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ORIGINAL

**FINAL DELIVERY ORDER PLANS
FOR
REMOVAL OF PESTICIDE CONTAMINATED SOIL
OPERABLE UNIT NO. 5, SITE 2
MCB CAMP LEJEUNE, NORTH CAROLINA**

Submitted to:

**Department of the Navy
Atlantic Division
Naval Facilities Engineering Command
Norfolk, VA**

Submitted by:

**OHM Remediation Services Corp.
Norcross, GA**

George E. Krauter, P.E.
Michael I. Gilman
Katherine M. Lista, P.E.
D. Kent Geis
J. Angelo Liberatore, CIH, CSP
Kathleen Jacobs

Program Manager
Program QC Manager
Project Manager
Delivery Order Manager
Southern Region Health and Safety Director
Health and Safety Officer

July 19, 1994

Contract No. N62470-93-D-3032
Delivery Order No. 0023

OHM Project No. 16207

FINAL DELIVERY ORDER PLANS

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CONTRACTOR'S SUBMITTAL TRANSMITTAL

LANTDIV NORFOLK 4-4355/3 (Rev. 11-90)

CONTRACT NO. N62470-93-D-3032	TRANSMITTAL NO. 001.01	DATE 7/19/94
PROJECT TITLE AND LOCATION Remediation/Removal - Pesticide Soils (Site 2) Operable Unit No. 5 - Camp Lejeune D.O. #0023		

FROM CONTRACTOR

OHM Remediation Services Corp.
Linda Berry - LANTDIV, NAVFACENG.COM

CONTRACTOR USE ONLY

*List only one specification division per form.

List only one of the following categories on each transmittal form, and indicate which is being submitted

- Contractor Approved
 OICC Approval
 Deviation/Substitution For OICC Approval

REVIEWER USE ONLY

**ACTION CODES

- A-Approved
 D-Disapproved
 AN-Approved as noted
 RA-Receipt acknowledged.
 C-Comments
 R-Resubmit

ITEM NO.	PROJ. SPEC. SECT. & PARA. and/or PROJ. DWG. NO. *	ITEM IDENTIFICATION (Type, size, model no., mfg. name, dwg. or brochure number)	NO. OF COPIES	ACTION CODES **	REVIEWER'S INITIALS CODE AND DATE
1	Spec. Sec. 01010 Para. 112.1.1	FINAL Work Plan - including Health & Safety Plan w/ Air Monitoring Plan, CQC Plan Addendum, Transportation & Disposal Plan, and Sam- pling & Analysis Plan.	5		

CONTRACTOR'S COMMENTS

Copies also distributed to:
 Don Shields - Baker Environmental (2 copies)
 Neal Paul - MCB Camp Lejeune (3 copies) - EMD
 Lt. Steve Challen - MCB Camp Lejeune (2 copies) - ROICC

COPY OF TRANSMITTAL AND SUBMITTALS TO ROICC

CONTRACTOR REPRESENTATIVE (Signature)

Matthew M. Lister, P.E.

DATE RECEIVED BY REVIEWER

FROM (Reviewer)

TO

- Submittals are returned with action indicated. Approval of an item does not include approval of any deviation from the contract requirements unless the contractor calls attention to and supports the deviation.
- Submittals are forwarded to LANTDIV with A-E recommendations indicated in REVIEWER USE ONLY Section and in comments below on ONE COPY of the transmittal form.

REVIEWER'S COMMENTS

COPIES TO:
 ROICC (2)
 LANTDIV (1)
 A-E (1)

DATE

SIGNATURE

**SITE WORK PLAN
FOR
REMOVAL OF PESTICIDE CONTAMINATED SOIL
OPERABLE UNIT NO. 5, SITE 2
MCB CAMP LEJEUNE, NORTH CAROLINA**

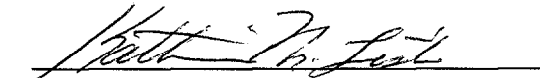
Submitted to:

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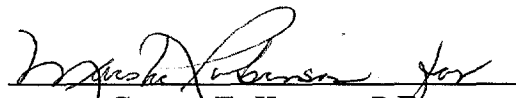
Submitted by:

**OHM Remediation Services Corp.
Norcross, Georgia**

Prepared by:


Katherine M. Lista, P.E.
Project Manger

Approved by:


George E. Krauter, P.E.
Program Manger

July 18, 1994

Contract No. N64270-93-D-3032
Delivery Order No. 0023

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1.0 INTRODUCTION

This Work Plan describes how OHM Remediation Services Corp. (OHM) will remove, transport, and dispose of pesticide contaminated soil at Site 2, Operable Unit No. 5 (OU No. 5) at Marine Corps Base, Camp Lejeune, North Carolina.

Site preparation activities will include the construction and/or upgrading of interior and access roadways, the construction of waste containment staging and storage areas, and all necessary measures for site drainage, siltation, and erosion control. All excavation will be diked, and diversion ditches will be constructed to mitigate contaminant migration from the site.

2.0 BACKGROUND

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

3.0 SITE DESCRIPTION

Site 2 is located to the northeast of the intersection of Holcomb Boulevard and Brewster Boulevard. The site is divided into two areas. The Mixing Pad Area (MPA) and the Former Storage Area (FSA). The MPA is split into two subareas, the Northern Mixing Pad and the Southern Mixing Pad. The MPA is bounded to the east by the Camp Lejeune Railroad and the west by Building 712. The FSA is located east of the railroad and south of the water treatment plant.

The land at Site 2 is primarily flat, but dips sharply at the drainage ditches which run parallel to the Lejeune Railroad. There is a drainage ditch on both the east and west side of the railroad tracks. Overland drainage is influenced over most of the site due to the flat topography. Drainage along the eastern edge of the Building 712 area is toward these drainage ditches which run in a north-northwest direction towards Overs Creek. Drainage along the western edge of the FSA is also toward these drainage ditches. Another drainage ditch extends westward from the Building 712 area, underneath Holcomb Boulevard.

From 1945 to 1958, Building 712 was used for the storing, handling, and dispensing of pesticides. Chemicals known to have been used include: chlordane, DDT, diazinon, and 2,4-D. Chemicals known to have been stored on site include dieldrin, lindane, malathion, silvex, and 2,4,5-T. The MPA is in an area of suspected contamination. Contamination is believed to have occurred as a result of small spills, washout and excess product disposal. During the years of operation, it is reasonable to assume several gallons per year were involved; therefore, estimated quantities involved are on the order of 100 to 500 gallons of liquids containing various concentrations of product.

4.0 MOBILIZATION

OHM will mobilize personnel and equipment from its Morrisville, North Carolina, Covington, Georgia, and Gallatin, Tennessee offices. Once mobilization of essential equipment and lead personnel is complete, OHM will begin site preparations by establishing limits of excavation, work zones, access/egress routes, decontamination locations, temporary facilities, and surface water control measures.

Prior to any work on site, the Site Specific Health and Safety Plan will be reviewed with all on-site personnel. Site hazards and conditions will be discussed and all personnel will acknowledge their understanding and compliance with the plan by signing the acceptance form.

4.1 ADMINISTRATION AREA

OHM will utilize the office trailer already located at Lot 203 (Operable Unit 2) as an administrative area and command center.

4.2 EXCAVATION LIMITS

The areas to be excavated will be delineated and visibly marked for easy recognition using paint and/or wooden stakes. Visibly marking the excavation areas allows for better determination of the work/safety zones and clearly defines the work area for the equipment operator.

4.3 CLEARING AND GRUBBING

Any trees within the excavation zone will be cut and staged in a convenient location for pickup by the Forestry Service. The roots of those trees in the contamination zones will be cut into small pieces, chipped and placed in trailers with the contaminated soil for disposal as hazardous waste.

4.4 DRAINAGE AND SEDIMENT CONTROL

Drainage, erosion and sediment control will be accomplished through the use of sediment fencing and diversion berms. In this manner, OHM will mitigate the spread of contamination to other areas and minimize the intrusion of rainwater into the active work area. Silt fencing will be placed on the down gradient side of the Northern and Southern MPA. Clean soil will be used to construct a berm on the up gradient side of the excavation area to prevent the intrusion of surface water into the excavation.

An earthen check dam will be constructed at the southern end (up gradient) of the MPA across the trench that runs parallel to the railroad tracks as designated by the specifications. This will prevent the majority of surface runoff water from entering the excavation area. Any water collected behind the dam will be pumped to the other side of the railroad tracks.

4.5 PERSONNEL AND EQUIPMENT DECONTAMINATION AREA

Equipment and personnel decontamination will be provided within the Contamination Reduction Zones (CRZ) upon exiting the Exclusion Zone (EZ). Equipment will be decontaminated on a prefabricated decontamination pad. Personnel decontamination will be accomplished outside of OHM's pollution control truck with a changing area located inside the truck.

Liquids generated from decontamination processes will be transferred to portable storage containers. Decontamination liquids will be sampled, analyzed for hazardous constituents and disposed of at an approved off-site, permitted disposal facility or through the base water treatment plant. Refer to the Site Specific Health and Safety Plan for additional information on personnel and equipment decontamination procedures, and air monitoring.

4.6 SECURITY MEASURES

OHM personnel will erect safety fencing around three sides of the MPA areas and around all sides of the FSA. Fencing will not be required along the eastern

side (bordering the railroad tracks) of the MPA area. Additional fencing will be placed around the monitoring well located between the northern and southern MPA. This will consist of a three foot high, bright orange, polyethylene, mesh fence to prevent personnel from accidentally entering the open excavation during non-work hours.

4.7 TRUCK SCALES

A calibrated (not certified) truck scale is located on Lot 203 and will be utilized for the pre- and post-weighing of trucks used to transport material off site for disposal.

5.0 ENVIRONMENTAL PROTECTION PLAN

This Environmental Protection Plan (EPP) has been prepared in accordance with standard OHM policies and procedures. The Environmental Protect Plan provides specific information relating to the scope of work under Delivery Order No. 0023, Removal of Pesticide Contaminated Soil, Site 2, Operable Unit 5. This plan provides site-specific information for:

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

The control of environmental pollution at Site No. 2 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.

5.1 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 Navy Technical Representative (NTR). The NTR will be responsible for contacting the 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.

5.2 TEMPORARY CONSTRUCTION ROADS

The construction of all temporary roads (if needed) in and around the job site will be performed in a manner which will minimize impact to the natural environment. Water will be used for dust control, as necessary. It is not expected that a significant number of construction roads will be necessary during removal action. All access to the site will most likely be from Holcomb Boulevard at the intersection of Holcomb Blvd. and Brewster Blvd.

5.3 PROTECTION OF TREES AND SHRUBS

Prudent steps will be taken to protect trees and shrubs outside of the excavation zone as necessary. 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 that will be taken to minimize the construction activities' impact on existing vegetation will include, but not be limited to:

- Utilization of existing or temporary construction roads only
- Closely supervised equipment operators with an emphasis placed on preservation of vegetation in non-work areas
- Proper guidance of heavy equipment and truck operators by site personnel to minimize damage to adjacent vegetation not directly affected by construction activities
- Utilization of equipment appropriately designed and sized for precise excavation

5.4 RESTORATION

Upon completion of removal actions, disturbed areas will be seeded. Prior to seeding and fertilization, lime will be applied as a soil amendment 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.

5.5 WATER RESOURCES PROTECTION

New River, Overs Creek and Wallace Creek are located near Site No. 2, and could possibly be impacted by construction activities if proper sediment and erosion protection measures are not taken. To protect against damage, storm water 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 to a minimum.

5.5.1 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 6 inches below grade and extending 36 inches above grade and fastened to posts no more than 6 feet apart. The posts will be installed with a minimum of 24 inches below grade and extend a minimum of 36 inches above grade. Fabric will be attached to the 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.

5.5.2 Check Dam

A storm water run-on dam will be constructed up gradient of the proposed excavation (at the MPA location) as per the specifications and design drawings. The dam will retain storm water run-on until a submersible pump activates, transferring the water through a discharge pipe down gradient of the excavation.

5.5.3 Spill Control

Measures will be taken to prevent chemicals, fuels, oils, greases, bituminous materials and contaminated materials from entering streams, rivers or lakes. Adsorbents will be available to contain any leaks. Any soil contaminated with fuel spills will be immediately removed and placed into appropriate containers and sampled to determine proper disposition.

5.6 DUST AND AIR POLLUTION CONTROL

5.6.1 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 assuring 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 SHSP.

5.6.2 Particulate Emission Controls

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

Soil Excavation, Handling, Site Grading and Transportation

- Apply water to work and traffic areas as necessary to minimize dust emissions.

- Cover stockpiles with sheeting to minimize wind and / or storm water erosion.
- Move and load soil for transport within the site that limits freefall of material and is least likely to generate dust emissions.
- Halt dust-generating work when on-site wind conditions exceed 35 miles per hour.

Movement of Equipment

- Water traffic areas as required to minimize dust emissions.
- Designate equipment traffic patterns to minimize travel distance and vehicular dust emissions.
- Limit vehicle speed to minimize dust emissions.

5.6.3 Burning

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

5.7 POST-EXCAVATION CLEANUP

All excavation equipment will be decontaminated in a lined pad 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 water will be transferred to the holding pool for analysis and disposal. The site will then be turned over to the Navy following their acceptance of site conditions.

6.0 CONCRETE PAD DEMOLITION

Approximately 1/4-inch of concrete will be removed from the top, sides and bottom of the pad. This will be accomplished using a concrete scabber. The scabber is a pneumatically activated, manually operated machine that uses cutters (similar to small jackhammers) to remove a concrete surface to a predetermined depth. The scabber is powered by a 185 cfm air compressor. Workers will make several passes with the scabber to remove the required amount of concrete. When the top and sides have been reduced by 0.6 cm., an excavator will be used to break the pad into pieces of sufficient size to allow the scabber to be utilized on the undersides of the pad. When the pad has been scarified on all sides, the remaining pad will be broken into appropriately sized pieces and placed into a dump truck for transport to the base sanitary landfill for disposal. The dust and residue left over from the scarifying operations will be incorporated into the contaminated soil for excavation and disposal.

7.0 MATERIAL EXCAVATION

The approximate dimensions of the anticipated area of contamination boundaries will be clearly marked prior to beginning excavation as per the drawings and specifications. The contaminated soils will be removed to the depth as indicated by the drawings, using a tracked excavator and loaded directly into dump trailers.

Excavation will begin by removing the contaminated soil in the FSA. The dimensions of the FSA site will allow the excavation of soils without contaminating the tracks of the excavator. The soils will be loaded directly into trucks for transport to the off-site disposal facility. Excavation will then move to the northern end of the MPA and proceed southerly, removing all contaminated soils to the depths as determined by previous sampling investigations. Additionally, any visibly contaminated soils will be excavated and loaded into trucks for disposal. The excavation will continue in the southern MPA in the same manner.

The trucks will be decontaminated at the decon pad prior to transportation off-site, to mitigate the spread of contaminants off site. When all contaminated soils have been removed, the excavator will have any residual soils removed from the cab, bucket, and tracks by scraping and brushing. The excavator will then be moved to the decon pad for final decontamination by pressure washing. All decontamination water will be pumped to a holding tank for sampling and analysis, prior to disposal.

Personnel involved with excavation, as well as the concrete cleaning operation, will be attired in Level C Personal Protective Equipment (PPE). Used PPE will be placed in plastic garbage bags which will be disposed with the contaminated soil.

8.0 TRANSPORTATION AND DISPOSAL

All hazardous waste destined for disposal will be transported by licensed hazardous waste haulers. All trucks will pre-weigh at Lot 203 to establish their tare weight prior to being loaded. After loading, a pressure washer will be used to decon the trucks' tires and trailer sides. All decontamination water will be pumped to a holding tank for sampling and analysis prior to disposal. The trailer will then be tarped, and the truck will be manifested and weighed to determine gross and net weights.

The contaminated soils and drummed debris (e.g., tree stumps) have been tentatively scheduled for disposal by incineration at LWD, Inc. located in Calvert City, Kentucky. The concrete pads and construction debris will be disposed at the local/base sanitary landfill. It is anticipated that decontamination liquids will be sent to the Base Wastewater Treatment Facility for treatment.

9.0 VERIFICATION SAMPLING AND ANALYSIS

After removal of all visibly contaminated soil, confirmation samples will be collected every 25 linear feet and/or 500 square feet along the sides and bottom of the excavation, and analyzed for full TCLP analysis. Sampling requirements are detailed in the Sampling and Analysis Plan. Should additional excavation be required upon receipt of analysis, a modification and approval will be obtained at that time and the soils will be excavated and loaded for transport and disposal.

Decontamination liquids will be sampled and analysis run to determine if the liquids can be sent to the Base Wastewater Treatment Facility for disposal or whether other disposal technologies are required. Sampling requirements will be identified by the Department of Environmental Management.

10.0 SITE RESTORATION

Once the contaminated materials have been removed from the site and the verification sampling has confirmed sufficient removal, OHM will begin site restoration activities.

10.1 BACKFILL

Backfilling operations will be implemented as soon as possible after analytical confirmation that the area is clean, in order to mitigate collection of storm water within open excavations. The excavated areas will be backfilled with suitable backfill material from the borrow area at Camp Lejeune and regraded to the original contours.

Fill will be spread evenly above the approved subgrade in lifts not exceeding 12 inches and compacted in horizontal layers as nearly even as possible.

10.2 TOPSOIL

After placement of the fill layers, OHM will place and grade four inches of topsoil over the excavated area. Topsoil will be placed in such a manner to control erosion and allow quick germination of vegetation.

10.3 MULCH AND SEED

Seed and mulch will be placed per contract specifications.

11.0 DEMOBILIZATION AND FINAL REPORT

All equipment and personnel will be demobilized from the project site.

A Contractor Closeout Report will be completed and submitted for review and comment.

**MATERIALS HANDLING,
TRANSPORTATION AND DISPOSAL PLAN
FOR
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July 18, 1994

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ATTACHMENTS

Drum Inventory Log

Waste Disposal Activities Checklist

1.0 INTRODUCTION

This Materials Handling, Transportation and Disposal Plan (MHTDP) has been prepared for use during remedial action activities at the site located at the intersection of Holcomb Boulevard and Brewster Boulevard on the Marine Corps Base, Camp LeJeune, North Carolina. The site is divided into two areas: the Mixing Pad Area (MPA) and the Former Storage Areas (FSA). From 1945 to 1958, a building in this area was used for storing, handling, and dispensing of pesticides. Chemicals known to have been used include: chlordane, DDT, diazinon, and 2,4-D. Chemicals known to have been stored on site include: dieldrin, lindane, malathion, silvex, and 2,4,5-T. Currently available analysis shows primarily the presence of DDT and its degradation products. Also found were heptachlor, chlordane, and dieldrin. No other pesticides have been detected in site analyses. Contamination is believed to have occurred as a result of small spills, washout and excess product disposal.

The MHTDP objective is to specify the methods and procedures to be implemented by OHM to ensure that wastes generated during site activities will be transported, stored, treated, and disposed in full compliance with applicable federal, state, and local rules and regulations.

2.0 CHARACTERIZATION OF WASTESTREAMS

Based on the information provided to OHM in the Basis of Design Report and Delivery Order Plans and Specifications, it is assumed that the waste will be bulk soils, PPE and other debris, and drummed decontamination water in the quantities and composition listed below. OHM has assumed waste codes will be P037, P059, U036, U060, U061, D020, and D031. All drums will be 17-H 55-gallon open-tops.

Soils	500 cubic yards	Sandy soils (>90%) Small debris including 1- to 2-inch rocks (≤10%) Small (3-4") grubbing debris (≤10%) Pesticides (≤0.5%)
PPE and Debris (tree roots)		Bulked with soil (<5%) Plastic sheeting, hose, & other debris (<50%) Larger debris from excavation including chipped tree stumps (<5%) Pesticides (≤0.5%)
Decon Water	10-20 drums	Water from equipment decontamination (>95%) Soil (<5%) Pesticides (<0.5%)

3.0 WASTE DISPOSAL APPROVAL

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 related to hazardous and solid waste treatment, storage, disposal, and transportation. This individual will review the analytical data collected by Baker Environmental, Inc. (Baker) during the delineation of contaminants and obtain pre-approval from the appropriate disposal facilities to allow direct loadout of excavated soil. The T&D Coordinator will also be responsible for preparing waste profiles to the selected disposal facility 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 potential vendors to prequalify transportation and disposal companies based on:

- Notice of Violation (NOV) status
- Ability to handle the wastes identified
- Cost effectiveness of the available transportation and disposal options
- Past experience

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

Disposal

- LWD, Inc.
Calvert City, Kentucky
- Aptus, Inc.
Aragonite, Utah
- Chemical Waste Management
Port Arthur, Texas
- ThermalKem, Inc.
Rockhill, South Carolina

Transportation

- Robbie D. Woods
Dolomite, Alabama
- Allwaste Services of Atlanta
Atlanta, Georgia
- A. R. Paquette & Company
Glenwood, Florida
- Laidlaw Environmental Services
Roebuck, South Carolina

All bids have been solicited using these eight bidders. All bids have been obtained based on written solicitation and all bid responses were written. All disposal bids were made in conjunction with OHM's procurement department. LWD, Inc. of Calvert City, Kentucky, has been tentatively selected based on their low total bid for the scope of work applicable to this project. The transportation vendor has yet to be selected. A condition of OHM's purchase order will be that the selected vendor must provide OHM with addresses, the name of a single point of contact, EPA ID numbers, permit verification, insurance verification, NOV status, and other qualifying data necessary.

4.0 WASTE PACKAGING

All drummed waste (if required) will be collected in 55-gallon (17H open-top) steel drums. These drums will be labeled and logged using OHM's standard drum inventory procedures (see attached Drum Inventory Log). OHM will maintain these drum logs and a database summary of the type and quantity of wastes generated each day. Appropriate measures will be taken to keep off-site back-up copies of these data as well.

OHM plans to excavate and load all soils directly into end-dumps. This will be a continuous operation and waste will be transported directly to the disposal facility at that time. No provision will exist for on-site stockpiles or on-site storage of waste in rollofs or dumps. OHM currently anticipates shipping five loads per day (M-F) to the selected disposal vendor

Non-hazardous materials (concrete, trees, etc.) will be accumulated on-site until sufficient quantities are available for shipment of a full load (≈80 drums or 20 to 30 cubic yards). OHM will conduct weekly inspections of the waste storage areas. All temporary storage will be in compliance with 40 CFR 262.34 and the applicable North Carolina regulations.

5.0 PREPARATION OF REQUIRED DOCUMENTATION

OHM will prepare (or oversee the preparation of) all paperwork associated with off-site disposal for review and signature by LANTDIV and Camp LeJeune representatives. This will include TSDF waste profiles, hazardous waste manifests, and land disposal restriction notification 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 all labels, manifests, LDR forms, and other shipping paperwork 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 24 hours in advance of the scheduled start of shipments.

Written verification that the proposed disposal site is permitted to accept the contaminated materials specified is required from the disposal vendors with their approvals. A written verification that all vehicles and containers were decontaminated prior to leaving the disposal site will be provided within three days of receipt of the waste materials. A written verification that wastes were actually delivered to the disposal site will be provided within seven days of receipt of the waste materials. A certificate of destruction will be provided within seven days of the date of actual waste disposal and for final payment of invoices.

6.0 TRANSPORTATION AND DISPOSAL

The T&D Coordinator will contact the selected vendor and schedule waste pickups 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 files and database printouts will be provided to the LANTDIV and Camp Lejeune representatives upon request and at the completion of the project.



OHM Corporation

DRUM INVENTORY LOG

DRUM NO _____

PROJECT NUMBER _____

PAGE _____ OF _____

PROJECT LOCATION _____ LOGGER _____ DATE _____
 PROJECT CONTACT _____ SAMPLER _____ TIME _____
 PHONE _____ WEATHER _____

DRUM TYPE: FIBER POLY-LINED STEEL POLY STAINLESS STEEL NICKEL
 LID TYPE: RINGTOP CLOSED TOP
 DRUM CONDITION: MEET DOT SPEC. GOOD FAIR POOR
 DRUM SIZE: 110 85 55 42 30 16 10 5 OTHER _____
 DRUM CONTENTS: VOLUME FULL 3/4 1/2 1/4 <1/4 MT
 OVERPACKED: NO YES Overpack Type: FIBER STEEL POLY

PHYS. STATE					COLOR	CLARITY			LAYER THICKNESS	FIELD ANALYSIS			
L	L	S	G	S	USE STD COLORS	C	C	O	INCHES	FIELD ANALYSIS			
A	I	O	E	L		L	L	P		pH _____	SU _____	PID _____	ppm _____
T										DOSIMETER _____			
M										OTHER _____			
B									DRUM LABELS/MARKINGS				
									DOT HAZ _____ UN/NA _____				

MFG NAME _____
 CHEMICAL NAME _____
 ADDITIONAL INFORMATION _____

LABORATORY COMPATIBILITY DATA										COMPATIBILITY CAT: _____									
<input type="checkbox"/> MARK IF PHYSICAL STATE AND COLOR MATCHES THE ABOVE INFORMATION. IF NOT, STOP ANALYSIS AND NOTIFY PROJECT CONTACT. FURTHER WORK WILL NOT BE PAID FOR.										ANALYSTS: _____									
RADIATION: POS <input type="checkbox"/> NEG <input type="checkbox"/> _____ MREM/HR										DATE PERFORMED: _____									
L	L	S	G	S	COLOR	CLARITY	WATER SOL	REACT	pH	HEX. SOL	PER	OXID	CN	SUL	BIEL-STEIN	FLASH POINT	PCBs (25ppm)	PCB TEST COMP	
L	I	O	E	L	USE STD COLORS	C	C	O	SOLUBILITY SPSI DENSITY H OR L	A=AIR W=WATER	STD. UNIT	S OR I	+ OR -	+ OR -	+ OR -	+ OR -	+ OR -	+ OR -	NUMBER
A	I	O	E	L		L	L	P											
T																			
M																			
B																			

COMMENTS: _____
 PCB CONC. _____ PPM FLASH POINT _____ °C COMPATIBILITY COMP. BULK # _____
 DATA REVIEWER: _____ DATA REVIEW DATE: _____
 FIELD REVIEWER: _____ FIELD REVIEW DATE: _____

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



Job Name: _____ **No.** _____
Waste Name: _____
Profile Number: _____
Work Order: _____

Waste Type: Dry solid
 Wet solid / sludge
 Liquid
 Other (specify _____)

Shipment Form: Drums (size/type _____)
 Tankers
 Dump trailers
 Rolloffs
 Other (specify _____)

Estimated Quantity: _____

Number of Loads: _____

Disposal Facility: _____
Address _____

Phone _____

EPA ID# _____

Contacts _____

Transporter: _____
Phone _____

EPA ID# _____

Contacts _____

See attached pages for: **Checklists**
 Drum labeling instructions (if applicable)
 Example manifests & LDR forms
 Drum or container lists
 Shipping tracking forms
 Special instructions

The site supervisor should review this material and the attached pages prior to performing work.



**Notifications, Forms,
Manifests & other Shipping
Papers Checklist**

Checklist of forms, notifications, manifests, and other paperwork associated with various federal, state and facility requirements & regulations. These items will be started by the T&D Coordinator but the site supervisor should review each for completion & inclusion with the shipment.

- | | Checked off
on |
|---|-------------------|
| <input type="checkbox"/> Determine if special state manifests are required. (AL, AR, LA, SC, & TX in the south) | _/_/_ |
| <input type="checkbox"/> Verify current manifests are being used? Get current ones if not. | _/_/_ |
| <input type="checkbox"/> Land Disposal Restriction notification(s) | _/_/_ |
| <input type="checkbox"/> Facility LDR form required <input type="checkbox"/> YES <input type="checkbox"/> NO | |
| <input type="checkbox"/> State LDR form required <input type="checkbox"/> YES <input type="checkbox"/> NO | |
| <input type="checkbox"/> Current forms available and attached? | |
| <input type="checkbox"/> Background information & data to complete form(s) in place? | |
| <input type="checkbox"/> Forms completed & reviewed for accuracy | |
| <input type="checkbox"/> Forms signed by OSC/Client? | |
| <input type="checkbox"/> Forms included with material to be sent with shipment (i.e. manifest, etc.) | |

- | | |
|--|-------|
| <input type="checkbox"/> Verify information or examples for manifests & labels is compiled & attached. | _/_/_ |
| <input type="checkbox"/> Prepare manifests & LDR forms, and have them checked for accuracy. (The disposal facility will review and verify the accuracy and completeness of these forms.--SEND THEM ADVANCED COPIES!!!) | _/_/_ |
| <input type="checkbox"/> Prepare drum labels, hazard class labels, & compile list of drum markings required. Labeling instruction sheets attached? | _/_/_ |
| <input type="checkbox"/> Arrange for client/OSC signatures on manifests & LDR forms. | _/_/_ |



Disposal Facility & Transporter Checklist

Activities conducted by the T&D Coordinator relating to scheduling and transporting waste to disposal facilities. These items will be started by the T&D Coordinator but the site supervisor should review each for completion.

Checked off on

- All approvals in place, or all facilities chosen? _/_/_
- Disposal windows lined up? Facilities have agreed to a specific receipt date, or have agreed to allow transporter to schedule material. Spoke with _____ _/_/_

- Project management informed of final scheduling plans? _/_/_
- Client/OSC informed of final scheduling plans? _/_/_
- Field personnel informed of final scheduling plans? _/_/_

- Three bids obtained for all disposal facility? _/_/_
- Disposal 3-bid approved & signed by client? _/_/_
- PO requisition for disposal completed & submitted? _/_/_
- Disposal vendor(s) given POs? _/_/_

- Three bids obtained for all transportation? _/_/_
- Transportation 3-bid approved & signed by client? _/_/_
- PO requisition for transportation completed & submitted? _/_/_
- Transportation vendor(s) given POs? _/_/_

- Transporter(s) are clear on the following: _/_/_
 - Arrival times & dates
 - Delivery times & dates
 - Equipment required
 - Types of trucks expected
 - Directions to site
 - Road & driving conditions at site
 - Site contacts & phone numbers
 - Subs are OK provided OHM informed
 - Billing and contracting details



Drum Checklist

The site supervisor should review each of these for completion before loading drums on the truck.

- Checked off
on
- Drums have been checked against inventory--there are no extra or missing drums? / /
- Drums are in good shape--or they have been overpacked? / /
- No leaks
- No dents greater than silver dollar size
- No creases greater than six inches
- No lid, ring or bung damage
- No damage to the seams or chimes
- No waste on the outside of the drum
- No large discolored areas on the drum
- ALL drums are numbered with the numbers on the top AND side? / /
- ALL drums have a complete waste label--either a yellow & red hazardous waste label or green non-hazardous label / /
- Drums have hazard class labels (if required) on their tops AND sides? / /
- Drums have approval numbers written on the top AND side / /
- Drums have the TSD name written on the side? / /
- If multiple trucks are used, an inventory record of which drums were loaded onto each truck is being made? / /



Drum Labeling Checklist

The site supervisor should review each of these for completion before loading drums on the truck.

- Checked off
on
//_
- [] Site supervisor has sufficient quantities of the appropriate drum labels?
 - [] Hazardous waste labels (yellow & red)
 - [] Non-hazardous labels (green)
 - [] Hazard class labels (i.e. flammable liquid, etc) (which _____)

 - [] Site supervisor has completed drum labels or has reviewed drum labeling instructions? _/_/_

 - [] Information on the drum labels is complete and matches the information on the manifest--This particularly important to double check when more than one manifest or truck is being used. Manifest numbers and other information will vary from truck to truck and manifest to manifest. Drum labels must match the specific manifest and the specific truck they are loaded onto. _/_/_
 - [] Generator's name
 - [] Generator's address
 - [] Generator's EPA ID number
 - [] DOT shipping name (Hazardous waste labels only)
 - [] EPA waste codes (Hazardous waste labels only)
 - [] Manifest number(s) (Hazardous waste labels only)
 - [] Accumulation Start Date (Hazardous waste labels only)



Manifest Checklist

Activities conducted by the Site Supervisor relating to manifests, LDR forms and other pre-shipment paperwork.

	Where to look	Checked off on
<input type="checkbox"/> Site supervisor has sufficient quantities of the appropriate manifests?		___/___/___
<input type="checkbox"/> Site supervisor has completed manifests or has reviewed manifest preparation instructions?		___/___/___
<input type="checkbox"/> Is a unique manifest number assigned to each manifest?	Section 1.	___/___/___
<input type="checkbox"/> Generator, Transporter, and Disposal facility information (including EPA id numbers, addresses, & phone numbers) complete & accurate--does it match sample manifests or manifest preparation instructions?	Sections 3-9 & A-H	___/___/___
<input type="checkbox"/> DOT description complete & accurate?	Section 11 lines a-d	___/___/___
<input type="checkbox"/> Number of containers, quantities, unites complete & accurate? Have the correct abbreviations been used?	Sections 12-14 lines a-d	___/___/___
<input type="checkbox"/> "Additional Description" section (including approval numbers and work order numbers) is complete & accurate?	Section J	___/___/___
<input type="checkbox"/> "Handling Codes" section (including emergency response guidebook codes) is complete & accurate?	Section K	___/___/___
<input type="checkbox"/> "Special Handling" section (including emergency phone number, and other special instructions) is complete & accurate?	Section 15.	___/___/___
<input type="checkbox"/> Client has signed manifest?	Section 16	___/___/___
<input type="checkbox"/> Transporter has signed manifest?	Section 17	___/___/___
<input type="checkbox"/> OHM has retained last page or a copy of manifest for our records?		___/___/___
<hr/>		
<input type="checkbox"/> LDR form is complete & included with manifest?		___/___/___
<input type="checkbox"/> LDR form has been signed by client?		___/___/___

**CONTRACT QUALITY CONTROL PLAN ADDENDUM
FOR
REMOVAL OF PESTICIDE CONTAMINATED SOIL
OPERABLE UNIT NO. 5, SITE 2
MCB CAMP LEJEUNE, NORTH CAROLINA**


Submitted to:

**Department of the Navy
Atlantic Division
Naval Facilities Engineering Command
Norfolk, VA**


Submitted by:

**OHM Remediation Services Corp.
Norcross, Georgia**

Prepared by:


Katherine M. Lista, P.E.
Project Manager

Approved by:


Michael I. Gilman
Program QC Manager


George E. Krauter, P.E.
Program Manager

July 18, 1994

Contract No. N62470-93-D-3032
Delivery Order No. 0023

Project No. 16207

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1.0 INTRODUCTION

This Contract Quality Control (CQC) Plan Addendum has been prepared in accordance with standard OHM Remediation Services Corp. (OHM) policies and procedures. The plan addendum provides specific QC information relating to the scope of work under Delivery Order Number 0023 of Navy Contract No. N62470-93-D-3032 (Removal of Pesticide Contaminated Soil, Site 2, Operable Unit 5). The tasks associated with this project include:

- Preparation of delivery order plans
- Pre-construction meeting
- Decontamination activities/transportation and disposal

1.1 SITE DESCRIPTION

Operable Unit No. 5, Site 2 is located to the northeast of the intersection of Holcomb Boulevard and Brewster Boulevard, Marine Corp Base (MCB) Camp Lejeune, North Carolina. The site is divided into two areas. The Mixing Pad Area (MPA) and the Former Storage Area (FSA). The MPA is split into two subareas, the Northern Mixing Pad and the Southern Mixing Pad. The MPAs are bound to the east by the Norfolk Southern Railroad and the west by Building 712. The FSA is located to the east of the railroad and south of the water treatment plant.

1.2 BACKGROUND

From 1945 to 1958, Building 712 was used for the storage, handling, and dispensing of pesticides. Chemicals known to have been used include: chlordane, DDT, diazinon, and 2,4-D. Chemicals known to have been stored on-site include dieldrin, lindane, malathion, silvex, and 2,4,5-T. The MPA is in an area of suspected contamination. Contamination is believed to have occurred as a result of small spills, washouts and excess product disposal. During the years of operation, it is reasonable to assume several gallons per year were involved; therefore, the estimated quantity involved is on the order of 100 to 500 gallons of liquids containing various concentrations of product.

2.0 PERSONNEL AND ORGANIZATION

The responsibilities of each person identified in the Quality Control (QC) organization are presented below.

2.1 PROGRAM MANAGER, GEORGE E. KRAUTER, P.E.

The program manager has ultimate responsibility for QC of project deliverables. Specific responsibilities include:

- Communicating with project manager to ensure project schedule and scope compliance
- Communicating with contracting officer (CO), and contracting officer's technical representative (COTR) on a regular basis to review project progress and contract compliance
- Providing updates to verify project is within budget

2.2 PROGRAM QC MANAGER, MICHAEL GILMAN

- Reviewing all deliverables prior to submittal to LANTDIV
- Reviewing QC procedures implemented during field activities, documentation preparation, and laboratory analysis

2.3 PROJECT MANAGER, KATHERINE M. LISTA, P.E.

The project manager is responsible for:

- Reviewing deliverables to ensure that they are both responsive and on schedule

- Reviewing all field activities including, but not limited to, sampling, decontamination, documentation, chain-of-custody procedures, site rules compliance with OHM site-specific health and safety plan
- Monitoring project costs
- Communicating with the LANTDIV NTR as the main point-of-contact
- Coordinate with other LANTDIV MCB Camp Lejeune delivery orders' activities
- Monitoring project progress to ensure schedule compliance and budget maintenance

2.4 DELIVERY ORDER MANAGER, KENT GEIS

The delivery order manager is responsible for:

- Scheduling and manpower for site activities
- Preparation of plans
- Daily communication with the site supervisor and project manager

2.5 SITE SUPERVISOR, RANDY SMITH

The site supervisor is responsible for day-to-day on-site activities. He communicates with the delivery order manager for updates on job progress and QC activities.

2.6 QC ENGINEER

The QC engineer is responsible for monitoring delivery order quality and, for this delivery order, will provide support to the project manager on a as-needed basis. If an independent site audit were to take place during site activities, the QC engineer would perform the audit. The QC engineer will not be on-site full-time, but will maintain contact with the site supervisor and project manager.

2.7 LABORATORY QA/QC OFFICER

The laboratory QA/QC officer is responsible for monitoring laboratory QA/QC procedures, ensuring QA/QC compliance, reviewing QA/QC data results and reporting any deficiencies to the project manager and the laboratory manager.

3.0 TESTING (INTERNAL AND EXTERNAL)

No special inspections or tests are required under this delivery order outside of analytical and geotechnical. The delivery order manager or site superintendent will be on-site to confirm that samples are collected from the locations jointly agreed upon by the NTR and the OHM project manager, and documented in a field book and on site drawings. In addition, field personnel will be monitoring to ensure proper sample collection, sample identification, sample custody, and equipment decontamination methods are followed. Through the use of field blanks, trip blanks, and duplicates samples, field activities and laboratory activities will be monitored. Further discussion of sampling and analysis is located in the Sampling and Analysis Plan.

The laboratory will be notified at least 48 hours prior to the start of sample collection so that they may prepare the necessary shuttles for delivery to the site. These shuttles will include all necessary sample containers, trip blanks, sample labels, preservatives, chain-of-custody forms for sample collection, storage, shipment and analysis.

4.0 REVIEW PROCEDURES

This delivery order will utilize two review procedures:

- Documentation review
- Analytical review

These are described in detail below.

4.1 DOCUMENT REVIEW

The project manager will review all deliverables, submit the final draft to the program manager for review and approval, respond to any comments provided by the program manager, and submit the final plan to the program manager for signature and submittal to the government. If, upon receipt and review of any document, the government has comments to be addressed, the document (with comments) will be returned to the project manager who will review the comments. The issues raised will be discussed with the delivery order manager and subsequently addressed in a resubmittal which will be handled through the same review procedure as the original submittal.

4.2 ANALYTICAL REVIEW

Upon completion of laboratory analysis, the laboratory QA/QC officer will review the results and all QA/QC data including instrument calibration checks, detection limits, compliance with published analytical methods, laboratory QA/QC sample results, etc., as soon as possible. If deficiencies are found, the QA/QC officer will initiate corrective actions as needed.

5.0 INSPECTION SCHEDULE

Two or three inspections will be made during the course of site activities. The first inspection will be performed by the OHM project manager and the NTR to review delivery order requirements and review preconstruction survey sample locations. This first inspection will occur on June 28, 1994.

The second (final) inspection will be held just prior to OHM demobilizing from the site. This inspection will confirm that the scope of work has been completed and that the site is left in an orderly condition to the satisfaction of the NTR. This inspection will be equivalent to a final walk-through with punch-list items identified as appropriate.

A third inspection may be performed at a time agreed upon in the field by the project manager and the NTR. This third inspection will be performed to confirm that:

- Proper health and safety procedures are being followed
- Proper decontamination procedures are being followed
- Samples are being labeled correctly
- Field documentation is being performed as required

Inspections will be documented and made part of the delivery order.

6.0 QC OPERATIONAL PROCEDURES AND RESPONSE TO DEFICIENCIES

QC operational procedures include documenting, tracking and correcting deficiencies. OHM personnel will be responsible for these procedures: the project manager (field and office activities), the delivery order manager (field activities) and the laboratory QA/QC officer (laboratory activities).

One project audit will be performed by an OHM auditor. An audit notice may not be required, but rather a phone call to the project manager will suffice as sufficient notice. A brief report will be developed by the qualified auditor in the form of a memo to the file. Any deficiencies noted will be discussed with the project manager and, if significant, the program manager, and program QC manager. Corrective actions will be implemented immediately.

7.0 CHEMICAL QC PROCEDURES

The laboratory awarded the analytical work associated with this delivery order will be identified to the NTR. The laboratory's Quality Assurance Program Plan (QAPP) will be submitted to the NTR for approval of the laboratory prior to sampling activities. The laboratory will be required for sample analysis and will implement their internal QC procedures as outlined in their QAPP.

