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___
2. Are employees who enter bell-bottom pier holes or other similar deep and confining excavations wearing a body harness with a life-line? YES___ NO___ N/A___

PROTECTION FROM HAZARDS ASSOCIATED WITH WATER ACCUMULATION

. Are employees prohibited from entering excavations that have accumulated water?	YES___	NO___	N/A___
2. Is water being controlled or prevented from accumulating in excavation by the use of water removal equipment?	YES___	NO___	N/A___
3. Is water control equipment operation being monitored by a competent person?	YES___	NO___	N/A___
4. Are diversion ditches, dikes, or other suitable means used to prevent surface water from entering excavation?	YES___	NO___	N/A___
5. Are excavations subjected to run-off from heavy rain immediately re-inspected by a competent person?	YES___	NO___	N/A___

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 any excavation below the level of the base or footing of foundations or retaining walls been:			
- Provided with a support system such as under pinning to ensure the safety of employees and stability of the structure	YES___	NO___	N/A___
- Performed in stable rock	YES___	NO___	N/A___
- Determined by a registered professional engineer that the structure is sufficiently removed from the excavation so as to be unaffected by the excavation activity	YES___	NO___	N/A___
- Determined by a registered professional that the excavation work will not pose a hazard to employees	YES___	NO___	N/A___
3. Is the undermining of sidewalks and pavement structures prohibited?	YES___	NO___	N/A___

PROTECTION OF EMPLOYEES FROM LOOSE ROCK OR SOIL

1. Is adequate protection provided to protect employees from loose rock or soil that could pose a hazard by falling or rolling from an excavation face?	YES___	NO___	N/A___
2. 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 after 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___
3. Are temporary wells, pits, shafts and similar exploratory operations backfilled upon completion?	YES___	NO___	N/A___

I have inspected the excavation described in this permit:

_____ _____

(Signature of Competent Person) (Date)

1. 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. PURPOSE

This procedure describes requirements for the safe operation of the high-pressure washer.

3. 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

4. OPERATION PROCEDURE

- Only trained, authorized personnel will operate the high-pressure washer.
- The lance must always be pointed at the work area.
- 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.
- 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.
- Always increase pressure slowly to inspect for leaks. All leaks or malfunctioning equipment must be repaired immediately or the unit taken out-of-service. Never exceed the operating pressure necessary to do the job.
- Attach a cable which connects the water supply hose to the laser wand to prevent whipping should they accidentally disconnect.
- 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.

1. OBJECTIVE

OHM Remediation Services Corp. (OHM) will inspect all equipment before use to ensure that it is proper working order and free from all safety deficiencies.

2. PURPOSE

The procedure provides for the systematic inspection of tools and equipment thereby ensuring periodic maintenance 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 portable tools and heavy equipment as found in 29 CFR 1926, Subpart I (1926.300 -.305) and 29 CFR 1910, Subpart P (1910.241-.247) and 29 CFR 1926, Subpart O.

3. PORTABLE TOOL REQUIREMENTS

3.1 All hand and power tools used at OHM facilities or project sites, whether furnished by OHM or the employee, shall be maintained in a safe condition. Each OHM supervisor is responsible for periodically inspecting all tools in the work area.

3.2 All tools shall be used in strict compliance with the manufacturer's instructions and only for the use intended.

3.3 Power tools shall be equipped and used with guards in place.

3.4 Any tools having reciprocating, rotating, or moving parts shall be guarded.

3.5 OHM supervisors shall ensure that unsafe hand tools are removed from service. Unsafe tools include, but are not limited to:

- Wrenches, with jaws sprung which slip when used.
- Impact tools (hammers, drift pins, wedges, chisels) with mushroomed heads.
- Wooden handles which are cracked, splintered, duct taped, and/or loose on the tool.

3.6 Electric power operated tools shall be approved double insulated, or grounded. Electric cords shall not be used for hoisting or lowering electric tools.

3.7 Pneumatic power tools shall be secured to the hose by a positive means to prevent accidental disconnection. Pneumatic hoses shall not be used for hoisting or lowering tools.

3.8 Fuel powered tools shall be stopped while being refueled, serviced or, maintained. When fuel powered tools are used in confined spaces, adequate ventilation shall be provided.