8.0 ENVIRONMENTAL QC PROCEDURES

OHM has prepared an Environmental Protection Plan (Work Plan Section 5.0) which provides procedures and plans for the following items:

- Land Resources Management
- Water Resources Protection
- Soil Erosion and Sediment Control
- Waste Management
- Dust and Air Pollution Control
- Spill Control

**SAMPLING AND ANALYSIS PLAN
FOR
REMOVAL OF PESTICIDE CONTAMINATED SOIL
OPERABLE UNIT 5, SITE 2
MCB CAMP LEJEUNE, NORTH CAROLINA**

Submitted to:

**Department of the Navy
Atlantic Division
Naval Facilities Engineering Command
Norfolk, VA**

Submitted by:

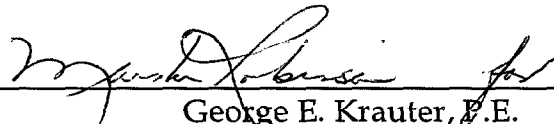
**OHM Remediation Services Corp.
Norcross, GA**

Prepared by:



**Katherine M. Lista, P.E.
Project Manager**

Approved by:



**George E. Krauter, P.E.
Program Manager**

July 18, 1994

Contract No. N62470-93-D-3032
Delivery Order No. 0023

OHM Project No. 16207

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1.0 INTRODUCTION

OHM Remediation Services Corp. (OHM) has been contracted by the Department of the Navy Atlantic Division (LANTDIV) under contract N62470-93-D-3032, Delivery Order No. 0023 to perform a removal action at the Marine Corps Base (MCB), Camp Lejeune in Jacksonville, North Carolina.

This Sampling and Analysis Plan (SAP) has been prepared to describe the sampling, analytical, and quality control procedures for the performance of work specified in the contract. The SAP details the sampling quantities, acquisition procedures and data collection methods employed during this removal action. This plan contains the field sampling plan and the quality assurance plan integrated into one document.

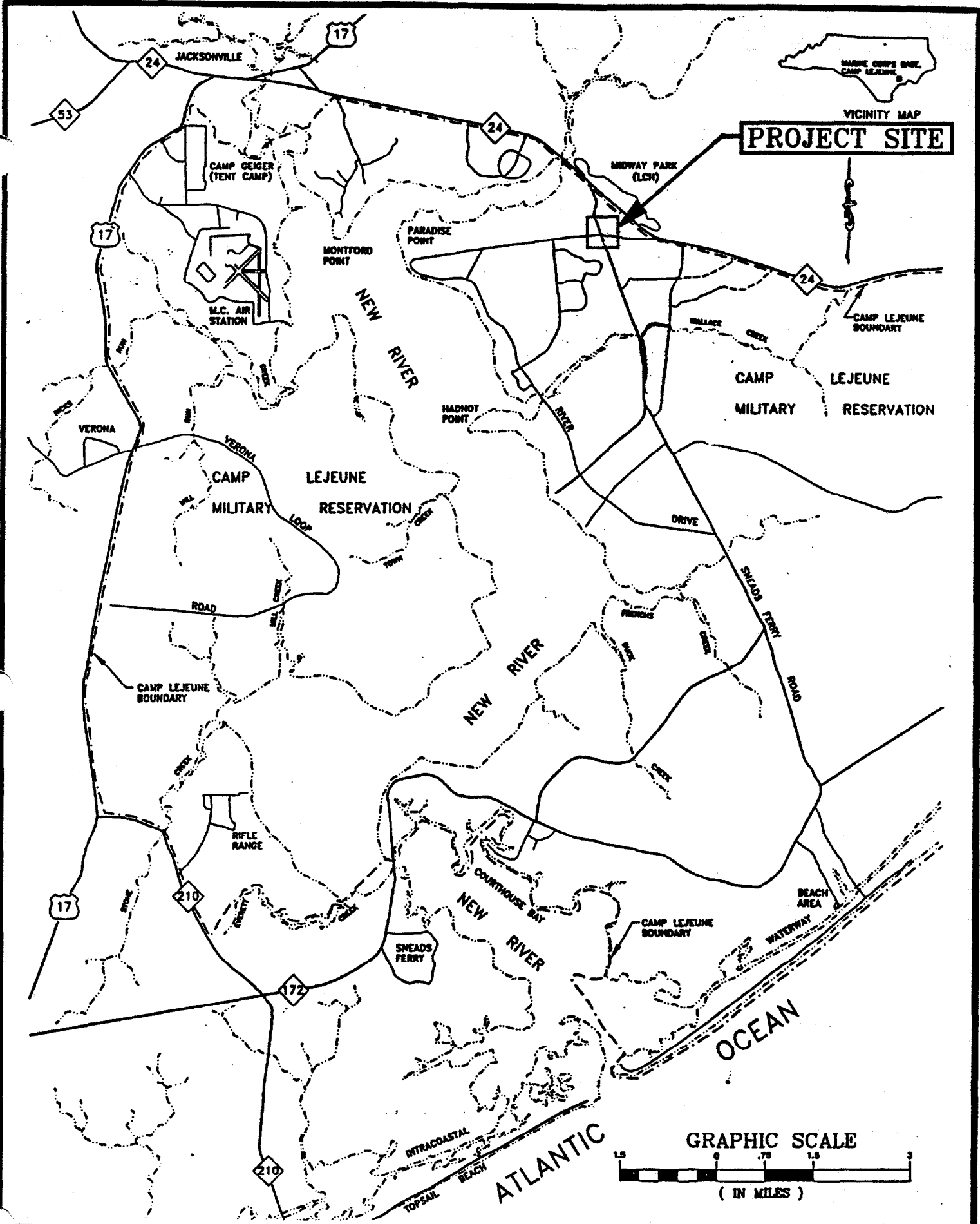
OHM is committed to providing a high quality of service. The SAP outlines the methods used to support OHM's commitment to deliver a precise, accurate and complete product.

2.0 PROJECT DESCRIPTION

The primary objective of this project is to remove, transport, and dispose of contaminated soils located at Operable Unit No. 5, Site 2 which is northeast of the intersection of Holcomb Boulevard and Brewater Boulevard, Marine Corps Base (MCB) Camp Lejeune, North Carolina. The site is divided into two areas: the Mixing Pad Area (MPA) and the Former Storage Area (FSA). The MPA is split into two sub-areas, the Northern Mixing Pad and the Southern Mixing Pad. The MPAs are bound to the east by the Norfolk Southern Railroad and the west by Building 712. The FSA is located to the east of the railroad and south of the water treatment plant.

From 1945 to 1958, Building 712 was used for the storage, handling, and dispensing of pesticides. Chemicals known to have been used include: chlordane, DDT, diazinon, and 2,4-D. Chemicals known to have been stored on site include dieldrin, lindane, malathion, silvex, and 2,4,5-T. The MPA is in an area of suspected contamination. Contamination is believed to have occurred as a result of small spills, washouts and excess product disposal. During the years of operation, it is reasonable to assume several gallons per year were involved; therefore, the estimated quantity involved is on the order of 100 to 500 gallons of liquids containing various concentrations of product.

Figures 2.1 and 2.2 show the site location and the project location.



PROJECT: CAMP LEJEUNE
REMEDIAL ACTION

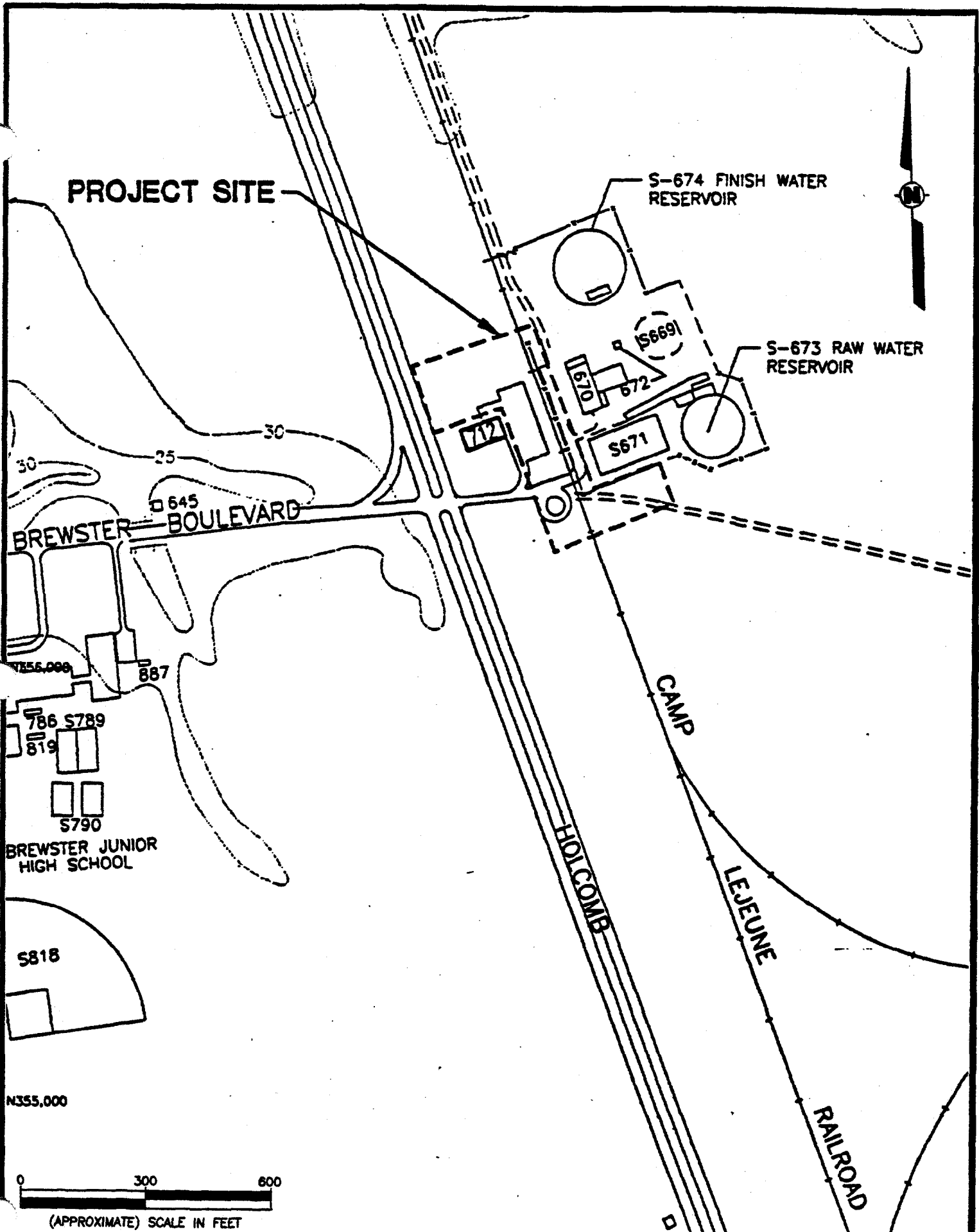
PROJECT No.: 16207

LOCATION: CAMP LEJEUNE, N.C.

FIGURE 2.1
SITE LOCATION MAP



OHM Remediation
Services Corp.



PROJECT: CAMP LEJEUNE
REMEDIAL ACTION
PROJECT No.: 16207
LOCATION: CAMP LEJEUNE, N.C.

FIGURE 2.2
PROJECT LOCATION MAP



3.0 SAMPLING OBJECTIVES

As stated earlier, the objective of this project is to remove, transport and dispose of pesticide-contaminated soils and general construction debris including the concrete mixing pads. Samples will be collected and analyzed to determine that the site is ready for use and to determine the proper disposal for the wastestreams encountered at the site.

The samples proposed for collection during the field work are confirmation samples, characterization samples, disposal samples and quality control samples. Quality assurance and quality control (QA/QC) provides confidence that the work is performed satisfactorily, conforms to the requirements of the contract, and ensures that the results are scientifically accurate and legally defensible.

All sampling methods employed in the SAP will follow applicable EPA, Navy and state of North Carolina guidelines and protocols. All laboratory analysis will conform with NFESC Level C Quality Assurance Requirements. Any modifications or changes to the established protocols will be approved by the LANTDIV Navy Technical Representative (NTR), OHM project manager and the OHM project chemist. Changes made in the field will be documented in the sampling field logbook before the actual work begins.

4.0 SAMPLE LOCATION AND FREQUENCY

Site work will generate the need for sampling and analysis to determine if the site has been restored to a satisfactory condition and to determine the proper disposal of the waste generated at the site. Sample matrices proposed for sampling at MCB Camp Lejeune consist of solid and liquid material. The solid matrix will consist of soil, solid debris samples, and personal protective equipment (PPE). The liquid matrix will consist of decontamination water samples.

At MCB Camp Lejeune, there will be several different types of samples collected and analyzed for specific purposes. These types of samples and their constituents, along with QA/QC requirements, are discussed below and presented in tabular format in Table 4.1.

**Table 4.1
Sample Summary**

Sample Type	Matrix	Required Analysis	Sample Frequency	Number of Samples	Additional QA/QC Samples	TAT
Confirmation	Soil	TCL Pesticides and PCBs	One sample every 500 sq. ft. of excavation bottom, one sample every 50 linear ft. of each wall	34	4 duplicates 1 field blank 2 rinsate blank	48 hours
Disposal	Aqueous liquids	TCLP: volatiles semi-volatiles pesticides, herbicides metals Total: PCBs, RCRA characteristics o/o water	One per disposal group	1	1 duplicate 1 trip blank	7-10 days

4.1 CONFIRMATION SAMPLES

Soil confirmation samples will be collected and analyzed to confirm the removal of all contaminated soil from the excavated trenches. Concentration levels greater than the following in the confirmation samples will require additional excavation and resampling as per the design specifications.

Compound	Soils (g/Kg)
4,4'-DDE	3,000
4,4'-DDD	4,000
4,4'-DDT	3,000
Chlordane (total)	621
Heptachlor	179
Dieldrin	50

Confirmation samples will be collected every 500 square feet along the floor of the excavation and every 50 linear feet along each wall. This will yield approximately 34 soil confirmation samples. Quality assurance/quality control samples will be collected at a rate of 10% of the total amount of samples collected. Therefore, there will be an additional four duplicate samples collected for QA/QC purposes. One field blank and two rinsate blanks will also be taken.

4.2 DISPOSAL SAMPLES

Disposal samples are only required for the aqueous liquids wastestream. All other wastestreams have been approved.

Table 4.1 identifies the number of disposal samples and the constituents to be analyzed. The number of samples presented for collection are subject to change due to field conditions. When this is the case, the changes will be documented and forwarded to the proper authorities for approval.

4.3 QUALITY ASSURANCE/QUALITY CONTROL SAMPLES

Table 4.2 identifies the frequency of field QC samples per sampling event. OHM will be following Level C criteria.

**Table 4.2
Field QC Samples Per Sampling Event**

Type of Sample	Level C		Level D		Level E	
	Metal	Organic	Metal	Organic	Metal	Organic
Trip Blank (for volatiles only)	NA ¹	1/cooler	NA ¹	1/cooler	NA ¹	1/cooler
Equipment rinsate ²	1/day	1/day	1/day	1/day	1/day	1/day
Field Blank	1/source/event for all levels and all analytes					
Field Duplicates ³	10%	10%	10%	10%	5%	5%

¹NA - Not applicable

²Samples are collected daily; however, only samples from every other day are analyzed. Other samples are held and analyzed only if evidence of contamination exists.

³The duplicate must be taken from the same sample which will become the laboratory matrix/spike duplicate for organics or for the sample used as a duplicate in inorganic analysis.

4.3.1 Trip Blanks

Trip blanks are defined as samples which originate from analyte-free water taken from the laboratory to the sampling site and returned to the laboratory with the volatile organic (VOA) samples. One trip blank should accompany each cooler containing VOAs, should be stored at the laboratory with the samples, and analyzed by the laboratory. Trip blanks are only analyzed for VOAs. No trip blanks will be required for this project unless analytical parameters change to include VOA samples.

4.3.2 Equipment Rinsates

Equipment rinsates are the final analyte-free water rinse from equipment cleaning collected daily during a sampling event. Initially, samples from every other day should be analyzed. If analytes pertinent to the project are found in the rinsate, the remaining samples must be analyzed. The results from the blanks will be used to flag or assess the levels of analytes in the samples. This comparison is made during data validation. The rinsates are analyzed for the same parameters as the related samples. The rinsate blank will only be required for the confirmational sampling activity. It is anticipated that two days will be required for sampling and one rinsate blank will be collected and analyzed for each day.

4.3.3 Field Blanks

Field blanks consist of the source water used in decontamination and steam cleaning. At a minimum, one field blank from each event and each source of water must be collected and analyzed for the same parameters as the related samples. The field blank will only be required for the confirmational sampling activity.

4.3.4 Field Duplicates/Splits

Duplicates or splits for soil samples are collected, homogenized, and split. All samples except VOAs are homogenized and split. Volatiles are not mixed, but select segments of soil are taken from the length of the core and placed in 40-ml glass vials. Cores may be sealed and shipped to the laboratory for subsampling if the project deems this appropriate. The duplicates for water samples should be collected simultaneously. Field duplicates should be collected at a frequency of 10 percent per sample matrix for Levels D and C. For Level E, the duplicates should be analyzed at a frequency of 5 percent. All the duplicates should be sent to the primary laboratory responsible for analysis. The same samples used for field duplicates shall be split by the laboratory and be used as the laboratory duplicate or matrix spike. This means that for the duplicate sample, there will be analyses of the normal sample, the field duplicate, and the laboratory matrix spike/duplicate. Duplicates will be required for all sampling activities.

5.0 SAMPLE DESIGNATION

Each type of sample collected at MCB Camp Lejeune will have a unique sample number to aid in identifying the sample. There are two types of samples that will be collected at the site: confirmation and disposal. For each type of sample a discussion is provided on the sample designation scheme used to identify the samples.

5.1 CONFIRMATION SAMPLES

The confirmation samples will consist of only one matrix, soil, collected from the excavated trenches. The samples will be numbered consecutively, starting with the first soil sample. An example of a confirmation sample number is presented below with an explanation.

CLJ2-CSS-01(D)
CLJ2 ≡ Camp Lejeune (2nd project)
CSS ≡ Confirmation soil sample
01 ≡ Sample number
D ≡ Duplicate, if applicable

5.2 DISPOSAL SAMPLES

Disposal samples will consist of only one matrix ≡ decontamination wastewater. The sample identification numbers will be assigned as follows:

CLJ2-DW-01(D)

Where:

CLJ2 ≡ Camp Lejeune (Project #2)
DW ≡ Disposal Decontamination Water Sample
01 ≡ Sample Number
D ≡ Duplicate, if applicable

5.3 QA/QC SAMPLES

QA/QC samples will consist of water samples. Sample identification numbers will be assigned to help distinguish between the different types of QA/QC samples. Duplicate samples have been described earlier.

For trip blank samples, the following designation will be used:

CLJ2-TB-01

For rinsate blank samples, the following description will be used:

CLJ2-RB-01

For field blank samples, the following designation will be used:

CLJ2-FB-01

Where:

CLJ2 ≡ Camp Lejeune

TB ≡ Trip Blank

RB ≡ Rinsate Blank

FB ≡ Field Blank

01 ≡ Sample Number

6.0 SAMPLING EQUIPMENT AND PROCEDURES

6.1 SAMPLING PROCEDURES

Sampling methodologies for this project will follow at a minimum the USEPA Region IV Engineering Support Branch Standard Operating Procedures and Quality Assurance Manual, February 1991. For each type of sample proposed for collection at MCB Camp Lejeune, the procedures used are described to enable a sampling team unfamiliar with the site to gather the samples and necessary information.

Confirmation soil samples collected at the site will consist solely of grab samples collected from the walls and floors of the trenches. The following procedures will be used to collect the confirmation soil samples:

1. Locate and flag (from the surface) the sampling locations in trenches.
2. Using a decontaminated bucket auger, retrieve the soil from the designated sample location. If the auger cannot reach the sample point, a decontaminated backhoe bucket can be used. Take the sample from the middle of the backhoe bucket.
3. Using a clean pair of sampling gloves and using a clean stainless steel spoon or a clean stainless steel auger, scrape the top layer of soil away.
4. With the spoon or auger, collect enough sample in a stainless steel or glass bowl to fill the sample jars.
5. Once enough soil has been collected, the sample jars should be filled. The volatile sample is transferred to the appropriate container first when applicable. After the volatile sample is collected, the remaining sample is thoroughly mixed in the sample bowl. After thorough mixing, the remaining sample jars are filled and labeled.

6.2 SAMPLING EQUIPMENT

Table 6.1 lists the equipment to be used to collect the samples at MCB Camp Lejeune along with the material composition of each piece of equipment.

The following steps will be used to decontaminate the sampling equipment utilized at MCB Camp Lejeune.

1. Clean with tap water and phosphate-free laboratory detergent (Liquinox), using brush, if necessary, to remove particulate matter and surface films.
2. Rinse thoroughly with tap water.
3. Rinse thoroughly with deionized water.
4. Rinse twice with pesticide-grade isopropanol.
5. Rinse thoroughly with organic-free water and allow to air dry as long as possible.
6. If organic-free water is not available, allow equipment to air dry as long as possible. Do not rinse with deionized or distilled water.
7. Wrap with aluminum foil, if appropriate, to prevent contamination if equipment is going to be stored or transported.

Decontamination fluids and PPE will be collected, containerized and disposed properly.

Heavy machinery brought on-site, which comes in contact with potentially-contaminated materials will require steam cleaning upon departure. The

equipment will be decontaminated on the decontamination pad and decontamination fluids transferred to the appropriate pool.

Table 6.1
Sample Equipment

Sample Group	Sample Type	Sample Equipment	Material Composition
Confirmation	Grab	Auger Spoon Bowl	Stainless Steel Stainless Steel Stainless Steel Glass
Disposal	Grab/Liquid	Bailer (as needed) Sample Jar	Teflon Stainless Steel Glass

7.0 SAMPLING HANDLING AND ANALYSIS

7.1 SAMPLE ANALYSIS

Table 7.1 provides the analysis, sample containers, preservatives, and holding times for the samples collected at MCB Camp Lejeune. The disposal decontamination water samples will be preserved with HCl for the volatiles fraction and with HNO₃ for the metals fraction. Chemical preservatives are not required for soil samples. All samples will be stored and shipped at 4°C.

Samples will have analyses performed at QC Level C.

Table 7.1
Sample Analysis, Containers, Preservation, Holding Times

Sample Group	Sample Matrix	Analysis	Sample Container	Preservation Method	Holding Time
Confirmation	Soil	TCL Pesticides and PCBs	8-ounce jar	Cool, 4°C	7 days to ext., 40 days after ext.
Disposal	Aqueous Liquids	TCLP Volatiles	3 ea. 40-ml vials with septums	Cool, 4°C	14 days
		TCLP Semi-Volatiles, Pesticides, Herbicides	1-gal. amber jar		14 days
		TCLP Metals	1-gal. amber jar	Cool, 4°C	6 months*
		Total PCBs, RCRA Characteristics	8-ounce jar		NA
		Ignitability	16-ounce jar		NA
pH	16-ounce jar	Cool, 4°C	NA		
Reactive CN-	8-ounce jar	Cool, 4°C	NA		
Reactive Sulfide o/o water		None	NA		

*Holding time for mercury is 28 days.

7.2 SAMPLE LOG BOOK

It is necessary for the sampling crew to maintain daily field notes. Items that must be included are sampling protocol, any changes to the procedures, meetings, instructions, safety precautions, personnel protection, and activities pertaining to the samples. The person taking notes must be knowledgeable enough about these activities to know which details are important.

Repetition of information recorded in other permanent logs should be avoided; but enough should be recorded to present a clear and accurate picture of technical activities. At a later date, should a question arise concerning a specific

event or a procedure used, it will be answered from these notes. Some items that would be considered noteworthy are as follows:

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, regulatory agencies (coordinate prior with LANTDIV), NTR, OHM project manager, or supervisor.

Details concerning any samples split with another party

Details of QC samples obtained

These notes must be dated and signed (each page) for validity in a court of law. 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.

All samples should be logged in the logbooks. The following columns are standard for all projects:

- 1) DATE -- Date sample was obtained

- 2) **SAMPLE NUMBER** -- Consecutive series of numbers which are assigned to every sample.
- 3) **LOCATION** -- Description of area sampled
- 4) **TIME** -- Military time sampled
- 5) **SAMPLERS** -- Initials of persons obtaining sample (usually two, at least witnessing if not involved in actual sampling task)
- 6) **DESCRIPTION OF SAMPLE** -- Physical description of sample (e.g., clear, cloudy, odor)
- 7) **WEIGHT OR VOLUME** -- Size of sample (500ml, 1L, etc)
- 8) **DATE RESULTS ARE DUE** -- Date analytical results should be reviewed
- 9) **LABORATORY** -- Laboratory who performed analytical work
- 10) **RESULTS** -- Will vary according to project requirements; should be in consistent units (ppm, ppb, etc.,) when possible
- 11) **CHAIN-OF-CUSTODY NUMBER**-- For samples sent to laboratory or given to client
- 12) **ADDITIONAL COMMENTS** -- Space reserved for any other information concerning particular sample or special procedure or analysis.
- 13) **PRESERVATIVES** -- Preservatives used or included by the lab
- 14) **DATE SAMPLES SENT** -- Date samples were sent to the lab
- 15) **AIRBILL NUMBER**

The following guidelines will be implemented for all log books:

Each page will be signed, dated, and numbered;

Blank pages will be identified as such;

The time of each entry will be noted (24 hour clock);

Logbook extensions (field sheets, purge records, etc.) will be recorded in the logbook; and

Logbooks will be returned to the NTR upon completion, during periods of absence, and at the end of the investigation.

This information will also be entered into the Microsoft Works data base program that has been prepared for this site. They will be entered daily by the designated Sample Management Officer (SMO), who may also be the chemist or sample tech for the site. This person will be the point of contact for all sampling and analytical information. Report outputs from the database is an acceptable substitute for the sample log book.

7.3 SAMPLE LABELING

Samples other than *in situ* measurements are identified by a sample label attached to the sample container. Included on the label is the following information:

- 1) OHM PROJECT NUMBER
- 2) PROJECT NAME
- 3) DATE -- Month, day, year
- 4) TIME -- Military time that sample is collected
- 5) SAMPLE NUMBER -- see Table 1 for designations
- 6) LOCATION -- Sample location
- 7) ANALYTICAL PARAMETERS REQUESTED
- 8) PRESERVATIVE -- Whenever applicable

9) TAKEN BY -- Sampler name

10) NUMBER OF JARS -- Used when one jar cannot hold all the sample

The information described above should be printed neatly using an indelible marker. After the sample is taken and the label is securely attached, the sample is logged into the sample log book. An example of a sample label is included in Appendix A.

7.4 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 should 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 opening of the sample transport containers. An example custody seal is included in Appendix A.

7.5 CHAIN-OF-CUSTODY (COC) 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.

A COC form has been provided in Appendix A of this plan. The following information is required on the COC:

- 1) PROJECT NAME
- 2) PROJECT LOCATION -- City and State in which the project is located
- 3) JOB 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) PROJECT TELEPHONE NUMBER -- Telephone number of on-site office trailer or number where person responsible for samples can be contacted.
- 6) STATION NUMBER -- Sampling location
- 7) DATE -- Month, Day, Year
- 8) TIME -- Military time
- 9) SAMPLE IDENTIFICATION -- Sample number
- 10) BOTTLE SIZE -- 12 ounces, 8 ounces, 1 liter, etc
- 11) BOTTLE TYPE -- Glass, polyethylene, cubitainer, 40-ml vial, etc.
- 12) BOTTLE NUMBER -- Designated on the sample label or by the lab
- 13) ANALYSES REQUESTED

14) LABEL, TAG NO./ REMARKS

15) AIRBILL NO

16) COOLER NO

17) LABORATORY -- Laboratory where samples are to be sent

18) PHONE -- Telephone number of laboratory

19) ATTN -- Contact for laboratory

20) RELINQUISHED BY -- Signature of sender (OHM)

21) DATE -- Date samples are sent

22) TURNAROUND TIME -- Turnaround times requested or date the results are required from the lab.

The COC needs to be sealed in a ziploc bag and taped in place on the underside of the top of the sample transport container (cooler).

7.6 SHIPMENT OF SAMPLES

Samples will be shipped via Federal Express to the appropriate laboratory. Also, COCs have been prepared accordingly and are organized according to sampling events.

The following instructions are for shipping samples with unknown or limited hazards. NO CHANGES OR SUBSTITUTIONS TO THESE INSTRUCTIONS ARE ALLOWED \equiv NO MATTER HOW INSIGNIFICANT THEY MAY SEEM.

- 1) Samples must be shipped in "strong outer packaging". A plastic cooler is acceptable.

- 2) Both the shipper's and receiver's addresses must be on the container.
- 3) The following shipping name must be printed on the container:

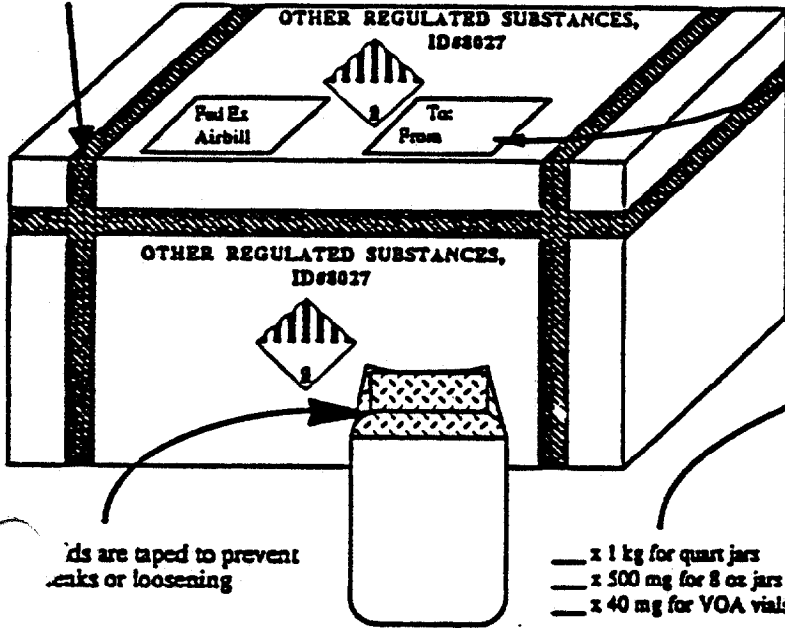
OTHER REGULATED SUBSTANCES,
ID # 8027

- 4) A Class 9 hazardous material shipping label must appear on the top of the box. Included in Appendix A is an example of a shipping label which also includes places for the shipper's and receiver's addresses.
- 5) Inner packages cannot exceed 1 gallon each, and the entire shipment (cooler, samples, and absorbent) cannot exceed 66 lbs.
- 6) Coolers must be packed with absorbent such as vermiculite or kitty litter.
- 7) Inner containers should have their lids secured with tape or wire.
- 8) The materials must be shipped using a Federal Express Hazardous Materials Airbill
- 9) Refer to Figure 7.1 (next page) for details on how to fill out the Federal Express Hazardous Materials Airbill. An example of this airbill is included in Appendix A.
- 10) Any questions regarding shipment of samples should be referred to Tom Mears in OHM's Norcross, Georgia office at (404) 729-3900.

Figure 7.1

Cooler lid is taped closed and additional tape should be used around the outside to act as strapping.

OHM Address Label w/ Lab's mailing address



Lower Portion of Fed-Ex DANGEROUS GOODS airbill

CHECK ONE -> [] 149 CFR [X] IATA/ICAO

Dangerous Goods Identification	UN or ID No.	Quantity and Type of Packing	Pack. Inst.	Auth.
Other Regulated Substances	Class 9 D 8027	Plastic Box Containing ___ x 1 kg inner containers	906	
		Passenger Aircraft		
		Non-Radioactive		

- Samples must be shipped in "Strong outer packaging". Fed-Ex stated that a rigid plastic cooler like we are currently using would be acceptable.
- Both the shipper's & receiver's address must be on the box. This can be either an address label or addresses actually written on the cooler using a permanent marker.
- The following shipping name must be printed in large letters using a permanent marker on the top and side of the cooler:
OTHER REGULATED SUBSTANCES, ID#8027
- A Class 9 hazardous material shipping label must appear on the top and side of the cooler next to the shipping name.
- Inner packages cannot exceed 1 gallon each, and the entire shipment (cooler & samples) cannot exceed 66 lb.
- 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.
- Inner containers should have their lids secured with tape or wire to prevent the lids coming off while being transported.
- 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.

8.0 ANALYTICAL METHODS AND DATA QUALITY OBJECTIVES

8.1 ANALYTICAL REQUIREMENTS

Analytical requirements for this project are listed in the Sampling Handling and Analysis (Section 7.0) of this document. All samples will be analyzed according to the USEPA SW-846 Test Methods for Evaluating Solid Waste Physical/Chemical Methods. Detection limits for analysis will depend on the specific method used, the matrix involved, and the final use of the data. The precleaned sample containers (including certifications) will be provided by the approved laboratory(s) of this project.

8.2 DATA QUALITATIVE OBJECTIVES (DQO)

On-site health and safety monitoring will follow EPA Level 1 DQO. (Information concerning on-site monitoring equipment is located in the Health and Safety Plan.) All other samples will be performed according to Level C DQO.

8.2.1 Quality Assurance Objectives

Appendix B outlines the analytical data quality assurance objectives for this project.

All performance and system audits conducted as part of the QC process other than trip blanks, field blanks and duplicate samples will be internal to the laboratory. These data will be reported along with the sample analysis data. These include instrument blanks, method blanks, prep blanks, surrogate recoveries, matrix spike and matrix spike duplicate recoveries. All laboratory data will be reviewed by an OHM chemist and/or the project's QA Officer to assess data assurance objectives which will be addressed in the final report.

8.2.2 Field Monitoring Equipment

Field monitoring equipment for this project is covered in the Health and Safety Plan.

9.0 ANALYTICAL STATISTICAL/CONTROL PARAMETERS

9.1 ACCURACY

The accuracy of the measurement data is evaluated by the comparison of the percent recovery of QC reference materials of known or established concentrations, independent of the routine calibration. Statistically based control limits are established for each method of analysis and sample matrix.

A spiked sample is routinely analyzed on each batch of 20 samples per matrix. Recoveries are assessed to determine method efficiency and matrix interference effects. Analytical accuracy is expressed as the percent recovery of the spike added. Equation 1 is used to calculate percent recovery.

Equation 1

$$\text{Percent} = \frac{\text{Spike Sample Results} - \text{Sample Results}}{\text{Amount of Spike Added}} \times 100$$

9.2 SENSITIVITY

The detection limits for each test are outlined in the analytical procedures and are covered in the laboratory QC manual.

9.3 PRECISION

Precision will be assessed by comparing the analytical results between matrix spikes (MS) and matrix spike duplicates (MSD). The relative percent difference (RPD) between the MS and MSD can be calculated using equation 2.

Equation 2

$$\text{RPD} = \frac{\text{MS Result} - \text{MSD Result}}{(\text{MS Result} + \text{MSD Result})/2} \times 100$$

9.4 COMPLETENESS

Completeness is defined as the percentage of measurements taken for analysis in order to make site decisions compared to the total valid results available.

Equation 3 defines completeness.

Equation 3

$$\text{Completeness} = \frac{\text{Valid Data Obtained}}{\text{Total Data Planned}} \times 100$$

9.5 FIELD QUALITY CONTROL

9.5.1 Field Blanks

Blanks which are collected in the field are an important link in the quality control data chain for a set of samples. The analytical data derived from these blanks are necessary to assess field sampling operations. Blanks are used to verify that sample containers, preserving reagents, and equipment are contaminant-free. Blanks are also used as a check for potential on-site environmental contamination, to evaluate personnel expertise in sample collection, and to reveal problems that may occur in sample storage and transport.

The field quality control blanks should not be isolated from actual samples. They must be considered as samples and treated identically (preserved with the same reagents, stored and transported in the same containers as the samples, etc.).

In cases where data quality objectives dictate more stringent controls, additional field quality control blanks may be required. The following protocol outlines the minimum field blank requirements necessary to assure the validity and integrity of any sampling episode.

9.5.2 Field Equipment Blanks

PURPOSE: Equipment blanks are required if sampling equipment must be cleaned in the field and re-used for subsequent sample collection. These blanks are used to determine the effectiveness of field cleaning procedures as well as reveal those sources of contamination that may be found in a trip blank. Equipment blanks are recommended for all parameters.

PROCEDURE: The final rinse water (analyte-free) will be rinsed on or through the sampling equipment, collected in appropriate sample containers and preserved in the same manner as samples. These blanks must be included in the same storage and transport containers as the samples.

FREQUENCY: At least one equipment blank will be submitted for equipment used in the sampling process that must be field cleaned. For each equipment blank collected, aliquots must be taken and properly preserved for each method group. VOA equipment blank water should be taken from water used in all decontamination procedures.

9.5.3 Trip Blanks

PURPOSE: The trip blank is to be used when sampling for volatile organics and other sensitive parameters. The purpose is to determine if contamination has occurred as a result of improper sample container cleaning, contaminated blank source water, sample contamination during storage and transportation due to exposure to volatile organics (e.g., gasoline fumes), and other environmental conditions during the sampling event.

PROCEDURE: Trip blanks will be prepared prior to the sampling event by the laboratory personnel who are responsible for the initial preparation of sample containers. The water will be free of volatile organic contaminants. Any appropriate preservatives will be added at the time that the blanks are prepared. The sample containers will be sealed, labeled appropriately, and transported to the field in the same sampling kits as the sample vials. These blanks will not be opened in the field. They will be transferred to the sample container designated for volatile sample storage and transport, and accompany the samples to the laboratory.

9.5.4 Field Duplicates

PURPOSE: These are identical samples used to verify reproducibility of data. Field duplicates often check the reproducibility of the sampling procedure, especially in composite sampling.

PROCEDURE: Duplicate samples are collected by sampling from successively-collected volumes of a sample (i.e., samples from the next bailer of sample water. These samples will be contained, preserved, and transported in the same manner as the samples of interest. Field duplicates will be collected and analyzed for the same parameter groups as the samples of interest.

FREQUENCY: 10 Percent

9.5.5 Field Measurement Duplicates

PURPOSE: Field measurement duplicate samples are used to verify reproducibility of data on field instruments.

PROCEDURE: Field measurement duplicate samples are collected as described above.

9.5.6 Split Samples

PURPOSE: Split samples are identical samples used to verify laboratory performance or provide the owner/operator with an independent source of analysis.

PROCEDURE: Split samples are collected from consecutive sample volumes using the same sampling procedures and equipment (i.e., the same bailer). If large sample volumes are required, consecutive samples will be collected and mixed in a large intermediate vessel. For large volume samples that may require more than one bailer full, the first half-volume of the first bailer full will be poured into the first container (second half in the second container), the first half-volume of the second bailer full will be poured into the second container (second half in the first container), etc., until both containers are full.

10.0 DATA ANALYSIS AND REPORTING

10.1 FIELD INSTRUMENTATION DATA REDUCTION

The on-site health and safety officer, or field chemist, is responsible for the proper use and calibration of these instruments. All raw data collected from the field survey instruments are logged into the health and safety logbook for the site. For more information of field instrumentation, operation, calibration and maintenance, consult the Health and Safety Plan.

10.2 LABORATORY/FIELD DATA REDUCTION

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;

Ensuring all QA/QC checks are supportive of data

Ensuring all documentation is complete and accurate in respective log books; and

Ensuring all chromatograms and strip chart recordings are labeled with date, instrument number, parameters run, and the analyst.

Analytical Records

The laboratory/field maintains a bound, numbered log book for all samples received/ sent off by the laboratory. The following column headings are entered for each item of sample information:

1. Date--Date sample was collected and date received by the laboratory*
2. Log Number--Consecutive series of numbers in which every sample is assigned (transferred to sample jar before analysis)*
3. Location--Description of area sampled (abbreviated form if sampled twice or more--log explaining locations and abbreviations should be attached to or written in front of the log book) Also included is the field-generated sample number*
4. Time--Time sample was collected (military)*
5. Samplers--Persons collecting sample (always two--one at least witnessing even if not involved in actual act)*
6. Type of Sample--Water, soil, air, sludge, etc.
7. Weight or volume--Size of sample (20 ml, 200 gram, 1 oz., etc.)
8. Released By--Person releasing samples to laboratory for analysis
9. Accepted By--Person in laboratory receiving samples released by field representative
10. Date of Analysis--When sample is analyzed and the result is determined

11. Analysis By--Chemist who performed analytical work
12. Results--The drum log will consist of the parameters tested for, while the sample log book will vary depending on disposal requirements and classification of waste stream
13. Additional Comments--Space reserved for any other information concerning particular sample or special procedure or analysis and chain of custody of samples that leave site

* This information should be included on sample label.

10.3 FIELD DATA VALIDATION

All field equipment will be checked and calibrated prior to use. Each instrument calibrated is recorded in the field instrument calibration notebook. Field personnel using the equipment (sample technician, health and safety officer, or field chemist) are responsible for the following information:

- Internal calibration complete and accurate;
- Field data integrity;
- All documentation is complete and accurate in log book;
- Raw data calculations/entries;
- Sample custody integrity; and
- Acknowledging historical data.

All field-generated data are checked by the site supervisor to ensure that all field instrumentation is calibrated and QC checks are within established limits.

10.4 PROJECT DATA REVIEW

All data produced from the project are given to the Project Manager and QA Officer for final data review. All log books, chain-of-custodies, etc., are reviewed by the QA Officer to ensure all QC protocols have been met. All information is then archived for data storage.

10.5 DATA REPORTING

Once the data has been reviewed, it is ready for report production. The report may contain the following:

Original chain-of-custody forms

Description of sample types

Tests performed, problems encountered during testing

Dates sampled

Date received

Date extracted

Analytical results

Dual column confirmation

Reportable limit

QC information, including:

- Percent recovery
- Relative percent difference
- Control limits
- Blanks analyzed
- Matrix spikes
- Any other special QC information

Methodology

Initial and ongoing calibration

All data are entered and checked by the data entry technician. The hard copy report is checked by the on-site field chemist and project manager before it is released. Data reports will be turned over to the OHM project manager and released to the respective clients and/or governmental agencies requesting copies.

The reports generated from the laboratory for the site work will also be reviewed by the QA officer for any discrepancies.

10.6 DATA STORAGE

Typically, all documentation used and generated for a particular project site is given to the program manager at the completion of a project. All log books, chromatograms, and support documentation are then archived. 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 to a diskette. This diskette is also archived. All information under the corresponding project number is maintained in the archive system for eight years.

All archives are accessed by the archives file master list which is maintained in a separate location from the archives.

11.0 ASSESSMENTS AND RESPONSE ACTIONS

11.1 SITE AUDITS

The QA Officer may perform site audits at his/her discretion to assess the following:

- Personnel performance
- Sampling methods and techniques
- Decontamination methods and techniques
- Quality control program
- Data review program
- Record-keeping procedures
- Document control system
- Data storage
- Corrective actions responses

Upon completion of each site audit, the QA Officer will generate a report citing the deficiencies found as well as the progress achieved since the last site audit. Copies of this report will be given to the project manager and the field chemist. One copy will also be placed in the project files for reference.

11.2 DATA REVIEW SYSTEM

11.2.1 Laboratory Analyst s Data Review Responsibilities

The laboratory analyst is responsible for the initial review of the data. Any errors or deficiencies should be addressed at this time.

11.2.2 Laboratory Quality Assurance (QA) Officer Data Review Responsibilities

The laboratory QA Officer is responsible for the final review of the data prior to sending the final report to OHM. Any errors or deficiencies should be addressed at this time.

11.2.3 Field Chemist Data Review Responsibilities

The field chemist is responsible for initial review of the data from the laboratory. This review includes:

Verify that all requested data are reported

Verify that samples are analyzed according to the contract specified methods

Verify that holding times are not exceeded

Verify that matrix spike, matrix spike duplicate, and surrogate recoveries fall within the laboratory's acceptable criteria

Review blank data for gross contamination

Review field quality control results for gross inconsistencies

The field chemist is then responsible for informing the Project Manager and OHM's QA Officer of any laboratory and/or sampling deficiencies or issues. The field chemist alone should not make decisions on the acceptability of the data. These issues and subsequent decisions will be documented on a weekly report to the QA Officer and Project Manager.

11.2.4 Quality Assurance (QA) Officer Data Review Responsibilities

The QA Officer is responsible for interfacing with the field chemist, project manager, and the laboratory's QA Officer to resolve any QA/QC issues affecting the data. He/she is also responsible for finalizing any QA/QC issues with the laboratory and/or the field chemist. This includes obtaining a corrective action from the parties involved.

11.3 CORRECTIVE ACTION REPORT

The Corrective Action Report (CAR) should include, but is not limited to, the following:

- A description of the problem, deficiency, or issue
- Proposed resolutions
- Resulting actions

Depending on the issues, this report may be generated by the laboratory or the field chemist. Copies of the report will be given to the QA Officer and the project manager. A copy will also be placed in the project files for future reference.

APPENDIX A

**CUSTODY SEALS, SAMPLE LABEL,
CHAIN-OF-CUSTODY FORM,
FEDERAL EXPRESS AIRBILL,
CLASS 9 SHIPPING LABEL**

CUSTODY SEAL

Person Collecting Sample _____ Sample No. _____
(Signature)

Date Collected _____ Time Collected _____

CUSTODY SEAL



OHM Corporation

Job # _____ Sample # _____

Date _____ Time _____

Sample _____

Taken by _____

Witness _____

SAMPLE LABEL



OHM Corporation



CHAIN-OF-CUSTODY RECORD

Form 0010
Field Technical Services
Rev. 03/88

No. 62119

O.H. MATERIALS CORP. • P.O. BOX 651 • FINDLAY, OH 45830-0551 • 419-423-3526

PROJECT NAME		PROJECT LOCATION				NUMBER OF CONTAINERS	ANALYSIS DESIRED (INDICATE SEPARATE CONTAINERS)										REMARKS		
PROJ NO	PROJECT CONTACT			PROJECT TELEPHONE NO															
CLIENT'S REPRESENTATIVE				PROJECT MANAGER/SUPERVISOR															
ITEM NO.	SAMPLE NUMBER	DATE	TIME	COMP	DRAS	SAMPLE DESCRIPTION (INCLUDE MATRIX AND POINT OF SAMPLE)										REMARKS			
1																			
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			

PLEASE PRESS HARD. ALL 4 PARTS MUST BE READABLE.

ITEM NO.	ITEM NUMBER	TRANSFERS RELINQUISHED BY	TRANSFERS ACCEPTED BY	DATE	TIME	REMARKS
1						
2						
3						
4						

COLLECTOR'S SIGNATURE

CHAIN-OF-CUSTODY RECORD



OHM Corporation

AIRBILL
PACKAGE TRACKING NUMBER **6729209572**

3083R **6729209572**

1245-0891-0

Company: **C H T CORP**
Address: **5335 TRIANGLE PKWY STE 450**
City: **NCRCRSS** State: **GA** ZIP: **30092**

604-729-3900

SERVICES

DELIVERY AND SPECIAL HANDLING

SERVICE CONDITIONS, DECLARED VALUE AND LIMIT OF LIABILITY

SIGNATURE RELEASE UNAVAILABLE

6729209572 AIRBILL NUMBER

SHIPPER'S CERTIFICATION FOR RESTRICTED ARTICLES/DANGEROUS GOODS

DANGEROUS GOODS IDENTIFICATION		UN OR ID NO	SUBS-DIARY RISK	QUANTITY AND TYPE OF PACKING	PACKING INST	AUTHOR-IZATION
PROPER SHIPPING NAME	CLASS OR DIVISION					

ADDITIONAL HANDLING INFORMATION

TRANSPORT DETAILS: THIS SHIPMENT IS WITHIN THE LIMITATIONS PRESCRIBED FOR

SHIPMENT TYPE: NON-RADIOACTIVE RADIOACTIVE

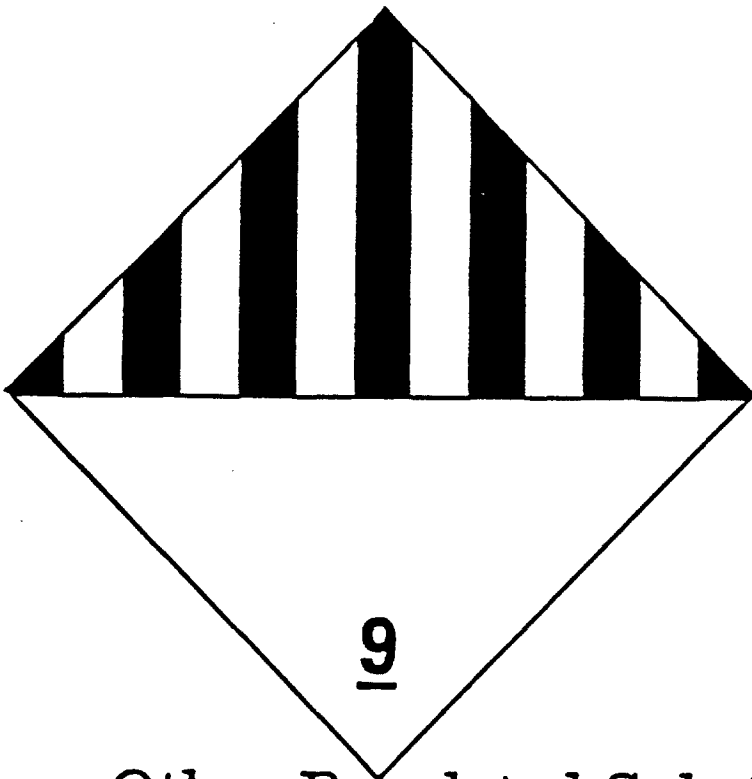
IF ACCEPTABLE FOR PASSENGER AIRCRAFT, THIS SHIPMENT CONTAINS RADIOACTIVE MATERIAL INTENDED FOR USE IN, OR INCIDENT TO, RESEARCH, MEDICAL DIAGNOSIS OR TREATMENT.

I HEREBY DECLARE THAT THE CONTENTS OF THIS CONSIGNMENT ARE FULLY AND ACCURATELY DESCRIBED ABOVE BY PROPER SHIPPING NAME AND ARE CLASSIFIED, PACKED, MARKED, AND LABELED, AND ARE IN ALL RESPECTS IN PROPER CONDITION FOR TRANSPORT BY AIR ACCORDING TO THE APPLICABLE INTERNATIONAL AND NATIONAL GOVERNMENT REGULATIONS.

NAME AND TITLE OF SHIPPER: _____ PLACE AND DATE: _____

EMERGENCY TELEPHONE NUMBER: _____ SIGNATURE OF SHIPPER: _____

SEE WARNING ON BACK



OHM Corporation



From:
Phone:
To:
Phone:

Other Regulated Substances, ID# 8027

Class 9 Shipping Label



OHM Corporation

APPENDIX B
QUALITY ASSURANCE OBJECTIVES

FIELD QUALITY ASSURANCE OBJECTIVES

Matrix	Field Duplicates	Trip Blanks	Field Blanks	Equipment Blanks	Split Samples
Waters	Precision: RPD < 50	Acetone < 50 ug/l Methylene Chloride < 25 ug/l 1,1,2-Trichlorotrifluoroethane < 25 ug/l All others < MDL	Acetone < 50 ug/l Methylene Chloride < 25 ug/l 1,1,2-Trichlorotrifluoroethane < 25 ug/l All others < MDL	Acetone < 50 ug/l Methylene Chloride < 25 ug/l 1,1,2-Trichlorotrifluoroethane < 25 ug/l All others < MDL	Precision: RPD < 50
Soils/ Sediments	Precision: RPD < 100	Acetone < 50 ug/kg * Methylene Chloride < 25 ug/kg * 1,1,2-Trichlorotrifluoroethane < 25 ug/kg * All others < MDL	Acetone < 50 ug/kg * Methylene Chloride < 25 ug/kg * 1,1,2-Trichlorotrifluoroethane < 25 ug/kg * All others < MDL	Acetone < 50 ug/kg * Methylene Chloride < 25 ug/kg * 1,1,2-Trichlorotrifluoroethane < 25 ug/kg * All others < MDL	Precision: RPD < 100
Solids	Precision: RPD < 100	Acetone < 50 ug/kg * Methylene Chloride < 25 ug/kg * 1,1,2-Trichlorotrifluoroethane < 25 ug/kg * All others < MDL	Acetone < 50 ug/kg * Methylene Chloride < 25 ug/kg * 1,1,2-Trichlorotrifluoroethane < 25 ug/kg * All others < MDL	Acetone < 50 ug/kg * Methylene Chloride < 25 ug/kg * 1,1,2-Trichlorotrifluoroethane < 25 ug/kg * All others < MDL	Precision: RPD < 100
Sludge	Precision: RPD < 100	Acetone < 50 ug/kg * Methylene Chloride < 25 ug/kg * 1,1,2-Trichlorotrifluoroethane < 25 ug/kg * All others < MDL	Acetone < 50 ug/kg * Methylene Chloride < 25 ug/kg * 1,1,2-Trichlorotrifluoroethane < 25 ug/kg * All others < MDL	Acetone < 50 ug/kg * Methylene Chloride < 25 ug/kg * 1,1,2-Trichlorotrifluoroethane < 25 ug/kg * All others < MDL	Precision: RPD < 100

* Without applying dilution factor

LABORATORY QA OBJECTIVES

Parameter	Reference	Method #	Precision Matrix	Accuracy & RPD	Method Det. Recovery	Limit
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CONVENTIONAL WET CHEMISTRY PARAMETERS, SOLID MATRIX (CONTINUED)

Flash Point, Setaflash	SW-846	1020	Solid	0 - 20°	NA	
Heat Content, BTU/LB	ASTM	D240-76	Solid	0 - 20°	NA	200 Btu/lb
Oil & Grease, Total Recoverable	SW-846	9070	Solid	0 - 20°	30-130°	mg/kg
Paint Filter Test	SW-846	9095	Solid	0 - 20°	NA	
pH, Electrometric	SW-846	9040	Solid	0 - 20°	NA	
Phenolics, Total Recoverable	SW-846	9065	Solid	0 - 19	69-121	mg/kg
Phosphorus, Total	SM	424E	Solid	0 - 20°	30-130°	mg/kg
Residue, Total	CAMW	160.3	Solid	0 - 20°	NA	mg/kg
Sulfate	CAMW	175.1	Solid	0 - 20°	30-130°	10.0 mg/kg
Sulfide, Reactive	SW-846	7.3.4.2	Solid	0 - 20°	> 50	10.0 mg/kg
Sulfide, Total	CAMW	7.3.4.2	Solid	0 - 20°	30-130°	10.0 mg/kg
Sulfur, Total	CAMW	300.0	Solid	0 - 20°	30-130°	0.1 mg/kg
Total Organic Carbon	CAMW	415.1	Solid	0 - 20°	NA	mg/kg
Viscosity	ASTM		Solid	NA	NA	

CONVENTIONAL WET CHEMISTRY PARAMETERS, ORGANIC MATRIX

Acidity	CAMW	305.1	Organic	0 - 20°	NA	mg/kg
Alkalinity	CAMW	310.1	Organic	0 - 20°	NA	mg/kg
Ammonia	SM	417B	Organic	0 - 20°	30-130°	mg/kg
Ash	ASTM	D402-95	Organic	0 - 20°	NA	
Chloride	CAMW	300.0	Organic	0 - 20°	30-130°	mg/kg
Chromium, Hexavalent	CAMW	218.4	Organic	0 - 20°	30-130°	mg/kg
Cyanide, Amenable to Chlorination	SW-846	9010	Organic	0 - 20°	30-130°	mg/kg
Cyanide, Reactive	SW-846	7.3.3.2	Organic	0 - 20°	> 50	mg/kg
Cyanide, Total	SW-846	9010	Organic	0 - 20°	30-130°	mg/kg
Density	ASTM	D1298-85	Organic	0 - 20°	NA	
Flash Point, Pensky Martens	SW-846	1010	Organic	0 - 20°	NA	
Flash Point, Setaflash	SW-846	1020	Organic	0 - 20°	NA	Btu/lb
Heat Content, BTU/LB	ASTM	D240-76	Organic	0 - 20°	NA	mg/kg
Oil & Grease, Total Recoverable	SW-846	9070	Organic	0 - 20°	30-130°	mg/kg
Paint Filter Test	SW-846	9095	Organic	0 - 20°	NA	mg/kg
pH, Electrometric	SW-846	9040	Organic	0 - 20°	NA	mg/kg
Phenolics, Total Recoverable	SW-846	9065	Organic	0 - 20°	30-130°	mg/kg
Phosphorus, Total	SM	424E	Organic	0 - 20°	30-130°	mg/kg
Sulfate	CAMW	300.0	Organic	0 - 20°	30-130°	mg/kg
Sulfide, Reactive	SW-846	7.3.4.2	Organic	0 - 20°	> 50	mg/kg
Sulfide, Total	SW-846	7.3.4.2	Organic	0 - 20°	30-130°	mg/kg
Sulfur, Total	CAMW	300.0	Organic	0 - 20°	30-130°	mg/kg
Total Organic Carbon	CAMW	415.2	Organic	0 - 20°	30-130°	mg/kg
Viscosity	ASTM		Organic	NA	NA	

Laboratory QA Objectives

LABORATORY QA OBJECTIVES

Parameter	Reference	Method #	Matrix	Precision RPD	Accuracy & Recovery	Method Det. Limit
METAL PARAMETERS, AQUEOUS MATRIX						
Aluminum	SW-846	6010	Aqueous	0 - 10	87-110	mg/L
Antimony	SW-846	6010	Aqueous	0 - 10	73-115	mg/L
Arsenic	SW-846	6010	Aqueous	0 - 10	79-110	mg/L
Barium	SW-846	6010	Aqueous	0 - 10	83-110	mg/L
Beryllium	SW-846	6010	Aqueous	0 - 10	79-110	mg/L
Cadmium	SW-846	6010	Aqueous	0 - 10	72-114	mg/L
Calcium	SW-846	6010	Aqueous	0 - 10	49-129	mg/L
Chromium (Total)	SW-846	6010	Aqueous	0 - 10	77-110	mg/L
Cobalt	SW-846	6010	Aqueous	0 - 10	77-110	mg/L
Copper	SW-846	6010	Aqueous	0 - 10	67-119	mg/L
Iron	SW-846	6010	Aqueous	0 - 10	78-127	mg/L
Lead	SW-846	6010	Aqueous	0 - 10	76-113	mg/L
Magnesium	SW-846	6010	Aqueous	0 - 10	78-110	mg/L
Manganese	SW-846	6010	Aqueous	0 - 10	78-110	mg/L
Molybdenum	SW-846	6010	Aqueous	0 - 10	77-111	mg/L
Nickel	SW-846	6010	Aqueous	0 - 10	75-110	mg/L
Potassium	SW-846	6010	Aqueous	0 - 10	75-111	mg/L
Selenium	SW-846	6010	Aqueous	0 - 10	74-110	mg/L
Silver	SW-846	6010	Aqueous	0 - 13	65-114	mg/L
Sodium	SW-846	6010	Aqueous	0 - 11	59-121	mg/L
Thallium	SW-846	6010	Aqueous	0 - 11	71-101	mg/L
Tin	SW-846	6010	Aqueous	0 - 20*	75-125*	mg/L
Titanium	SW-846	6010	Aqueous	0 - 20*	75-125*	mg/L
Vanadium	SW-846	6010	Aqueous	0 - 10	84-106	mg/L
Zinc	SW-846	6010	Aqueous	0 - 10	68-109	mg/L
Mercury	SW-846	7471	Aqueous	0 - 15	71-130	mg/L
Arsenic	SW-846	7060	Aqueous	0 - 20	75-125	mg/L
Lead	SW-846	7421	Aqueous	0 - 20	75-125	mg/L
Selenium	SW-846	7740	Aqueous	0 - 20	75-125	mg/L
Thallium	SW-846	7841	Aqueous	0 - 20	75-125	mg/L
METAL PARAMETERS, SOLID MATRIX						
Aluminum	SW-846	6010	Solid	0 - 16	75-125*	mg/kg
Antimony	SW-846	6010	Solid	0 - 20	24-117	mg/kg
Arsenic	SW-846	6010	Solid	0 - 15	61-110	mg/kg
Barium	SW-846	6010	Solid	0 - 13	74-110	mg/kg
Beryllium	SW-846	6010	Solid	0 - 10	70-110	mg/kg
Cadmium	SW-846	6010	Solid	0 - 10	66-117	mg/kg
Calcium	SW-846	6010	Solid	0 - 12	75-125*	mg/kg

Laboratory QA Objectives
(Continued)

LABORATORY QA OBJECTIVES

Parameter	Reference	Method #	Matrix	Precision RPD	Accuracy & Recovery	Method Det. Limit
ORGANIC PARAMETERS BY GC, AQUEOUS MATRIX						
Bromodichloromethane	SW-846	8010	Aqueous	0 - 20*	30-130*	ug/L
Bromoform	SW-846	8010	Aqueous	0 - 20*	30-130*	ug/L
Bromomethane	SW-846	8010	Aqueous	0 - 20*	30-130*	ug/L
Carbon Tetrachloride	SW-846	8010	Aqueous	0 - 20*	30-130*	ug/L
Chlorobenzene	SW-846	8010	Aqueous	0 - 20*	30-130*	ug/L
Chloroethane	SW-846	8010	Aqueous	0 - 20*	30-130*	ug/L
2-Chloroethylvinyl ether	SW-846	8010	Aqueous	0 - 20*	30-130*	ug/L
Chloroform	SW-846	8010	Aqueous	0 - 20*	30-130*	ug/L
Chloromethane	SW-846	8010	Aqueous	0 - 20*	30-130*	ug/L
Dibromochloromethane	SW-846	8010	Aqueous	0 - 20*	30-130*	ug/L
1,2-Dichlorobenzene	SW-846	8010	Aqueous	0 - 20*	30-130*	ug/L
1,3-Dichlorobenzene	SW-846	8010	Aqueous	0 - 20*	30-130*	ug/L
1,4-Dichlorobenzene	SW-846	8010	Aqueous	0 - 20*	30-130*	ug/L
Dichlorodifluoromethane	SW-846	8010	Aqueous	0 - 20*	30-130*	ug/L
1,1-Dichloroethane	SW-846	8010	Aqueous	0 - 20*	30-130*	ug/L
1,2-Dichloroethane	SW-846	8010	Aqueous	0 - 20*	30-130*	ug/L
1,1-Dichloroethane	SW-846	8010	Aqueous	0 - 20*	30-130*	ug/L
trans-1,2-Dichloroethane	SW-846	8010	Aqueous	0 - 20*	30-130*	ug/L
1,2-Dichloropropane	SW-846	8010	Aqueous	0 - 20*	30-130*	ug/L
cis-1,2-Dichloropropane	SW-846	8010	Aqueous	0 - 20*	30-130*	ug/L
trans-1,2-Dichloropropane	SW-846	8010	Aqueous	0 - 20*	30-130*	ug/L
Methylene Chloride	SW-846	8010	Aqueous	0 - 20*	30-130*	ug/L
1,1,2,2-Tetrachloroethane	SW-846	8010	Aqueous	0 - 20*	30-130*	ug/L
Tetrachloroethane	SW-846	8010	Aqueous	0 - 20*	30-130*	ug/L
1,1,1-Trichloroethane	SW-846	8010	Aqueous	0 - 20*	30-130*	ug/L
1,1,2-Trichloroethane	SW-846	8010	Aqueous	0 - 20*	30-130*	ug/L
Trichloroethane	SW-846	8010	Aqueous	0 - 20*	30-130*	ug/L
Trichlorofluoromethane	SW-846	8010	Aqueous	0 - 20*	30-130*	ug/L
Vinyl Chloride	SW-846	8010	Aqueous	0 - 20*	30-130*	ug/L
Benzene	SW-846	8020	Aqueous	0 - 12	76-118	ug/L
Chlorobenzene	SW-846	8020	Aqueous	0 - 20*	30-130*	ug/L
Ethylbenzene	SW-846	8020	Aqueous	0 - 11	78-111	ug/L
Toluene	SW-846	8020	Aqueous	0 - 11	77-114	ug/L
Xylenes	SW-846	8020	Aqueous	0 - 14	76-116	ug/L
Aldrin	SW-846	8080	Aqueous	0 - 23	67-120	ug/L
alpha-BHC	SW-846	8080	Aqueous	0 - 18	54-120	ug/L
beta-BHC	SW-846	8080	Aqueous	0 - 20	55-123	ug/L
delta-BHC	SW-846	8080	Aqueous	0 - 20	51-143	ug/L

Laboratory QA Objectives
(Continued)

LABORATORY QA OBJECTIVES

Parameter	Reference	Method #	Matrix	Precision RPD	Accuracy & Recovery	Method Det. Limit
METAL PARAMETERS, ORGANIC MATRIX (CONTINUED)						
Molybdenum	SW-846	6010	Organic	0 - 20*	75-125*	mg/kg
Nickel	SW-846	6010	Organic	0 - 13	67-110	mg/kg
Potassium	SW-846	6010	Organic	0 - 13	72-110	mg/kg
Selenium	SW-846	6010	Organic	0 - 11	64-115	mg/kg
Silver	SW-846	6010	Organic	0 - 10	46-110	mg/kg
Sodium	SW-846	6010	Organic	0 - 14	57-117	mg/kg
Thallium	SW-846	6010	Organic	0 - 26	67-110	mg/kg
Tin	SW-846	6010	Organic	0 - 20*	75-125*	mg/kg
Titanium	SW-846	6010	Organic	0 - 20*	75-125*	mg/kg
Vanadium	SW-846	6010	Organic	0 - 12	76-110	mg/kg
Zinc	SW-846	6010	Organic	0 - 18	36-118	mg/kg
Mercury	SW-846	7470	Organic	0 - 17	60-129	mg/kg
Arsenic	SW-846	7060	Organic	0 - 20	75-125	
Lead	SW-846	7421	Organic	0 - 20	75-125	
Selenium	SW-846	7740	Organic	0 - 20	75-125	
Thallium	SW-846	7841	Organic	0 - 20	75-125	
METAL PARAMETERS, TCLP LEACHATE MATRIX						
Arsenic	SW-846	6010	TCLP Leachate	0 - 10	82-110	mg/L
Barium	SW-846	6010	TCLP Leachate	0 - 10	78-114	mg/L
Cadmium	SW-846	6010	TCLP Leachate	0 - 10	78-110	mg/L
Chromium (Total)	SW-846	6010	TCLP Leachate	0 - 10	81-110	mg/L
Copper	SW-846	6010	TCLP Leachate	0 - 20*	75-125*	mg/L
Lead	SW-846	6010	TCLP Leachate	0 - 10	78-110	mg/L
Selenium	SW-846	6010	TCLP Leachate	0 - 10	81-114	mg/L
Silver	SW-846	6010	TCLP Leachate	0 - 10	64-114	mg/L
Zinc	SW-846	6010	TCLP Leachate	0 - 20*	75-125*	mg/L
Mercury	SW-846	7470	TCLP Leachate	0 - 15	77-129	mg/L

Laboratory QA Objectives
(Continued)

LABORATORY QA OBJECTIVES

Parameter	Reference	Method #	Matrix	Precision RPD	Accuracy & Recovery	Method Det. Limit
METAL PARAMETERS, SOLID MATRIX (CONTINUED)						
Chromium (Total)	SW-846	6010	Solid	0 - 27	51-132	mg/kg
Cobalt	SW-846	6010	Solid	0 - 10	61-110	mg/kg
Copper	SW-846	6010	Solid	0 - 31	58-126	mg/kg
Iron	SW-846	6010	Solid	0 - 33	55-134	mg/kg
Lead	SW-846	6010	Solid	0 - 25	45-119	mg/kg
Magnesium	SW-846	6010	Solid	0 - 13	75-125*	mg/kg
Manganese	SW-846	6010	Solid	0 - 33	42-126	mg/kg
Molybdenum	SW-846	6010	Solid	0 - 10	61-110	mg/kg
Nickel	SW-846	6010	Solid	0 - 13	62-110	mg/kg
Potassium	SW-846	6010	Solid	0 - 16	56-125	mg/kg
Selenium	SW-846	6010	Solid	0 - 14	65-110	mg/kg
Silver	SW-846	6010	Solid	0 - 10	45-118	mg/kg
Sodium	SW-846	6010	Solid	0 - 12	66-120	mg/kg
Thallium	SW-846	6010	Solid	0 - 12	50-110	mg/kg
Tin	SW-846	6010	Solid	0 - 20*	75-125*	mg/kg
Titanium	SW-846	6010	Solid	0 - 20*	75-125*	mg/kg
Vanadium	SW-846	6010	Solid	0 - 14	62-114	mg/kg
Zinc	SW-846	6010	Solid	0 - 21	49-127	mg/kg
Mercury	SW-846	7471	Solid	0 - 17	56-127	mg/kg
Arsenic	SW-846	7060	Solid	0 - 20	75-125	
Lead	SW-846	7421	Solid	0 - 20	75-125	
Selenium	SW-846	7740	Solid	0 - 20	75-125	
Thallium	SW-846	7841	Solid	0 - 20	75-125	
METAL PARAMETERS, ORGANIC MATRIX						
Aluminum	SW-846	6010	Organic	0 - 20*	75-125*	mg/kg
Antimony	SW-846	6010	Organic	0 - 16	28-117	mg/kg
Arsenic	SW-846	6010	Organic	0 - 12	57-111	mg/kg
Barium	SW-846	6010	Organic	0 - 14	70-120	mg/kg
Beryllium	SW-846	6010	Organic	0 - 10	65-110	mg/kg
Cadmium	SW-846	6010	Organic	0 - 12	60-111	mg/kg
Calcium	SW-846	6010	Organic	0 - 20*	75-125*	mg/kg
Chromium (Total)	SW-846	6010	Organic	0 - 12	68-110	mg/kg
Cobalt	SW-846	6010	Organic	0 - 20*	75-125*	mg/kg
Copper	SW-846	6010	Organic	0 - 17	71-110	mg/kg
Iron	SW-846	6010	Organic	0 - 21	75-125*	mg/kg
Lead	SW-846	6010	Organic	0 - 27	34-129	mg/kg
Magnesium	SW-846	6010	Organic	0 - 20*	75-125*	mg/kg
Manganese	SW-846	6010	Organic	0 - 11	56-114	mg/kg

Laboratory QA Objectives
(Continued)

LABORATORY QA OBJECTIVES

Parameter	Reference	Method #	Matrix	Precision MPD	Accuracy & Recovery	Method Det. Limit
ORGANIC PARAMETERS BY GC, AQUEOUS MATRIX (CONTINUED)						
gamma-BHC (Lindane)	SW-846	8080	Aqueous	0 - 18	50-131	ug/L
Chlordane	SW-846	8080	Aqueous	0 - 10	30-130*	ug/L
4,4'-DDD	SW-846	8080	Aqueous	0 - 21	43-133	ug/L
4,4'-DDE	SW-846	8080	Aqueous	0 - 20	50-134	ug/L
4,4'-DDT	SW-846	8080	Aqueous	0 - 21	48-150	ug/L
Dieldrin	SW-846	8080	Aqueous	0 - 22	44-131	ug/L
Endosulfan I	SW-846	8080	Aqueous	0 - 27	40-121	ug/L
Endosulfan II	SW-846	8080	Aqueous	0 - 24	39-133	ug/L
Endosulfan Sulfate	SW-846	8080	Aqueous	0 - 22	34-143	ug/L
Endrin	SW-846	8080	Aqueous	0 - 25	48-139	ug/L
Endrin Aldehyde	SW-846	8080	Aqueous	0 - 28	20-119	ug/L
Endrin Ketone	SW-846	8080	Aqueous	0 - 27	30-150	ug/L
Heptachlor	SW-846	8080	Aqueous	0 - 20	47-126	ug/L
Heptachlor epoxide	SW-846	8080	Aqueous	0 - 20	47-133	ug/L
Methoxychlor	SW-846	8080	Aqueous	0 - 20	46-150	ug/L
Toxaphene	SW-846	8080	Aqueous	0 - 20*	30-130*	ug/L
PCB-1016	SW-846	8080	Aqueous	0 - 20*	30-130*	ug/L
PCB-1221	SW-846	8080	Aqueous	0 - 20*	30-130*	ug/L
PCB-1232	SW-846	8080	Aqueous	0 - 20*	30-130*	ug/L
PCB-1243	SW-846	8080	Aqueous	0 - 20*	30-130*	ug/L
PCB-1248	SW-846	8080	Aqueous	0 - 10	30-130*	ug/L
PCB-1254	SW-846	8080	Aqueous	0 - 10	30-130*	ug/L
PCB-1260	SW-846	8080	Aqueous	0 - 10	30-130*	ug/L
Acenaphthene	SW-846	8100	Aqueous	0 - 20*	30-130*	ug/L
Acenaphthylene	SW-846	8100	Aqueous	0 - 20*	30-130*	ug/L
Anthracene	SW-846	8100	Aqueous	0 - 20*	30-130*	ug/L
Benzo(a)anthracene	SW-846	8100	Aqueous	0 - 20*	30-130*	ug/L
Benzo(a)pyrene	SW-846	8100	Aqueous	0 - 20*	30-130*	ug/L
Benzo(b)fluoranthene	SW-846	8100	Aqueous	0 - 20*	30-130*	ug/L
Benzo(ghi)perylene	SW-846	8100	Aqueous	0 - 20*	30-130*	ug/L
Benzo(k)fluoranthene	SW-846	8100	Aqueous	0 - 20*	30-130*	ug/L
Chrysene	SW-846	8100	Aqueous	0 - 20*	30-130*	ug/L
Dibenzo(ab)anthracene	SW-846	8100	Aqueous	0 - 20*	30-130*	ug/L
Fluoranthene	SW-846	8100	Aqueous	0 - 20*	30-130*	ug/L
Fluorene	SW-846	8100	Aqueous	0 - 20*	30-130*	ug/L
Indeno(1,2,3-c,d)pyrene	SW-846	8100	Aqueous	0 - 20*	30-130*	ug/L
Naphthalene	SW-846	8100	Aqueous	0 - 20*	30-130*	ug/L
1-Methylnaphthalene	SW-846	8100	Aqueous	0 - 20*	30-130*	ug/L
2-Methylnaphthalene	SW-846	8100	Aqueous	0 - 20*	30-130*	ug/L
Phenanthrene	SW-846	8100	Aqueous	0 - 20*	30-130*	ug/L
Pyrene	SW-846	8100	Aqueous	0 - 20*	30-130*	ug/L

LABORATORY QA OBJECTIVES

Parameter	Reference	Method #	Matrix	Precision RPD	Accuracy & Recovery	Method Det. Limit
ORGANIC PARAMETERS BY GC, AQUEOUS MATRIX (CONTINUED)						
2,4-D	SW-846	8150	Aqueous	0 - 10	51-138	ug/L
2,4-DB	SW-846	8150	Aqueous	0 - 20*	30-130*	ug/L
2,4,5-T	SW-846	8150	Aqueous	0 - 14	58-141	ug/L
2,4,5-TP (Silvex)	SW-846	8150	Aqueous	0 - 19	51-138	ug/L
Dalapon	SW-846	8150	Aqueous	0 - 20*	30-130*	ug/L
Dicamba	SW-846	8150	Aqueous	0 - 20*	30-130*	ug/L
Dichloroprop	SW-846	8150	Aqueous	0 - 20*	30-130*	ug/L
Dinoseb	SW-846	8150	Aqueous	0 - 20*	30-130*	ug/L
MCPP	SW-846	8150	Aqueous	0 - 20*	30-130*	ug/L
MCPP	SW-846	8150	Aqueous	0 - 20*	30-130*	ug/L
ORGANIC PARAMETERS BY GC, SOLID MATRIX						
Bromodichloromethane	SW-846	8010	Solid	0 - 20*	30-130*	ug/kg
Bromoform	SW-846	8010	Solid	0 - 20*	30-130*	ug/kg
Bromomethane	SW-846	8010	Solid	0 - 20*	30-130*	ug/kg
Carbon Tetrachloride	SW-846	8010	Solid	0 - 20*	30-130*	ug/kg
Chlorobenzene	SW-846	8010	Solid	0 - 20*	30-130*	ug/kg
Chloroethane	SW-846	8010	Solid	0 - 20*	30-130*	ug/kg
2-Chloroethylvinyl ether	SW-846	8010	Solid	0 - 20*	30-130*	ug/kg
Chloroform	SW-846	8010	Solid	0 - 20*	30-130*	ug/kg
Chloromethane	SW-846	8010	Solid	0 - 20*	30-130*	ug/kg
Dibromochloromethane	SW-846	8010	Solid	0 - 20*	30-130*	ug/kg
1,3-Dichlorobenzene	SW-846	8010	Solid	0 - 20*	30-130*	ug/kg
1,3-Dichlorobenzene	SW-846	8010	Solid	0 - 20*	30-130*	ug/kg
1,4-Dichlorobenzene	SW-846	8010	Solid	0 - 20*	30-130*	ug/kg
Dichlorodifluoromethane	SW-846	8010	Solid	0 - 20*	30-130*	ug/kg
1,1-Dichloroethane	SW-846	8010	Solid	0 - 20*	30-130*	ug/kg
1,2-Dichloroethane	SW-846	8010	Solid	0 - 20*	30-130*	ug/kg
1,1-Dichloroethane	SW-846	8010	Solid	0 - 20*	30-130*	ug/kg
trans-1,2-Dichloroethane	SW-846	8010	Solid	0 - 20*	30-130*	ug/kg
1,2-Dichloropropane	SW-846	8010	Solid	0 - 20*	30-130*	ug/kg
cis-1,3-Dichloropropene	SW-846	8010	Solid	0 - 20*	30-130*	ug/kg
trans-1,3-Dichloropropene	SW-846	8010	Solid	0 - 20*	30-130*	ug/kg
Methylene Chloride	SW-846	8010	Solid	0 - 20*	30-130*	ug/kg
1,1,1,2-Tetrachloroethane	SW-846	8010	Solid	0 - 20*	30-130*	ug/kg
Tetrachloroethane	SW-846	8010	Solid	0 - 20*	30-130*	ug/kg
1,1,1-Trichloroethane	SW-846	8010	Solid	0 - 20*	30-130*	ug/kg
1,1,2-Trichloroethane	SW-846	8010	Solid	0 - 20*	30-130*	ug/kg
Trichloroethane	SW-846	8010	Solid	0 - 20*	30-130*	ug/kg
Trichlorofluoromethane	SW-846	8010	Solid	0 - 20*	30-130*	ug/kg
Vinyl Chloride	SW-846	8010	Solid	0 - 20*	30-130*	ug/kg

Laboratory QA Objectives
(Continued)

LABORATORY QA OBJECTIVES

Parameter	Reference	Method #	Matrix	Precision RPD	Accuracy & Recovery	Method Det. Limit
ORGANIC PARAMETERS BY GC, SOLID MATRIX (CONTINUED)						
Benzene	SW-846	8020	Solid	0 - 17	70-117	ug/kg
Chlorobenzene	SW-846	8020	Solid	0 - 20*	30-130*	ug/kg
Ethylbenzene	SW-846	8020	Solid	0 - 23	59-121	ug/kg
Toluene	SW-846	8020	Solid	0 - 20	69-116	ug/kg
Xylenes	SW-846	8020	Solid	0 - 24	56-125	ug/kg
Aldrin	SW-846	8080	Solid	0 - 28	66-119	ug/kg
α-BHC	SW-846	8080	Solid	0 - 21	68-112	ug/kg
β-BHC	SW-846	8080	Solid	0 - 19	59-130	ug/kg
γ-BHC	SW-846	8080	Solid	0 - 19	56-130	ug/kg
γ-BHC (Lindane)	SW-846	8080	Solid	0 - 22	65-122	ug/kg
Chlordane	SW-846	8080	Solid	0 - 20*	30-130*	ug/kg
1,1'-DDD	SW-846	8080	Solid	0 - 23	47-139	ug/kg
1,1'-DDX	SW-846	8080	Solid	0 - 22	66-138	ug/kg
1,1'-DDT	SW-846	8080	Solid	0 - 29	56-150	ug/kg
Dieldrin	SW-846	8080	Solid	0 - 26	68-133	ug/kg
Endosulfan I	SW-846	8080	Solid	0 - 23	57-135	ug/kg
Endosulfan II	SW-846	8080	Solid	0 - 18	60-135	ug/kg
Endosulfan Sulfate	SW-846	8080	Solid	0 - 17	30-143	ug/kg
Endrin	SW-846	8080	Solid	0 - 24	74-140	ug/kg
Endrin Aldehyde	SW-846	8080	Solid	0 - 30	36-110	ug/kg
Endrin Ketone	SW-846	8080	Solid	0 - 21	57-150	ug/kg
Heptachlor	SW-846	8080	Solid	0 - 24	64-134	ug/kg
Heptachlor epoxide	SW-846	8080	Solid	0 - 22	73-123	ug/kg
Methoxychlor	SW-846	8080	Solid	0 - 20	54-150	ug/kg
Toxaphene	SW-846	8080	Solid	0 - 20*	30-130*	ug/kg
PCB-1016	SW-846	8080	Solid	0 - 20*	30-130*	ug/kg
PCB-1221	SW-846	8080	Solid	0 - 20*	30-130*	ug/kg
PCB-1222	SW-846	8080	Solid	0 - 20*	30-130*	ug/kg
PCB-1262	SW-846	8080	Solid	0 - 20*	30-130*	ug/kg
PCB-1268	SW-846	8080	Solid	0 - 10	30-130*	ug/kg
PCB-1254	SW-846	8080	Solid	0 - 10	30-130*	ug/kg
PCB-1260	SW-846	8080	Solid	0 - 21	73-143	ug/kg
Acenaphthene	SW-846	8100	Solid	0 - 20*	30-130*	ug/L
Acenaphthylene	SW-846	8100	Solid	0 - 20*	30-130*	ug/L
Anthracene	SW-846	8100	Solid	0 - 20*	30-130*	ug/L
Benzo(a)anthracene	SW-846	8100	Solid	0 - 20*	30-130*	ug/L
Benzo(a)pyrene	SW-846	8100	Solid	0 - 20*	30-130*	ug/L
Benzo(b)fluoranthene	SW-846	8100	Solid	0 - 20*	30-130*	ug/L
Benzo(g,h)perylene	SW-846	8100	Solid	0 - 20*	30-130*	ug/L
Benzo(k)fluoranthene	SW-846	8100	Solid	0 - 20*	30-130*	ug/L

Laboratory QA Objectives
(Continued)