3.9 Tools which are not serviceable shall be immediately removed from service and repaired, or destroyed.

4. 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 small, should be reported immediately to the site supervisor. In this way, many potential breakdowns of your machine or safety hazards can be avoided by corrective maintenance.

4.1 Check the engine oil level. If low, add enough to bring the level to the full mark.

4.2 Check the coolant level. Add water coolant if level is low.

4.3 Check fuel level. Refill if necessary.

4.4 Check tires for proper inflation, worn spots, cuts or breaks and objects imbedded in or between the tires. Correct or report conditions when found.

4.5 Check under the vehicle for signs of oil, water, fuel, or other leaks. If leaks are seen, report them to your supervisor.

4.6 Check head, tail, and clearance lights. If any are burned out, damaged, or missing, report them at once.

4.7 Check batteries at least once a week for proper electrolyte level, leaks, and loose connections.

4.8 Report any change in steering play or vibration in the steering mechanisms.

4.9 Check the horn. If inoperative, have it repaired.

4.10 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.

4.11 Check belts on air compressor, generator, water pump, and any other. If loose or torn, report to your supervisor.

4.12 Check special equipment such as wrenches, jacks, fire extinguisher, etc. Report any that are missing or unserviceable.

4.13 Check the tracks for any loose bolts, nuts, proper adjustment, unusual wear patterns, cracks etc.

4.14 Check for any worn or frayed cables.

4.15 Check the boom, buckets and gantry for cracks, bent members, worn teeth and cutting edges.

4.16 Check fluid level of the hydraulic system.

4.17 Check for dirty or inoperative air cleaners and filters.

4.18 Check for proper brake operation.

4.19 Check to make sure the equipment is equipped with a back-up alarm and the alarm is working properly.

4.20 Make a complete walk-around inspection of your unit. In this manner you may detect damage before you put the machine to work.

4.21 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.

4.22 If applicable, drain water off of the lubricating oil sump daily.

4.23 In cold weather, bleed the air tank and, if equipment is equipped, use the alcohol injector pump.

OHM Corporation

DAILY HEAVY EQUIPMENT SAFETY INSPECTION CHECKLIST

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 N[illegible] and Employee No.							

INSTRUCTI[illegible] - Inspect all applicable items indicated, each shift. If an unsatisfa[illegible] condition is observed, suspend operation of the equipment and rep[illegible] the unsatisfactory condition to the site supervisor immediately.

1. OBJECTIVE

OHM Remediation Services Corp. (OHM) has established and observes a Personal Protective Equipment (PPE) Program for all OHM personnel.

2. PURPOSE

The purpose of this procedure is to address the elements of the (PPE) program. This PPE program will conform to the requirements found in 29 CFR 1910.120 (g), .132, .133, .134, .135, .136 and .1200 .

3. THE PROGRAM

3.1 Hazards - All work undertaken by OHM personnel will be characterized for physical and chemical hazards prior to commencement of work. All known hazards will be considered to ensure that OHM personnel use an acceptable level of PPE.

3.2 PPE Selection - The regional health-and-safety manager will review the expected work to assure the proper selection of PPE for the associated hazard.

3.3 PPE Use - Each site supervisor will be responsible for the proper use of PPE by workers under his/her direction. The site safety officer (SSO) will advise and assist the site supervisor in proper PPE use and will monitor the effectiveness of the chosen PPE.

3.4 Work Mission Duration - The site supervisor will be responsible for the establishment of the duration of specific work missions. The duration will be determined by the complexity of the assignment, PPE involved, physical factors, temperature, humidity, weather conditions, elevation of work, acclimation of the worker to the demands of the task assigned, and recommendation of the SSO.

A sufficient amount of rest breaks will be allowed in order to avoid overexertion by the employees while maintaining productive work practices.

3.5 PPE Maintenance and Storage - Each employee is responsible for the proper maintenance and storage of the standard equipment issued (e.g., hard hat, full facepiece negative pressure respirator, safety glasses). The

site supervisor, will assure that proper maintenance is carried out. OHM will provide, at no cost to the employees, spare parts for maintenance of OHM standard issue PPE.

All supplied air respirators will be cleaned and prepared for storage by the individual wearer or an individual that has been assigned to that task. The SSO will perform periodic inspections to verify proper cleaning and storage of PPE. Only factory representatives or certified technicians will perform maintenance or make adjustments that are considered to be other than basic maintenance.