LABORATORY QA OBJECTIVES

Parameter	Reference	Method #	Matrix	Precision RPD	Accuracy & Recovery	Method Det. Limit
ORGANIC PARAMETERS BY GC, SOLID MATRIX (CONTINUED)						
Chrysene	SW-846	8100	Solid	0 - 20*	30-130*	ug/L
Dibenzo(ab)anthracene	SW-846	8100	Solid	0 - 20*	30-130*	ug/L
Fluoranthene	SW-846	8100	Solid	0 - 20*	30-130*	ug/L
Fluorene	SW-846	8100	Solid	0 - 20*	30-130*	ug/L
Indeno(1,2,3-c,d)pyrene	SW-846	8100	Solid	0 - 20*	30-130*	ug/L
Naphthalene	SW-846	8100	Solid	0 - 20*	30-130*	ug/L
1-Methylnaphthalene	SW-846	8100	Solid	0 - 20*	30-130*	ug/L
2-Methylnaphthalene	SW-846	8100	Solid	0 - 20*	30-130*	ug/L
Phenanthrene	SW-846	8100	Solid	0 - 20*	30-130*	ug/L
Pyrene	SW-846	8100	Solid	0 - 20*	30-130*	ug/L
2,4-D	SW-846	8150	Solid	0 - 19	33-143	ug/kg
2,4-DB	SW-846	8150	Solid	0 - 20*	30-130*	ug/kg
2,4,5-T	SW-846	8150	Solid	0 - 20	77-127	ug/kg
2,4,5-TP (Silvex)	SW-846	8150	Solid	0 - 33	60-170	ug/kg
Dalapon	SW-846	8150	Solid	0 - 20*	30-130*	ug/kg
Dicamba	SW-846	8150	Solid	0 - 20*	30-130*	ug/kg
Dichloroprop	SW-846	8150	Solid	0 - 20*	30-130*	ug/kg
Dinoseb	SW-846	8150	Solid	0 - 20*	30-130*	ug/kg
MCPA	SW-846	8150	Solid	0 - 20*	30-130*	ug/kg
				0 - 20*	30-130*	ug/kg
ORGANIC PARAMETERS BY GC, ORGANIC MATRIX						
Bromodichloromethane	SW-846	8010	Organic	0 - 20*	30-130*	ug/kg
Bromoform	SW-846	8010	Organic	0 - 20*	30-130*	ug/kg
Bromomethane	SW-846	8010	Organic	0 - 20*	30-130*	ug/kg
Carbon Tetrachloride	SW-846	8010	Organic	0 - 20*	30-130*	ug/kg
Chlorobenzene	SW-846	8010	Organic	0 - 20*	30-130*	ug/kg
Chloroethane	SW-846	8010	Organic	0 - 20*	30-130*	ug/kg
2-Chloroethylvinyl ether	SW-846	8010	Organic	0 - 20*	30-130*	ug/kg
Chloroform	SW-846	8010	Organic	0 - 20*	30-130*	ug/kg
Chloromethane	SW-846	8010	Organic	0 - 20*	30-130*	ug/kg
Dibromochloromethane	SW-846	8010	Organic	0 - 20*	30-130*	ug/kg
1,2-Dichlorobenzene	SW-846	8010	Organic	0 - 20*	30-130*	ug/kg
1,3-Dichlorobenzene	SW-846	8010	Organic	0 - 20*	30-130*	ug/kg
1,4-Dichlorobenzene	SW-846	8010	Organic	0 - 20*	30-130*	ug/kg
Dichlorodifluoromethane	SW-846	8010	Organic	0 - 20*	30-130*	ug/kg
1,1-Dichloroethane	SW-846	8010	Organic	0 - 20*	30-130*	ug/kg
1,2-Dichloroethane	SW-846	8010	Organic	0 - 20*	30-130*	ug/kg

Laboratory QA Objectives
(Continued)

LABORATORY QA OBJECTIVES

Parameter	Reference	Method #	Matrix	Precision RFD	Accuracy & Recovery	Method Det. Limit
ORGANIC PARAMETERS BY GC, ORGANIC MATRIX (CONTINUED)						
1,1-Dichloroethene	SW-846	8010	Organic	0 - 20%	30-130%	ug/kg
trans-1,2-Dichloroethene	SW-846	8010	Organic	0 - 20%	30-130%	ug/kg
1,2-Dichloropropane	SW-846	8010	Organic	0 - 20%	30-130%	ug/kg
cis-1,2-Dichloropropene	SW-846	8010	Organic	0 - 20%	30-130%	ug/kg
trans-1,2-Dichloropropene	SW-846	8010	Organic	0 - 20%	30-130%	ug/kg
Methylene Chloride	SW-846	8010	Organic	0 - 20%	30-130%	ug/kg
1,1,2,2-Tetrachloroethane	SW-846	8010	Organic	0 - 20%	30-130%	ug/kg
Tetrachloroethene	SW-846	8010	Organic	0 - 20%	30-130%	ug/kg
1,1,1-Trichloroethane	SW-846	8010	Organic	0 - 20%	30-130%	ug/kg
1,1,2-Trichloroethane	SW-846	8010	Organic	0 - 20%	30-130%	ug/kg
Trichloroethene	SW-846	8010	Organic	0 - 20%	30-130%	ug/kg
Trichlorofluoromethane	SW-846	8010	Organic	0 - 20%	30-130%	ug/kg
Vinyl Chloride	SW-846	8010	Organic	0 - 20%	30-130%	ug/kg
Benzene	SW-846	8020	Organic	0 - 20%	30-130%	ug/kg
Chlorobenzene	SW-846	8020	Organic	0 - 20%	30-130%	ug/kg
Ethylbenzene	SW-846	8020	Organic	0 - 20%	30-130%	ug/kg
Toluene	SW-846	8020	Organic	0 - 20%	30-130%	ug/kg
Xylenes	SW-846	8020	Organic	0 - 20%	30-130%	ug/kg
Aldrin	SW-846	8080	Organic	0 - 20%	30-130%	ug/kg
a-BHC	SW-846	8080	Organic	0 - 20%	30-130%	ug/kg
b-BHC	SW-846	8080	Organic	0 - 20%	30-130%	ug/kg
g-BHC	SW-846	8080	Organic	0 - 20%	30-130%	ug/kg
γ-BHC (Lindane)	SW-846	8080	Organic	0 - 20%	30-130%	ug/kg
Chlordane	SW-846	8080	Organic	0 - 20%	30-130%	ug/kg
4,4'-DDD	SW-846	8080	Organic	0 - 20%	30-130%	ug/kg
4,4'-DDT	SW-846	8080	Organic	0 - 20%	30-130%	ug/kg
4,4'-DDE	SW-846	8080	Organic	0 - 20%	30-130%	ug/kg
Dieldrin	SW-846	8080	Organic	0 - 20%	30-130%	ug/kg
Endosulfan I	SW-846	8080	Organic	0 - 20%	30-130%	ug/kg
Endosulfan II	SW-846	8080	Organic	0 - 20%	30-130%	ug/kg
Endosulfan Sulfate	SW-846	8080	Organic	0 - 20%	30-130%	ug/kg
Endrin	SW-846	8080	Organic	0 - 20%	30-130%	ug/kg
Endrin Aldehyde	SW-846	8080	Organic	0 - 20%	30-130%	ug/kg
Endrin Ketone	SW-846	8080	Organic	0 - 20%	30-130%	ug/kg
Heptachlor	SW-846	8080	Organic	0 - 20%	30-130%	ug/kg
Heptachlor epoxide	SW-846	8080	Organic	0 - 20%	30-130%	ug/kg
Methoxychlor	SW-846	8080	Organic	0 - 20%	30-130%	ug/kg
Toxaphene	SW-846	8080	Organic	0 - 20%	30-130%	ug/kg
PCB-1016	SW-846	8080	Organic	0 - 20%	30-130%	ug/kg
PCB-1221	SW-846	8080	Organic	0 - 20%	30-130%	ug/kg

Laboratory QA Objectives
(Continued)

LABORATORY QA OBJECTIVES

Parameter	Reference	Method #	Matrix	Precision RPD	Accuracy & Recovery	Method Det. Limit
ORGANIC PARAMETERS BY GC, ORGANIC MATRIX (CONTINUED)						
PCB-1232	SW-846	8080	Organic	0 - 20*	30-130*	ug/kg
PCB-1242	SW-846	8080	Organic	0 - 20*	30-130*	ug/kg
PCB-1248	SW-846	8080	Organic	0 - 10	30-130*	ug/kg
PCB-1254	SW-846	8080	Organic	0 - 10	30-130*	ug/kg
PCB-1260	SW-846	8080	Organic	0 - 11	30-130*	ug/kg
Acenaphthene	SW-846	8100	Organic	0 - 20*	30-130*	ug/L
Acenaphthylene	SW-846	8100	Organic	0 - 20*	30-130*	ug/L
Anthracene	SW-846	8100	Organic	0 - 20*	30-130*	ug/L
Benzo(a)anthracene	SW-846	8100	Organic	0 - 20*	30-130*	ug/L
Benzo(a)pyrene	SW-846	8100	Organic	0 - 20*	30-130*	ug/L
Benzo(b)fluoranthene	SW-846	8100	Organic	0 - 20*	30-130*	ug/L
Benzo(ghi)perylene	SW-846	8100	Organic	0 - 20*	30-130*	ug/L
Benzo(k)fluoranthene	SW-846	8100	Organic	0 - 20*	30-130*	ug/L
Chrysene	SW-846	8100	Organic	0 - 20*	30-130*	ug/L
Dibenzo(ab)anthracene	SW-846	8100	Organic	0 - 20*	30-130*	ug/L
Fluoranthene	SW-846	8100	Organic	0 - 20*	30-130*	ug/L
Fluorene	SW-846	8100	Organic	0 - 20*	30-130*	ug/L
Indeno(1,2,3-c,d)pyrene	SW-846	8100	Organic	0 - 20*	30-130*	ug/L
Naphthalene	SW-846	8100	Organic	0 - 20*	30-130*	ug/L
1-Methylnaphthalene	SW-846	8100	Organic	0 - 20*	30-130*	ug/L
2-Methylnaphthalene	SW-846	8100	Organic	0 - 20*	30-130*	ug/L
Phenanthrene	SW-846	8100	Organic	0 - 20*	30-130*	ug/L
Pyrene	SW-846	8100	Organic	0 - 20*	30-130*	ug/L
2,4-D	SW-846	8150	Organic	0 - 20*	46-139	ug/kg
2,4-DN	SW-846	8150	Organic	0 - 20*	30-130*	ug/kg
2,4,5-T	SW-846	8150	Organic	0 - 20*	30-130*	ug/kg
2,4,5-TP (Silvex)	SW-846	8150	Organic	0 - 20*	55-130	ug/kg
Delepon	SW-846	8150	Organic	0 - 20*	30-130*	ug/kg
Dicamba	SW-846	8150	Organic	0 - 20*	30-130*	ug/kg
Dichloroprop	SW-846	8150	Organic	0 - 20*	30-130*	ug/kg
Dinoseb	SW-846	8150	Organic	0 - 20*	30-130*	ug/kg
MCPA	SW-846	8150	Organic	0 - 20*	30-130*	ug/kg
MCPP	SW-846	8150	Organic	0 - 20*	30-130*	ug/kg

Laboratory QA Objectives
(Continued)

LABORATORY QA OBJECTIVES

Parameter	Reference	Method #	Matrix	Precision RPD	Accuracy % Recovery	Method Det. Limit
ORGANIC PARAMETERS BY GC, TCLP LEACHATE MATRIX						
γ-BHC (lindane)	SW-846	8080	TCLP Leachate	0 - 20*	30-130*	ug/L
Chlordane	SW-846	8080	TCLP Leachate	0 - 16	76-143	ug/L
Endrin	SW-846	8080	TCLP Leachate	0 - 17	79-150	ug/L
Heptachlor	SW-846	8080	TCLP Leachate	0 - 25	66-139	ug/L
Heptachlor epoxide	SW-846	8080	TCLP Leachate	0 - 15	88-138	ug/L
Methoxychlor	SW-846	8080	TCLP Leachate	0 - 20*	30-130*	ug/L
2,4-D	SW-846	8150	TCLP Leachate	0 - 22	60-120	ug/L
2,4,5-TP (Silvex)	SW-846	8150	TCLP Leachate	0 - 25	71-126	ug/L

Laboratory QA Objectives
(Continued)

LABORATORY QA OBJECTIVES

Parameter	Reference	Method #	Matrix	Precision RPD	Accuracy & Recovery	Method Det. Limit
ORGANICS BY GCMS, AQUEOUS MATRIX						
Acetone	SW-846	8240	Aqueous	0 - 20*	30-110*	ug/L
Acrolein	SW-846	8240	Aqueous	0 - 20*	30-110*	ug/L
Acrylonitrile	SW-846	8240	Aqueous	0 - 20*	30-110*	ug/L
Benzene	SW-846	8240	Aqueous	0 - 16	74-122	ug/L
Bromoform	SW-846	8240	Aqueous	0 - 18	65-124	ug/L
Carbon Disulfide	SW-846	8240	Aqueous	0 - 20*	30-110*	ug/L
Carbon Tetrachloride	SW-846	8240	Aqueous	0 - 16	71-121	ug/L
Chlorobenzene	SW-846	8240	Aqueous	0 - 10	90-110	ug/L
Chlorodibromomethane	SW-846	8240	Aqueous	0 - 19	72-117	ug/L
Chloroethane	SW-846	8240	Aqueous	0 - 12	77-115	ug/L
Chloroform	SW-846	8240	Aqueous	0 - 10	90-110	ug/L
2-Chloroethylvinyl ether	SW-846	8240	Aqueous	0 - 21	55-117	ug/L
3-Chloropropene	SW-846	8240	Aqueous	0 - 20*	30-110*	ug/L
1,2-Dibromo-1-chloropropane	SW-846	8240	Aqueous	0 - 20*	30-110*	ug/L
Dichlorobromomethane	SW-846	8240	Aqueous	0 - 17	71-122	ug/L
1,4-Dichloro-2-butene	SW-846	8240	Aqueous	0 - 20*	30-110*	ug/L
Dichlorodifluoromethane	SW-846	8240	Aqueous	0 - 14	73-140	ug/L
1,2-Dichlorobenzene	SW-846	8240	Aqueous	0 - 20*	30-110*	ug/L
1,3-Dichlorobenzene	SW-846	8240	Aqueous	0 - 20*	30-110*	ug/L
1,4-Dichlorobenzene	SW-846	8240	Aqueous	0 - 20*	30-110*	ug/L
1,1-Dichloroethane	SW-846	8240	Aqueous	0 - 10	86-110	ug/L
1,2-Dichloroethane	SW-846	8240	Aqueous	0 - 10	87-114	ug/L
1,1-Dichloroethene	SW-846	8240	Aqueous	0 - 12	81-117	ug/L
1,2-Dichloropropane	SW-846	8240	Aqueous	0 - 25	71-121	ug/L
cis-1,2-Dichloropropene	SW-846	8240	Aqueous	0 - 21	62-127	ug/L
trans-1,2-Dichloropropene	SW-846	8240	Aqueous	0 - 21	62-112	ug/L
Dibromomethane	SW-846	8240	Aqueous	0 - 20*	30-110*	ug/L
Ethylbenzene	SW-846	8240	Aqueous	0 - 10	90-110	ug/L
Ethylene Dibromide	SW-846	8240	Aqueous	0 - 20*	30-110*	ug/L
Ethyl acetate	SW-846	8240	Aqueous	0 - 20*	30-110*	ug/L
Ethyl ether	SW-846	8240	Aqueous	0 - 20*	30-110*	ug/L
2-Hexanone	SW-846	8240	Aqueous	0 - 20*	30-110*	ug/L
Iodomethane	SW-846	8240	Aqueous	0 - 20*	30-110*	ug/L
Methyl bromide	SW-846	8240	Aqueous	0 - 10	81-117	ug/L
Methyl chloride	SW-846	8240	Aqueous	0 - 17	76-116	ug/L
Methylene Chloride	SW-846	8240	Aqueous	0 - 11	84-116	ug/L
Methyl ethyl ketone (2-Butanone)	SW-846	8240	Aqueous	0 - 20*	30-110*	ug/L
Methyl-iso-butyl ketone	SW-846	8240	Aqueous	0 - 20*	30-110*	ug/L
Styrene	SW-846	8240	Aqueous	0 - 20*	30-110*	ug/L
1,1,1,2-Tetrachloroethane	SW-846	8240	Aqueous	0 - 20*	30-110*	ug/L
1,1,2,2-Tetrachloroethane	SW-846	8240	Aqueous	0 - 18	84-111	ug/L

Laboratory QA Objectives
(Continued)

LABORATORY QA OBJECTIVES

Parameter	Reference	Method #	Matrix	Precision RPD	Accuracy & Recovery	Method Det. Limit
ORGANICS BY GCMS, AQUEOUS MATRIX (CONTINUED)						
Tetrachloroethene	SW-846	8240	Aqueous	0 - 10	90-111	ug/L
Tetrahydrofuran	SW-846	8240	Aqueous	0 - 20*	10-130*	ug/L
Toluene	SW-846	8240	Aqueous	0 - 10	89-110	ug/L
1,1,1-Trichloroethane	SW-846	8240	Aqueous	0 - 14	72-118	ug/L
1,1,2-Trichloroethane	SW-846	8240	Aqueous	0 - 19	76-120	ug/L
Trichloroethene	SW-846	8240	Aqueous	0 - 20	71-127	ug/L
1,2-trans-Dichloroethene	SW-846	8240	Aqueous	0 - 11	85-112	ug/L
Trichlorofluoromethane	SW-846	8240	Aqueous	0 - 11	87-117	ug/L
1,2,3-Trichloropropane	SW-846	8240	Aqueous	0 - 20*	10-130*	ug/L
1,1,2-Trichlorotrifluoroethane	SW-846	8240	Aqueous	0 - 20*	10-130*	ug/L
Vinyl Acetate	SW-846	8240	Aqueous	0 - 20*	10-130*	ug/L
Vinyl Chloride	SW-846	8240	Aqueous	0 - 11	84-111	ug/L
Total Xylenes	SW-846	8240	Aqueous	0 - 20*	10-130*	ug/L
Acenaphthene	SW-846	8270	Aqueous	0 - 16	59-110	ug/L
Acenaphthylene	SW-846	8270	Aqueous	0 - 20*	10-130*	ug/L
Anthracene	SW-846	8270	Aqueous	0 - 20*	10-130*	ug/L
Benzidine	SW-846	8270	Aqueous	0 - 20*	10-130*	ug/L
Benzoic acid	SW-846	8270	Aqueous	0 - 20*	10-130*	ug/L
Benzyl alcohol	SW-846	8270	Aqueous	0 - 20*	10-130*	ug/L
Benzo(a)anthracene	SW-846	8270	Aqueous	0 - 20*	10-130*	ug/L
Benzo(b)fluoranthene	SW-846	8270	Aqueous	0 - 20*	10-130*	ug/L
Benzo(k)fluoranthene	SW-846	8270	Aqueous	0 - 20*	10-130*	ug/L
Benzo(ghi)perylene	SW-846	8270	Aqueous	0 - 20*	10-130*	ug/L
Benzo(a)pyrene	SW-846	8270	Aqueous	0 - 20*	10-130*	ug/L
Bis(2-Chloroethoxy)ethane	SW-846	8270	Aqueous	0 - 20*	10-130*	ug/L
Bis(2-chloroethyl)ether	SW-846	8270	Aqueous	0 - 20*	10-130*	ug/L
Bis(2-chloroethoxy)methane	SW-846	8270	Aqueous	0 - 20*	10-130*	ug/L
Bis(2-chloroisopropyl)ether	SW-846	8270	Aqueous	0 - 20*	10-130*	ug/L
Bis(2-ethylhexyl)phthalate	SW-846	8270	Aqueous	0 - 20*	10-130*	ug/L
4-Bromophenyl phenyl ether	SW-846	8270	Aqueous	0 - 20*	10-130*	ug/L
Butyl benzyl phthalate	SW-846	8270	Aqueous	0 - 20*	10-130*	ug/L
4-Chloroaniline	SW-846	8270	Aqueous	0 - 20*	10-130*	ug/L
4-Chloro-3-methylphenol	SW-846	8270	Aqueous	0 - 20*	10-130*	ug/L
2-Chloronaphthalene	SW-846	8270	Aqueous	0 - 20*	10-130*	ug/L
2-Chlorophenol	SW-846	8270	Aqueous	0 - 30	48-110	ug/L
4-Chlorophenyl phenyl ether	SW-846	8270	Aqueous	0 - 20*	10-130*	ug/L
3-Chloropropionitrile	SW-846	8270	Aqueous	0 - 20*	10-130*	ug/L
Chrysene	SW-846	8270	Aqueous	0 - 20*	10-130*	ug/L
Cyclohexanone	SW-846	8270	Aqueous	0 - 23	54-121	ug/L
Dibenzo(ah)anthracene	SW-846	8270	Aqueous	0 - 20*	10-130*	ug/L

Laboratory QA Objectives
 (Continued)

LABORATORY QA OBJECTIVES

Parameter	Reference	Method #	Matrix	Precision RPD	Accuracy & Recovery	Method Det. Limit
ORGANICS BY GCMS, AQUEOUS MATRIX (CONTINUED)						
Dibenzofuran	SW-846	8270	Aqueous	0 - 20*	30-130*	ug/L
Di-n-butylphthalate	SW-846	8270	Aqueous	0 - 16	50-110	ug/L
1,2-Dichlorobenzene	SW-846	8270	Aqueous	0 - 20*	30-130*	ug/L
1,3-Dichlorobenzene	SW-846	8270	Aqueous	0 - 20*	30-130*	ug/L
1,4-Dichlorobenzene	SW-846	8270	Aqueous	0 - 19	41-110	ug/L
3,3-Dichlorobenzidine	SW-846	8270	Aqueous	0 - 20*	30-130*	ug/L
2,4-Dichlorophenol	SW-846	8270	Aqueous	0 - 20*	30-130*	ug/L
2,6-Dichlorophenol	SW-846	8270	Aqueous	0 - 20*	30-130*	ug/L
Diethylphthalate	SW-846	8270	Aqueous	0 - 20*	30-130*	ug/L
Dimethylphthalate	SW-846	8270	Aqueous	0 - 20*	30-130*	ug/L
2,4-Dimethylphenol	SW-846	8270	Aqueous	0 - 20*	30-130*	ug/L
4,6-Dinitro-o-cresol	SW-846	8270	Aqueous	0 - 20*	30-130*	ug/L
2,4-Dinitrophenol	SW-846	8270	Aqueous	0 - 20*	30-130*	ug/L
2,4-Dinitrotoluene	SW-846	8270	Aqueous	0 - 16	60-110	ug/L
2,6-Dinitrotoluene	SW-846	8270	Aqueous	0 - 20*	30-130*	ug/L
Di-n-octylphthalate	SW-846	8270	Aqueous	0 - 20*	30-130*	ug/L
2-Ethoxyethanol	SW-846	8270	Aqueous	0 - 20*	30-130*	ug/L
Fluoranthene	SW-846	8270	Aqueous	0 - 20*	30-130*	ug/L
Fluorene	SW-846	8270	Aqueous	0 - 20*	30-130*	ug/L
Hexachlorobenzene	SW-846	8270	Aqueous	0 - 20*	30-130*	ug/L
Hexachlorobutadiene	SW-846	8270	Aqueous	0 - 20*	30-130*	ug/L
Hexachlorocyclopentadiene	SW-846	8270	Aqueous	0 - 20*	30-130*	ug/L
Hexachloroethane	SW-846	8270	Aqueous	0 - 20*	30-130*	ug/L
Hexachlorophene	SW-846	8270	Aqueous	0 - 20*	30-130*	ug/L
Hexachloropropene	SW-846	8270	Aqueous	0 - 20*	30-130*	ug/L
Indeno-(1,2,3-c,d)pyrene	SW-846	8270	Aqueous	0 - 20*	30-130*	ug/L
Isophorone	SW-846	8270	Aqueous	0 - 20*	30-130*	ug/L
4,4'-Methylenebis(2-chloroaniline)	SW-846	8270	Aqueous	0 - 20*	30-130*	ug/L
2-Methylnaphthalene	SW-846	8270	Aqueous	0 - 20*	30-130*	ug/L
2-Methylphenol	SW-846	8270	Aqueous	0 - 25	40-110	ug/L
4-Methylphenol	SW-846	8270	Aqueous	0 - 20*	30-130*	ug/L
2-Nitropropane	SW-846	8270	Aqueous	0 - 20*	30-130*	ug/L
N-Nitrosodimethylamine	SW-846	8270	Aqueous	0 - 20*	30-130*	ug/L
N-Nitrosodi-n-propylamine	SW-846	8270	Aqueous	0 - 21	49-110	ug/L
N-Nitrosodiphenylamine	SW-846	8270	Aqueous	0 - 20*	30-130*	ug/L
Naphthalene	SW-846	8270	Aqueous	0 - 20*	30-130*	ug/L
2-Nitroaniline	SW-846	8270	Aqueous	0 - 20*	30-130*	ug/L
3-Nitroaniline	SW-846	8270	Aqueous	0 - 20*	30-130*	ug/L
4-Nitroaniline	SW-846	8270	Aqueous	0 - 20*	30-130*	ug/L
Nitrobenzene	SW-846	8270	Aqueous	0 - 20*	30-130*	ug/L
3-Nitrophenol	SW-846	8270	Aqueous	0 - 20*	30-130*	ug/L

Laboratory QA Objectives
(Continued)

LABORATORY QA OBJECTIVES

Parameter	Reference	Method #	Matrix	Precision RPD	Accuracy & Recovery	Method Det. Limit
ORGANICS BY GCMS, AQUEOUS MATRIX (CONTINUED)						
4-Nitrophenol	SW-846	8270	Aqueous	0 - 18	71-110	ug/L
Pentachlorobenzene	SW-846	8270	Aqueous	0 - 20*	30-130*	ug/L
Pentachloronitrobenzene	SW-846	8270	Aqueous	0 - 20*	30-130*	ug/L
Pentachlorophenol	SW-846	8270	Aqueous	0 - 24	19-127	ug/L
Pentachloroethane	SW-846	8270	Aqueous	0 - 20*	30-130*	ug/L
Phenanthrene	SW-846	8270	Aqueous	0 - 20*	30-130*	ug/L
Phenol	SW-846	8270	Aqueous	0 - 24	29-110	ug/L
Propamide	SW-846	8270	Aqueous	0 - 20*	30-130*	ug/L
Pyrene	SW-846	8270	Aqueous	0 - 20	67-112	ug/L
Pyridine	SW-846	8270	Aqueous	0 - 20*	30-130*	ug/L
1,2,4,5-Tetrachlorobenzene	SW-846	8270	Aqueous	0 - 20*	30-130*	ug/L
2,3,4,6-Tetrachlorophenol	SW-846	8270	Aqueous	0 - 20*	30-130*	ug/L
1,2,4-Trichlorobenzene	SW-846	8270	Aqueous	0 - 20	43-110	ug/L
2,4,5-Trichlorophenol	SW-846	8270	Aqueous	0 - 20*	30-130*	ug/L
2,4,6-Trichlorophenol	SW-846	8270	Aqueous	0 - 20*	30-130*	ug/L
ORGANICS BY GCMS, SOLID MATRIX						
Acetone	SW-846	8240	Solid	0 - 20*	30-130*	ug/L
Acrolein	SW-846	8240	Solid	0 - 20*	30-130*	ug/L
Acrylonitrile	SW-846	8240	Solid	0 - 20*	30-130*	ug/L
Benzene	SW-846	8240	Solid	0 - 12	76-119	ug/L
Bromoform	SW-846	8240	Solid	0 - 18	65-117	ug/L
Carbon Disulfide	SW-846	8240	Solid	0 - 20*	30-130*	ug/L
Carbon Tetrachloride	SW-846	8240	Solid	0 - 16	69-119	ug/L
Chlorobenzene	SW-846	8240	Solid	0 - 18	90-110	ug/L
Chlorodibromomethane	SW-846	8240	Solid	0 - 19	72-116	ug/L
Chloroethane	SW-846	8240	Solid	0 - 12	68-114	ug/L
Chloroform	SW-846	8240	Solid	0 - 18	89-110	ug/L
2-Chloroethylvinyl ether	SW-846	8240	Solid	0 - 23	69-128	ug/L
3-Chloropropene	SW-846	8240	Solid	0 - 20*	30-130*	ug/L
1,2-Dibromo-3-chloropropane	SW-846	8240	Solid	0 - 20*	30-130*	ug/L
Dichlorobromomethane	SW-846	8240	Solid	0 - 17	69-120	ug/L
1,4-Dichloro-2-butene	SW-846	8240	Solid	0 - 20*	30-130*	ug/L
Dichlorodifluoromethane	SW-846	8240	Solid	0 - 14	81-110	ug/L
1,2-Dichlorobenzene	SW-846	8240	Solid	0 - 20*	30-130*	ug/L
1,3-Dichlorobenzene	SW-846	8240	Solid	0 - 20*	30-130*	ug/L
1,4-Dichlorobenzene	SW-846	8240	Solid	0 - 20*	30-130*	ug/L
1,1-Dichloroethane	SW-846	8240	Solid	0 - 18	86-110	ug/L
1,2-Dichloroethane	SW-846	8240	Solid	0 - 18	86-110	ug/L

Laboratory QA Objectives
(Continued)

LABORATORY QA OBJECTIVES

Parameter	Reference	Method #	Matrix	Precision RPD	Accuracy & Recovery	Method Det. Limit
ORGANICS BY GCMS, SOLID MATRIX (CONTINUED)						
1,1-Dichloroethene	SW-846	8240	Solid	0 - 12	66-116	ug/L
1,2-Dichloropropane	SW-846	8240	Solid	0 - 15	64-129	ug/L
cis-1,3-Dichloropropene	SW-846	8240	Solid	0 - 17	76-113	ug/L
trans-1,3-Dichloropropane	SW-846	8240	Solid	0 - 12	66-110	ug/L
Dibromomethane	SW-846	8240	Solid	0 - 20*	30-130*	ug/L
Ethylbenzene	SW-846	8240	Solid	0 - 10	90-110	ug/L
Ethylene Dibromide	SW-846	8240	Solid	0 - 20*	30-130*	ug/L
Ethyl acetate	SW-846	8240	Solid	0 - 20*	30-130*	ug/L
Ethyl ether	SW-846	8240	Solid	0 - 20*	30-130*	ug/L
2-Hexanone	SW-846	8240	Solid	0 - 20*	30-130*	ug/L
Iodomethane	SW-846	8240	Solid	0 - 20*	30-130*	ug/L
Methyl bromide	SW-846	8240	Solid	0 - 10	70-123	ug/L
Methyl chloride	SW-846	8240	Solid	0 - 18	75-110	ug/L
Methylene Chloride	SW-846	8240	Solid	0 - 12	84-114	ug/L
Methyl ethyl ketone (2-Butanone)	SW-846	8240	Solid	0 - 20*	30-130*	ug/L
Methyl-iso-butyl ketone	SW-846	8240	Solid	0 - 20*	30-130*	ug/L
Styrene	SW-846	8240	Solid	0 - 20*	30-130*	ug/L
1,1,1,2-Tetrachloroethane	SW-846	8240	Solid	0 - 20*	30-130*	ug/L
1,1,2,2-Tetrachloroethane	SW-846	8240	Solid	0 - 27	80-111	ug/L
Tetrachloroethene	SW-846	8240	Solid	0 - 10	90-110	ug/L
Tetrahydrofuran	SW-846	8240	Solid	0 - 20*	30-130*	ug/L
Toluene	SW-846	8240	Solid	0 - 10	88-110	ug/L
1,1,1-Trichloroethane	SW-846	8240	Solid	0 - 13	72-118	ug/L
1,1,2-Trichloroethane	SW-846	8240	Solid	0 - 14	74-121	ug/L
Trichloroethane	SW-846	8240	Solid	0 - 22	69-134	ug/L
1,2-trans-Dichloroethene	SW-846	8240	Solid	0 - 10	84-110	ug/L
Trichlorofluoromethane	SW-846	8240	Solid	0 - 10	59-116	ug/L
1,2,3-Trichloropropane	SW-846	8240	Solid	0 - 20*	30-130*	ug/L
1,1,2-Trichlorotrifluoroethane	SW-846	8240	Solid	0 - 20*	30-130*	ug/L
Vinyl Acetate	SW-846	8240	Solid	0 - 20*	30-130*	ug/L
Vinyl Chloride	SW-846	8240	Solid	0 - 14	85-110	ug/L
Total Xylenes	SW-846	8240	Solid	0 - 20*	30-130*	ug/L
Acenaphthene	SW-846	8270	Solid	0 - 12	67-128	ug/L
Acenaphthylene	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
Anthracene	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
Benidine	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
Benzoic acid	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
Benzyl Alcohol	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
Benzo(a)anthracene	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
Benzo(b)fluoranthene	SW-846	8270	Solid	0 - 20*	30-130*	ug/L

Laboratory QA Objectives
(Continued)

LABORATORY QA OBJECTIVES

Parameter	Reference	Method #	Matrix	Precision RPD	Accuracy & Recovery	Method Det. Limit
ORGANICS BY GCMS, SOLID MATRIX (CONTINUED)						
Benzo(k)fluoranthene	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
Benzo(ghi)perylene	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
Benzo(a)pyrene	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
Bis(2-Chloroethoxy)ethane	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
Bis(2-chloroethyl)ether	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
Bis(2-chloroethoxy)methane	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
Bis(2-chloroisopropyl)ether	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
Bis(2-ethylhexyl)phthalate	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
4-Bromophenyl phenyl ether	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
Butyl benzyl phthalate	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
4-Chloroaniline	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
4-Chloro-3-methylphenol	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
2-Chloronaphthalene	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
2-Chlorophenol	SW-846	8270	Solid	0 - 29	34-129	ug/L
4-Chlorophenyl phenyl ether	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
3-Chloropropionitrile	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
Chrysene	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
Cyclohexanone	SW-846	8270	Solid	0 - 11	53-146	ug/L
Dibenzo(a,h)anthracene	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
Dibenzofuran	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
Di-n-butylphthalate	SW-846	8270	Solid	0 - 10	77-122	ug/L
1,3-Dichlorobenzene	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
1,3-Dichlorobenzene	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
1,4-Dichlorobenzene	SW-846	8270	Solid	0 - 22	55-124	ug/L
3,3-Dichlorobenzidine	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
2,4-Dichlorophenol	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
2,6-Dichlorophenol	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
Diethylphthalate	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
Dimethylphthalate	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
2,4-Dimethylphenol	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
4,6-Dinitro-o-cresol	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
2,4-Dinitrophenol	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
2,4-Dinitrotoluene	SW-846	8270	Solid	0 - 16	60-125	ug/L
2,6-Dinitrotoluene	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
Di-n-octylphthalate	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
2-Ethoxyethanol	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
Fluoranthene	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
Fluorene	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
Hexachlorobenzene	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
Hexachlorobutadiene	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
Hexachlorocyclopentadiene	SW-846	8270	Solid	0 - 20*	30-130*	ug/L

Laboratory QA Objectives
(Continued)

LABORATORY QA OBJECTIVES

Parameter	Reference	Method #	Matrix	Precision RPD	Accuracy & Recovery	Method Det. Limit
ORGANICS BY GCMS, SOLID MATRIX (CONTINUED)						
Hexachloroethane	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
Hexachlorophene	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
Hexachloropropene	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
Indeno-(1,2,3-c,d)pyrene	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
Isophorone	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
4,4'-Methylenebis(2-chloroaniline)	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
2-Methylnaphthalene	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
2-Methylphenol	SW-846	8270	Solid	0 - 20	54-124	ug/L
4-Methylphenol	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
2-Nitropropane	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
N-Nitrosodimethylamine	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
N-Nitrosodi-n-propylamine	SW-846	8270	Solid	0 - 21	44-131	ug/L
N-Nitrosodiphenylamine	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
Naphthalene	SW-846	8270	Solid	0 - 10	30-130*	ug/L
2-Nitroaniline	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
3-Nitroaniline	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
4-Nitroaniline	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
Nitrobenzene	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
2-Nitrophenol	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
4-Nitrophenol	SW-846	8270	Solid	0 - 19	48-110	ug/L
Pentachlorobenzene	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
Pentachloronitrobenzene	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
Pentachlorophenol	SW-846	8270	Solid	0 - 32	19-115	ug/L
Pentachloroethane	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
Phenanthrene	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
Phenol	SW-846	8270	Solid	0 - 19	54-122	ug/L
Pronamide	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
Pyrene	SW-846	8270	Solid	0 - 12	66-140	ug/L
Pyridine	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
1,2,4,5-Tetrachlorobenzene	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
2,3,4,6-Tetrachlorophenol	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
1,2,4-Trichlorobenzene	SW-846	8270	Solid	0 - 23	60-132	ug/L
2,4,5-Trichlorophenol	SW-846	8270	Solid	0 - 20*	30-130*	ug/L
2,4,6-Trichlorophenol	SW-846	8270	Solid	0 - 20*	30-130*	ug/L

Laboratory QA Objectives
(Continued)

LABORATORY QA OBJECTIVES

Parameter	Reference	Method #	Matrix	Precision RPD	Accuracy & Recovery	Method Det. Limit
ORGANICS BY GCMS, ORGANIC MATRIX						
Acetone	SW-846	8240	Organic	0 - 20*	30-130*	ug/L
Acrolein	SW-846	8240	Organic	0 - 20*	30-130*	ug/L
Acrylonitrile	SW-846	8240	Organic	0 - 20*	30-130*	ug/L
Benzene	SW-846	8240	Organic	0 - 10	79-112	ug/L
Bromoform	SW-846	8240	Organic	0 - 14	70-112	ug/L
Carbon Disulfide	SW-846	8240	Organic	0 - 20*	30-130*	ug/L
Carbon Tetrachloride	SW-846	8240	Organic	0 - 10	78-110	ug/L
Chlorobenzene	SW-846	8240	Organic	0 - 10	90-110	ug/L
Chlorodibromomethane	SW-846	8240	Organic	0 - 10	76-110	ug/L
Chloroethane	SW-846	8240	Organic	0 - 14	75-111	ug/L
Chloroform	SW-846	8240	Organic	0 - 10	89-110	ug/L
2-Chloroethylvinyl ether	SW-846	8240	Organic	0 - 27	65-128	ug/L
1-Chloropropene	SW-846	8240	Organic	0 - 20*	30-130*	ug/L
1,2-Dibromo-3-chloropropane	SW-846	8240	Organic	0 - 20*	30-130*	ug/L
Dichlorobromomethane	SW-846	8240	Organic	0 - 10	76-110	ug/L
1,4-Dichloro-2-butene	SW-846	8240	Organic	0 - 20*	30-130*	ug/L
Dichlorodifluoromethane	SW-846	8240	Organic	0 - 13	81-114	ug/L
1,2-Dichlorobenzene	SW-846	8240	Organic	0 - 20*	30-130*	ug/L
1,3-Dichlorobenzene	SW-846	8240	Organic	0 - 20*	30-130*	ug/L
1,4-Dichlorobenzene	SW-846	8240	Organic	0 - 20*	30-130*	ug/L
1,1-Dichloroethane	SW-846	8240	Organic	0 - 12	88-111	ug/L
1,2-Dichloroethane	SW-846	8240	Organic	0 - 10	82-113	ug/L
1,1-Dichloroethane	SW-846	8240	Organic	0 - 12	84-124	ug/L
1,2-Dichloropropane	SW-846	8240	Organic	0 - 20	79-115	ug/L
cis-1,2-Dichloropropene	SW-846	8240	Organic	0 - 13	80-110	ug/L
trans-1,2-Dichloropropene	SW-846	8240	Organic	0 - 10	68-110	ug/L
Dibromomethane	SW-846	8240	Organic	0 - 20*	30-130*	ug/L
Ethylbenzene	SW-846	8240	Organic	0 - 10	89-111	ug/L
Ethylene Dibromide	SW-846	8240	Organic	0 - 20*	30-130*	ug/L
Ethyl acetate	SW-846	8240	Organic	0 - 20*	30-130*	ug/L
Ethyl ether	SW-846	8240	Organic	0 - 20*	30-130*	ug/L
2-Hexanone	SW-846	8240	Organic	0 - 20*	30-130*	ug/L
Iodomethane	SW-846	8240	Organic	0 - 20*	30-130*	ug/L
Methyl bromide	SW-846	8240	Organic	0 - 10	82-122	ug/L
Methyl chloride	SW-846	8240	Organic	0 - 17	65-125	ug/L
Methylene Chloride	SW-846	8240	Organic	0 - 11	88-116	ug/L
Methyl ethyl ketone (2-Butanone)	SW-846	8240	Organic	0 - 20*	30-130*	ug/L
Methyl-iso-butyl ketone	SW-846	8240	Organic	0 - 20*	30-130*	ug/L
Styrene	SW-846	8240	Organic	0 - 20*	30-130*	ug/L
1,1,1,2-Tetrachloroethane	SW-846	8240	Organic	0 - 20*	30-130*	ug/L
1,1,2,2-Tetrachloroethane	SW-846	8240	Organic	0 - 14	80-116	ug/L

Laboratory QA Objectives
(Continued)

LABORATORY QA OBJECTIVES

Parameter	Reference	Method #	Matrix	Precision RPD	Accuracy & Recovery	Method Det. Limit
ORGANICS BY GCMS, ORGANIC MATRIX (CONTINUED)						
Tetrachloroethene	SW-846	8240	Organic	0 - 10	90-110	ug/L
Tetrahydrofuran	SW-846	8240	Organic	0 - 20*	10-130*	ug/L
Toluene	SW-846	8240	Organic	0 - 10	89-110	ug/L
1,1,1-Trichloroethane	SW-846	8240	Organic	0 - 10	74-112	ug/L
1,1,2-Trichloroethane	SW-846	8240	Organic	0 - 11	81-116	ug/L
Trichloroethene	SW-846	8240	Organic	0 - 22	78-123	ug/L
1,2-trans-Dichloroethene	SW-846	8240	Organic	0 - 10	89-110	ug/L
Trichlorofluoromethane	SW-846	8240	Organic	0 - 13	72-120	ug/L
1,2,3-Trichloropropane	SW-846	8240	Organic	0 - 20*	10-130*	ug/L
1,1,2-Trichlorotrifluoroethane	SW-846	8240	Organic	0 - 20*	10-130*	ug/L
Vinyl Acetate	SW-846	8240	Organic	0 - 20*	10-130*	ug/L
Vinyl Chloride	SW-846	8240	Organic	0 - 14	81-113	ug/L
Total Xylenes	SW-846	8240	Organic	0 - 20*	10-130*	ug/L
Acenaphthene	SW-846	8270	Organic	0 - 20*	10-130*	ug/L
Acenaphthylene	SW-846	8270	Organic	0 - 20*	10-130*	ug/L
Anthracene	SW-846	8270	Organic	0 - 20*	10-130*	ug/L
Benidine	SW-846	8270	Organic	0 - 20*	10-130*	ug/L
Benzoic acid	SW-846	8270	Organic	0 - 20*	10-130*	ug/L
Benzyl Alcohol	SW-846	8270	Organic	0 - 20*	10-130*	ug/L
Benzo(a)anthracene	SW-846	8270	Organic	0 - 20*	10-130*	ug/L
Benzo(b)fluoranthene	SW-846	8270	Organic	0 - 20*	10-130*	ug/L
Benzo(k)fluoranthene	SW-846	8270	Organic	0 - 20*	10-130*	ug/L
Benzo(ghi)perylene	SW-846	8270	Organic	0 - 20*	10-130*	ug/L
Benzo(a)pyrene	SW-846	8270	Organic	0 - 20*	10-130*	ug/L
Bis(2-Chloroethoxy)ethane	SW-846	8270	Organic	0 - 20*	10-130*	ug/L
Bis(2-chloroethyl)ether	SW-846	8270	Organic	0 - 20*	10-130*	ug/L
Bis(2-chloroethoxy)methane	SW-846	8270	Organic	0 - 20*	10-130*	ug/L
Bis(2-chloroisopropyl)ether	SW-846	8270	Organic	0 - 20*	10-130*	ug/L
Bis(2-ethylhexyl)phthalate	SW-846	8270	Organic	0 - 20*	10-130*	ug/L
4-Bromophenyl phenyl ether	SW-846	8270	Organic	0 - 20*	10-130*	ug/L
Butyl benzyl phthalate	SW-846	8270	Organic	0 - 20*	10-130*	ug/L
4-Chloroaniline	SW-846	8270	Organic	0 - 20*	10-130*	ug/L
4-Chloro-3-methylphenol	SW-846	8270	Organic	0 - 20*	10-130*	ug/L
2-Chloronaphthalene	SW-846	8270	Organic	0 - 20*	10-130*	ug/L
2-Chlorophenol	SW-846	8270	Organic	0 - 20*	10-130*	ug/L
4-Chlorophenyl phenyl ether	SW-846	8270	Organic	0 - 20*	10-130*	ug/L
3-Chloropropionitrile	SW-846	8270	Organic	0 - 20*	10-130*	ug/L
Chrysene	SW-846	8270	Organic	0 - 20*	10-130*	ug/L
Cyclohexanone	SW-846	8270	Organic	0 - 20*	10-130*	ug/L
Dibenzo(ah)anthracene	SW-846	8270	Organic	0 - 20*	10-130*	ug/L

LABORATORY QA OBJECTIVES

Parameter	Reference	Method #	Matrix	Precision RPD	Accuracy & Recovery	Method Det. Limit
ORGANICS BY GCMS, ORGANIC MATRIX (CONTINUED)						
Dibenzofuran	SW-846	8270	Organic	0 - 20*	10-130*	ug/L
Di-n-butylphthalate	SW-846	8270	Organic	0 - 20*	10-130*	ug/L
1,2-Dichlorobenzene	SW-846	8270	Organic	0 - 20*	10-130*	ug/L
1,3-Dichlorobenzene	SW-846	8270	Organic	0 - 20*	10-130*	ug/L

Laboratory QA Objectives
(Continued)

LABORATORY QA OBJECTIVES

Parameter	Reference	Method #	Matrix	Precision RPD	Accuracy & Recovery	Method Det. Limit
ORGANICS BY GCMS, ORGANIC MATRIX (CONTINUED)						
4-Nitrophenol	SW-846	8270	Organic	0 - 20*	10-110*	ug/L
Pentachlorobenzene	SW-846	8270	Organic	0 - 20*	10-110*	ug/L
Pentachloronitrobenzene	SW-846	8270	Organic	0 - 20*	10-110*	ug/L
Pentachlorophenol	SW-846	8270	Organic	0 - 20*	10-110*	ug/L
Pentachloroethane	SW-846	8270	Organic	0 - 20*	10-110*	ug/L
Phenanthrene	SW-846	8270	Organic	0 - 20*	10-110*	ug/L
Phenol	SW-846	8270	Organic	0 - 20*	10-110*	ug/L
Pronamide	SW-846	8270	Organic	0 - 20*	10-110*	ug/L
Pyrene	SW-846	8270	Organic	0 - 20*	10-110*	ug/L
Pyridine	SW-846	8270	Organic	0 - 20*	10-110*	ug/L
1,2,4,5-Tetrachlorobenzene	SW-846	8270	Organic	0 - 20*	10-110*	ug/L
2,3,4,6-Tetrachlorophenol	SW-846	8270	Organic	0 - 20*	10-110*	ug/L
1,2,4-Trichlorobenzene	SW-846	8270	Organic	0 - 20*	10-110*	ug/L
2,4,5-Trichlorophenol	SW-846	8270	Organic	0 - 20*	10-110*	ug/L
2,4,6-Trichlorophenol	SW-846	8270	Organic	0 - 20*	10-110*	ug/L

LABORATORY QA OBJECTIVES

Parameter	Reference	Method #	Matrix	Precision RPD	Accuracy & Recovery	Method Det. Limit
ORGANICS BY GCMS, TCLP LEACHATE MATRIX						
Benzene	SW-846	8240	TCLP Leachate	0 - 10	75-128	ug/L
Carbon Tetrachloride	SW-846	8240	TCLP Leachate	0 - 10	76-127	ug/L
Chlorobenzene	SW-846	8240	TCLP Leachate	0 - 10	90-110	ug/L
Chloroform	SW-846	8240	TCLP Leachate	0 - 10	88-110	ug/L
1,4-Dichlorobenzene	SW-846	8240	TCLP Leachate	0 - 10	77-110	ug/L
1,2-Dichloroethane	SW-846	8240	TCLP Leachate	0 - 10	71-116	ug/L
1,1-Dichloroethene	SW-846	8240	TCLP Leachate	0 - 10	79-115	ug/L
Methyl ethyl ketone (2-Butanone)	SW-846	8240	TCLP Leachate	0 - 20*	30-130*	ug/L
Tetrachloroethene	SW-846	8240	TCLP Leachate	0 - 10	90-111	ug/L
Trichloroethene	SW-846	8240	TCLP Leachate	0 - 10	72-133	ug/L
Vinyl Chloride	SW-846	8240	TCLP Leachate	0 - 11	38-113	ug/L
Total Xylenes	SW-846	8240	TCLP Leachate	0 - 20*	30-130*	ug/L
2,4-Dinitrotoluene	SW-846	8270	TCLP Leachate	0 - 12	48-147	ug/L
Hexachlorobenzene	SW-846	8270	TCLP Leachate	0 - 17	41-125	ug/L
Hexachlorobutadiene	SW-846	8270	TCLP Leachate	0 - 19	38-110	ug/L
Hexachloroethane	SW-846	8270	TCLP Leachate	0 - 20	33-110	ug/L
2-Methylphenol	SW-846	8270	TCLP Leachate	0 - 15	50-110	ug/L
4-Methylphenol	SW-846	8270	TCLP Leachate	0 - 15	25-120	ug/L
Nitrobenzene	SW-846	8270	TCLP Leachate	0 - 14	60-111	ug/L
Pentachlorophenol	SW-846	8270	TCLP Leachate	0 - 20	38-148	ug/L
Pyridine	SW-846	8270	TCLP Leachate	0 - 22	46-110	ug/L
2,4,5-Trichlorophenol	SW-846	8270	TCLP Leachate	0 - 15	61-120	ug/L
2,4,6-Trichlorophenol	SW-846	8270	TCLP Leachate	0 - 14	59-119	ug/L
MISCELLANEOUS PROCEDURES, Aqueous MATRIX						
Ignitability	SW-846	1020	Aqueous	0 - 20*	NA	NA
Corrosivity toward steel	SW-846	1110	Aqueous	0 - 20*	NA	NA
Toxicity Characteristic						
Leachate Procedure (TCLP)	SW-846	1311	Aqueous	NA	NA	NA
Oxidizer Spot Test		038	Aqueous	NA	NA	NA
pH Paper Test	SW-846	018	Aqueous	NA	NA	NA
Sulfide Spot Test		038	Aqueous	NA	NA	NA
Cyanide Spot Test		038	Aqueous	NA	NA	NA
Flashpoint Determination	SW-846	1020	Aqueous	0 - 20*	NA	NA

NOTE: The QA objectives are targeted internal laboratory GC limits.

Laboratory QA Objectives
(Continued)

**SITE SPECIFIC
HEALTH AND SAFETY PLAN
FOR
REMOVAL OF PESTICIDE CONTAMINATED SOIL
OPERABLE UNIT NO. 5, SITE 2
MCB CAMP LEJEUNE, NORTH CAROLINA**

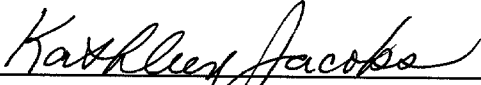
Submitted to:

**Department of the Navy
Atlantic Division
Naval Facilities Engineering Command
Norfolk, VA**

Submitted by:

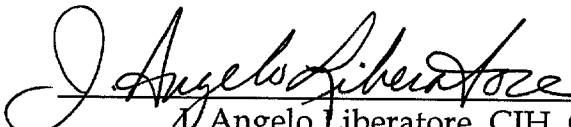
**OHM Remediation Services Corp.
Norcross, Georgia**

Prepared by:



Kathleen Jacobs

Approved by:



Angelo Liberatore, CIH, CSP
Regional Health and Safety Director

July 15, 1994

Contract No. N62470-93-D-3032
Delivery Order No. 0023

OHM Project No. 16207

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1.0 INTRODUCTION

OHM has developed this site health and safety plan (SHSP) specifically for the removal of pesticide-contaminated soils at Site 2 Operable Unit No. 5, MCB Camp Lejeune, North Carolina. This SHSP establishes the policies and procedures which protect workers and the public from potential hazards posed by work at this site. The health and safety procedures contained in this SHSP are a part of OHM's Corporate Health and Safety Program, which complies with 29 CFR 1910.120(b)(1) through (b)(4). OHM considers safety the highest priority during work at a site containing potentially hazardous materials. All project activities will be conducted in a manner that minimizes the probability of injury, accident or incident occurrence.

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

This SHSP has been prepared in accordance with OSHA's "Hazardous Waste Operations and Emergency Response" standard contained in 29 CFR 1910.120.

1.1 PROJECT DESCRIPTION

The scope of work for the project consists of the removal, transportation and disposal of pesticide-contaminated soils located at Site 2, Operable Unit No. 5. The mixing pad area and the former storage area have been identified as the areas of contamination. OHM will accomplish removal of contaminated soil through the performance of the following major tasks:

- **Mobilization and Site Preparation**

This task will include fencing installation around the proposed area of excavation and loading work zones; Construction of personnel and equipment decontamination facilities; Utility service connection;

Construction of temporary access roads; Installation of erosion and stormwater run-off controls; and Clearing and grubbing.

- **Concrete Pad Demolition**

The exterior concrete surface (6/10th centimeters or removal of all visible stains) will be removed with a grinding unit and the dust collected for proper disposal. The slabs will then be broken with a pneumatic hammer and staged for additional grinding (bottom and edges of the slabs). After completion of the surface grinding the concrete will be loaded for off-site transport.

- **Contaminated Soil Excavation**

Contaminated soil will be excavated from the designated areas with a tracked excavator and directly loaded into haul trucks for off-site treatment and disposal. The bottom and sides of the excavations will be sampled for verification of the contaminant removal.

- **Backfill/Compaction and Grading of the Excavation**

The excavated areas will be backfilled to pre-existing grade, and compacted in 12-inch lifts.

- **Heavy Equipment Decontamination** will be performed by manually scraping gross contamination from the equipment prior to washing with a high pressure water laser.

- **Site Restoration/Demobilization**

Top soil will be applied to disturbed areas and seeded and mulched. An erosion control mat will be placed to protect the area. Heavy equipment will be decontaminated and the site will be restored to its pre-existing condition prior to demobilizing equipment and personnel.

2.0 KEY PERSONNEL AND MANAGEMENT

OHM maintains a policy of providing its employees, subcontractors, and authorized visitors with information and procedures in order to protect them and the adjacent community from any adverse effects that might result from work at a job site involving potentially hazardous substances. All personnel involved with this project will follow the health and safety procedures set forth in this plan. Visitors will not be given entry unless they read and agree to comply with this plan. The site safety plan acknowledgement will be signed by all personnel required to enter contaminated work areas.

2.1 SITE SAFETY OFFICER

OHM designates a site safety officer (SSO) who defines, implements and enforces the project safety program and procedures. The SSO will conduct the daily safety meetings and will interface as required with other site representatives. The SSO takes the following action(s) when appropriate:

- Orders the immediate shut-down of site activities in the case of a medical emergency or unsafe practice.
- Ensures protective clothing and equipment are properly stored and maintained.
- Ensures that the environmental and personnel monitoring operations are on-going and in accordance with this SHSP.
- Restricts visitors from areas of potential exposure to harmful substances.

A safety log will be kept for all OHM activities. This log will include daily safety meeting topics, training given, air monitoring information, first aid administered, visits of all outside personnel and any incidents of a health and safety nature.

The SSO has responsibility for implementing and enforcing the site safety program and procedures. He will oversee any personnel monitoring and will decide when action levels have been reached which require more stringent personnel protection. The SSO establishes and enforces the use of protective equipment for various site activities. The SSO will maintain contact with OHM Regional and Corporate Certified Industrial Hygienists (CIH).

2.2 SITE SUPERVISOR

The site supervisor (SS) has responsibility for all field activities and enforces safe work practices by all crew members. He watches for any ill effects on any of the crew members, especially those symptoms caused by heat stress or chemical exposure. The SS oversees the safety of any visitors who enter the site. The SS maintains communication with the OHM project manager and client representative(s).

2.3 EQUIPMENT OPERATORS

Equipment operators will be responsible for the maintenance, inspection, and safe operation of their equipment. Operators are responsible for daily inspection of their equipment and assuring it is in safe operating condition.

2.4 EMPLOYEE SAFETY RESPONSIBILITY

Each employee is responsible for his own safety as well as the safety of those around him. The employee shall use all equipment provided in a safe and responsible manner as directed by his supervisor. All OHM personnel will follow the policies set forth in OHM's Health and Safety Procedures Manual. Health and Safety Procedures relevant to site operations are attached to this SHSP.

All site activities that involve physical or chemical hazards will be performed by a work team of no fewer than two people (Buddy system). For potential high hazard situations or activities, a third person will be located in the support zone

to serve as an observer or respond to a rescue situation in the event of an emergency.

2.5 RESPONSIBLE OHM HEALTH AND SAFETY PERSONNEL

The following personnel are responsible for health and safety on site:

Project Manager: Katherine Lista
(609) 588-6345

Delivery Order Manager: Kent Geis
(919) 467-2349

Site Supervisor: Randy Smith (on-site)

Site Safety Officer: Jeff Wynette (on-site)

**Regional Health
and Safety Director:** J. Angelo Liberatore, CIH, CSP
(404-729-3900, Ext. 7671)

Regional Manager: Mike Szomjassy
(404-729-3900)

3.0 JOB HAZARD ANALYSIS

This section discusses concerns to workers on the site.

3.1 CHEMICAL HAZARDS

From 1945 to 1958, the site (Building 712) was used for the storing, handling, and dispensing of various pesticides. Chemicals known to have been used include the following:

Chemical	PEL*/TLV**/REL***
Chlordane	0.5 mg/m ³ *
DDT	0.5 mg/m ³ ***
2,4-D	10 mg/m ³ *
Diazinon	0.1 mg/m ³ **

Chemicals known to have been stored at the site include the following:

Chemical	PEL*/TLV**
Dieldrin	0.25 mg/m ³ **
Lindane	0.5 mg/m ³ **
Malathion	10 mg/m ³ **
2,4,5-T	10 mg/m ³ **
Silvex	No Limit Established

*OSHA Permissible Exposure Limit (PEL)

**American Conference Governmental Industrial Hygienist (ACGIH) Threshold Limit Values (TLVs) 1993-1994

***NIOSH Recommended Exposure Limit (REL)

The most conservative of these published exposure limits has been selected to represent an exposure guideline.

The primary health hazards posed to site personnel during soil removal operations at the site are: airborne particulate contaminants which may be generated in personnel breathing zone; potential for dermal contact with pesticide-contaminated soils; and inadvertent ingestion of pesticide-

contaminated materials through improper personal decontamination and poor personal hygiene practices. Some of the chlorinated pesticides are suspected to cause cancer in humans (i.e., chlordane, DDT and dieldrin) and most are readily absorbed through intact skin with dermal contact. The following is a summary of the health effects and symptoms of overexposure to these chemicals.

Chlordane is a suspected carcinogen which is poisonous by ingestion, and possibly by inhalation. It is readily absorbed through the skin on dermal contact, and overexposure may produce tremors, excitement, loss of muscle coordination (alexia), gastritis, convulsions, and anorexia. Lung, liver, and kidney damage may result from chronic overexposure.

DDT is also a human poison by ingestion and is a known human carcinogen. It is also suspected to be poisonous with dermal contact (skin absorption). Symptoms of overexposure include tremor, dizziness, confusion, headache, fatigue, convulsions and may cause liver and kidney damage.

2,4,-D is a poison suspected to cause cancer in humans which may produce similar symptoms as manifested by overexposure to DDT. DDE is also very irritating to the skin and eyes.

Diazinon is poisonous by ingestion, skin contact and toxic by inhalation. Overexposure may cause changes in motor activity, muscle weakness and profuse sweating. It is very irritating to the skin and eyes.

Dieldrin is a poison also absorbed readily through intact skin which acts as a central nervous system (CNS) stimulant. It is suspected to cause cancer in humans and may accumulate in the body from chronic, low dose exposures. Symptoms of overexposure include those listed for diazinon, as well as nausea, vomiting, convulsions, liver and kidney damage.

Lindane is irritating to the skin, eyes, nose, throat and may also be absorbed through the skin on dermal contact. Symptoms of overexposure include headaches, nausea, respiratory difficulties, cyanosis, muscle spasms, liver and kidney damage.

Malathion is potentially poisonous by inhalation and ingestion causing blood pressure depression, difficulty in breathing, and coma. Symptoms of overexposure include blurred vision, aching of the eyes, pupil contraction, and may cause an allergic sensitization of the skin. Malathion is an organic phosphate cholinesterase inhibitor.

2,4,5-T is a suspected carcinogen and also a poison by ingestion. It may be absorbed through the skin when dermal contact occurs and overexposure may produce signs of intoxication, including weakness, lethargy, anorexia, diarrhea, ventricular fibrillation, and cardiac arrest. Dermal contact produces skin irritation and/or an acne-like skin rash.

Minimal exposure/toxicity data is available for **Silvex (2,4,5-TP)**; however, reported symptoms of overexposure and subsequent health effects are very similar as for most of the previously identified chlorinated pesticides anticipated to be encountered during soil removal operations.

3.2 HAZARD COMMUNICATION

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

- **Material Safety Data Sheets (MSDSs)**

There will be an MSDS located on site for each hazardous chemical known to be used on-site. All MSDSs will be located in Appendix A of the SHSP. The SHSP will be maintained in the project office trailer for the duration of the project.

- **Employee Information and Training**

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

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

- Chemicals and their hazards in the work area
- How to prevent exposure to these hazardous chemicals
- What the company has done to prevent workers' exposure to these chemicals
- Procedures to follow if they are exposed to these chemicals.
- How to read and interpret labels and MSDSs for hazardous substances found on OHM sites
- Emergency spill procedures
- Proper storage and labeling

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

information pertinent to the chemical hazards will be communicated to project personnel.

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

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

3.3 PHYSICAL HAZARDS

There are numerous physical hazards associated with this project which, if not identified and addressed, could present operational problems as well as cause accidents and personal injury to the work force. Hazard identification and mitigation, training, adherence to work rules and careful housekeeping can prevent many problems or accidents arising from physical hazards. The following outlines the major physical hazards and the suggested preventative measures to be followed during this project:

- **Heavy and Bulky Loads**

Intelligent thought shall be exercised before heavy and bulky loads are lifted or handled manually by personnel. Mechanical equipment such as fork-lifts, wheel barrows, hand-trucks, loaders, and cranes shall be utilized when possible and needed. **Note: Back injuries are real, debilitating, unproductive, and costly to both employees and employers, and sometime permanent. Back injury prevention must be given high priority on all project sites. If you think the load you are about to lift is too heavy or bulky, it probably is! Get help or utilize mechanical equipment.**

- **Explosion Hazard**

Flammable materials in confined spaces (i.e., excavation areas) can produce an explosive atmosphere which can be triggered by a spark or other energy source. To prevent this type of accident, the concentration of flammable material in air will be carefully monitored and confined space entry procedures will be followed.

- **Hoisting Accidents**

Employees can have suspended loads dropped on them, be caught behind a load and a stationary object, or be crushed or struck by the counterweight. All hoisting will be done by qualified personnel only after safety checks are made of chokes and cables. In addition, no hoisting will take place without a designated signal man present.

- **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:

- Seat belts,
- 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.

- **Bulk Fuel Storage**

A bulk fuel storage area will be designated for storage of bulk fuels and other flammable materials. The bulk fuel vessels will be grounded with bonding cables attached. The area will be prominently posted as a flammable fuels area and no smoking signs erected. At least one 20-pound dry chemical, ABC-type fire extinguisher will be positioned in this area.

- **High Pressure Washing**

Washing or cleaning certain pieces of equipment may require the use of high pressure washers referred to as lasers. These devices can be hazardous if not used properly. Refer to Appendix B for specific laser safety instructions.

- **Small Quantity Flammable Liquids**

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

- **Electrical Hazards**

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

Electrical devices and equipment must be de-energized prior to working near them. All extension cords must be kept out of water, protected from crushing, and inspected regularly to ensure structural integrity.

Temporary electrical circuits must be protected with ground fault interrupters. Only qualified electricians are authorized to work on electrical circuits.

- **Slip/Trip/Fall Hazards**

Some areas may have wet surfaces which will greatly increase the possibility of inadvertent slips. Caution must be exercised when using steps and stairs due to slippery surfaces in conjunction with fall hazards. Good housekeeping practices are essential to minimize the trip hazards.

- **Ground Personnel**

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

- **Excavations and Trenching**

Excavations and trenching present a special risk to workers due to the hazard of trench wall collapse. If any OHM personnel must enter excavations 5 feet in depth or greater, the sides of the excavation will be sloped 1-1/2:1 (horizontal:vertical) or shored in accordance with 29 CFR 1926.650 through 652.

- **Pumping Equipment**

Various types of pumps may be used for the removal of materials from ditches, ponds, lagoons, etc. The handling of pressurized hoses that could rupture and violently release liquid materials to the work area will be controlled by inspecting all hose fittings for secure connections [all OPW (camlock) and fittings must be secured with the wire]. All employees must wear splash gear including splash shields when moving or disconnecting pumps and hoses.

- **Noise**

Work around large equipment often creates excessive noise. The effects of noise can include:

- Workers being startled, annoyed, or distracted.
- Physical damage to the ear, pain, or temporary and/or permanent hearing loss.
- Communication interference that may increase potential hazards due to the inability to warn of danger and the proper safety precautions to be taken.

If employees are not able to hear normal conversation without shouting, noise levels exceeding 85 dBA are likely and hearing protection is required to be worn. The use of portable power tools and the operation of certain heavy construction equipment (i.e. bulldozers), requires mandatory use of hearing protection. OHM maintains an effective hearing conservation program as described in OSHA Regulation 29 CFR Part 1910.95.

All OHM personnel are familiar with the field activities which will be conducted at the site. They are trained to work safely under various field conditions. In addition, the SS will observe the general work practices of each crew member and equipment operator, and enforce safe procedures to minimize physical hazards. Also, hard hats, safety glasses, and safety boots will be required in all areas of the site. Specific health and safety SOPs that apply to site remedial operations are included in Appendix B.

3.4 ENVIRONMENTAL HAZARDS

3.4.1 Weather and Heat Stress

Due to 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 SOPs for heat stress prevention.

3.5 TASK SPECIFIC RISK ASSESSMENT

Task No. 1:	Mobilization/Site Preparation and Facilities Construction
Hazards:	Slip, trip, fall; Vehicular traffic; Material handling, manual lifting; Heavy equipment operation; Excavation, trenching; Contact with overhead/buried utilities or pipelines; Construction hazards; Electrical hazards (high voltage) during utility installation and power distribution operations
Control Procedures:	Institute traffic control procedures and post directional and speed limit signs; Follow safe material handling and manual lifting procedures; Follow OHM SOP for vehicle and equipment operation and trenching operations; Maintain a 15-foot buffer (bucket swing radius) from all energized overhead lines or de-energize lines within 15 feet of heavy equipment operations; Locate all underground utilities and pipelines prior to initiating excavation, grading, or trenching operations; Electrical installations and power distribution to be performed only

by a qualified electrician; Clearly mark or identify all high voltage lines and equipment with warning signs

- Task No. 2:** Surface Grinding of Concrete Pad
- Hazards:** Hazards associated with operation of grinder; Dust emissions and flying projectiles; Inhalation, dermal contact with contaminated concrete dust; Noise
- Control Procedures:** Follow the OHM SOP for operation of grinding equipment and operate unit in conformance with manufacturer's guidelines; Collect/contain all dust emissions for proper disposal; Monitor dust emissions with mini-ram and institute dust control measures as indicated; Wear Level C protection with tyvek; Wear hearing protection and faceshield when operating grinding unit
-
- Task No. 3:** Concrete Pad Demolition and Loadout
- Hazards:** Refer to Task No. 2 and airborne concrete pieces; Heavy equipment operation; Vehicular traffic
- Control Procedures:** Refer to Task No. 2 and ensure employees wear hard hat when working in the vicinity of demolition operations; Follow OHM SOP for vehicle and equipment inspections and operations; Ground personnel in loadout areas must wear high visibility vests
-
- Task No. 4:** Contaminated Soil Excavation/Confirmation Sampling
- Hazards:** Inhalation, dermal contact hazards; Heavy equipment operation; Material handling; Dust emissions; Excavation/cave-in hazards
- Control Procedures:** Wear Level C protection; Perform real-time air monitoring as stated in air monitoring requirements; Follow OHM SOP for heavy equipment maintenance/inspection and operation; Practice safe material handling procedures; Monitor dust emissions and institute dust control measures as necessary; Follow OHM SOP for excavation operations; Slope/shore excavation sides 1-

1/2:1 (horizontal:vertical) where personnel must enter excavations greater than 5 feet deep; Perform post-excavation side wall and bottom sampling remotely where practical

- Task No. 5:** Contaminated Soil Loadout and Transportation Procedures
- Hazards:** Material handling; Heavy operation; Dust emissions/inhalation hazards; Fuel storage, dispensing hazards; Vehicular traffic; Pressure washer operation and splash hazards when decontaminating trucks prior to departure
- Control Procedures:** Practice safe material handling; Follow OHM SOP for operation of heavy construction equipment; Wear Level C with tyvek for loadout operations; Follow OHM SOP for dispensing/storage of flammable materials; Institute traffic control measures and follow posted speed limits; Ground personnel in vicinity of vehicular traffic must wear high visibility vests; Wear splash shield over respirator face piece when operating pressure washer or working near splash, spill hazards; Follow OHM SOP for operation of high pressure washer
- Task No. 6:** Backfill/Compaction of Excavation
- Hazards:** Inhalation, dermal contact when placing/compacting first lift; Heavy equipment operation; Excavation cave-in; Material handling; Dust emissions
- Control Procedures:** Wear Level C protection when placing first lift of fill; Perform dust emission monitoring and institute dust control measures as indicated; Follow OHM SOP for heavy equipment inspection/maintenance and operation; Practice safe material handling procedures; Ensure excavation sides are sloped 1-1/2:1 (horizontal/vertical) where personnel must enter excavation greater than 5 feet deep

Task No. 7: Equipment Decontamination
Hazards: Slip, trip, fall; Splash; Operation of high pressure washer;
Manual lifting, back strain hazards
Control Procedures: Ensure employees are constantly aware of footing; Wear
Level C with sarans, splash shield over respirator face
piece; Follow OHM SOP for high pressure washer
operations; Practice safe manual lifting techniques;
Employ mechanical lifting when practical

Task No. 8: Site Restoration and Demobilization
Hazards: Refer to Task No. 1
Control Procedures: Refer to Task No. 1

4.0 WORK AND SUPPORT AREAS

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

4.1 EXCLUSION ZONE

The exclusion zone will consist of areas where inhalation, oral contact, or dermal contact with contaminants will be possible. The boundaries of the site exclusion will be marked with flagging, tape, and/or fencing before site operations commence. The location of the site exclusion zone will also be marked on the site map.

4.2 CONTAMINATION-REDUCTION ZONE

The CRZ or transition zone will be established between the exclusion zone and support zone. In this area, personnel will begin the sequential decontamination process required to exit the exclusion zone. To prevent off-site migration of contamination and for personnel accountability, all personnel will enter and exit the exclusion zone through the CRZ. Personnel and equipment decontamination facilities will be located and clearly defined in the CRZ.

4.3 SUPPORT ZONE

The support zone will consist of a clearly marked area where the office and decontamination trailer are located. Smoking and drinking will be allowed only in designated areas. Eating will be allowed in the breakroom only.

4.4 ACCESS CONTROLS

The SSO and the SS shall establish the physical boundaries of each zone and shall instruct all workers and visitors on the limits of the restricted areas. No one shall be allowed to enter the restricted area without the required protective equipment for that area. The SS shall ensure compliance with all restricted area entry and exit procedures.

The SS shall also designate a decontamination point for personnel to exit from the contaminated area and enter into the clean area where personnel may rest and drink.

Visitors will be required to check in immediately upon arrival. Only authorized visitors will be allowed access to the contaminated areas. Each visitor will be required to provide the necessary protective equipment for use during the visits and shall be escorted by the SS while on site. Personal protective equipment designated for use by LANTDIV representatives will be maintained on-site by the SS. All visitors who seek access to the exclusion zone and/or contamination reduction zone, will be required to show proof of completion, as a minimum, the 24-hour training required by OSHA for occasional visits to hazardous waste sites. 24-hour OSHA training is only applicable when visitors are unlikely to be exposed over the permissible exposure limit and published exposure limits and are not required to wear respirators, otherwise 40-hour OSHA training will be required prior to granting access to these site zones.

All visitors, subcontractors and personnel will be required to sign a safety plan acknowledgement sheet to certify that they have read, understand, and will comply with the SHSP. Failure to comply with this site entry procedure will result in expulsion from the site.

5.0 PROTECTIVE EQUIPMENT

This section details the personal protective equipment (PPE) that will be provided and worn by site personnel to protect them against dermal contact and inhalation exposure to hazardous chemicals present on site.

5.1 LEVELS OF PROTECTION

The following levels of protection and accompanying PPE will be used during site operations.

Level C Protection

- Full facepiece air-purifying respirator with combination organic vapor/HEPA cartridges
- Tyvek or saran-coated tyvek coveralls
- Inner latex and outer nitrile/butyl gloves
- Steel toe/shank boots with latex overboots
- Tape overboots and outer gloves to Tyvek
- Hard hat
- Splash protection - as required by task
- Hearing protection - as required by task

Modified Level D Protection

- Tyvek or saran-coated tyvek
- Inner latex and outer nitrile/butyl gloves
- Steel toe/shank boots with latex overboots

- Tape overboots outer gloves to Tyvek
- Hard hat
- Safety glasses with side shields
- Splash protection - as required by task
- Hearing protection - as required by task

Level D Protection

- Coveralls or long pants and long sleeved shirt
- Steel toe/shank boots
- Safety glasses with side shield
- Work gloves - as required by task
- Splash protection - as required by task
- Hearing protection - as required by task

5.2 TASK-SPECIFIC LEVELS OF PROTECTION

The following minimum levels of protection are specified for tasks performed during site operations. Upgrades/downgrades will be based on air monitoring results when compared to the appropriate action level, as detailed in Section 7.0 Air Monitoring.

Task No. 1: Mobilization/Site Preparation
Level of Protection: Level D – site setup surface contaminated areas – Level C with tyvek

- Task No. 2:** Surface Grinding of Concrete
Level of Protection: Level C with tyvek, hearing protection and faceshield
- Task No. 3:** Concrete Slab Demolition and Loadout (Surface Cleaned)
Level of Protection: Modified Level D with tyvek and work gloves
- Task No. 4:** Contaminated Soil Excavation and Confirmation Sampling
Level of Protection: Level C with tyvek
- Task No. 5:** Contaminated Soil Loadout
Level of Protection: Level C with tyvek
- Task No. 6:** Backfill/Compaction Excavation
Level of Protection: First Lift – Level C with tyvek; Remaining Lifts – Level D
- Task No. 7:** Heavy Equipment Decontamination
Level of Protection: Level C with sarans, splash shield over respirator face piece and hearing protection
- Task No. 8:** Site Restoration and Demobilization
Level of Protection: Level D

5.3 RESPIRATOR CARTRIDGES

The crew members working in Level C will wear respirators equipped with Mine Safety Appliance (MSA) GMC-H air purifying cartridges. The GMC-H cartridge holds approval for:

- Organic vapors <1,000 ppm
- Chlorine gas <10 ppm
- Hydrogen chloride <50 ppm
- Sulfur dioxide <50 ppm
- Dusts, fumes and mists with a TWA <0.05 mg/m³
- Asbestos-containing dusts and mists

- Radon daughters
- Radionuclides
- Pesticides

5.4 AIR-PURIFYING RESPIRATORS

OHM's air-purifying respirators for this project will be MSA's ultratwin full facepiece respirator with nose cups. OHM's Respirator Protection Program for air purifying respirators is adhered to on site.

5.5 CARTRIDGE CHANGES

All cartridges will be changed a minimum of once daily. However, water saturation of the HEPA filter or dusty conditions may necessitate more frequent changes. Changes will occur when personnel begin to experience increased inhalation resistance, or breakthrough of a chemical warning property. Chemical warning properties for the contaminants on-site may include skin or eye irritation, any unusual or unpleasant odor, taste or manifestation of the symptoms of overexposure presented in Section 3.1 Chemical Hazards.

5.6 INSPECTION AND CLEANING

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

5.7 FIT TESTING

Annual respirator fit tests are required of all personnel wearing negative pressure respirators. The test will utilize isoamyl acetate or irritant smoke. The fit test must be for the style and size of the respirator to be used.

5.8 FACIAL HAIR

No personnel who have facial hair which interferes with the respirator's sealing surface will be permitted to wear a respirator.

5.9 CORRECTIVE LENSES

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

5.10 CONTACT LENSES

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

5.11 MEDICAL CERTIFICATION

Only workers who have been certified by a physician as being physically capable of respirator usage will be issued a respirator.

6.0 DECONTAMINATION PROCEDURES

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

6.1 PERSONNEL DECONTAMINATION

Decontamination of personnel shall be accomplished to ensure that any material, which personnel may have contacted in the hot zone, is removed in the contamination-reduction zone. Decontamination of personnel exiting the exclusion zone will utilize the following steps for Level C/Modified Level D personnel decontamination:

- Step 1: Equipment/backpack/egress system drop
- Step 2: Scrub outer boots and gloves with a detergent-water solution.
- Step 3: Remove tape and discard.
- Step 4: Remove and discard outer boots and gloves.
- Step 5: Remove hard hat and wipe clean.
- Step 6: Remove chemical protective clothing (Tyvek/sarans) and discard into plastic garbage bags.
- Step 7: Remove respirator/facepiece (Levels C only) and suitably store while on breaks and during lunch. At the end of shift, discard the cartridges into 55-gallon drum, then clean, disinfect, rinse and air dry the respirator.
- Step 8: Discard inner gloves into 55-gallon trash drum.
- Step 9: Depart transition zone in work clothes and boots.

- Step 10: Wash hands, face and neck before breaks and lunch.

6.2 SUSPECTED CONTAMINATION

Any employee suspected of sustaining skin contact with chemical materials will first use the emergency shower. Following a thorough drenching, the worker will proceed to the decontamination facility. Here the worker will remove clothing, shower, don clean clothing, and immediately be taken to the First Aid Station.

6.3 PERSONAL HYGIENE

Before any eating, smoking, or drinking, personnel will wash hands, arms, neck and face. To promote personal hygiene and to control personnel exposure to contaminants, project-issued work coveralls worn under chemical protective clothing will remain at the job site and will be laundered at regular intervals during the course of the project.

6.4 OTHER DECONTAMINATION PROCEDURES

All disposable items (i.e., protective clothing) or other items which cannot be adequately decontaminated (i.e., miscellaneous sampling equipment) will be disposed of in accordance with EPA requirements.

6.5 VEHICLE AND HEAVY EQUIPMENT DECONTAMINATION

Gross contamination (soil, mud) will be removed from the heavy equipment prior to exiting the exclusion zone. Heavy equipment will be decontaminated using the high-pressure washer until all visible contamination is removed. Those parts of the equipment that come into direct contact with contaminated materials (i.e., buckets, tires, tracks) will receive special attention.

Decontamination solutions, soil, mud, etc., removed with the high pressure washer will be collected, placed into containers and disposed of according to EPA requirements.

7.0 AIR MONITORING

Air monitoring will be conducted in order to determine airborne contamination levels. This ensures that respiratory protection is adequate to protect personnel against the chemicals that are encountered.

The following chart describes the air monitoring required and appropriate action levels. Additional air monitoring may be conducted at the discretion of the SSO.

Monitoring Device	Monitoring Frequency	Action Level	Action
LEL/O ₂ (excavation area)	At start-up and four times daily when excavating and loading	>10% LEL	Stop operations; allow vapors to vent to <10% LEL before continuing
PID (Breathing Zones)	At start-up and four times daily when excavating and loading	>1 ppm for 5 min. >50 ppm for 5 min.	Upgrade to Level C Shut-down operations, allow vapors to dissipate to <50 ppm before continuing
Miniram (Breathing Zones)	At start-up and four times daily when concrete grinding, excavation and loadout operations	>1 mg/m ³ >2.5 mg/m ³	Upgrade to Level C protection Institute dust control measures until <1 mg/m ³ and perform work area perimeter monitoring
Miniram (Work Area Perimeter)	When breathing zone readings exceed 2.5 mg/m ³	>1 mg/m ³	Institute dust control measures until <1 mg/m ³

The above LEL action level only applies to LEL readings obtained in an area where flammable/explosive vapors may be present, personnel entry into the area will not occur. The confined space entry LEL and oxygen action levels for personnel entry into a confined space are 0% LEL and 20.9% oxygen, with LEL/oxygen readings taken at representative locations inside the space.

7.1 LOWER EXPLOSIVE LIMIT/OXYGEN METER

Prior to entering a confined space area, LEL/O₂ measurements must be obtained. All such permitted work will be performed in accordance with MCB Camp Lejeune and OHM SOPs. LEL monitoring will be conducted at each excavation when personnel entry is required for sampling of contaminated excavations on-site.

7.2 PHOTOIONIZATION DETECTOR (PID)

A 10.2eV PID will be used to monitor total organic contaminants in ambient air. A PID will prove useful as a direct reading instrument which will aid in determining if respiratory protection needs to be worn (Level C) or upgraded to Level B and to indicate if the exclusion zone encompasses the required areas. PID monitoring will be performed in personnel breathing zone during site operations to document that the proper level of protection is worn by site personnel. Action limits with required actions to be taken are provided in the chart on page 7.1.

The SSO will take measurements before operations begin in an area to determine the amount of volatile organic compounds (VOCs) naturally occurring in the air. This is referred to as a background level. The PID breathing zone action level only applies to PID readings above background (i.e. 1 ppm for 5 minutes above background).

7.3 REAL-TIME AEROSOL MONITOR (MINIRAM)

A real-time aerosol monitor (miniram) will be used to measure airborne particulate in personnel breathing zones and site work area locations. A breathing zone action level has been specified that requires upgrading to Level C protection based on sustained (5-minute average) miniram results. The miniram will be used to monitor personnel breathing zones when wearing Modified Level D protection and to determine when an upgrade to Level C is warranted.

7.4 AIR SAMPLING AND ANALYSIS

Personal air samples will be collected in personnel breathing zones to document that the appropriate level of protection was worn during remedial actions on-site. Air samples will be collected on personnel with the greatest potential for exposure during each major project phase. Personnel breathing zone samples will be collected during each major phase of remedial activities including contaminated soil excavation and loadout activities. It is anticipated that two to three personal air samples will be collected on crew members during site remedial activities on at least two separate occasions.

Air samples will be collected in accordance with NIOSH Method 5503 for chlorodiphenyls and analyzed in accordance with EPA Method 8080 for organo chlorine pesticides. Air samples will be analyzed by an AIHA accredited laboratory.

7.5 AIR MONITORING LOG

The SSO will ensure that all air-monitoring data is logged into a monitoring notebook. Data will include instrument used, instrument reading, location, type of reading (breathing zone or work area perimeter) and site operations being performed. The Regional and Corporate OHM CIH will periodically review this data.

7.6 CALIBRATION REQUIREMENTS

The PID, LEL/O₂ meter, miniram and air sampling pumps will be calibrated daily prior to use, in accordance with the manufacturer's procedures. A separate log will be kept detailing date, time span, gas, or other standard, and name of person performing the calibration.

7.7 AIR MONITORING RESULTS

Air sampling analytical results will be posted for personnel inspection, and direct reading air monitoring results will be discussed during morning safety meetings.

8.0 EMERGENCY RESPONSE

Prior to field activities, the SS shall plan emergency egress routes and discuss them with all personnel who will be conducting the field work. Initial planning includes establishing emergency warning signals and evacuation routes in case of an emergency.

8.1 EMERGENCY SERVICES

A tested system shall exist for rapid and clear distress communication. All personnel shall be provided concise and clear directions and accessible transportation to local emergency services. A map outlining directions to the nearest hospital will be posted on-site. A copy of Table 8.1 will be posted near the telephone in each trailer on-site.

The following emergency equipment shall be present on the site:

- Fire extinguishers (minimum 20-lb. A/B/C)
- Industrial first aid kit
- Portable eye wash/emergency shower

8.2 EMERGENCY EVACUATION FROM EXCLUSION AND CONTAMINATION-REDUCTION ZONES

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

If decontamination can be performed:

- Wash external clothing and cut it away.

If decontamination cannot be performed:

- Wrap the victim in blankets or plastic to reduce contamination of other personnel.
- Alert emergency and off-site medical personnel to potential contamination; instruct them about specific decontamination procedures.
- Send along site personnel familiar with the incident.

8.3 FIRST AID

Only qualified personnel shall give first aid and stabilize an individual needing assistance. At least two persons trained and certified in First Aid/CPR will be present on-site at all times during remedial actions. Life support techniques such as CPR and treatment of life threatening problems, such as airway obstruction and shock will be given top priority. Professional medical assistance shall be obtained at the earliest possible opportunity.

To provide first-line assistance to field personnel in the case of sickness or injury, the following items will be immediately available:

- First aid kit
- Portable emergency eye wash
- Supply of clean water

8.4 EMERGENCY ACTIONS

If actual or suspected serious injury occurs, these steps shall be followed:

- Remove the exposed or injured person(s) from immediate danger.