3.6 PPE Decontamination - Each employee is responsible for daily cleaning and decontamination of standard issue PPE. Some projects may require other designated personnel to decontaminate reusable PPE, such as Level A and acid suits.

3.7 PPE Training and Proper Fitting - All employees will receive training in the proper use of PPE prior to wearing the equipment in a work situation. This training will be administered upon commencement of employment and will be reviewed annually. Employees will be directed in the proper use and fitting of PPE by the site supervisor.

- All employees that are required to wear full facepiece negative pressure respirators will be qualitatively or quantitatively fit tested in the type and size respirator which is assigned to them.

- All employees that are required to wear full-facepiece negative pressure respirators and work with asbestos, lead or any other chemical or compound that requires quantitative respirator fit testing will receive the proper test.

3.8 PPE Donning and Doffing Procedures - All employees will receive training upon commencement of employment and during annual refresher training concerning the donning and doffing of PPE. Periodic training will be given as needed.

3.9 PPE Inspection - Each employee shall inspect standard issue PPE for defects and proper function prior to each use. If any parts are missing or defective, they will be replaced at no cost to the employee.

Supplied air respirators shall be periodically inspected by qualified employees for defective or missing parts and if the unit is defective it will be sent to a licensed service facility for repairs.

3.10 PPE In Use Monitoring - The site supervisor is responsible for monitoring the effectiveness of selected PPE. If at any time PPE is to be down-graded, it is mandatory that the change be approved by the regional health and safety manager.

3.11 Evaluation of PPE Program - It is the goal of OHM to supply our employees with PPE that provides the highest degree of protection required in any situation. OHM SSO's will compile data on PPE in the field to determine that the PPE performs to OHM needs. Periodically, this information should be reviewed manager of industrial hygiene to ensure that PPE is providing the necessary level of protection, quality, and is appropriate for the work performed.

If at any time the failure of PPE causes injury to an employee or fails to perform as expected, OHM will take the unit out of service and investigate the incident. If after scrutiny, the unit is determined to have a manufacturing defect, all like units will be de-activated and recalled.

3.12 Limitations During Temperature Extreme - Extreme temperatures exert undue stress on personnel and equipment. During periods of extreme temperature, work assignments will be adjusted to protect the employee from overexertion or exposure.

3.13 Unserviceable PPE - Any PPE which is no longer functioning properly or is no longer serviceable, shall be repaired or removed and destroyed.

4. WORK CLOTHES

OHM employees, contractors, and visitors will observe the requirements for proper work clothing when on OHM project sites, facilities and shops.

4.1 Long pants are required at all times.

4.2 Shirts will be worn on the job. Shirts will be buttoned up the front and at the cuff unless rolled up. Shirt tails must be kept in the trousers. Sleeveless shirts are prohibited at all work locations.

4.3 Loose or ragged clothing will not be worn.

4.4 Clothing (including shoes) saturated with petroleum products or chemicals will be removed immediately to prevent irritation and possible dermal exposure.

4.5 Rings and other jewelry (except watches) must be removed when working in areas where they could catch on moving objects or sharp protrusions or come in contact with electrical circuits or chemical agents. Additionally, the site supervisor, may deem other types of jewelry inappropriate for hazardous waste and emergency response activity.

4.6 Hair long enough to constitute a hazard while working around moving machinery or rotating tools and equipment must be secured by a net or tied back. Hair styles must make it possible to wear safety headgear and safety glasses properly.

5. SAFETY FOOTWEAR

All OHM employees, contractors, and visitors that enter OHM operating facilities must wear approved, steel toe and shank safety shoes or boots.

5.1 Project Sites

Steel toe and shank leather work boots conforming to the American National Standards Institute (ANSI) standard Z-41.1 - 1991 shall be worn on all OHM project sites. High top or low top sneakers, even though ANSI approved are not appropriate for the activities encountered at hazardous waste and emergency response sites and shall not be worn.

5.2 OHM Facilities and Shops

Personnel working at OHM shops and facilities have the option of wearing other types of ANSI approved safety work shoes and boots provided they are appropriate for the tasks being performed. The supervisor of the affected personnel is responsible to decide what type footwear is appropriate.

6. SAFETY HEADGEAR

All OHM employees, contractors, and visitors will wear approved safety headgear at all times on project sites and as described in 6.2 of this procedure for activities conducted at OHM facilities and shops.

6.1 Safety headgear meeting the requirements of ANSI Z89.1-1986 shall be worn in all appropriate operating areas. The safety headgear worn must meet the ANSI requirements of impact resistance.

6.2 Safety headgear will be worn by all personnel while engaged in work where there is a hazard of falling objects or where there are low overhead restrictions. Safety headgear and winter liners are furnished by OHM.

6.3 Safety headgear must be worn by all contractors' employees and visitors to company facilities where overhead hazards exist and work sites where safety headgear is required to be worn by company employees.

6.4 Safety headgear must be worn prescribed by the manufacturer and shall not be painted, drilled or modified in any manner.

7. HAND PROTECTION / GLOVES

OHM employees and contractors will don suitable gloves when engaged in any operation that presents a hazard to the hands.

7.1 A wide variety of work gloves are available for hand protection against heat and flame, cold, chemicals, petroleum products, corrosive materials, moisture, mechanical abrasion, electricity, and sharp and rough surfaces. The type of work gloves used must be approved by the regional health and safety manager.

7.2 Employees shall wear suitable gloves while engaged in all operations that are hazardous to the hands. Specific types of hand hazardous operations are:

- Welder's leather gloves, protective sleeves, jacket and chaps for use during welding and burning operations to prevent burns from flying sparks.
- Protective gloves must be worn during any operation where there is the probability of contact with harmful chemicals, solvents or oil.
- When handling slings or wire ropes and rough, abrasive materials, leather palmed, flame resistant leather, heat-treated, gauntlet work gloves should be worn.
- When working on certain high voltage (480 volts and above) electrical equipment, electrically tested high voltage gloves will be worn. Leather protection will be worn over these gloves. (NOTE: only authorized personnel are allowed to work on High Voltage electrical equipment).

8. EYE/FACE PROTECTION

No OHM employee, contractor or visitor will knowingly expose himself/herself to a hazardous condition without donning the proper protective eye/face equipment. All eye and face protection shall meet the ANSI Z87.1 - 1989 standard for eye/face protection designated for the hazard present during the operation posing exposure to eye or face injury.

8.1 To protect the face and eyes against injuries from flying objects, splashing liquids, and harmful rays that cannot always be controlled at the source, spectacles with side shields, goggles, and face shields will be used. No unprotected person shall knowingly subject themselves to a hazardous condition but shall protect themselves with the proper eye and face protection that is provided by OHM. The SSO will be responsible to identify the need for eye/face protection and specify the eye/face protection required for each operation.

8.2 Nearly all eye/face injuries can be prevented by the use of eye/face protection. From past general industry experience, certain areas and operations have been designated as requiring the use of safety spectacles or goggles. Several areas and operations are listed below:

- Flying Objects - When striking one object with another object, personnel will wear safety goggles to protect their eyes/face from flying metal particles. Proper goggles shall be worn by all personnel performing work with a recognized hazard to the eyes/face such as: wire brushing, buffing, chipping, grinding, cutting wire, welding, handling chemicals, acids or caustic, working on rusty or dirty chains or cable.

- Welding - Never look directly at a welding arc and always shield your eyes/face from the rays, even rays being reflected from another surface. Wear special goggles provided by OHM while helping or working within close range of welders. Refer to Table 1 and Table 2 at the end of this procedure to determine the darkness of goggle and welding helmets lenses.

- Prescription Spectacles - For personnel that wear prescription spectacles, OHM provides prescription safety spectacles. It is mandatory that prescription safety spectacles not be altered by the employee and be worn at all times when safety spectacles are required.

- Splash Goggles - Safety spectacles are not safety goggles. Wear safety goggles over spectacles if work being performed requires safety goggles.

- Pressure Vessels - Working with any elevated pressure piping, tubing, or cylinders.

8.3 Eye/face protection will meet the following requirements:

- They provide adequate protection against the hazard for which they were designed.

- They will be reasonably comfortable when worn under actual work conditions.

- They will fit securely and will not impede the movement of the wearer.
- They will be durable.
- They will be capable of being disinfected.
- They will be easily cleaned.
- They will be kept in good repair and clean.