- Render first aid if necessary. Decontaminate affected personnel after critical first aid given.
- 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 to a safe distance until the site supervisor determines that it is safe for work to resume. If there is any doubt regarding the condition of the area, work shall not commence until all hazard control issues are resolved.
- Notify MCB Camp Lejeune RIOCC Office (Lt. Steve Challeen, (910) 451-2583) and LANTDIV representative Linda Berry, (804) 322-4793.

8.5 GENERAL EVACUATION PLAN

The SS will act as the OHM Emergency Coordinator in the event of an evacuation. In the general case of a large fire, explosion, or toxic vapor release, a site evacuation shall be ordered and shall follow these steps:

- Sound the applicable alarm and advise client representative.
- Evaluate the immediate situation and downwind direction. All personnel will evacuate in the upwind direction.
- All personnel will assemble in an upwind area when the situation permits, a head count will be taken by the SS or his designee.
- The SS will determine the extent of the problem and identify the corrective measures to be implemented. The SS will instruct and dispatch a response team in protective clothing and self-contained breathing apparatus on site to evacuate any missing personnel or to correct the problem. The response team will be selected based on the nature of the emergency and the level of personnel qualifications (e.g., 8-hour supervisory training, first aid/CPR certification or other specialized skills).

- Notify MCB Camp Lejeune RIOCC Office (Lt. Steve Challeen, (910) 451-2583) and LANTDIV representative Linda Berry, (804) 322-4793.

8.6 SPILL CONTROL

Spill control throughout the project will be achieved on an ongoing basis through the processing plan of operation and the design of facilities and equipment. Spill control measures will be in effect in all areas of ongoing operations.

Primary spill control operations will include a system of temporary dikes and sand bag berms in all areas of operation. The containment dikes will be erected around those operations where a spill potential exists. The containment dikes will be set up to avert run-on from work areas as well as contain any materials released inside the work area.

Gasoline and diesel fuels, bulk lubricants, and waste oils will be stored in clearly marked areas dedicated for this purpose. Storage will be skid-mounted above-ground steel tanks or 55-gallon drums as appropriate. Storage units will be located in areas away from routine traffic patterns to prevent accidental damage. Each storage area will be underlined with an impermeable liner and surrounded by a containment berm.

Table 8.1
Emergency Phone Numbers

Ambulance Phone Number: on base: 911 off base: 455-9119

Hospital: Onslow County Memorial Hospital, 317 Western Boulevard
Jackson, North Carolina

Hospital Phone Number: on base: (919) 577-2240 off base: (919) 577-2240

Fire Department: 911 _____

Police: 911 or (910) 451-3855

Poison Control: 800-382-9097

Route to hospital:

1. Proceed north on Holcomb Boulevard and exit MCB Camp Lejeune through the main gate.
2. Follow Highway 24 West (approximately 2.5 miles) to Western Boulevard and turn right (north).
3. Continue on Western Boulevard (approximately 1.5 miles) to the fifth stoplight and the hospital is on the left side of the street.
4. Follow signs to the Emergency Room entrance.

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

9.0 TRAINING REQUIREMENTS

As a prerequisite to employment at OHM, all field employees are required to take a 40-hour training class and pass a written examination. This training is comprehensive and covers all forms of personal protective equipment. In addition, this course covers the toxicological effects of various chemicals including nerve agents, handling of unknown tanks, drums and confined space entering procedures and electrical safety. This course is in full compliance with OSHA requirements in 29 CFR 1910.120(e).

OHM has developed and implemented a Bloodborne Pathogen Exposure Control Plan which meets the OSHA requirements set forth in 29 CFR 1910.1030. An OHM field personnel hired after January, 1992, must receive this training as part of the required 40-hour training. Field personnel hired prior to January, 1992, received the training in an OHM 8-hour annual refresher training course. A copy of the OHM Bloodborne Pathogen Exposure Control Plan will be maintained in the office trailer on-site.

All personnel entering the exclusion zone will be trained in the provisions of this site safety plan and will be required to sign the SHSP, acknowledgement which is included as Appendix C. OHM has a full-time training department which, in addition to providing in-house training, has assisted Federal OSHA and USEPA in developing training program requirements.

Personnel training files for all OHM personnel are maintained at the employees' home-base division office. On long-term remediation projects where the Regional Health and Safety Director or the LANTDIV representative deems necessary, the following documentation will be required on-site for all personnel entering the exclusion zone:

- 40-hour training
- 8-hour annual refresher training
- Annual fit test record
- 8-hour supervisor training (supervisory personnel only)
- First aid/CPR training as applicable

OHM subcontractors, who will be working in the site exclusion zone, will be required to certify, in writing, that their employees have been trained in accordance with 29 CFR 1910.120(e).

10.0 MEDICAL SURVEILLANCE PROGRAM

All OHM personnel participate in a medical and health monitoring program that meets the requirements of 29CFR1910.120 and ANSI Z-88.2. This program is initiated when the employee starts work with a complete physical and medical history and is continued on a regular basis. A listing of OHM's worker medical profile is shown below. There are no additional medical testing anticipated to be performed on project personnel. This program was developed in conjunction with a licensed physician who is certified in Occupational Medicine by the American Board of Preventive Medicine and consultant toxicologist. Other medical consultants are retained when additional expertise is required.

OHM subcontractors, who will be working in the site exclusion zone, will be required to certify, in writing, that their employees have been medically qualified to perform hazardous waste operations in accordance with 29CFR1910.120(f).

Table 10.1
Worker Medical Profile

Item	Initial	Annual
Medical History	√	√
Work History	√	√
Visual Acuity and Tonometry	√	√
Pulmonary Function Tests	√	√
Physical Examination	√	√
Audiometry Tests	√	√
Chest X-ray	√	√
Electrocardiogram/Stress Test (based on age)	√	√
Complete Blood Counts	√	√
Blood Chemistry (SMAC-23)	√	√
Complete Urinalysis	√	√
Dermatology Exam	√	√

APPENDIX A

MATERIAL SAFETY DATA SHEETS

Alconox	Isobutylene
Anti-fog liquid	Lindane
Bleach	Malathion
Chlordane	Methane
Compressed air	Motor oil
DDT	Pentane
2,4-D	Silvex
Diazinon	2,4,5-T
Dieldrin	Trisodium phosphate (detergent)
Diesel fuel	Unleaded gasoline
Grease	WD-40
Hydrogen	

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/Identify 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 ₂ O = 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 INTERSPERED WITH CREAM 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**

Section V — Reactivity Data

Stability	Unstable		Conditions to Avoid NONE
	Stable	XX	

Incompatibility (Materials to Avoid) **AVOID STRONG ACIDS**

Hazardous Decomposition or Byproducts **MAY RELEASE CO₂ GAS ON BURNING**

Hazardous Polymerization	May Occur		Conditions to Avoid 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 **YES-FLUSH WITH PLENTY OF WATER FOR 15 MINUTES. SKIN-FLUSH WITH PLENTY OF WATER. INGESTION-DRINK LARGE QUANTITIES OF WATER, GET MEDICAL ATTENTION FOR DISCOMFORT.**

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		Special	N.A.
	Mechanical (General)	NORMAL	Other	N.A.

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

Other Protective Clothing or Equipment **NOT REQUIRED**

Work/Hygiene Practices **NO SPECIAL PRACTICES REQUIRED**

MATERIAL SAFETY DATA SHEET

IDENTITY: SIGHT SAVERS brand ANTI-FOG LIQUID

CATALOG #24, 25, 68, 69, 8565, 8570, 143060, 3569, 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

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

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

Appearance and Odor: Purple liquid, odor of rubbing alcohol

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 171.3, 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: *[Signature]*

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

Material Safety Data Sheet

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 glassful 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 CSHA 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 use, 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

CHLORDANE

CDN

Common Synonyms Chlordan 1,2,4,5,6,7,8-octachloro-2,3,3a,4,7,7a-hexahydro-4,7-methanonindene Toxichlor, Octa-klor Velsicol 1068		Liquid Sinks in water.	Brown	Sharp odor
AVOID CONTACT WITH LIQUID. KEEP PEOPLE AWAY. Wear goggles, self-contained breathing apparatus, and rubber overclothing (including gloves). Stop discharge if possible. Call fire department. Isolate and remove discharged material. Notify local health and pollution control agencies.				
Fire		Not flammable but solution may be combustible. POISONOUS GASES MAY BE PRODUCED IN FIRE. Extinguish with dry chemicals, foam or carbon dioxide. Water may be ineffective on fire. Cool exposed containers with water.		
Exposure		CALL FOR MEDICAL AID. LIQUID OR SOLUTION POISONOUS IF SWALLOWED OR IF SKIN IS EXPOSED. Irritating to skin and eyes Remove contaminated clothing and shoes. Flush affected areas with plenty of water. DO NOT RUB AFFECTED AREAS. IF IN EYES, hold eyelids open and flush with plenty of water. IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk and have victim induce vomiting. IF SWALLOWED and victim is UNCONSCIOUS OR HAVING CONVULSIONS, do nothing except keep victim warm.		
Water Pollution		HARMFUL TO AQUATIC LIFE IN VERY LOW CONCENTRATIONS. May be dangerous if it enters water intakes. Notify local health and wildlife officials. Notify operators of nearby water intakes.		
1. RESPONSE TO DISCHARGE (See Response Methods Handbook) Issue warning-poison Restrict access Should be removed Chemical and physical treatment		2. LABEL 2.1 Category: None 2.2 Class: Not pertinent		
3. CHEMICAL DESIGNATIONS 3.1 CG Compatibility Class: Not listed 3.2 Formula: C ₁₀ H ₆ Cl ₈ 3.3 IMO/UN Designation: 6.1/2762 3.4 DOT ID No.: 2762 3.5 CAS Registry No.: 57-74-9		4. OBSERVABLE CHARACTERISTICS 4.1 Physical State (as shipped): Liquid 4.2 Color: Brown 4.3 Odor: Penetrating; aromatic; slightly pungent, like chlorine		
5. HEALTH HAZARDS 5.1 Personal Protective Equipment: Respirator for sprays, fogs, or dust; goggles; rubber gloves. 5.2 Symptoms Following Exposure: Moderately irritating to eyes and skin. Ingestion, absorption through skin, or inhalation of mist or dust may cause excitability, convulsions, nausea, vomiting, diarrhea, and some local irritation of the gastrointestinal tract. 5.3 Treatment of Exposure: INHALATION: administer oxygen and give fluid therapy; do not give epinephrine, since it may induce ventricular fibrillation; enforce complete rest. EYES: flush with water for at least 15 min. SKIN: wash off skin with adequate quantities of soap and water; do NOT scrub. INGESTION: induce vomiting and follow with gastric lavage and administration of saline cathartics; ether and barbiturates may be used to control convulsions; oxygen and fluid therapy are also recommended; do NOT give epinephrine. Since no specific antidotes are known, symptomatic therapy must be accompanied by complete rest. 5.4 Threshold Limit Value: 0.5 mg/m ³ 5.5 Short Term Inhalation Limits: 2 mg/m ³ for 30 min. 5.6 Toxicity by Ingestion: Grade 3; oral LD ₅₀ = 263 mg/kg (rat) 5.7 Late Toxicity: Possible liver damage; loss of appetite and weight. 5.8 Vapor (Gas) Irritant Characteristics: Data not available 5.9 Liquid or Solid Irritant Characteristics: Data not available 5.10 Odor Threshold: Data not available 5.11 IDLH Value: 500 mg/m ³				

6. FIRE HAZARDS 6.1 Flash Point: Solution: 225°F O.C.: 132°F C.C. Solid is not flammable. 6.2 Flammable Limits in Air: 0.7%-5% (kerosene solution) 6.3 Fire Extinguishing Agents: Dry chemical, foam, carbon dioxide 6.4 Fire Extinguishing Agents Not to be Used: Water may be ineffective on solution fire. 6.5 Special Hazards of Combustion Products: Irritating and toxic hydrogen chloride and phosgene gases may be formed when kerosene solution of compound burns. 6.6 Behavior in Fire: Not pertinent 6.7 Ignition Temperature: 410°F (kerosene solvent) 6.8 Electrical Hazard: Data not available 6.9 Burning Rate: Not pertinent (Continued)		10. HAZARD ASSESSMENT CODE (See Hazard Assessment Handbook) A-X-Y	
7. CHEMICAL REACTIVITY 7.1 Reactivity With Water: No reaction 7.2 Reactivity with Common Materials: No reaction 7.3 Stability During Transport: Stable to 180°F 7.4 Neutralizing Agents for Acids and Caustics: Not pertinent 7.5 Polymerization: Not pertinent 7.6 Inhibitor of Polymerization: Not pertinent 7.7 Molar Ratio (Reactant to Product): Data not available 7.8 Reactivity Group: Data not available		11. HAZARD CLASSIFICATIONS 11.1 Code of Federal Regulations: Combustible liquid 11.2 NAS Hazard Rating for Bulk Water Transportation: Not listed 11.3 NFPA Hazard Classification: Not listed	
8. WATER POLLUTION 8.1 Aquatic Toxicity: 0.5 ppm/96 hr/goldfish/TL ₅₀ /fresh water 8.2 Waterfowl Toxicity: LD ₅₀ = 1,200 mg/kg Data not available 8.3 Biological Oxygen Demand (BOD): Data not available 8.4 Food Chain Concentration Potential: High		12. PHYSICAL AND CHEMICAL PROPERTIES 12.1 Physical State at 15°C and 1 atm: Liquid 12.2 Molecular Weight: 409.8 12.3 Boiling Point at 1 atm: Decomposes 12.4 Freezing Point: Not pertinent 12.5 Critical Temperature: Not pertinent 12.6 Critical Pressure: Not pertinent 12.7 Specific Gravity: 1.6 at 25°C (liquid) 12.8 Liquid Surface Tension: (est.) 25 dynes/cm = 0.025 N/m at 20°C 12.9 Liquid Water Interfacial Tension: (est.) 50 dynes/cm = 0.05 N/m at 20°C 12.10 Vapor (Gas) Specific Gravity: Not pertinent 12.11 Ratio of Specific Heats of Vapor (Gas): Not pertinent 12.12 Latent Heat of Vaporization: Not pertinent 12.13 Heat of Combustion: (est.) -4,000 Btu/lb = -2,200 cal/g = -93 X 10 ⁴ J/kg 12.14 Heat of Decomposition: Not pertinent 12.15 Heat of Solution: Not pertinent 12.16 Heat of Polymerization: Not pertinent 12.25 Heat of Fusion: Data not available 12.26 Limiting Value: Data not available 12.27 Reid Vapor Pressure: Data not available *Properties refer to undiluted, technical-grade chlordane.	
9. SHIPPING INFORMATION 9.1 Grades of Purity: Technical. A variety of dusts, powders, and solutions in kerosene containing 2-80% chlordane are shipped. 9.2 Storage Temperature: Ambient 9.3 Inert Atmosphere: No requirement 9.4 Venting: Open (flame arrester)		6. FIRE HAZARDS (Continued) 6.10 Adiabatic Flame Temperature: Data not available 6.11 Stoichiometric Air to Fuel Ratio: Data not available 6.12 Flame Temperature: Data not available	

CDN	CHLORDANE
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12.17 SATURATED LIQUID DENSITY		12.18 LIQUID HEAT CAPACITY		12.19 LIQUID THERMAL CONDUCTIVITY		12.20 LIQUID VISCOSITY	
Temperature (degrees F)	Pounds per cubic foot (estimate)	Temperature (degrees F)	British thermal unit per pound-F (estimate)	Temperature (degrees F)	British thermal unit-inch per hour- square foot-F (estimate)	Temperature (degrees F)	Centipoise (estimate)
52	100.400	60	.300	60	1.209	130	58.980
54	100.400	61	.300	61	1.209	140	51.140
56	100.299	62	.300	62	1.209	150	44.560
58	100.200	63	.300	63	1.209	160	38.990
60	100.200	64	.300	64	1.209	170	34.270
62	100.099	65	.300	65	1.209	180	30.240
64	100.000	66	.300	66	1.209	190	26.780
66	99.940	67	.300	67	1.209	200	23.810
68	99.879	68	.300	68	1.209	210	21.240
70	99.809	69	.300	69	1.209	220	19.020
72	99.740	70	.300	70	1.209	230	17.080
74	99.669	71	.300	71	1.209	240	15.390
76	99.599	72	.300	72	1.209	250	13.900
78	99.530	73	.300	73	1.209	260	12.590
80	99.459	74	.300	74	1.209	270	11.440
82	99.389	75	.300	75	1.209	280	10.420
84	99.320	76	.300	76	1.209	290	9.518
86	99.250	77	.300	77	1.209	300	8.710

12.21 SOLUBILITY IN WATER		12.22 SATURATED VAPOR PRESSURE		12.23 SATURATED VAPOR DENSITY		12.24 IDEAL GAS HEAT CAPACITY	
Temperature (degrees F)	Pounds per 100 pounds of water	Temperature (degrees F)	Pounds per square inch	Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F
	I	215	.000	215	.00001		N
	N	220	.000	220	.00001		O
	S	225	.000	225	.00002		T
	O	230	.000	230	.00002		P
	L	235	.001	235	.00003		E
	U	240	.001	240	.00005		R
	B	245	.001	245	.00007		T
	L	250	.002	250	.00009		I
	E	255	.002	255	.00012		N
		260	.003	260	.00017		E
		265	.004	265	.00023		R
		270	.006	270	.00031		T
		275	.008	275	.00042		I
		280	.011	280	.00056		N
		285	.015	285	.00074		E
		290	.019	290	.00099		R
		295	.026	295	.00131		T
		300	.035	300	.00174		I
		305	.046	305	.00228		N
		310	.060	310	.00300		E
		315	.079	315	.00391		R
		320	.104	320	.00510		T
		325	.136	325	.00662		I
		330	.177	330	.00856		N
		335	.230	335	.01104		E
		340	.297	340	.01418		R



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

Telephone
(216) 642-6600

MATERIAL
SAFETY
DATA SHEET

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

HEALTH HAZARD DATA

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

Information contained in this material safety data sheet is offered without charge for use by technically qualified personnel at their discretion and risk. All statements, technical information and recommendations contained herein are based on tests and data which we believe to be reliable, but the accuracy or completeness thereof is not guaranteed and no warranty of any kind is made with respect thereto. This information is not intended as a license to operate under or a recommendation to practice or infringe any patent of this Company or others covering any process, composition 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 Unstable	CONDITIONS TO AVOID	
Stable	X	N/A
INCOMPATIBILITY (Materials to avoid) None		
HAZARDOUS DECOMPOSITION PRODUCTS None		
HAZARDOUS POLYMERIZATION May Occur	CONDITIONS TO AVOID	
Will Not Occur	X	N/A

SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

N/A

WASTE DISPOSAL METHOD

N/A

RESPIRATORY PROTECTION (Specify type) N/A			
VENTILATION N/A	LOCAL EXHAUST	N/A	SPECIAL N/A
	MECHANICAL (Gen.)	N/A	OTHER N/A
PROTECTIVE GLOVES Any material			
EYE PROTECTION Safety goggles or glasses			
OTHER PROTECTIVE EQUIPMENT Safety shoes			

SPECIAL PRECAUTIONS*

SPECIAL LABELING INFORMATION

DOT Shipping Name: Air, compressed DOT Hazard Class: Nonflammable gas
 DOT Shipping Label: Nonflammable gas I.D. No.: UN 1002

SPECIAL HANDLING RECOMMENDATIONS

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

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

SPECIAL STORAGE RECOMMENDATIONS

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

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

SPECIAL PACKAGING RECOMMENDATIONS

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

OTHER RECOMMENDATIONS OR PRECAUTIONS

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

CHEMICAL FORMULA: (Continued)

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

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

*Concentrations may have slight variations.

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

DDT

DDT

<p>Common Synonyms Dichlorodiphenyltrichloroethane p, p' - DDT 1, 1, 1-Trichloro-2, 2-bis(p-chlorophenyl) ethane</p>	<p>Solid</p> <p>Sinks in water.</p>	<p>Colorless</p>	<p>Odorless</p>
<p>Avoid contact with solid. Call fire department. Isolate and remove discharged material. Notify local health and pollution control agencies.</p>			
Fire	<p>Combustible. POISONOUS GASES ARE PRODUCED IN FIRE. Wear goggles and self-contained breathing apparatus. Extinguish with water, dry chemical, foam, or carbon dioxide.</p>		
Exposure	<p>CALL FOR MEDICAL AID.</p> <p>SOLIDS Irritating to skin and eyes. If swallowed, will cause nausea, vomiting, headache, or loss of consciousness. Remove contaminated clothing and shoes. Flush affected areas with plenty of water. IF IN EYES, hold eyelids open and flush with plenty of water. IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk.</p>		
Water Pollution	<p>HARMFUL TO AQUATIC LIFE IN VERY LOW CONCENTRATIONS. May be dangerous if it enters water intakes. Notify local health and wildlife officials. Notify operators of nearby water intakes.</p>		
<p>1. RESPONSE TO DISCHARGE (See Response Methods Handbook) Issue warning-water contaminant Should be removed</p>	<p>2. LABEL</p> <p>2.1 Category: None 2.2 Class: Not pertinent</p>		
<p>3. CHEMICAL DESIGNATIONS</p> <p>3.1 CG Compatibility Class: Not listed 3.2 Formula: $(p\text{-ClC}_6\text{H}_4)_2\text{CHCl}_2$ 3.3 IMO/UN Designation: 9/2781 3.4 DOT ID No.: 2781 3.5 CAS Registry No.: 50-29-3</p>	<p>4. OBSERVABLE CHARACTERISTICS</p> <p>4.1 Physical State (as shipped): Solid 4.2 Color: White 4.3 Odor: None</p>		
<p>5. HEALTH HAZARDS</p>			
<p>5.1 Personal Protective Equipment: Data not available 5.2 Symptoms Following Exposure: Very large doses are followed promptly by vomiting, due to local gastric irritation; delayed emesis or diarrhea may occur. With smaller doses, symptoms usually appear 2-3 hours after ingestion. These include tingling of lips, tongue, and face; malaise, headache, sore throat, fatigue, coarse tremors of neck, head, and eyelids; apprehension, ataxia, and confusion. Convulsions may alternate with periods of coma and partial paralysis. Vital signs are essentially normal, but in severe poisoning the pulse may be irregular and abnormally slow; ventricular fibrillation and sudden death may occur at any time during acute phase. Pulmonary edema usually indicates solvent intoxication. 5.3 Treatment of Exposure: INGESTION: treatment should be done by a physician. It usually includes gastric lavage and administration of saline cathartic, phenobarbital, and parenteral fluids. Patient should be kept quiet and under observation for at least 24 hours. 5.4 Threshold Limit Value: 1 mg/m³ 5.5 Short Term Inhalation Limits: 3 mg/m³ 5.6 Toxicity by Ingestion: Grade 3; LD₅₀ = 50 to 500 mg/kg (rat) 5.7 Late Toxicity: Data not available 5.8 Vapor (Gas) Irritant Characteristics: Not pertinent 5.9 Liquid or Solid Irritant Characteristics: Minimum hazard. If spilled on clothing and allowed to remain, may cause smearing and reddening of the skin. 5.10 Odor Threshold: Not pertinent 5.11 IDLH Value: Data not available</p>			

<p>6. FIRE HAZARDS</p> <p>6.1 Flash Point: 162°F-171°F C.C. 6.2 Flammable Limits in Air: Not pertinent 6.3 Fire Extinguishing Agents: Water, foam, dry chemical, or carbon dioxide 6.4 Fire Extinguishing Agents Not to be Used: Not pertinent 6.5 Special Hazards of Combustion Products: Toxic and irritating gases may be generated 6.6 Behavior in Fire: Melts and burns 6.7 Ignition Temperature: Data not available 6.8 Electrical Hazard: Not pertinent 6.9 Burning Rate: Data not available 6.10 Adiabatic Flame Temperature: Data not available 6.11 Stoichiometric Air to Fuel Ratio: Data not available 6.12 Flame Temperature: Data not available</p>	<p>10. HAZARD ASSESSMENT CODE (See Hazard Assessment Handbook)</p> <p style="text-align: center;">II</p>
<p>7. CHEMICAL REACTIVITY</p> <p>7.1 Reactivity With Water: No reaction 7.2 Reactivity with Common Materials: No reaction 7.3 Stability During Transport: Stable 7.4 Neutralizing Agents for Acids and Caustics: Not pertinent 7.5 Polymerization: Not pertinent 7.6 Inhibitor of Polymerization: Not pertinent 7.7 Molar Ratio (Reactant to Product): Data not available 7.8 Reactivity Group: Data not available</p>	<p>11. HAZARD CLASSIFICATIONS</p> <p>11.1 Code of Federal Regulations: ORM-A 11.2 NAB Hazard Rating for Bulk Water Transportation: Not listed 11.3 NFPA Hazard Classification: Not listed</p>
<p>8. WATER POLLUTION</p> <p>8.1 Aquatic Toxicity: 0.0039 ppm/24 hr/bass/TL₅₀/fresh water 0.0018 ppm/96 hr/bass/TL₅₀/fresh water 0.0028 ppm/48 hr/killfish/50% kill/salt water 8.2 Waterfowl Toxicity: 2240 mg/kg 8.3 Biological Oxygen Demand (BOD): Not pertinent 8.4 Food Chain Concentration Potential: High</p>	<p>12. PHYSICAL AND CHEMICAL PROPERTIES</p> <p>12.1 Physical State at 15°C and 1 atm: Solid 12.2 Molecular Weight: 354.5 12.3 Boiling Point at 1 atm: Not pertinent 12.4 Freezing Point: 226°F = 108°C = 381°K 12.5 Critical Temperature: Not pertinent 12.6 Critical Pressure: Not pertinent 12.7 Specific Gravity: 1.56 at 15°C (solid) 12.8 Liquid Surface Tension: Not pertinent 12.9 Liquid Water Interfacial Tension: Not pertinent 12.10 Vapor (Gas) Specific Gravity: Not pertinent 12.11 Ratio of Specific Heats of Vapor (Gas): Not pertinent 12.12 Latent Heat of Vaporization: Not pertinent 12.13 Heat of Combustion: Not pertinent 12.14 Heat of Decomposition: Not pertinent 12.15 Heat of Solution: Not pertinent 12.16 Heat of Polymerization: Not pertinent 12.25 Heat of Fusion: Data not available 12.26 Limiting Value: Data not available 12.27 Reid Vapor Pressure: Data not available</p>
<p>9. SHIPPING INFORMATION</p> <p>9.1 Grades of Purity: Technical 9.2 Storage Temperature: Data not available 9.3 Inert Atmosphere: Data not available 9.4 Venting: Data not available</p>	
<p>NOTES</p>	

DDT	DDT
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12.17 SATURATED LIQUID DENSITY		12.18 LIQUID HEAT CAPACITY		12.19 LIQUID THERMAL CONDUCTIVITY		12.20 LIQUID VISCOSITY	
Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F	Temperature (degrees F)	British thermal unit-inch per hour- square foot-F	Temperature (degrees F)	Centipoise
	N O T P E R T I N E N T		N O T P E R T I N E N T		N O T P E R T I N E N T		N O T P E R T I N E N T

12.21 SOLUBILITY IN WATER		12.22 SATURATED VAPOR PRESSURE		12.23 SATURATED VAPOR DENSITY		12.24 IDEAL GAS HEAT CAPACITY	
Temperature (degrees F)	Pounds per 100 pounds of water	Temperature (degrees F)	Pounds per square inch	Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F
	I N S O L U B L E		N O T P E R T I N E N T		N O T P E R T I N E N T		N O T P E R T I N E N T

2, 4-D ESTERS

DES

<p>Common Synonyms Butyl 2,4-Dichlorophenoxyacetate Isopropyl 2, 4-dichlorophenoxyacetate 2, 4-Dichlorophenoxyacetic acid, butoxyethyl ester</p>		<p>Liquid Yellowish brown Fuel oil-like odor</p>
<p>Stop discharge if possible. Keep people away. Shut off ignition sources. Call fire department. Avoid contact with liquid. Isolate and remove discharged material. Notify local health and pollution control agencies.</p>		<p>Sinks in water.</p>
<p>Fire</p>	<p>Combustible. Irritating gases may be produced when heated. Wear goggles and self-contained breathing apparatus. Extinguish with dry chemicals, foam or carbon dioxide. Water may be ineffective on fire. Cool exposed containers with water.</p>	
<p>Exposure</p>	<p>CALL FOR MEDICAL AID. LIQUID Irritating to skin and eyes. Harmful if swallowed. Remove contaminated clothing and shoes. Flush affected areas with plenty of water. IF IN EYES, hold eyelids open and flush with plenty of water. IF SWALLOWED, and victim is CONSCIOUS, have victim drink water or milk and have victim induce vomiting. IF SWALLOWED and victim is UNCONSCIOUS OR HAVING CONVULSIONS, do nothing except keep victim warm.</p>	
<p>Water Pollution</p>	<p>Dangerous to aquatic life in high concentrations. May be dangerous if it enters water intakes. Notify local health and wildlife officials. Notify operators of nearby water intakes.</p>	
<p>1. RESPONSE TO DISCHARGE (See Response Methods Handbook) Issue warning-water contaminant Should be removed Chemical and physical treatment</p>		<p>2. LABEL 2.1 Category: None 2.2 Class: Not pertinent</p>
<p>3. CHEMICAL DESIGNATIONS 3.1 CG Compatibility Class: Not listed 3.2 Formula: 2,4-Cl₂C₆H₃OCH₂COOR, where R=C₄H₉, C₃H₇, or CH₂CH₂OC₂H₅ 3.3 IMO/UN Designations: Not listed 3.4 DOT ID No.: 2765 3.5 CAS Registry No.: 94-11-1</p>		<p>4. OBSERVABLE CHARACTERISTICS 4.1 Physical State (as shipped): Liquid 4.2 Color: Brown; amber 4.3 Odor: May have odor of fuel oil.</p>
<p>5. HEALTH HAZARDS 5.1 Personal Protective Equipment: Face shield or goggles, rubber gloves 5.2 Symptoms Following Exposure: Contact with eyes may cause mild irritation. 5.3 Treatment of Exposure: INGESTION: If large amounts are swallowed, induce vomiting and get medical help. EYES: flush with plenty of water and see a doctor. SKIN: flush with water, wash with soap and water. 5.4 Threshold Limit Value: Data not available 5.5 Short Term Inhalation Limits: Data not available 5.6 Toxicity by Ingestion: Grade 2 or 3; LD₅₀ = 320-817 mg/kg 5.7 Late Toxicity: Data not available 5.8 Vapor (Gas) Irritant Characteristics: Data not available 5.9 Liquid or Solid Irritant Characteristics: Data not available 5.10 Odor Threshold: Data not available 5.11 IDLH Value: Data not available</p>		

<p>6. FIRE HAZARDS 6.1 Flash Point: > 175°F O.C. 6.2 Flammable Limits in Air: Data not available 6.3 Fire Extinguishing Agents: Foam, dry chemical, carbon dioxide 6.4 Fire Extinguishing Agents Not to be Used: Water may be ineffective. 6.5 Special Hazards of Combustion: Products: Irritating hydrogen chloride vapor may form in fire. 6.6 Behavior in Fire: Data not available 6.7 Ignition Temperature: Data not available 6.8 Electrical Hazard: Data not available 6.9 Burning Rate: Data not available 6.10 Adiabatic Flame Temperature: Data not available 6.11 Stoichiometric Air to Fuel Ratio: Data not available 6.12 Flame Temperature: Data not available</p>	<p>10. HAZARD ASSESSMENT CODE (See Hazard Assessment Handbook) A-X-Y</p>
<p>7. CHEMICAL REACTIVITY 7.1 Reactivity With Water: No reaction 7.2 Reactivity with Common Materials: May attack some forms of plastics 7.3 Stability During Transport: Stable 7.4 Neutralizing Agents for Acids and Caustics: Not pertinent 7.5 Polymerization: Not pertinent 7.6 Inhibitor of Polymerization: Not pertinent 7.7 Molar Ratio (Reactant to Product): Data not available 7.8 Reactivity Group: Data not available</p>	<p>11. HAZARD CLASSIFICATIONS 11.1 Code of Federal Regulations: OSM-E 11.2 HAS Hazard Rating for Bulk Water Transportation: Not listed 11.3 NFPA Hazard Classification: Not listed</p>
<p>8. WATER POLLUTION 8.1 Aquatic Toxicity: 350 ppm/24 hr/bass, bluegill/50% kill/fresh water 1.0-5.0 ppm/96 hr/oyster/39% shell growth disease/salt water 8.2 Waterflow Toxicity: LD₅₀ = 2025.0 mg/kg 8.3 Biological Oxygen Demand (BOD): Data not available 8.4 Food Chain Concentration Potential: None</p>	<p>12. PHYSICAL AND CHEMICAL PROPERTIES 12.1 Physical State at 15°C and 1 atm: Liquid 12.2 Molecular Weight: 234-291 12.3 Boiling Point at 1 atm: Very high 12.4 Freezing Point: Not pertinent 12.5 Critical Temperature: Not pertinent 12.6 Critical Pressure: Not pertinent 12.7 Specific Gravity: 1.068-1.237 at 20°C (liquid) 12.8 Liquid Surface Tension: Data not available 12.9 Liquid Water Intercalated Tension: Data not available 12.10 Vapor (Gas) Specific Gravity: Not pertinent 12.11 Ratio of Specific Heats of Vapor (Gas): Not pertinent 12.12 Latent Heat of Vaporization: Data not available 12.13 Heat of Combustion: Data not available 12.14 Heat of Decomposition: Not pertinent 12.15 Heat of Solution: Not pertinent 12.16 Heat of Polymerization: Not pertinent 12.25 Heat of Fusion: Data not available 12.26 Limiting Value: Data not available 12.27 Reid Vapor Pressure: Data not available</p>
<p>9. SHIPPING INFORMATION 9.1 Grades of Purity: Technical, 90%; 64% in petroleum oil 9.2 Storage Temperature: Ambient 9.3 Inert Atmosphere: No requirement 9.4 Venting: Open</p>	
<p>NOTES</p>	

DES

2,4-D ESTERS

12.17 SATURATED LIQUID DENSITY		12.18 LIQUID HEAT CAPACITY		12.19 LIQUID THERMAL CONDUCTIVITY		12.20 LIQUID VISCOSITY	
Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F	Temperature (degrees F)	British thermal unit-inch per hour- square foot-F	Temperature (degrees F)	Centipoise
68	71.790		N O T P E R T I N E N T		N O T P E R T I N E N T		N O T P E R T I N E N T

12.21 SOLUBILITY IN WATER		12.22 SATURATED VAPOR PRESSURE		12.23 SATURATED VAPOR DENSITY		12.24 IDEAL GAS HEAT CAPACITY	
Temperature (degrees F)	Pounds per 100 pounds of water	Temperature (degrees F)	Pounds per square inch	Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F
	I N S O L U B L E		N O T P E R T I N E N T		N O T P E R T I N E N T		N O T P E R T I N E N T

DIAZINON

DZN

<p>Common Synonyms O, O-Diethyl O-(2-isopropyl-6-methyl-4-pyrimidinyl) phosphorothioate</p> <p>Alt.-for: Spectracide Sardex</p>	<p>Liquid Light to dark brown</p> <p>Sinks in water.</p>
<p>Stop discharge if possible. Keep people away. Isolate and remove discharged material. Notify local health and pollution control agencies.</p>	
Fire	<p>Not flammable. POISONOUS GASES ARE PRODUCED WHEN HEATED.</p>
Exposure	<p>CALL FOR MEDICAL AID.</p> <p>LIQUID POISONOUS IF SWALLOWED. Irritating to skin and eyes. Remove contaminated clothing and shoes. Flush affected areas with plenty of water. IF IN EYES, hold eyelids open and flush with plenty of water. IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk.</p>
Water Pollution	<p>HARMFUL TO AQUATIC LIFE IN VERY LOW CONCENTRATIONS. May be dangerous if it enters water intakes.</p> <p>Notify local health and wildlife officials. Notify operators of nearby water intakes.</p>
<p>1. RESPONSE TO DISCHARGE (See Response Methods Handbook) Issue warning-poison, water contaminant, high flammability (if solution) Restrict access Should be removed Chemical and physical treatment</p>	<p>2. LABEL</p> <p>2.1 Category: None 2.2 Class: Not pertinent</p>
<p>3. CHEMICAL DESIGNATIONS</p> <p>3.1 CG Compatibility Class: Not listed 3.2 Formula: C₁₂H₁₁N₂O₂PS 3.3 IMO/UN Designation: 6.1/1615 3.4 DOT ID No.: 1615 3.5 CAS Registry No.: 333-41-5</p>	<p>4. OBSERVABLE CHARACTERISTICS</p> <p>4.1 Physical State (as shipped): Solid or liquid solution 4.2 Color: Amber to dark brown 4.3 Odor: Data not available</p>
<p>5. HEALTH HAZARDS</p> <p>5.1 Personal Protective Equipment: Goggles or face shield; rubber gloves; protective clothing. 5.2 Symptoms Following Exposure: Ingestion or prolonged inhalation of mist causes headache, giddiness, blurred vision, nervousness, weakness, cramps, diarrhea, discomfort in the chest, sweating, nausea, tearing, edema and other excessive respiratory tract secretion, vomiting, cyanosis, papilledema, uncontrollable muscle twitches, convulsions, coma, loss of reflexes, and loss of sphincter control. Liquid irritates eyes and skin. 5.3 Treatment of Exposure: INHALATION: remove to fresh air; keep warm; get medical attention at once. EYES: flush with plenty of water for at least 15 min. and get medical attention. SKIN: wash contaminated area with soap and water. INGESTION: get medical attention at once; give water slurry of charcoal; do NOT give milk or alcohol. 5.4 Threshold Limit Value: 0.1 mg/m³ 5.5 Short Term Inhalation Limit: Not pertinent 5.6 Toxicity by Ingestion: Grade 3; oral LD₅₀ = 76 mg/kg (rat) 5.7 Late Toxicity: May be mutagenic 5.8 Vapor (Gas) Irritant Characteristics: Data not available 5.9 Liquid or Solid Irritant Characteristics: Data not available 5.10 Odor Threshold: Data not available 5.11 IDLH Value: Data not available</p>	

<p>6. FIRE HAZARDS</p> <p>6.1 Flash Point: 82-105°F C.C. (solutions only; pure liquid difficult to burn) 6.2 Flammable Limits in Air: Not pertinent 6.3 Fire Extinguishing Agents: (for solutions) Foam, dry chemical, or carbon dioxide 6.4 Fire Extinguishing Agents Not to be Used: Water may be ineffective. 6.5 Special Hazards of Combustion Products: Oxides of sulfur and of phosphorus are generated in fires. 6.6 Behavior in Fire: Not pertinent 6.7 Ignition Temperature: Not pertinent 6.8 Electrical Hazard: Data not available 6.9 Burning Rate: (for solutions) 4 mm/min. 6.10 Adiabatic Flame Temperature: Data not available 6.11 Stoichiometric Air to Fuel Ratio: Data not available 6.12 Flame Temperature: Data not available</p>	<p>10. HAZARD ASSESSMENT CODE (See Hazard Assessment Handbook) A-X-Y</p>
<p>7. CHEMICAL REACTIVITY</p> <p>7.1 Reactivity With Water: No reaction 7.2 Reactivity with Common Materials: No reaction 7.3 Stability During Transport: Stable 7.4 Neutralizing Agents for Acids and Caustics: Not pertinent 7.5 Polymerization: Not pertinent 7.6 Inhibitor of Polymerization: Not pertinent 7.7 Molar Ratio (Reactant to Product): Data not available 7.8 Reactivity Group: Data not available</p>	<p>11. HAZARD CLASSIFICATIONS</p> <p>11.1 Code of Federal Regulations: OSHA 11.2 MAS Hazard Rating for Bulk Water Transportation: Not listed 11.3 NFPA Hazard Classification: Not listed</p>
<p>8. WATER POLLUTION</p> <p>8.1 Aquatic Toxicity: 0.025 ppm/96 hr/stonely nymph/TL₅₀/fresh water 30 µg/l/48 hr/bluegill/TL₅₀/fresh water (becomes bound to soil when used according to directions) 8.2 Waterfowl Toxicity: LD₅₀ = 3.54 mg/kg LC₅₀ = 5 days, 90 ppm mallard duck LC₅₀ = 7 days, 68 ppm quail 8.3 Biological Oxygen Demand (BOD): Data not available 8.4 Food Chain Concentration Potential: Data not available</p>	<p>12. PHYSICAL AND CHEMICAL PROPERTIES</p> <p>12.1 Physical State at 15°C and 1 atm: Liquid 12.2 Molecular Weight: 304.4 12.3 Boiling Point at 1 atm: Very high; decomposes 12.4 Freezing Point: Not pertinent 12.5 Critical Temperature: Not pertinent 12.6 Critical Pressure: Not pertinent 12.7 Specific Gravity: 1.117 at 20°C (liquid) 12.8 Liquid Surface Tension: (est.) 35 dynes/cm = 0.035 N/m at 20°C 12.9 Liquid Water Interfacial Tension: (est.) 40 dynes/cm = 0.040 N/m at 20°C 12.10 Vapor (Gas) Specific Gravity: Not pertinent 12.11 Ratio of Specific Heats of Vapor (Gas): Not pertinent 12.12 Latent Heat of Vaporization: Not pertinent 12.13 Heat of Combustion: (est.) -12,000 Btu/lb = -6,500 cal/g = -270 X 10³ J/kg 12.14 Heat of Decomposition: Not pertinent 12.15 Heat of Solution: Not pertinent 12.16 Heat of Polymerization: Not pertinent 12.25 Heat of Fusion: Data not available 12.26 Limiting Value: Data not available 12.27 Reid Vapor Pressure: Data not available</p>
<p>9. SHIPPING INFORMATION</p> <p>9.1 Grades of Purity: Technical; wettable powders; a variety of emulsifiable solutions in combustible solvents. 9.2 Storage Temperature: Ambient 9.3 Inert Atmosphere: No requirement 9.4 Venting: Open (flame arrester)</p>	<p style="text-align: center;">NOTES</p>