9. FALL PROTECTION

OHM requires that employees and contractors never engage in activities at heights that put them at risk without the proper fall protection. Fall protection shall be used whenever work is performed above 4 feet.

9.1 General

OHM requires that no exposure shall be permitted to a fall hazard without protection. Protection shall consist of:

- Removing the hazard exposure by establishing walls, floors and railings.
- Restricting the travel on unprotected elevations.
- Using safety nets or personal fall protection equipment to arrest an accidental fall.
- Enforcing general housekeeping requirements to ensure that all places of employment are kept clean and orderly at all times.

9.2 Handrail / Scaffold Fall Protection

Fall protection utilizing approved handrails shall be considered as the best method of protection when working on all elevated platforms. Handrails shall be constructed per 29 CFR 1910.28. As a minimum, the following criteria will be met:

- Scaffolding on wheels shall have wheels locked before any work aloft can commence.
- Scaffolding members shall be free of defects such as kinks in the tubular members.

- Scaffolding members shall not be constructed more than 5 units high unless approved by the SSO or a qualified engineer.

- All scaffolding shall be equipped with guardrails not less than 2 x 4 inches and not less than 36 inches or more than 42 inches high, with a mid-rail of 1 x 4 inch lumber or equivalent.

- All scaffolding 10 feet or more above the ground or floor must be equipped with toeboards on all open sides. Toeboards shall be a minimum of 4 inches in height.

- All planking or scaffolding floor members shall be of an approved type.

9.3 Fall Protection Equipment

Anchorage points for lifelines shall have the following minimum specifications:

- Anchorage points shall be at least waist high and preferably overhead.

- Anchorage points such as eyebolts or pad-eyes will be specified by a qualified engineer before utilization in a complete fall protection system.

- Anchorage points must be able to support a minimum of 5400 lbs. per worker in the direction of pull.

- Swing falls shall be prohibited.

- OHM approved full body harnesses shall be used for all fall protection applications. The harnesses are equipped with several "D" rings to accommodate safety lanyards or ladder climbing devices. Body type belts are not approved.

- OHM approved lanyard with double-locking snap hooks make up the standard personal protection for complete fall protection. Shock absorbing lanyards with double-locking snap hooks are also approved. Always hook the lanyard to the back "D" ring on the full body harness.

- Lifelines used in special cases for manlift applications shall exceed 5400 lbs. of breaking strength. The preferable rope is 5/8" black polypropylene. Use chafe protection around sharp edges. (NOTE: Standard yellow work rope are not to be used as lifelines).

- Ladder safety climbing devices shall be used when the ladder is equipped with such. The climbing device shall always hook to the front "D" ring of the harness.

- Lanyards exposed to shock loading due to a fall arrest shall be destroyed and replaced.

9.4 Rescue

- If the need for a rescue arises, only trained emergency responders shall make the attempt.

9.5 Inspection

All fall protection equipment shall be inspected before use for the following deformities.

- Inspect harness for frayed or torn straps.

- Inspect lanyard for torn or frayed parts especially near the sewn eyes.

- Inspect the snap hooks for cracks or the inability to open and close due to corrosion.

- Inspect all static lifelines for damage.

Heavy Equipment

Heavy construction equipment operators present construction safety hazards to operating and ground personnel. OHM has safe operating procedures (SOPs) for the use of heavy construction equipment. Only trained and qualified operators are authorized to operate heavy construction equipment. The operator is responsible for performing daily equipment inspections on their equipment to identify, take out of service, and correct any equipment defects of non-functioning safety devices that would render the equipment unsafe to operate. Standard safety devices and equipment required to be inspected and functional during use includes:

- Seatbelts,
- Safety glass in enclosed cab,
- Braking system,
- Back-up alarms,
- Portable fire extinguisher,
- Horn, tires, and
- Steering and hydraulic systems.

Operators are required to wear seatbelts when operating equipment and are responsible for the location of ground personnel in their work area. The turning radius of trackhoes is guarded to prevent contact between the equipment counterweight and ground personnel.

Environmental Hazards

Weather and Heat Stress

Cold stress is not an environmental hazard during site operations due to the warm weather anticipated at the site. However, the combination of warm ambient temperature and use of protective clothing anticipated during site operations, the potential for heat stress is a concern. The potential exists for:

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

Heat stroke, heat cramps, and heat exhaustion are covered in detail during OHM's 40-hour OSHA 29 CFR 1910. 120 approved pre-employment course. In addition, this information is discussed during a safety "tailgate" meeting before each work day. Workers are encouraged to increase consumption of water and electrolyte-containing beverages such as Gatorade during warm weather. Water and electrolyte-containing beverages will be provided on-site and will be available for consumption during work breaks.

An action level for heat stress has been established at 75°F ambient temperature when site personnel are wearing chemical protective clothing during the performance of field activities. The following work/rest schedule is recommended, with personnel drinking fluids (tepid water and/or electrolyte) at rest periods consistent with their fluid loss:

Ambient Temperature (degrees F)	Work Period (minutes)	Rest Period (minutes)
75 - 80 F	120	15
80 - 85 F	90	15
85 - 90 F	60	15
90 - 95 F	30	15
95 - 100 F	15	15

The above work/rest schedule is only a guideline for use during field activities when personnel are wearing protective clothing.

The actual work/rest schedule will be determined by conducting pulse monitoring before and after the work period and by performing daily pre/post work shift body weights. The action level for adjusting the work/rest schedule would be 110 beats per minute (bpm), obtained immediately after the work period in a seated, shaded position. When a person's pulse exceeds 110 bpm, that person is undergoing heat stress, which will require the work period to be reduced in 15 minute intervals, while maintaining the same rest period, until post work period pulse monitoring is maintained below 110 bpm. In addition, should a person's body weight change at the end of the work day by more than 1.5%, the work period must be reduced in 15 minute intervals, while maintaining the same rest period, until no daily body weight changes greater than 1.5% are observed.

Field activities, in which site personnel are required to wear chemical protective clothing at ambient temperatures higher than 95 degrees F, will be avoided, whenever feasible, by scheduling these activities during the work day to avoid peak ambient temperatures (10 a.m. -- 2 p.m.). Site personnel who have experienced a heat-related illness (heat cramps, heat exhaustion) will be restricted to Level D tasks for a minimum of one day after illness occurrence and will return to tasks requiring chemical protective clothing only with the concurrence of the attending physician. Site personnel will follow OHM's Standard Operating Procedure (SOP) for heat stress prevention.

Hazard Communications

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. 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.

- MSDSs
  There will be an MSDS located on site for each hazardous chemical known to be or used on site. All MSDSs will be located in Appendix A of the site safety plan. The site safety plan can be found in the project office trailer.

- Employee Information and Training
  Training employees on chemical hazards is accomplished through on ongoing corporate training program. Additionally, chemical hazards are communicated to employees through daily safety meetings held at OHM 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. To find MSDSs for the hazardous chemicals anticipated to be brought to the site. Refer to the attached MSDS sheets.

EMERGENCY
TELEPHONE NUMBERS

Ambulance: _____

Hospital: _____

Doctor: _____

Fire Department: _____

Police/Sheriffs Department: _____

Poison Control: 1-800-382-9097

Regional Safety Director: Angelo Liberatore , 1-800-327-9942

Directions from the site to the hospital: _____

_____

_____

_____

_____

_____

(Post on site in a location where all employees will be able to see)

JOB SAFETY & HEALTH PROTECTION

The Occupational Safety and Health Act of 1970 provides job safety and health protection for workers by promoting safe and healthful working conditions throughout the Nation. Provisions of the Act include the following:

Employers

All employers must furnish to employees employment and a place of employment free from recognized hazards that are causing or are likely to cause death or serious harm to employees. Employers must comply with occupational safety and health standards issued under the Act.

Employees

Employees must comply with all occupational safety and health standards, rules, regulations and orders issued under the Act that apply to their own actions and conduct on the job.

The Occupational Safety and Health Administration (OSHA) of the U.S. Department of Labor has the primary responsibility for administering the Act. OSHA issues occupational safety and health standards, and its Compliance Safety and Health Officers conduct jobsite inspections to help ensure compliance with the Act.

Inspection

The Act requires that a representative of the employer and a representative authorized by the employees be given an opportunity to accompany the OSHA inspector for the purpose of aiding the inspection.