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DIAZINON

12.17 SATURATED LIQUID DENSITY		12.18 LIQUID HEAT CAPACITY		12.19 LIQUID THERMAL CONDUCTIVITY		12.20 LIQUID VISCOSITY	
Temperature (degrees F)	Pounds per cubic foot (estimate)	Temperature (degrees F)	British thermal unit per pound-F (estimate)	Temperature (degrees F)	British thermal unit-inch per hour- square foot-F (estimate)	Temperature (degrees F)	Centipoise (estimate)
52	70.280	51	.400	51	1.048	51	4.064
54	70.209	52	.400	52	1.048	52	4.005
56	70.139	53	.400	53	1.048	53	3.948
58	70.070	54	.400	54	1.048	54	3.892
60	70.000	55	.400	55	1.048	55	3.836
62	69.929	56	.400	56	1.048	56	3.782
64	69.860	57	.400	57	1.048	57	3.729
66	69.790	58	.400	58	1.048	58	3.677
68	69.730	59	.400	59	1.048	59	3.625
70	69.660	60	.400	60	1.048	60	3.575
72	69.589	61	.400	61	1.048	61	3.525
74	69.520	62	.400	62	1.048	62	3.476
76	69.450	63	.400	63	1.048	63	3.428
78	69.379	64	.400	64	1.048	64	3.381
80	69.309	65	.400	65	1.048	65	3.335
82	69.240	66	.400	66	1.048	66	3.290
84	69.169	67	.400	67	1.048	67	3.245
86	69.099	68	.400	68	1.048	68	3.201
		69	.400	69	1.048	69	3.158
		70	.400	70	1.048	70	3.116
		71	.400	71	1.048	71	3.074
		72	.400	72	1.048	72	3.033
		73	.400	73	1.048	73	2.993
		74	.400	74	1.048	74	2.954
		75	.400	75	1.048	75	2.915
		76	.400	76	1.048	76	2.877

12.21 SOLUBILITY IN WATER		12.22 SATURATED VAPOR PRESSURE		12.23 SATURATED VAPOR DENSITY		12.24 IDEAL GAS HEAT CAPACITY	
Temperature (degrees F)	Pounds per 100 pounds of water	Temperature (degrees F)	Pounds per square inch	Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F
68	.004		N O T P E R T I N E N T		N O T P E R T I N E N T		N O T P E R T I N E N T

DIELDRIN

DED

<p>Common Synonyms</p> <p>HEOD endo,exo-1,2,3,4,10,10-Hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4,5,8-dimethanonaphthalene</p>	<p>Solid</p> <p>Light brown</p> <p>Mild chemical odor</p> <p>Sinks in water.</p>	
<p>AVOID CONTACT WITH SOLID AND DUST. KEEP PEOPLE AWAY. Wear goggles, dust respirator and rubber overclothing (including gloves). Stop discharge if possible. Isolate and remove discharged material. Notify local health and pollution control agencies.</p>		
<p>Fire</p>	<p>Not flammable. POISONOUS GASES MAY BE PRODUCED WHEN HEATED.</p>	
<p>Exposure</p>	<p>CALL FOR MEDICAL AID.</p> <p>DUST POISONOUS IF INHALED OR IF SKIN IS EXPOSED. If inhaled will cause headache, dizziness, or loss of consciousness. If in eyes, hold eyelids open and flush with plenty of water. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen.</p> <p>SOLID POISONOUS IF SWALLOWED OR IF SKIN IS EXPOSED. If swallowed will cause headache, nausea, dizziness, vomiting, or loss of consciousness. Remove contaminated clothing and shoes. Flush affected areas with plenty of water. IF IN EYES, hold eyelids open and flush with plenty of water. IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk and have victim induce vomiting. IF SWALLOWED and victim is UNCONSCIOUS OR HAVING CONVULSIONS, do nothing except keep victim warm.</p>	
<p>Water Pollution</p>	<p>HARMFUL TO AQUATIC LIFE IN VERY LOW CONCENTRATIONS. May be dangerous if it enters water intakes.</p> <p>Notify local health and wildlife officials. Notify operators of nearby water intakes.</p>	
<p>1. RESPONSE TO DISCHARGE (See Response Methods Handbook) Issue warning-water contaminant Restrict access Should be removed Chemical and physical treatment</p>		<p>2. LABEL</p> <p>2.1 Category: None 2.2 Class: Not pertinent</p>
<p>3. CHEMICAL DESIGNATIONS</p> <p>3.1 CQ Competibility Class: Not listed 3.2 Formula: C₁₂H₈Cl₆O 3.3 IMO/UN Designation: Not listed 3.4 DOT ID No.: 2761 3.5 CAS Registry No.: 60-57-1</p>		<p>4. OBSERVABLE CHARACTERISTICS</p> <p>4.1 Physical State (as shipped): Solid 4.2 Color: Buff to light brown. 4.3 Odor: Mild chemical</p>
<p>5. HEALTH HAZARDS</p> <p>5.1 Personal Protective Equipment: U. S. Bu. Mines approved respirator; clean rubber gloves; goggles or face shield 5.2 Symptoms Following Exposure: Inhalation, ingestion, or skin contact causes irritability, convulsions and/or coma, nausea, vomiting, headache, fainting, tremors. Contact with eyes causes irritation. 5.3 Treatment of Exposure: INHALATION: move to fresh air; give oxygen and artificial respiration as required. INGESTION: induce vomiting and get medical attention. EYES: flush with plenty of water; get medical attention. SKIN: flush with plenty of water. 5.4 Threshold Limit Value: 0.25 mg/m³ 5.5 Short Term Inhalation Limits: 1 mg/m³ for 30 min. 5.6 Toxicity by Ingestion: Grade 4; oral LD₅₀ = 46 mg/kg (rat), 65 mg/kg (dog) 5.7 Late Toxicity: Banned by EPA in October 1974 because of alleged "imminent hazard to human health" as a potential carcinogen in man. 5.8 Vapor (Gas) Irritant Characteristics: Data not available 5.9 Liquid or Solid Irritant Characteristics: Minimum hazard. If spilled on clothing and allowed to remain, may cause smarting and reddening of the skin. 5.10 Odor Threshold: 0.041 ppm 5.11 IDLH Value: 450 mg/m³</p>		

<p>6. FIRE HAZARDS</p> <p>6.1 Flash Point: Not flammable 6.2 Flammable Limits in Air: Not flammable 6.3 Fire Extinguishing Agents: Not pertinent 6.4 Fire Extinguishing Agents Not to be Used: Data not available 6.5 Special Hazards of Combustion Products: Toxic and irritating hydrogen chloride fumes may form in fire. 6.6 Behavior in Fire: Data not available 6.7 Ignition Temperature: Not pertinent 6.8 Electrical Hazard: Not pertinent 6.9 Burning Rate: Not pertinent 6.10 Adiabatic Flame Temperature: Data not available 6.11 Stoichiometric Air to Fuel Ratio: Data not available 6.12 Flame Temperature: Data not available</p>	<p>10. HAZARD ASSESSMENT CODE (See Hazard Assessment Handbook) II</p>
<p>7. CHEMICAL REACTIVITY</p> <p>7.1 Reactivity With Water: No reaction 7.2 Reactivity with Common Materials: Data not available 7.3 Stability During Transport: Stable 7.4 Neutralizing Agents for Acids and Caustics: Not pertinent 7.5 Polymerization: Not pertinent 7.6 Inhibitor of Polymerization: Not pertinent 7.7 Molar Ratio (Reactant to Product): Data not available 7.8 Reactivity Group: Data not available</p>	<p>11. HAZARD CLASSIFICATIONS</p> <p>11.1 Code of Federal Regulations: ORM-A 11.2 NAB Hazard Rating for Bulk Water Transportation: Not listed 11.3 NFPA Hazard Classification: Not listed</p>
<p>8. WATER POLLUTION</p> <p>8.1 Aquatic Toxicity: 0.0079 mg/l/96 hr/bluegill/TL₅₀/fresh water .037 ppm/96 hr/goldfish/TL₅₀/fresh water 0.050 ppm/5 hr/muleet/100% kill/salt water 0.025-.050 ppm/48 hr/brown shrimp/TL₅₀/salt water 8.2 Waterfowl Toxicity: LD₅₀ 381.0 mg/kg 8.3 Biological Oxygen Demand (BOD): Data not available 8.4 Food Chain Concentration Potential: High</p>	<p>12. PHYSICAL AND CHEMICAL PROPERTIES</p> <p>12.1 Physical State at 15°C and 1 atm: Solid 12.2 Molecular Weight: 380.93 12.3 Boiling Point at 1 atm: Not pertinent (decomposes) 12.4 Freezing Point: 349°F = 176°C = 449°K 12.5 Critical Temperature: Not pertinent 12.6 Critical Pressure: Not pertinent 12.7 Specific Gravity: 1.75 at 20°C (solid) 12.8 Liquid Surface Tension: Not pertinent 12.9 Liquid Water Interfacial Tension: Not pertinent 12.10 Vapor (Gas) Specific Gravity: Not pertinent 12.11 Ratio of Specific Heats of Vapor (Gas): Not pertinent 12.12 Latent Heat of Vaporization: Not pertinent 12.13 Heat of Combustion: Data not available 12.14 Heat of Decomposition: Not pertinent 12.15 Heat of Solution: Not pertinent 12.16 Heat of Polymerization: Not pertinent 12.25 Heat of Fusion: Data not available 12.26 Limiting Value: Data not available 12.27 Reid Vapor Pressure: Data not available</p>
<p>9. SHIPPING INFORMATION</p> <p>9.1 Grades of Purity: Technical, 85+% HEOD; 18% emulsifiable concentrates in petroleum hydrocarbons, which are combustible. 9.2 Storage Temperature: Ambient 9.3 Inert Atmosphere: No requirement 9.4 Venting: Open (flame arrester) (for liquid form)</p>	
<p>NOTES</p>	

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12.17 SATURATED LIQUID DENSITY		12.18 LIQUID HEAT CAPACITY		12.19 LIQUID THERMAL CONDUCTIVITY		12.20 LIQUID VISCOSITY	
Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F	Temperature (degrees F)	British thermal unit-inch per hour- square foot-F	Temperature (degrees F)	Centipoise
	N O T P E R T I N E N T		N O T P E R T I N E N T		N O T P E R T I N E N T		N O T P E R T I N E N T

12.21 SOLUBILITY IN WATER		12.22 SATURATED VAPOR PRESSURE		12.23 SATURATED VAPOR DENSITY		12.24 IDEAL GAS HEAT CAPACITY	
Temperature (degrees F)	Pounds per 100 pounds of water	Temperature (degrees F)	Pounds per square inch	Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F
	I N S O L U B L E		N O T P E R T I N E N T		N O T P E R T I N E N T		N O T P E R T I N E N T

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 (900 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.

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

AUTOIGNITION TEMPERATURE

Greater than 204°C (400°F)

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).

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) - HAZARD IDENTIFICATION

Health Flammability Reactivity

0

2

0

BASIS

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.

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 (320-650°F)

VAPOR PRESSURE
Less than 1 mm Hg @ 20°C

SPECIFIC GRAVITY (15.6 C/15.6 C)
0.86

VAPOR DENSITY (AIR = 1)
Greater than 5

MOLECULAR WEIGHT
Approximately 212 average

PERCENT VOLATILE BY VOLUME
100

pH
Essentially neutral

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

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

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

VISCOSITY
2.7 cSt @ 40°C

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

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

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 550
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) 656-5949

WITCO MATERIAL SAFETY DATA SHEET

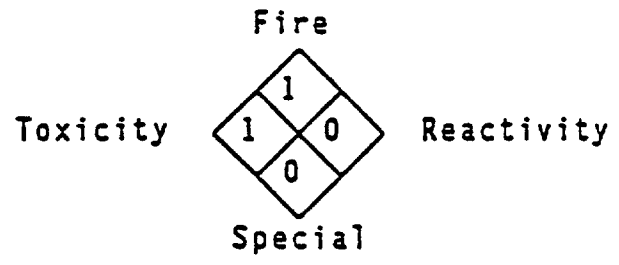
Kendall C-915 Grease

PAGE 1

Product Code: J63 7834

NFPA HAZARD RATING

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



DIVISION AND LOCATION---SECTION I

Division: KENDALL REFINING 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 (bv weight %): negligible
Volatile (bv 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.
Unusual Fire and Explosion Hazards:
 none

(Continued on next page)

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

Vendall C-915 Grease

PAGE 2

Product Code: J63 7834

(Section III continued)

Flashpoint: (Method Used) ASTM D92 greater than 210°C (410°F)

Flammable limits %: not applicable

Extinguishing agents:

Drychemical or Waterfog or CO₂ or Foam or Sand/Earth
Water may cause frothing.

Closed containers exposed to fire may be cooled with water.

=====

HEALTH HAZARD DATA---SECTION 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)

WITCO MATERIAL SAFETY DATA SHEET

Wendall C-915 Grease

PAGE 3

Product Code: J63 7834

SPECIAL PRECAUTIONS---SECTION VII

Precautions to be taken in handling and storage:

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

TRANSPORTATION DATA---SECTION VIII

D.O.T.: Not Regulated

Reportable Quantity: not applicable

Freight Classification: Petroleum Lubricating Grease

Special Transportation Notes:

Robert Kellar

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

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Genium Publishing Corporation

One Genium Plaza
Schenectady, NY 12304-4690 USA
(518) 377-8854

Sheet No. 65
Hydrogen Gas/Liquid

Issued: 5/80

Revision: B, 9/92

Section 1. Material Identification

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Hydrogen (H₂) Description: The most abundant element on earth, present as free hydrogen in air at ~ 1 ppm. Produced by reacting steam with natural gas and subsequent purification, dissociation of ammonia, passing steam over iron, electrolysis of water (simplest process and used when a high degree of purity is needed but because of high energy consumption is seldom produced in large quantities), or the most economical, the conversion of hydrocarbon gases (i.e. interaction of methane with water vapor). Used in production of ammonia, metals that resist fusion (molybdenum and bismuth), and methyl alcohol; in reducing metal oxides at high temperatures, welding and cutting steel, hydrogenation of liquid fuels and plant oils, extraction of liquid fuel from coal, and organic synthesis for reduction reactions. Liquid H₂ is used as a coolant, in balloons and airships, thermonuclear reactions, and to study subatomic particles in bubble chambers.

Other Designations: CAS No. 1333-74-0, protium.

Manufacturer: Contact your supplier or distributor. Consult latest *Chemical Week Buyers' Guide*⁽⁷³⁾ for a suppliers list.

Cautions: Hydrogen is highly flammable and explosive when exposed to heat, flame, oxidizers. The gas is relatively inert although it becomes a simple asphyxiant at high concentrations by replacing oxygen. Rapid release of compressed gas or contact with the liquid may cause frostbite or severe burns.

		Gas	NFPA
R	1	HMS	
I	-	H 0	
S	-	F 4	
K	4	R 0	
		PPE*	
		* Sec. 8	
		Liquid	
R	1	HMS	
I	-	H 3	
S	3	F 4	
K	4	R 0	

Section 2. Ingredients and Occupational Exposure Limits

Hydrogen, ca 100%

1991 OSHA PEL

None established

1990 DFG (Germany) MAK

None established

1992-93 ACGIH TLV

Classified as 'inert'; a simple asphyxiant at high concentrations.

1990 NIOSH REL

None established

1985-86 Toxicity Data*

None reported

* Monitor NIOSH, RTECS (MW8900000), for future toxicity data.

Section 3. Physical Data

Boiling Point: -423 °F (-253 °C)

Freezing Point: -434 °F (-259 °C)

Critical Pressure: 12.8 atm

Vapor Density (Air = 1): 0.069

Ionization Potential: 13.59 eV

Molecular Weight: 2.02

Density (liquid): 0.07 at -423 °F (-253 °C)

Water Solubility*: Slightly, 1:50 parts water at 32 °F (0 °C).

Other Solubilities: Slightly soluble in alcohol and ether.

Critical Temperature: -399.8 °F (-239 °C)

Expansion Ratio, liquid to gas at b.p. to 70 °F: 1 to 851.33

Appearance and Odor: Colorless, tasteless, odorless gas which is much lighter than air.

* Contact with water at ambient temperatures will cause vigorous hydrogen vaporization.

Section 4. Fire and Explosion Data

Flash Point: None reported | Autoignition Temperature: 752 °F (400 °C) | Explosion Range: 4 to 75% v/v | Detonation Range: 20 to 65% v/v

Extinguishing Media: Use flooding quantities of water as fog and apply from as far away as possible. If possible without risk, stop flow of gas before extinguishment.

Unusual Fire or Explosion Hazards: Liquefied or compressed gas has a low ignition energy and burns with a light blue to nearly invisible flame. Container may explode in heat of fire. Hydrogen has a burning rate of 9.9 mm/min.

Special Fire-fighting Procedures: Because fire may produce toxic thermal decomposition products, wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in pressure-demand or positive-pressure mode. Approach fire with caution since high temperature flame is practically invisible. Approach release from upwind as flame can flash back easily. Use water spray to cool fire-exposed containers. Structural firefighter's protective clothing provides only limited protection. Stay away from ends of tanks. For massive fire in cargo area use monitor nozzles or unmanned hose holder; if impossible, withdraw and let fire burn. Withdraw immediately if you hear a rising sound from venting safety device or notice tank discoloration due to fire. Do not release runoff from fire control methods to sewers or waterways.

Section 5. Reactivity Data

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

Chemical Incompatibilities: Under normal temperatures hydrogen is not very chemically reactive, but as temperatures increase so does reactivity. "Explodes on contact with bromine trifluoride, fluorine, chlorine trifluoride, hydrogen peroxide + catalysts, and acetylene + ethylene. Explodes when heated with 3,4-dichloronitrobenzene + catalysts, calcium carbonate + magnesium, vegetable oil + catalysts, ethylene + nickel catalysts, difluorodiazene (> 90 °C), 2-nitroanisole (> 250 °C/34 bar + 12% catalyst), copper (II) oxide, nitryl fluoride, (> 200 °C), or polycarbon monofluoride (> 500 °C). Forms shock sensitive compounds with bromine, chlorine, iodine heptafluoride (heat or spark sensitive), chlorine dioxide, dichlorine oxide, dinitrogen oxide, dinitrogen tetraoxide, and oxygen (gas). Reacts with liquid nitrogen and heat to create an explosive product. A violent reaction or ignition occurs with air + catalysts (platinum or similar metals containing absorbed O₂ and H₂), iodine, dioxane + nickel, lithium, nitrogen trifluoride, oxygen difluoride, palladium + isopropyl alcohol, lead trifluoride, nickel + oxygen, fluorine perchlorate (ignition on contact), xenon hexafluoride (violent reaction), nitrogen oxide + oxygen (ignition above 360 °C), palladium powder + 2-propanol + air (spontaneous ignition). Produces a vigorous exothermic reaction with benzene + Raney nickel catalyst, metals (lithium, calcium, barium, strontium, sodium, and potassium above 300 °C), palladium (II) oxide, palladium trifluoride, and 1,1,1-tris(hydroxymethyl)-nitromethane + nickel catalyst. Some metals are susceptible to hydrogen attack or embrittlement.

Conditions to Avoid: Exposure to heat, flame, and incompatibles.

Continue on next page

Section 6. Health Hazard Data

Carcinogenicity: The IARC,⁽¹⁶⁴⁾ NTP,⁽¹⁶⁹⁾ and OSHA⁽¹⁶⁴⁾ do not list hydrogen as a carcinogen.

Summary of Risks: Hydrogen gas is generally inert but can cause asphyxiation at high concentrations by replacing air. Symptoms of exposure end on the degree and duration of oxygen deficiency and are characterized by air hunger, fatigue, decreased vision, mood disturbances, numbness of extremities, headache, decreased coordination and judgement, cyanosis, and unconsciousness. Hydrogen can also be narcotic at elevated pressures.

Medical Conditions Aggravated by Long-Term Exposure: None reported

Target Organs: Respiratory and nervous systems.

Primary Entry Routes: Inhalation.

Acute Effects: Asphyxia. Skin exposure to liquid hydrogen or rapid bursts of compressed air can cause frostbite.

Chronic Effects: None reported.

FIRST AID *Rescuers should protect against asphyxiation and possible fire/explosion when entering areas having potentially dangerous H₂ levels.*

Eyes: 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: For frostbite; immerse exposed area in 107.6 °F (42 °C) until completely rewarmed. Do not use dry heat.

Inhalation: Remove exposed person to fresh air and support breathing and administer 100% humidified-supplemental oxygen as needed.

Note to Physicians: Treatment is symptomatic and supportive.

Section 7. Spill, Leak, and Disposal Procedures

Spill/Leak: Immediately notify safety personnel. Isolate and ventilate area, deny entry, and stay upwind. Shut off all ignition sources. If possible without risk, stop gas flow. Use water spray to reduce gas. Small leaks can be detected by bubbles that form when a suspected leak area has been painted with soapy water. Because hydrogen ignites readily and burns with a nearly invisible flame in daylight, leaks must be approached in a manner to protect against a jet flame. Remove leaking cylinder to a safe, outdoor area and repair or allow to empty. If impossible, place in a fume hood with good forced ventilation. Allow gas to be discharged at a slow rate. Tag the empty cylinder to reflect the defect, close the valve and return it to the supplier. Follow applicable OSHA regulations (29 CFR 1910.120).

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

EPA Designations

RCRA Hazardous Waste (40 CFR 261.33): Not listed

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

SARA Toxic Chemical (40 CFR 372.65): Not listed

Listed as a CERCLA Hazardous Substance* (40 CFR 302.4): Final Reportable Quantity (RQ), 100 lb (45.4 kg) [*per RCRA, Sec. 3001]

OSHA Designations

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

Section 8. Special Protection Data

Rules: Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133). Because contact lens use in industry is controversial, establish your own policy. **Respirator:** Seek professional advice prior to respirator selection and use. Follow OSHA respirator regulations (29 CFR 1910.134) and, if necessary, wear a MSHA/NIOSH-approved respirator. Select respirator based on its suitability to provide adequate worker protection for given working conditions, level of airborne contamination, and presence of sufficient oxygen. For emergency or nonroutine operations (cleaning spills, reactor vessels, or storage tanks), wear an SCBA using air, not pure oxygen! *Warning! Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.* If respirators are used, OSHA requires a respiratory protection program that includes at least: medical certification, training, fit-testing, periodic environmental monitoring, maintenance, inspection, cleaning, and convenient, sanitary storage areas. **Other:** Wear cryogenically (extreme cold) protective gloves, boots, aprons, and gauntlets to prevent skin contact with liquid hydrogen. **Ventilation:** Provide general and local exhaust ventilation systems to maintain airborne concentrations low enough to prevent oxygen displacement (O₂ levels should not go below 18% by volume). Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its source.⁽¹⁰³⁾ **Safety Stations:** Make available in the work area emergency eyewash stations, safety/quick-drench showers, and washing facilities. **Contaminated Equipment:** Separate contaminated work clothes from street clothes and launder before reuse. **Clean PPE.** **Comments:** Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9. Special Precautions and Comments

Storage Requirements: Prevent physical damage to containers. Store in a cool, dry, well-ventilated area away from heat, sun, flame, and oxidizers. Store and transport in labeled, steel containers under pressure of not more than 150 atm. Outside or detached storage is preferred. Install electrical equipment Class I, Group B. Use only non-sparking tools when opening and closing H₂ containers. "A compact portable ultrasafe unit for hydrogen for laboratory use has been developed based on a lanthanum-nickel alloy hydride storage capsule, to eliminate hazards associated with use of high-pressure storage of hydrogen".⁽¹⁴⁹⁾ Comply with handling, use, storage, and inspection procedures (29 CFR 1910.103).

Engineering Controls: To reduce potential health hazards, use sufficient dilution or local exhaust ventilation to control airborne contaminants and to maintain concentrations at the lowest practical level. Never allow air or oxygen to enter a liquid hydrogen system as fractionation can produce a spark causing an explosion. See NFPA (Sec. 50B, 1989) for complete coverage of construction, siting, piping, components and safety devices in consumer systems for liquid hydrogen. Electrically ground and bond piping.

Administrative Controls: Train employees on safe handling of liquid H₂ and follow procedure in the Confined Space Standard (29 CFR 1910.146) when work requires entry into confined spaces. Consider preplacement and periodic medical exams of exposed workers.

Transportation Data (49 CFR 172.101)

DOT Shipping Name: Hydrogen, compressed

Hazard Class: 2.1

UN: UN1049

DOT Packing Group: --

DOT Label: Flammable Gas

Special Provisions (172.102): --

Packaging Authorizations

a) Exceptions: 173.306

b) Non-bulk Packaging: 173.302

c) Bulk Packaging: 173.302, 173.314

Vessel Stowage Requirements

a) Vessel Stowage: E

b) Other: 40, 57

Quantity Limitations

a) Passenger, Aircraft, or Railcar: Forbidden

b) Cargo Aircraft Only: 150 kg

MSDS Collection References: 73, 103, 124, 126, 127, 132, 136, 139, 149, 153, 159, 163, 164

Prepared by: M Gannon, BA; **Industrial Hygiene Review:** D Wilson, CIH; **Medical Review:** AC Darlington, MPH, MD

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 streams by absorption on 65% sulfuric acid (H₂SO₄) 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.



NFPA

Other Designations: Isobutene; 2-Methylpropene; *gamma*-Butylene; CH₂=C(CH₃)₂; CAS No. 0115-11-7

HMIS

H	1	R	1
F	4	I	1
R	0	S	1
PPG*		K	4

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

*See sect. 8

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, LC₅₀: 620 g/m³ (4 Hrs)
Mouse, Inhalation, LC₅₀: 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 (H₂O = 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 CO₂ 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-

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 gases 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 maximum, explosion-proof ventilation systems powerful enough to maintain airborne levels of this material below the lower explosive limit cited 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

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

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

Prepared by PJ Igoe, BS

Industrial Hygiene Review: DJ Wilson, CIH

Medical Review: W Silverman, MD

MATERIAL SAFETY DATA SHEET

RHONE-POULENC AG COMPANY

P.O. Box 12014, T.W. Alexander Drive, Research Triangle Park, NC 27709
 24-HOUR EMERGENCY TELEPHONE 1-800-334-7577 OR CHEMTREC 1-800-424-9300

Effective Date: SEP 01, 1990
 Supercodes: JUL 30, 1988

Date Printed: SEP 5, 1990

PRODUCT CODES: P86528, P86532, S80799702LB

EPA Registration Number: 264-455

Page 1 of 8

PRODUCT NAME: LINDANE POWDER

I. IDENTIFICATION

CHEMICAL NAME: Lindane (Gamma Isomer of Benzene Hexachloride)

FORMULA: C6H6Cl6

MOLECULAR WEIGHT: 290.82

SYNONYMS: Lindane; 1,2,3,4,5,6-Hexachloro-cyclohexane

CAS # & NAME: 58-89-9 Cyclohexane, 1,2,3,4,5,6-hexachloro-

IMPORTANT HEALTH EFFECT INFORMATION

WARNING

MAY BE FATAL IF SWALLOWED.
 MAY BE FATAL IF ABSORBED THROUGH THE SKIN.
 HARMFUL IF INHALED.

See Section IV for complete Health Hazard Data.

NATIONAL FIRE PROTECTION ASSOCIATION RATING

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM

KEY = NFPA/HMIS	NFPA	HMIS
	Health	
4=Extreme/ Severe	3	2
	Fire	
3=High/ Serious	1	1
	Reactivity	
2=Moderate		
1=Slight		
0=Minimum	0	0

SARA TITLE III HAZARD CLASSIFICATION

Immediate (acute) Health	YES
Delayed (chronic) Health	YES
Fire	NO
Sudden Release of Pressure	NO
Reactive	NO

Post-it[™] Fax Note 7671

Date	7-19-94	# of pages	11
To	Katherine Lista		
From			
Co./Dept.	ALMA - S.D.		
Co.			

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

PHONE-POULENC AG COMPANY

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Effective Date: SEP 01, 1990

Date Printed: SEP 5, 1990

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PRODUCT NAME: LINDANE POWDER

II. HAZARDOUS INGREDIENTS

MATERIAL

WEIGHT %

(1) Lindane

99.5

EXPOSURE LIMITS:

Lindane: 0.5 mg/cubic meter TWA skin (OSHA-PEL & ACGIH-TLV)

III. PHYSICAL DATA

BULK DENSITY:	Not known
BOILING POINT, 760 mm Hg, Degrees C (F):	Decomposes before boiling
MELTING POINT, Degrees C (F):	113 (235)
FREEZING POINT, Degrees C (F):	Not applicable
VAPOR PRESSURE, 20 Degrees C:	0.0000094
VAPOR DENSITY (air=1):	Not known
pH:	Not applicable
SOLUBILITY IN WATER, @ 25 Degrees C:	10 ppm
APPEARANCE AND ODOR:	Colorless solid; musty odor (pure material is odorless)

IV. HEALTH HAZARD DATA

TOXICOLOGY DATA:

Oral LD50 (rats): 125 mg/kg body weight
 Dermal LD50 (rabbits): 300 mg/kg body weight
 Inhalation LC50 (rats - 4 Hour Exposure): 1.6 mg/L (nose exposure only)
 Skin Effects (rabbits): Non-irritating
 Eye Effects (rabbits): Slight irritation

CARCINOGENICITY, TERATOGENICITY, MUTAGENICITY:

Lindane is not teratogenic, mutagenic, or genotoxic. Based upon results of chronic feeding studies in mice, EPA has currently classified lindane as a possible carcinogen (Class C). The National Toxicology Program (NTP) has classified Lindane as a substance that may reasonably be anticipated to be carcinogenic. IARC (7th Supplement) concluded that evidence for carcinogenicity to animals is sufficient for the technical grade and the alpha isomer and is limited for the beta and gamma isomers.

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

RHONE-POULENC AG COMPANY

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PRODUCT NAME: LINDANE POWDER

IV. HEALTH HAZARD DATA (continued)

EFFECTS OF SINGLE OVEREXPOSURE:

Swallowing:

May be fatal if swallowed. (See TOXICOLOGY DATA)

Lindane is a central nervous system stimulant.

May cause dizziness, headache, nausea, vomiting, diarrhea, tremors, weakness, convulsions, dyspnea, cyanosis, circulatory collapse.

Skin Absorption:

May be fatal if absorbed through the skin. (See TOXICOLOGY DATA)

Inhalation:

Harmful if inhaled. (See TOXICOLOGY DATA).

Inhalation may lead to symptoms as described above for swallowing.

Vapors may irritate eyes, nose and throat.

Skin Irritation:

No significant adverse effects are anticipated based on available information. (See TOXICOLOGY DATA)

Eye Contact:

Causes eye irritation, tearing and redness. (See TOXICOLOGY DATA)

EFFECTS OF REPEATED OVEREXPOSURE:

No evidence of additional adverse effects from available information.

OTHER EFFECTS OF OVEREXPOSURE:

See Notes To Physician.

EXISTING MEDICAL CONDITIONS POSSIBLY AGGRAVATED BY EXPOSURE:

Skin irritation may be aggravated in persons with existing skin lesions.

Breathing of vapor or dust may aggravate acute or chronic asthma and other chronic pulmonary disease.

(continued on Page 4)

MATERIAL SAFETY DATA SHEET

RHONE-POULENC AG COMPANY

P.O. Box 12014, T.W. Alexander Drive, Research Triangle Park, NC 27709
24-HOUR EMERGENCY TELEPHONE 1-800-334-7577 OR CHEMTREC 1-800-424-9300

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PRODUCT NAME: LINDANE POWDER

IV. HEALTH HAZARD DATA (continued)

EMERGENCY AND FIRST AID PROCEDURES:

Remove the patient from immediate source of exposure and assure that the individual is breathing. If not breathing, use cardio-pulmonary resuscitation or artificial respiration. GET MEDICAL ATTENTION.

Swallowing:

If patient is conscious and alert, give 2-3 glasses of water or milk to drink. Give one tablespoon of Syrup of Ipecac to induce vomiting. If vomiting has not occurred in 20 minutes, the same dose of Syrup of Ipecac may be repeated one additional time. Alternatively, induce vomiting by touching back of throat with finger. Do not make an unconscious person vomit. GET MEDICAL ATTENTION.

Skin:

Immediately wash skin with plenty of soap and water, while removing contaminated clothing and shoes. Shoes and clothing contaminated by substantial spillage of concentrated product should be discarded in a manner which limits further exposure. Otherwise, wash clothing separately before reuse. GET MEDICAL ATTENTION.

Inhalation:

Remove victim to fresh air. If not breathing, administer cardio-pulmonary resuscitation or artificial respiration. If breathing is difficult, administer oxygen. GET MEDICAL ATTENTION.

Eyes:

Hold eyelids open and flush with a steady, gentle stream of water for at least 15 minutes. GET MEDICAL ATTENTION.

NOTES TO PHYSICIAN:

Treat symptomatically. Consideration should be given to the possibility that exposure to materials other than this product may have occurred.

Lindane is a central nervous system stimulant for which no specific antidote is available. A short acting barbituate should be used for alleviation of symptoms. Diazepam is the treatment of choice for convulsions.

(continued on Page 5)

MATERIAL SAFETY DATA SHEET

RHONE-POULENC AG COMPANY

P.O. Box 12014, T.W. Alexander Drive, Research Triangle Park, NC 27709
24-HOUR EMERGENCY TELEPHONE 1-800-334-7577 OR CHEMTREC 1-800-424-9300

Effective Date: SEP 01, 1990

Date Printed: SEP 5, 1990

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PRODUCT NAME: LINDANE POWDER

V. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT Degrees C (F): Non-combustible

EXPLOSIVE LIMITS IN AIR (ounces/cubic foot):

Lower: Not applicable

Upper: Not applicable

AUTOIGNITION TEMPERATURE Degrees C (F): Not applicable

EXTINGUISHING MEDIA: Not combustible. Use appropriate extinguishing media for material that is supplying fuel.

SPECIAL FIRE FIGHTING PROCEDURES: Provide for the protection of employees and residents:

- a) Evacuate residents who are downwind of fire.
- b) Prevent unauthorized entry to fire area.
- c) Persons who may have been exposed to contaminated smoke should be examined by a physician and treated appropriately.
- d) Dike area to prevent runoff and contamination of water sources.

Notify local authorities that firemen should:

- a) Wear protective clothing and use self-contained breathing apparatus.
- b) Be immediately relieved from duty, if exposed to contaminated smoke, and checked for symptoms of poisoning. These should not be mistaken for heat exhaustion or smoke inhalation. See Section IV, Health Hazard Data for symptoms of poisoning, first aid procedures, and notes to physician.

UNUSUAL FIRE AND EXPLOSION HAZARDS:

Thermal decomposition products may be hazardous. These may include chlorine, hydrogen chloride, phosgene, trichlorobenzene and the oxides of carbon.

(continued on Page 6)

MATERIAL SAFETY DATA SHEET

RHONE-POULENC AG COMPANY

P.O. Box 12014, T.W. Alexander Drive, Research Triangle Park, NC 27709
24-HOUR EMERGENCY TELEPHONE 1-800-334-7577 OR CHEMTREC 1-800-424-9300

Effective Date: SEP 01, 1990

Date Printed: SEP 5, 1990

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PRODUCT NAME: LINDANE POWDER

VI. REACTIVITY DATA

STABILITY:

Stable

CONDITIONS TO AVOID:

May burn, but does not ignite readily. Protect from excessively high temperatures. Decomposes before boiling.

MATERIALS TO AVOID:

Strong bases

HAZARDOUS DECOMPOSITION PRODUCTS:

Decomposition products may be hazardous. These may include chlorine, hydrogen chloride, phosgene, trichlorobenzene and the oxides of carbon.

HAZARDOUS POLYMERIZATION:

Will not occur.

VII. SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED:

To the extent possible, clean up spillage using shovels. Carefully scoop up loose material and place it in appropriate containers so as to avoid dust generation. Stand upwind if possible.

Residual spillage that cannot be removed by shovelling should be cleaned from hard surfaces as appropriate.

If spilled on the ground, the affected area should be scraped clean and the material placed in an appropriate container for disposal.

Do not flush material to public sewer systems or any waterways.

Wear appropriate protective clothing and equipment (see below) during cleanup activities.

Ensure adequate decontamination of tools and equipment following cleanup.

WASTE DISPOSAL METHOD:

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

NOTE: Lindane is RCRA Hazardous Waste (U129) when disposed.

Lindane is subject to CERCLA reporting requirements, RQ = 1 lb.

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

RHONE-POULENC AG COMPANY

P.O. Box 12014, T.W. Alexander Drive, Research Triangle Park, NC 27709
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Effective Date: SEP 01, 1990

Date Printed: SEP 5, 1990

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PRODUCT NAME: LINDANE POWDER

VIII. SPECIAL PROTECTION INFORMATION

PROTECTIVE EQUIPMENT SHOULD BE USED DURING THE FOLLOWING PROCEDURES:

- Manufacture or formulation of this product
- Repair and maintenance of contaminated equipment
- Clean-up of leaks and spills

RESPIRATORY PROTECTION: Use NIOSH/MSHA approved respirator for pesticide dust and vapor. Use positive pressure self-contained breathing apparatus for emergency conditions where exposure limits are exceeded.

VENTILATION: Local exhaust ventilation, when necessary.

PROTECTIVE GLOVES: Chemical-resistant gloves.

EYE PROTECTION: Goggles, eye bath.

OTHER PROTECTIVE EQUIPMENT: Protective clothing, safety shower.

IX. SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING:

- Do not breathe vapor or dust. Do not ingest.
- Do not get in eyes, on skin or on clothing.
- Do not store near food, feedstuffs, fertilizers, or seed.
- Do not contaminate water, food, or feed by storage or disposal.

X. REGULATORY STATUS

TSCA Inventory:	Yes
EPA Registration No.:	264-455
RCRA Hazardous Waste:	U129
SARA Title III	
Section 302 Extremely Hazardous Substances List:	Yes
Section 313 Toxic Chemicals:	Yes
Reportable Quantity (RQ), under U.S. EPA CERCLA:	RQ = 1 lb

(continued on Page 8)

MATERIAL SAFETY DATA SHEET

RHONE-POULENC AG COMPANY
P.O. Box 12014, T.W. Alexander Drive, Research Triangle Park, NC 27709
24-HOUR EMERGENCY TELEPHONE 1-800-334-7577 OR CHEMTREC 1-800-424-9300

Effective Date: SEP 01, 1990

Date Printed: SEP 5, 1990
Page 8 of 8

PRODUCT NAME: LINDANE POWDER

X. REGULATORY STATUS

California Proposition 65:

WARNING: Lindane and other hexachlorocyclohexane isomers have been listed as a chemical known to the State of California to cause cancer.

A

State's Right-to-Know Laws:

California:

Connecticut:

Florida:

Illinois:

Louisiana:

Massachusetts:

New Jersey:

New York:

Pennsylvania:

Rhode Island:

Canada:

Prop 65 Carcinogen
Survey

Toxic

Toxic, Chem

RTK, Spill RQ=1 lb

RTK, EHS, Cancer,

Spill RQ=1 lb

ID# 1117, RTK,

Spec Haz (CA),

ENV, TAX

Spill RQ: Air=1 lb

L/W=1 lb

RTK, ENV, SPEC

HAZ, Note TF-Skin

Not listed

A

The information herein is given in good faith
but no warranty, expressed or implied, is made.

(Last Page)

MATERIAL SAFETY DATA SHEET

Drexel Chemical Co.
2487 Pennsylvania St.
Memphis, TN 38109
(901) 774-4370

Emergency Telephone No.
(901) 774-4370 or
1-800-424-9300 (ChemTrec)

LINDANE

SECTION I - GENERAL INFORMATION

TRADE NAME..... **LINDANE 20%**
CHEMICAL NAME..... **1,2,3,4,5,6 Hexachlorocyclohexane; gamma isomer**
FORMULA..... **C6H6Cl6**
CHEMICAL FAMILY.... **Chlorinated Hydrocarbons (Insecticide)**
EPA REG. NO..... **728-70-19713**

SECTION II - INGREDIENTS

(Class = H (Hazardous), NH (Non-Hazardous))

<u>NAME</u>	<u>CAS NO.</u>	<u>% (by wt.)</u>	<u>TLV</u>	<u>CLASS</u>
Lindane (Gamma Isomer)	58-89-9	20.44	0.5 mg/m3	H
Xylene Range Aromatic	1330-20-7	65.10		H
Cyclohexanone	108941	11.45		H
Inert Ingredients	N/A	3.00		NH

SECTION III - PHYSICAL DATA

Boiling Point... **>212°F** Specific Gravity..... **0.975 gms/cc**
Vapor Pressure.. **0.03 mm Hg** % Volatiles..... **N/A**
 (Tech)
Vapor Density... **N.K.** Solubility in Water... **Miscible**
Ph..... **Neutral** Appearance/Odor..... **Brown liquid with solvent odor.**

SECTION IV - FIRE & EXPLOSION DATA

Flash Point..... **>100°F**
Extinguishing Media..... **Foam, halon, dry chemical, carbon dioxide. Water may not be effective.**
Fire Fighting Procedures... **Use self contained breathing apparatus and full protective equipment. Stay upwind.**

SECTION V - REACTIVITY DATA

Stability.....	Stable
Conditions to Avoid.....	Exposure to high heat, strong alkalis.
Incompatibility.....	Excessive heat, strong alkalis and powdered metals, i.e. iron, aluminum, zinc.
Hazardous Decomposition Products.....	Hydrogen chloride gas, phosgene, oxides of carbon.
Hazardous Polymerization.....	Will not occur

SECTION VI - HEALTH HAZARD DATA

Carcinogenicity.....	(IARC Group 2-B)
Toxicity Data.....	Oral LD50 (Rat) = 76 mg/kg (Tech) Dermal LD50 (Rabbit) = 50 mg/kg (Tech)
TLV.....	0.5 mg/m3
N.F.P.A..... (Rating: 4-Extreme, 3-High, 2-Moderate, 1-Slight, 0-Insignificant)	Health: 2, Fire: 2, Reactivity: 0
Effects of Overexposure.....	Central nervous system stimulant, dyspnea, cyanosis, headache, nausea, irritation to respiratory tract.