Where there is no authorized employee representative, the OSHA Compliance Officer must consult with a reasonable number of employees concerning safety and health conditions in the workplace.

Complaint

Employees or their representatives have the right to file a complaint with the nearest OSHA office requesting an inspection if they believe unsafe or unhealthful conditions exist in their workplace. OSHA will withhold, on request, names of employees complaining.

The Act provides that employees may not be discharged or discriminated against in any way for filing safety and health complaints or for otherwise exercising their rights under the Act.

Employees who believe they have been discriminated against may file a complaint with their nearest OSHA office within 30 days of the alleged discriminatory action.

Citation

If upon inspection OSHA believes an employer has violated the Act, a citation alleging such violations will be issued to the employer. Each citation will specify a time period within which the alleged violation must be corrected.

The OSHA citation must be prominently displayed at or near the place of alleged violation for three days, or until it is corrected, whichever is later, to warn employees of dangers that may exist there.

Proposed Penalty

The Act provides for mandatory civil penalties against employers of up to $7,000 for each serious violation and for optional penalties of up to $7,000 for each nonserious violation. Penalties of up to $7,000 per day may be proposed for failure to correct violations within the proposed time period and for each day the violation continues beyond the prescribed abatement date. Also, any employer who willfully or repeatedly violates the Act may be assessed penalties of up to $70,000 for each such violation. A minimum penalty of $5,000 may be imposed for each willful violation. A violation of posting requirements can bring a penalty of up to $7,000.

There are also provisions for criminal penalties. Any willful violation resulting in the death of any employee, upon conviction, is punishable by a fine of up to $250,000 (or $500,000 if the employer is a corporation), or by imprisonment for up to six months, or both. A second conviction of an employer doubles the possible term of imprisonment. Falsifying records, reports, or applications is punishable by a fine of $10,000 or up to six months in jail or both.

Voluntary Activity

While providing penalties for violations, the Act also encourages efforts by labor and management, before an OSHA inspection, to reduce workplace hazards voluntarily and to develop and improve safety and health programs in all workplaces and industries. OSHA's Voluntary Protection Programs recognize outstanding efforts of this nature.

OSHA has published Safety and Health Program Management Guidelines to assist employers in establishing or perfecting programs to prevent or control employee exposure to workplace hazards. There are many public and private organizations that can provide information and assistance in this effort, if requested. Also, your local OSHA office can provide considerable help and advice on solving safety and health problems or can refer you to other sources for help such as training.

Consultation

Free assistance in identifying and correcting hazards and in improving safety and health management is available to employers, without citation or penalty, through OSHA-supported programs in each State. These programs are usually administered by the State Labor or Health department or a State university.

Posting Instructions

Employers in States operating OSHA approved State Plans should obtain and post the State's equivalent poster.

Under provisions of Title 29,Code of Federal Regulations, Part 1903.2(a)(1) employers must post this notice (or facsimile) in a conspicuous place where notices to employees are customarily posted.

More Information

Additional information and copies of the Act, specific OSHA safety and health standards, and other applicable regulations may be obtained from your employer or from the nearest OSHA Regional Office in the following locations:

Atlanta, GA	(404) 347-3573
Boston, MA	(617) 565-7164
Chicago, IL	(312) 353-2220
Dallas, TX	(214) 767-4731
Denver, CO	(303) 844-3061
Kansas City, MO	(816) 426-5861
New York, NY	(212) 337-2378
Philadelphia, PA	(215) 596-1201
San Francisco, CA	(415) 744-6670
Seattle,WA	(206) 442-5930

Lynn Martin

Lynn Martin, Secretary of Labor

U.S. Department of Labor

Occupational Safety and Health Administration

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BIOLOGICAL HAZARDS

Biological Hazards

- POISON IVY (Rhus Radicans)

  Poison Ivy may be found at the site. It is highly recommended that all personnel entering into an area with poison ivy wear a minimum of a tyvek coverall, to avoid skin contact.

The majority of skin reactions following contact with offending plants are allergic in nature and characterized by:

- General symptoms of headache and fever
- Itching
- Redness
- A rash

Some of the most common and most severe allergic reactions result from contact with plants of the poison ivy group, including poison oak and poison sumac. Such plants produce severe rash characterized by redness, blisters, swelling, and intense burning and itching. The victim may develop a high fever and feel very ill. Ordinarily, the rash begins within a few hours after exposure, but may be delayed 24 to 48 hours.

Distinguishing Features of Poison Ivy Group Plants

The most distinctive features of poison ivy and poison oak are their leaves, which are composed of three leaflets each. Both plants have greenish-white flowers and berries that grow in clusters.

First Aid

a. Remove contaminated clothing; wash all exposed areas thoroughly with soap and water, followed by rubbing alcohol.
b. Apply calamine or other soothing lotion if rash is mild.
c. Seek medical advice if a severe reaction occurs, or if there is a known history of previous sensitivity.

- TICKS

  Heavily vegetated areas of a site may have ticks. It is highly recommended that all personnel walking through such areas wear a tyvek coverall and latex boot covers taped at all joints. The ticks will stand out against the light colors. A tick or insect repellent containing DEET is recommended.

Ticks can transmit several diseases, including Rocky Mountain spotted fever, a disease that occurs in the eastern portion of the United States as well as the western portion, and Lyme disease. Ticks adhere tenaciously to the skin or scalp. There is some evidence that the longer an infected tick remains attached, the greater is the chance that it will transmit disease.

First Aid

a. Cover the tick with heavy oil (mineral, salad, or machine) to close its breathing pores. The tick may disengage at once; if not, allow oil to remain in place for a half hour. Carefully (slowly and gently) remove the tick with tweezers, taking care that all parts are removed.

b. With soap and water, thoroughly, but gently, scrub the area from which the tick has been removed, because disease germs may be present on the skin; also wipe the bite area with an antiseptic. Although use of tweezers for the removal of the tick and application of heat to the tick's body often have been attempted, these methods may leave tick parts in the wound or may injure the skin.

c. If you have been bitten, place the tick in a jar labeled with the date, location of the bite, and the location acquired. If any symptom appears, such as an expanding red rash, contact a physician immediately.

- LYME DISEASE

Lyme disease may cause a number of medical conditions, including arthritis, that can be treated if you recognize the symptoms early and see your doctor. Early signs may include a flu-like illness, an expanding skin rash and joint pain. If left untreated, Lyme disease can cause serious nerve and heart problems as well as a disabling type of arthritis.

You are more likely to spot early signs of Lyme disease rather than see the tick or its bite. This is because the tick is so small (about the size of the head of a common pin or a period on this page and a little larger after they fill with blood), you may miss it or signs of a bite. However, it is also easy to miss the early symptoms of Lyme disease.

In its early stage, Lyme disease may be a mild illness with symptoms like the flu. It can include a stiff neck, chills, fever, sore throat, headache, fatigue, and joint pain. But this flu-like illness is usually out of season, commonly happening between May and October when ticks bite.

Most people develop a large, expanding skin rash around the area of the bite. Some people may get more than one rash. The rash may feel hot to the touch and may be painful. Rashes vary in size, shape, and color, but often look like a red ring with a clear center. The outer edges expand in size. Its easy to miss the rash and the connection between the rash and the tick bite. The rash develops from three days to as long as a month after the tick bite. Almost one third of those with Lyme disease never get the rash.

Joint or muscle pain may be another early sign of Lyme disease. These aches and pains may be easy to confuse with the pain that comes from other types of arthritis. However, unlike many other types of arthritis, this pain seems to move or travel from joint to joint.

In later stages, Lyme disease may be confused with other medical problems. These problems can develop months to years after the first tick bite.

Early treatment of Lyme disease symptoms with antibiotics can prevent the more serious medical problems of later stages. If you suspect that you have symptoms of Lyme disease, notify the SS or SSO; or if you have demobilized from the porject site, contact your doctor.

Lyme disease can cause problems with the nervous system that look like other diseases. These include symptoms of stiff neck, severe headache, and fatigue usually linked to meningitis. They may also include pain and drooping of the muscles on the face, called Bell's Palsy. Lyme disease can also mimic symptoms of multiple sclerosis or other types of paralysis.

Lyme disease can cause serious but reversible heart problems, such as irregular heart beat. Finally, Lyme disease can result in a disabling, chronic type of arthritis that most often affects the knees. Treatment is more difficult and less successful in later stages. Researchers think these more serious problems may be linked to how the body's defense or immune system responds to the infection.