SECTION VII - EMERGENCY PROCEDURES

<u>Skin Contact</u>	Flush with soap and water and get medical attention. Assure clothing is laundered before reuse.
<u>Eye Contact</u>	Flush with water for 15 minutes. Seek medical attention.
<u>Inhalation</u>	Remove victim to fresh air. Treat symptomatically and supportively. Get medical attention immediately.
<u>Ingestion</u>	Remove by giving syrup of IPECAC. Treat symptomatically and supportively. Get medical attention immediately.

LINDANE 20%

Page 3 of 3

SECTION VIII - SPILL OR LEAK PROCEDURES

Steps to be taken in case of material leak or spill

Contain spills and pick up with absorbent clay or material. Prevent any runoff from entering waterways. Assure protective clothing is worn.

Waste Disposal Method Dispose of in accordance with Local, Federal and State Regulations.

SECTION IX - SPECIAL PROTECTION INFORMATION

Respiratory Protection.....	Approved organochlorine respirator.
Ventilation.....	Local Exhaust
Protective Gloves.....	Impervious Rubber
Eye Protection.....	Chemgoggles
Other.....	Rubber safety shoes, coveralls, long sleeve shirt.

SECTION X - SPECIAL PRECAUTIONS

Precautions To Be Taken In Handling & Storage

KEEP OUT OF REACH OF CHILDREN.

Store in cool, dry, well ventilated place away from heat. Wear protect equipment to avoid contact. Keep away from foodstuffs.

D.O.T. Description.....	Organochlorine pesticides, liquid, toxic, flammable, NOS, (Lindane/Xylene), 6.1, UN-2995, PG-III, RQ.
Freight Description.....	Agricultural Insecticide Liquid, N.O.S.
Reportable Quantity.....	1 lb.
E.R.G. Guide Sheet No.....	28

Date Prepared: June 1993

Prepared By: /s/ Mike Shankle

MALATHION

MLT

Common Synonyms Olythion insecticide		Liquid Yellow to dark brown Blank-like odor Sinks in water. Freezing point is 37°F.
AVOID CONTACT WITH LIQUID. Keep people away. Wear chemical protective suit with self-contained breathing apparatus. Stop discharge if possible. Call fire department. Isolate and remove discharged material. Notify local health and pollution control agencies.		
Fire	Combustible. POISONOUS GASES ARE PRODUCED IN FIRE AND WHEN HEATED. Containers may explode in fire. Wear chemical protective suit with self-contained breathing apparatus. Extinguish with dry chemical, carbon dioxide, water, or foam. Cool exposed containers with water.	
Exposure	CALL FOR MEDICAL AID. LIQUID POISONOUS IF SWALLOWED OR IF SKIN IS EXPOSED. Irritating to eyes. Remove contaminated clothing and shoes. Flush affected areas with plenty of water. IF IN EYES, hold eyelids open and flush with plenty of water. IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk and have victim induce vomiting. IF SWALLOWED and victim is UNCONSCIOUS OR HAVING CONVULSIONS, do nothing except keep victim warm.	
Water Pollution	HARMFUL TO AQUATIC LIFE IN VERY LOW CONCENTRATIONS. May be dangerous if it enters water intakes. Notify local health and wildlife officials. Notify operators of nearby water intakes.	
1. RESPONSE TO DISCHARGE (See Response Methods Handbook) Issue warning-poison, water contaminant Restrict access Should be removed Chemical and physical treatment		2. LABEL 2.1 Category: None 2.2 Class: Not pertinent
3. CHEMICAL DESIGNATIONS 3.1 CG Compatibility Class: Not listed 3.2 Formula: C ₁₀ H ₁₁ O ₆ P ₃ 3.3 Molecular Weight: 330.38 3.4 DOT ID No.: 2783 3.5 CAS Registry No.: 121-75-6		4. OBSERVABLE CHARACTERISTICS 4.1 Physical State (as shipped): Liquid 4.2 Color: Yellow to dark brown. 4.3 Odor: Characteristic blank-like mercaptan
5. HEALTH HAZARDS 5.1 Personal Protective Equipment: Wear self-contained breathing apparatus (or respirator for organophosphate pesticides) and rubber clothing while fighting fires of malathion with chlorine bleach solution. All clothing contaminated by fumes and vapors must be decontaminated. 5.2 Symptoms Following Exposure: Exposure to fumes from a fire or to liquid causes headache, blurred vision, constricted pupils of the eyes, weakness, nausea, cramps, diarrhea, and tightness in the chest. Muscle twitch and convulsions may follow. The symptoms may develop over a period of 8 hours. 5.3 Treatment of Exposure: Speed is essential. INHALATION: In the nonbreathing victim immediately institute artificial respiration, using the mouth-to-mouth, the mouth-to-nose, or the mouth-to-oropharyngeal method. Call physician. INGESTION: administer milk, water or salt-water and induce vomiting repeatedly. SKIN OR EYE CONTACT: flood and wash exposed skin areas thoroughly with water. Remove contaminated clothing under a shower. Administer atropine, 2 mg(1/30 gr) intramuscularly or intravenously as soon as any local or systemic signs or symptoms of an intoxication are noted; repeat the administration of atropine every 3-8 min. until signs of atropinization (mydriasis, dry mouth, rapid pulse, hot and dry skin) occur; initiate treatment in children with 1 mg of atropine. Watch respiration, and remove bronchial secretions if they appear to be obstructing the airway; intubate if necessary. Give 2-PAM (Protopam; Protopam), 2.5 gm in 100 ml of sterile water or in 5% dextrose and water, intravenously, slowly, in 15-30 min.; if sufficient fluid is not available, give 1 gm of 2-PAM in 3 ml of distilled water by deep intramuscular injection; repeat this every half hour if respiration weakens or if muscle fasciculation or convulsions recur. 5.4 Threshold Limit Value: 10 mg/m ³ 5.5 Short Term Inhalation Limit: Data not available 5.6 Toxicity by Ingestion: Grade 2; LD ₅₀ = 6.5 to 8g/kg(bw) 5.7 Late Toxicity: Data not available 5.8 Vapor (Gas) Irritant Characteristics: None listed 5.9 Liquid or Solid Irritant Characteristics: Minimum hazard. If spilled on clothing and allowed to remain, may cause smearing and reddening of the skin.		

(Continued)

6. FIRE HAZARDS 6.1 Flash Point: >325°F 6.2 Flammable Limits in Air: Data not available 6.3 Fire Extinguishing Agents: Dry chemical, carbon dioxide, water spray, foam 6.4 Fire Extinguishing Agents Not to be Used: Not pertinent 6.5 Special Hazards of Combustion: Products: Vapors and fumes from fires are hazardous. They include sulfur dioxide and phosphoric acid. 6.6 Behavior in Fire: Gives off hazardous fumes. Area surrounding fire should be diked to prevent water runoff. 6.7 Ignition Temperature: Data not available 6.8 Electrical Hazard: Not pertinent 6.9 Burning Rate: Data not available 6.10 Autoclave Flame Temperature: Data not available (Continued)	10. HAZARD ASSESSMENT CODE (See Hazard Assessment Handbook) A-X-Y
7. CHEMICAL REACTIVITY 7.1 Reactivity With Water: None 7.2 Reactivity with Common Materials: No hazardous reaction 7.3 Stability During Transport: Not pertinent 7.4 Neutralizing Agents for Acids and Caustics: Liquid bleach solution for decontamination. 7.5 Polymerization: Not pertinent 7.6 Inhibitor of Polymerization: Not pertinent 7.7 Molar Ratio (Reactant to Product): Data not available 7.8 Reactivity Group: Data not available	11. HAZARD CLASSIFICATIONS 11.1 Code of Federal Regulations: OPM-A 11.2 HAS Hazard Rating for Bulk Water Transportation: Not listed 11.3 NFPA Hazard Classification: Not listed
8. WATER POLLUTION 8.1 Aquatic Toxicity: 0.06 ppm/96 hr/bluegill/TL ₅₀ /fresh water 0.053-0.063 ppm/96 hr/marine crustacea/LC ₅₀ 8.2 Waterfowl Toxicity: LD ₅₀ = 1486 mg/kg 8.3 Biological Oxygen Demand (BOD): Data not available 8.4 Food Chain Concentration Potential: None	12. PHYSICAL AND CHEMICAL PROPERTIES 12.1 Physical State at 18°C and 1 atm: Liquid 12.2 Molecular Weight: 330.38 12.3 Boiling Point at 1 atm: Very high 12.4 Freezing Point: 37°F = 2.9°C = 278°K 12.5 Critical Temperature: Not pertinent 12.6 Critical Pressure: Not pertinent 12.7 Specific Gravity: 1.234 at 25°C (liquid) 12.8 Liquid Surface Tension: 37.1 dynes/cm = 0.6371 N/m at 24°C 12.9 Liquid Water Interfacial Tension: 19 dynes/cm = 0.019 N/m at 24°C 12.10 Vapor (Gas) Specific Gravity: Not pertinent 12.11 Rate of Specific Heats of Vapor (Gas): Not pertinent 12.12 Latent Heat of Vaporization: Not pertinent 12.13 Heat of Combustion: Data not available 12.14 Heat of Decomposition: Not pertinent 12.15 Heat of Solution: Not pertinent 12.16 Heat of Polymerization: Not pertinent 12.18 Heat of Fusion: Data not available 12.20 Limiting Value: Data not available 12.27 Reid Vapor Pressure: Data not available
9. SHIPPING INFORMATION 9.1 Grades of Purity: CYTHON Insecticide; Malathion ULV Concentrate Insecticide. Many powders, dusts, and spray solutions are sold under a variety of trade names. 9.2 Storage Temperature: Below 120°F. Decomposition (non-hazardous) occurs at higher temperatures. 9.3 Inert Atmosphere: Data not available 9.4 Venting: Data not available	5. HEALTH HAZARDS (Continued) 5.10 Odor Threshold: Data not available 5.11 ED ₀₁ Values: 5000 mg/m ³
6. FIRE HAZARDS (Continued) 6.11 Stoichiometric Air to Fuel Ratio: Data not available 6.12 Flame Temperature: Data not available	

MLT

MALATHION

12.17 SATURATED LIQUID DENSITY		12.18 LIQUID HEAT CAPACITY		12.19 LIQUID THERMAL CONDUCTIVITY		12.20 LIQUID VISCOSITY	
Temperature (degrees F)	Pounds per cubic foot (estimate)	Temperature (degrees F)	British thermal unit per pound-F	Temperature (degrees F)	British thermal unit-inch per hour- square foot-F	Temperature (degrees F)	Centipoise
77	77.089	85	.380		N O T P E R T I N E N T	70	45.270
78	77.089	90	.384			72	42.690
79	77.089	95	.389			74	40.260
80	77.089	100	.393			76	37.990
81	77.089	105	.398			78	35.870
82	77.089	110	.402			80	33.880
83	77.089	115	.406			82	32.020
84	77.089	120	.411			84	30.270
85	77.089	125	.415			86	28.620
86	77.089	130	.420			88	27.080
87	77.089	135	.424			90	25.630
88	77.089	140	.429			92	24.270
89	77.089	145	.433			94	22.990
90	77.089	150	.438			96	21.780
91	77.089					98	20.650
92	77.089					100	19.580
93	77.089					102	18.580
94	77.089					104	17.630
95	77.089					106	16.740
96	77.089					108	15.900
97	77.089				110	15.100	
98	77.089				112	14.350	
99	77.089				114	13.650	
100	77.089				116	12.980	
101	77.089				118	12.350	
102	77.089				120	11.750	

12.21 SOLUBILITY IN WATER		12.22 SATURATED VAPOR PRESSURE		12.23 SATURATED VAPOR DENSITY		12.24 IDEAL GAS HEAT CAPACITY	
Temperature (degrees F)	Pounds per 100 pounds of water	Temperature (degrees F)	Pounds per square inch	Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F
77.02	.014		N O T P E R T I N E N T		N O T P E R T I N E N T		N O T P E R T I N E N T



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

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; CH₄; CAS No. 0074-82-8.
Manufacturer: Contact your supplier or distributor. Consult the latest *Chemicalweek Buyers' Guide* (Genium ref. 73) for a suppliers list.

R 1
I -
S -
K 4



NFPA

HMSI

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 (C₂H₆), propane (C₃H₈), butane (C₄H₁₀), higher molecular weight alkanes, carbon dioxide (CO₂), nitrogen (N₂), and oxygen (O₂).

† Monitor NIOSH, RTECS (PA1490000), for future toxicity data.

Section 3. Physical Data

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

Appearance and Odor: A colorless, odorless, tasteless, extremely flammable gas. Commercial methane's trace amounts of a suitable mercaptan compound give it natural gas's familiar rotten egg smell.

*Soluble in alcohol and ether.

Section 4. Fire and Explosion Data

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

Extinguishing Media: Methane's extreme flammability, extensive explosibility range, and very low flash point represent dangerous fire and explosion risks. *Treat any fire situation involving rapidly escaping and burning methane gas as an emergency.* Extinguish methane fires by shutting off the source of the gas. Use water sprays to cool fire-exposed containers and to protect the personnel attempting to seal the source of the escaping gas.

Unusual Fire or Explosion Hazards: Methane gas is very flammable with an extensive explosibility range. The best fire-fighting technique may be simply to let the burning gas escape from the pressurized cylinder, tank car, or pipelines. Never extinguish the burning gas without first locating and sealing its source. Otherwise, the still leaking gas could explosively re-ignite without warning and cause more damage than if it burned itself out.

Special Fire-fighting Procedures: Wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode.

* The loudest methane-air explosions occur when 1 volume of methane is mixed with 10 volumes of air (or 2 volumes of oxygen). **Warning:** Air with more than 14% by volume methane burns *noiselessly*. Methane burns with a pale, faintly luminous, not always easily detected flame.

Section 5. Reactivity Data

Stability/Polymerization: Methane is stable at room temperature in closed, pressurized containers during routine operations. Hazardous polymerization cannot occur.

Chemical Incompatibilities: Genium reference 84 reports that methane can react violently with bromine pentafluoride, chlorine, chlorine dioxide, nitrogen trifluoride, liquid oxygen, and oxygen difluoride.

Conditions to Avoid: Never expose methane to ignition sources such as open flame, lighted cigarettes or pipes, uninsulated heating elements, or electrical or mechanical sparks. Prevent any accidental or uncontrollably rapid release of methane gas from high-pressure cylinders, tank cars, or pipelines.

Hazardous Products of Decomposition: Thermal oxidative degradation of methane can produce carbon dioxide and toxic carbon monoxide (CO).

Section 6. Health Hazard Data

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

FIRST AID

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

Section 7. Spill, Leak, and Disposal Procedures

Spill/Leak: Design and practice a methane spill control and countermeasure plan (SCCP). When a leak occurs, notify safety personnel, eliminate heat and ignition sources, evacuate unnecessary personnel, provide maximum explosion-proof ventilation, and implement the SCCP. Use only nonsparking tools and equipment. Locate and seal the source of the leaking gas. Use water sprays to protect the personnel attempting this 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) exists. Recommended storage containers include steel.

Transportation Data (49 CFR 172.101-2)

DOT Shipping Name: Methane

IMO Shipping Name: Methane, compressed

DOT Hazard Class: Flammable gas

IMO Hazard Class: 2.1

DOT ID No.: UN1971

IMO Label: Flammable gas

DOT Label: Flammable gas

DOT Packaging Requirements: 49 CFR 173.302

DOT Packaging Exceptions: 49 CFR 173.306

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

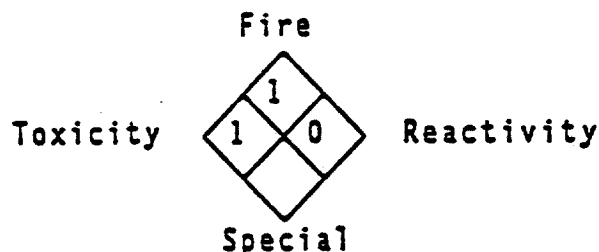
Prepared by: PJ Igoe, BS; **Industrial Hygiene Review:** DJ Wilson, CIH; **Medical Review:** MJ Hardies, MD

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

KENDALL NON-DETERGENT MOTOR OIL, ALL SAE GRADES

PAGE 1

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



DIVISION AND LOCATION---SECTION I

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

CHEMICAL AND PHYSICAL PROPERTIES---SECTION II

Chemical Name:
 petroleum hydrocarbon plus additives
Formula: not applicable
Hazardous Decomposition Products:
 carbon monoxide and carbon dioxide from burning.
 oxides of phosphorous from burning
 oxides of sulfur
Incompatibility (Keep away from):
 strong oxidizers such as hydrogen peroxide, bromine, and chromic acid.
Toxic and Hazardous Ingredients:
 none
Form: liquid Odor: motor oil
Appearance: liquid Color: dark green-brown
Specific Gravity (water=1): .86 to .89
Boiling Point: greater than 330°C (625°F)
Melting Point: less than -12°C (10°F)
Solubility in Water (bv weight %): 0 at 20°C
Volatile (bv 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 CO₂ or Foam

Closed containers exposed to fire may be cooled with water.

HEALTH HAZARD DATA---SECTION IV

Permissible concentrations (air):

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

Chronic effects of overexposure:

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

Acute toxicological properties:

no data available

Emergency First Aid Procedures:

Eyes: Immediately flush with large quantities of water for at least 15 minutes and call a physician.

Skin Contact: Remove excess with cloth or paper. Wash thoroughly with soap and water.

Inhalation: Remove victim to fresh air. Call a physician.

If Swallowed: Contact a physician immediately.

SPECIAL PROTECTION INFORMATION---SECTION V

Ventilation Type Required (Local, mechanical, special):

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

Respiratory Protection (Specify type):

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

Protective Gloves:

neoprene type

Eye Protection:

chemical safety goggles

Other Protective Equipment:

none

(Continued on next page)

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)

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

KENDALL NON-DETERGENT MOTOR OIL, ALL SAE GRADES

PAGE 4

(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.

Material Safety Data Sheet

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



No. 523
n-PENTANE
 (Revision A)

Issued: October 1986
 Revised: August 1987

SECTION 1. MATERIAL IDENTIFICATION

23

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; C₅H₁₂; 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 0
 PPE*
 *See sect. 8

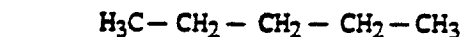
4	0
1	0
-	-

R 1
 I -
 S 1
 K 4

SECTION 2. INGREDIENTS AND HAZARDS

n-Pentane, CAS #0109-66-0; NIOSH RTECS #RZ9450000

% HAZARD DATA



NIOSH REL 1986
 10-Hr TWA: 120 ppm, 350 mg/m³
 15-Min Ceiling: 610 ppm, 1800 mg/m³
 Current OSHA PEL-TWA: 1000 ppm (2950 mg/m³).
 The 1987-88 ACGIH TLVs are TWA = 600 ppm (1800 mg/m³)
 and STEL = 750 ppm (2250 mg/m³).
 *Immediately dangerous to life and health

TOXICITY DATA
 Human, Inhalation, LC_{Lo}:
 130000 ppm
 Human, Inhalation, TC_{Lo}:
 90000 ppm/5 Min.
 Mouse, Intravenous, LD₅₀:
 446 mg/kg
 IDLH* Level: 15000 ppm

SECTION 3. PHYSICAL DATA

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

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 has 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 Required Label: Flammable Liquid

IMO Class: 3.1

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

DOT Hazard Class: Flammable Liquid

DOT ID No. UN1265

IMO Label: Flammable Liquid

Judgements as to the suitability of information herein for purchaser's purposes are necessarily purchaser's responsibility. Therefore, although reasonable care has been taken in the preparation of such information, Gemum Publishing Corp. extends no warranties, makes no representations and assumes no responsibility as to the accuracy or suitability of such information for application to purchaser's intended purposes or for consequences of its use.

Approvals *JOR*

Indust. Hygiene/Safety *12/87*

Medical Review *12/87*

SILVEX

MSDS for Silvex to follow - no longer manufactured, so MSDS difficult to obtain.

Any questions should be addressed to Ms. Gina Regent, OHM Midwest Health and Safety at:

800-537-9540

2,4,5-T ESTERS

TES

<p>Common Synonyms Butyl 2,4,5-trichloro-phenylacetate Butoxypropyl trichloro-phenylacetate Isoctyl trichlorophenylacetate</p>		<p>Liquid</p>	<p>Yellowish brown</p>	<p>Mild odor</p>
<p>Sinks in water.</p>				
<p>Avoid contact with liquid. Keep people away. Stop discharge if possible. Isolate and remove discharged material. Notify local health and pollution control agencies.</p>				
<p>Fire</p>	<p>Combustible. Irritating gases may be produced when heated. Wear goggles and self-contained breathing apparatus. Extinguish with dry chemicals or carbon dioxide. Water and foam may be ineffective on fire. Cool exposed containers with water.</p>			
<p>Exposure</p>	<p>CALL FOR MEDICAL AID. LIQUID Irritating to skin and eyes. If swallowed will cause nausea and vomiting. Remove contaminated clothing and shoes. Flush affected areas with plenty of water. IF IN EYES, hold eyelids open and flush with plenty of water. IF SWALLOWED and victim is CONSCIOUS, have victim drink water or milk and have victim induce vomiting. IF SWALLOWED and victim is UNCONSCIOUS OR HAVING CONVULSIONS, do nothing except keep victim warm.</p>			
<p>Water Pollution</p>	<p>Effect of low concentrations on aquatic life is unknown. May be dangerous if it enters water intakes. Notify local health and wildlife officials. Notify operators of nearby water intakes.</p>			
<p>1. RESPONSE TO DISCHARGE (See Response Methods Handbook) Issue warning-water contaminant Should be removed Chemical and physical treatment</p>		<p>2. LABEL 2.1 Category: None 2.2 Class: Not pertinent</p>		
<p>3. CHEMICAL DESIGNATIONS 3.1 CG Compatibility Class: Not listed 3.2 Formula: 2, 4, 5-Cl₃C₆H₃OCH₂COOR where R=C₄H₉, C₈H₁₇, etc. 3.3 IMO/IUN Designation: Not listed 3.4 DOT ID No.: Data not available 3.5 CAS Registry No.: 93-79-8</p>		<p>4. OBSERVABLE CHARACTERISTICS 4.1 Physical State (as shipped): Liquid 4.2 Color: Amber; dark amber 4.3 Odor: Very weak; mixture with kerosene or diesel oil have odor of the solvent.</p>		
<p>5. HEALTH HAZARDS 5.1 Personal Protective Equipment: Goggles or face shield and rubber gloves 5.2 Symptoms Following Exposure: Ingestion causes intestinal disturbances. Contact with eyes or skin causes mild irritation; transient corneal injury may occur. 5.3 Treatment of Exposure: INGESTION: promptly induce vomiting and get medical attention. EYES: flush with flowing water and get medical attention. SKIN: wash with soap and water. 5.4 Threshold Limit Value: Data not available 5.5 Short Term Inhalation Limit: Data not available 5.6 Toxicity by Ingestion: Grade 3; LD₅₀ = 50-500 mg/kg 5.7 Lethal Toxicity: Data not available 5.8 Vapor (Gas) Irritant Characteristics: Data not available 5.9 Liquid or Solid Irritant Characteristics: Data not available 5.10 Odor Threshold: Data not available 5.11 IDLH Value: Data not available</p>				

6. FIRE HAZARDS

6.1 Flash Point: 265-420°F O.C.
 6.2 Flammable Limits in Air: Data not available
 6.3 Fire Extinguishing Agents: Water, foam, dry chemical, carbon dioxide
 6.4 Fire Extinguishing Agents Not to be Used: Water or foam may cause frothing.
 6.5 Special Hazards of Combustion: Products: Hydrogen chloride gas and other irritating fumes may form in fires.
 6.6 Behavior in Fire: Data not available
 6.7 Ignition Temperature: Data not available
 6.8 Electrical Hazard: Data not available
 6.9 Burning Rate: Data not available
 6.10 Adiabatic Flame Temperature: Data not available
 6.11 Stoichiometric Air to Fuel Ratio: Data not available
 6.12 Flame Temperature: Data not available

7. CHEMICAL REACTIVITY

7.1 Reactivity With Water: No reaction
 7.2 Reactivity with Common Materials: May attack some forms of plastics
 7.3 Stability During Transport: Stable
 7.4 Neutralizing Agents for Acids and Caustics: Not pertinent
 7.5 Polymerization: Not pertinent
 7.6 Inhibitor of Polymerization: Not pertinent
 7.7 Molar Ratio (Reactant to Product): Data not available
 7.8 Reactivity Group: Data not available

8. WATER POLLUTION

8.1 Aquatic Toxicity:
 Isoctyl ester: 26 ppm/48 hr/bluegill/TL₅₀/fresh water
 Butoxypropyl ester: 17 ppm/48 hr/bluegill/TL₅₀/fresh water
 8.2 Waterfowl Toxicity: Data not available
 8.3 Biological Oxygen Demand (BOD): Data not available
 8.4 Food Chain Concentration Potential: Data not available

9. SHIPPING INFORMATION

9.1 Grades of Purity: Technical, 95-99%; 55-85% solutions in kerosene or diesel oil, which are combustible.
 9.2 Storage Temperature: Ambient
 9.3 Inert Atmosphere: No requirement
 9.4 Venting: Open

10. HAZARD ASSESSMENT CODE
 (See Hazard Assessment Handbook)
 A-X-Y

11. HAZARD CLASSIFICATIONS

11.1 Code of Federal Regulations: OPM-E
 11.2 NAS Hazard Rating for Bulk Water Transportation: Not listed
 11.3 NFPA Hazard Classification: Not listed

12. PHYSICAL AND CHEMICAL PROPERTIES

12.1 Physical State at 16°C and 1 atm: Liquid
 12.2 Molecular Weight: Mixtures, all greater than 300
 12.3 Boiling Point at 1 atm:
 Butyl: 636°F = 337°C = 610°K
 Butoxypropyl: 651°F = 344°C = 617°K
 Isooctyl: 770°F = 410°C = 683°K
 2-Ethylhexyl: -770°F = -410°C = -683°K
 12.4 Freezing Point: Not pertinent
 12.5 Critical Temperature: Not pertinent
 12.6 Critical Pressure: Not pertinent
 12.7 Specific Gravity: 1.2 at 20°C (liquid)
 12.8 Liquid Surface Tension: Not pertinent
 12.9 Liquid Water Interfacial Tension: Not pertinent
 12.10 Vapor (Gas) Specific Gravity: Not pertinent
 12.11 Ratio of Specific Heats of Vapor (Gas): Not pertinent
 12.12 Latent Heat of Vaporization: Data not available
 12.13 Heat of Combustion: Data not available
 12.14 Heat of Decomposition: Not pertinent
 12.15 Heat of Solution: Not pertinent
 12.16 Heat of Polymerization: Not pertinent
 12.25 Heat of Fusion: Data not available
 12.26 Limiting Value: Data not available
 12.27 Reid Vapor Pressure: Data not available

NOTES

TES

2,4,5-T ESTERS

12.17 SATURATED LIQUID DENSITY		12.18 LIQUID HEAT CAPACITY		12.19 LIQUID THERMAL CONDUCTIVITY		12.20 LIQUID VISCOSITY	
Temperature (degrees F)	Pounds per cubic foot	Temperature (degrees F)	British thermal unit per pound-F	Temperature (degrees F)	British thermal unit-inch per hour-square foot-F	Temperature (degrees F)	Centipoise
34	76.089		N		N		N
36	76.020		O		O		O
38	75.950		T		T		T
40	75.879						
42	75.809		P		P		P
44	75.740		E		E		E
46	75.669		R		R		R
48	75.599		T		T		T
50	75.530		I		I		I
52	75.459		N		N		N
54	75.389		E		E		E
56	75.320		N		N		N
58	75.250		T		T		T
60	75.179						
62	75.110						
64	75.049						
66	74.980						
68	74.910						
70	74.839						
72	74.770						
74	74.700						
76	74.629						

12.21 SOLUBILITY IN WATER		12.22 SATURATED VAPOR PRESSURE		12.23 SATURATED VAPOR DENSITY		12.24 IDEAL GAS HEAT CAPACITY	
Temperature (degrees F)	Pounds per 100 pounds of water	Temperature (degrees F)	Pounds per square inch (estimate)	Temperature (degrees F)	Pounds per cubic foot (estimate)	Temperature (degrees F)	British thermal unit per pound-F
	D	430	.859	430	.03599		N
	A	440	1.007	440	.04170		O
	T	450	1.176	450	.04816		T
	A	460	1.368	460	.05544		
		470	1.587	470	.06362		P
	N	480	1.836	480	.07279		E
	O	490	2.116	490	.08303		R
	T	500	2.432	500	.09444		T
		510	2.787	510	.10710		I
	A	520	3.186	520	.12120		N
	V	530	3.631	530	.13670		E
	A	540	4.128	540	.15390		N
	I	550	4.681	550	.17280		T
	L	560	5.295	560	.19350		
	A	570	5.976	570	.21630		
	B	580	6.728	580	.24110		
	L	590	7.557	590	.26830		
	E	600	8.471	600	.29790		
		610	9.474	610	.33000		
		620	10.570	620	.36490		
		630	11.780	630	.40290		
		640	13.090	640	.44370		
		650	14.530	650	.48790		
		660	16.090	660	.53550		

MATERIAL SAFETY DATA SHEET

GENIUM PUBLISHING CORPORATION
 1145 CATALYN STREET
 SCHENECTADY, NY 12303-1836 USA
 (518) 377-8855



No. 43

TRISODIUM PHOSPHATE
 DODECAHYDRATE

Date November 1978

SECTION I. MATERIAL IDENTIFICATION

MATERIAL NAME: TRISODIUM PHOSPHATE DODECAHYDRATE

DESCRIPTION: Crystallizes from water as $\text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}$ and can exist as several hydrate forms, depending on processing, and as the anhydrous salt.

OTHER DESIGNATIONS: TSP, Trisodium Orthophosphate, Sodium Phosphate, Tribasic, Tertiary Sodium Phosphate, GE Material D4K1, ASTM D538, CAS# 007 601 549

MANUFACTURER: Available from several suppliers, including FMC Corporation, Monsanto Co., Stauffer Chemical Co., and Olin Corp.

SECTION II. INGREDIENTS AND HAZARDS

Trisodium Phosphate (as $\text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}$)

x

HAZARD DATA

>97

No TLV established*

*Under OSHA inert dust limits it can be assumed that airborne particulate, not otherwise controlled, is limited to a maximum of 5 mg/kg of respirable dust; however, this level may not be adequate to prevent irritation with this material.

($\text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}$)
 Rat, Oral
 LD₅₀ 7400 mg/kg

SECTION III. PHYSICAL DATA

Boiling point ----- -11 H₂O at 100 C
 (decomposes)

Specific gravity (20/4 C) ----- 1.62
 pH of 1% water solution at 25 C - ca 12

Melting point, deg C -- >73.3 (dec)

Molecular weight ----- 380.1

Solubility, g/100g H₂O:

at 0 C ----- 1.5

at 15 C ----- 28.3

at 70 C ----- 157

Appearance & Odor: White or colorless crystalline solid (also as powder flake, granules, etc.).
 No odor.

SECTION IV. FIRE AND EXPLOSION DATA

LOWER UPPER

Flash Point and Method

Autoignition Temp.

Flammability Limits In Air

None

None

None

Extinguishing Media: Use that which is appropriate to the surrounding fire; this material is non-combustible.

In a fire situation at high temperature phosphates can emit highly toxic phosphorus oxide fumes. Firefighters should use self-contained breathing apparatus.

SECTION V. REACTIVITY DATA

This material is a stable alkaline solid at room temperature. It does not undergo hazardous polymerization.

It is incompatible with acidic materials.

SECTION VI. HEALTH HAZARD INFORMATION

TLV None established (See Sect II)

This alkaline material will cause irritation to the respiratory tract if inhaled as a dust or as a solution mist. Prolonged or repeated skin contact will irritate the skin. Eye contact will irritate and can damage the eyes (alkaline attack). This material is low in toxicity by ingestion, but its alkaline nature will irritate, injure the digestive tract. (Trisodium phosphate is used as a food additive; but it must be reduced in alkalinity before being taken into the body.)

FIRST AID:

Eye contact: Promptly flush with plenty of water for 15 minutes. Get medical help.

Skin contact: Wash well with soap and water; rinse well with water. If irritation persists, get medical help.

Inhalation: Remove to fresh air. Get medical help if irritation persists.

Ingestion: Give 1-2 glasses of water or milk to drink to dilute; then give fruit juice or diluted vinegar to drink. Do not induce vomiting! Immediately contact a physician.

SECTION VII. SPILL, LEAK, AND DISPOSAL PROCEDURES

For large spills, notify safety personnel. Clean-up personnel should use protection against contact or inhalation of dust or mist. Scoop up spill for recovery or disposal and place in a container with a lid. Flush residues to the sewer with plenty of water.

DISPOSAL: Scrap material can be used for neutralizing acidic wastes, or it can be buried in an approved manner in an approved landfill. Small amounts can be flushed to the sewer if regulations permit. Follow Federal, State and local regulations for disposal.

SECTION VIII. SPECIAL PROTECTION INFORMATION

Provide general ventilation to the workplace; if dusting conditions occur, local exhaust ventilation will be needed and a NIOSH approved dust respirator may be required.

The use of rubber or plastic gloves and chemical safety glasses with side shields is recommended for handling this material. An apron may also be desirable to prevent contact with clothing, especially where solutions are involved.

Provide eyewash station near to the workplace where this material is used; a safety shower may also be needed where large amounts of solution are prepared or used.

SECTION IX. SPECIAL PRECAUTIONS AND COMMENTS

Store this material in tightly sealed containers in a clean, dry, ventilated area. Prevent physical damage to containers.

Avoid contact with the body and inhalation of dust.

Note that anhydrous trisodium phosphate and lower hydrates are more alkaline on a weight basis than $\text{Na}_3\text{PO}_4 \cdot 12\text{H}_2\text{O}$.

DATA SOURCE(S) CODE: 1.2.4-7.12.15

Judgment as to the suitability of information herein for purchaser's purposes are necessarily purchaser's responsibility. Therefore, although reasonable care has been taken in the preparation of such information, Genium Publishing Corporation assumes no warranty, makes no representations and assumes no responsibility as to the accuracy or suitability of such information for application to purchaser's intended purposes or for consequences of its use.

APPROVALS: MIS, CRD

Industrial Hygiene
and SafetyCorporate Medical
Staff



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

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
NEGLECTIBLE**

**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, HPPA 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: 114MAR001**

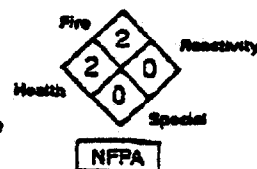
SECTION 9 - HAZARD WARNING

DANGER!
EXTREMELY FLAMMABLE
HARMFUL OR FATAL IF SWALLOWED
**CONTAINS BENZENE WHICH MAY CAUSE
CANCER OR BE TOXIC TO BLOOD-FORMING ORGANS.**

SECTION 10 - COMMENTS.



WD-40



MATERIAL SAFETY DATA SHEET

I. PRODUCT IDENTIFICATION

Manufacturer: WD-40 Company Address: 1061 Cudahy Place (92110) P.O. Box 80607 San Diego, California 92138-9021	Telephone: Emergency Only: 1 (800) 424-9300 (CHEMTREC) (619) 275-1400 Information: 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/M ³ (TWA)
Non-hazardous Ingredients		< 10	

III. PHYSICAL DATA

Boiling Point:	300°F (minimum)	Evaporation Rate:	Not determined
Vapor Density (air = 1):	Greater than 1	Vapor Pressure:	Not determined
Solubility in Water:	Insoluble	Appearance:	Cloudy light amber
Specific Gravity (H₂O = 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 <u>X</u>	The components in this mixture have been found to be noncarcinogenic by NTP, IARC and OSHA.

VI. REACTIVITY DATA

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

VII. SPILL OR LEAK PROCEDURES

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

VIII. SPECIAL HANDLING INFORMATION

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

IX. SPECIAL PRECAUTIONS

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

X. TRANSPORTATION DATA

Domestic Surface	
Description:	Petroleum Distillate Mixture
Hazard Class:	Combustible Liquid
ID No.:	UN 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 DirectorREVISION DATE: March 1990SUPERSEDES: April 1988

NA = Not applicable

NDA = No data available

< = Less than

> = More than

APPENDIX B

SPECIFIC HEALTH AND SAFETY PROCEDURES

Air Monitoring (SOP No. 12)

Respiratory protection (SOP No. 18)

Heat Stress (SOP No. 22)

Excavation (SOP No. 28)

Personal Lifting Safety (SOP No. 33)

Vehicle Safety (SOP No. 45)

Bloodborne Pathogen Exposure Control Plan



OHM Corporation

HEALTH & SAFETY PROCEDURES

AIR MONITORING

PROCEDURE NUMBER 12

Page 1 of 3

LAST REVISED 12/=2 APPROVED BY: JFK/FHH

1. OBJECTIVE

Air monitoring will be conducted on all projects involving hazardous materials in order to determine the appropriate level of dermal and respiratory protection, to alert personnel of potentially explosive hazardous conditions, and to ensure sufficient oxygen for work if in confined spaces. Monitoring programs for activities conducted on United States Army Corp. of Engineers project sites will conform to the requirements in EM 385-1-1, 07.B.05., and 08.A.04.,05., 06., as well as the above. Air monitoring results must be posted for employee information and results entered into employee medical files.

2. PURPOSE

The purpose of this procedure is to describe air monitoring procedures which will be implemented at OHM Remediation Services Corp. (OHM) project sites to determine personnel exposures, potentially hazardous atmospheres, and off-site migration of contaminants.

3. REQUIREMENTS

- 3.1 Direct reading instruments will be used on sites involving hazardous materials. The instrument to be utilized will be specified in the site health-and-safety plan.
- 3.2 Instruments available can include portable organic vapor analyzers (OVA), photoionization detectors (PID), combustible gas indicator/oxygen meter CGI/O₂, hydrogen sulfide monitors, hydrogen cyanide monitors, carbon monoxide monitors, Drager tubes, miniature random aerosol monitor (Mini-Ram), and portable radiological survey meter.
- 3.3 An action level will be established in the site health-and-safety plan for each suspected airborne contaminant.

4. PERIMETER SAMPLING ACTION LEVELS

In order to maintain environmental air quality, concentrations of organic vapors, fugitive dust, and other materials will be kept as low as possible. Any elevated reading should be investigated and the appropriate actions taken to control the emission.

5. ESTABLISHMENT OF BACKGROUND CONCENTRATIONS

A "competent person" as defined in 29 CFR 1926.32 is 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. With this definition in mind, a "competent person" will perform a site survey prior to site operations to determine the concentration for "contaminants" in non-contaminated areas (generally up wind from the site). This is referred to as a background concentration and will be subtracted from measurements made during actual measurements in potentially contaminated areas.

6. AIR MONITORING LOG

The site supervisor will ensure that all air monitoring data is logged into a monitoring notebook. Data will include instrument used, calibration, wind direction, work process, etc. A sample Real Time Air Monitoring Log and an Area Time Weighted Sampling Data Sheet is attached to this procedure.

7. CALIBRATION AND MAINTENANCE REQUIREMENTS

All direct reading instruments, air monitoring pumps and any other instruments used to monitor air contamination will be calibrated daily prior to use. A separate log will be kept detailing date, time, calibration gas or other standard, and name of person performing the calibration. Maintenance of the instruments will be as in detailed in the manufacturer's reference manuals. Sample calibration data sheets are attached to this procedure.

8. PERIMETER MONITORING

Sampling stations may be established around the active work area or spill site (i.e., exclusion zone) for perimeter monitoring. The intent of perimeter monitoring is to collect upwind and downwind measurements to determine if site operations are affecting the quality of air migrating off site. While exclusion zones are rarely perfectly circular and access to all areas surrounding these zones is never easily accomplished, the general plan will be to establish four monitoring stations; upwind, downwind, and two crosswind.

9. PERSONAL AIR MONITORING

Personal air monitoring shall be performed on personnel who are working in USEPA Levels C and D protection that have the highest potential for exposure to hazardous substances or health hazards above permissible exposure limits.

Direct reading instrumentation and fixed media/integrated sampling shall be used to determine if and when this type of monitoring is needed. OSHA or NIOSH methods will be used to collect the chosen analyte. An American Industrial

Hygiene Association (AIHA) accredited laboratory will be used to analyze the samples with the most expedient analysis time ordered.

All personal air monitoring results shall be entered into the employee's medical records. A Personal Sampling Data Sheet for recording personal sampling data is attached to this procedure.

10. POSTING OF AIR MONITORING RESULTS

All personal air monitoring results will be posted in an area where the employees have direct access to the information. At the request of the employee, the results will be explained. If any results are elevated, the site safety officer will investigate, identify the cause and take corrective action.

11. AIR MONITORING FREQUENCY

Air monitoring shall be conducted at least twice daily (once during the beginning of daily activity and once during peak activity) and;

- When work begins on a new phase or portion of a site
- When contaminants other than those previously identified are being handled
- When different types of activities occur (e.g. drum opening as opposed to exploratory well drilling)
- When employees are handling leaking drums or are exposed to obvious contamination
- Upon determination by the site safety officer, monitoring can be conducted continuously, daily or hourly.



OHM Corporation

AREA TIME WEIGHTED SAMPLING DATA SHEET

PROJECT # _____

DATE: _____
DAY: _____

PERFORMED BY: _____
TITLE: _____

SAMPLE NO.	LOCATION	TASK PERFORMED	ANALYSIS METHOD	SAMPLING MEDIA	FLOW RATE (L/MIN)			TIME		TOTAL TIME(MIN)
					PRE	POST	TOTAL VOL.(L)	START	STOP	

REMARKS:



OHM Corporation

COMBUSTIBLE GAS INDICATOR CALIBRATION DATA SHEET

PROJECT # _____

INSTRUMENT NO. _____
CALIBRATION GAS _____
CAL GAS O₂ CONCENTRATION _____

CALIBRATION GAS % LEL _____
CHEMICAL MONITORED _____
CONVERSION FACTOR _____

DATE	PERSON CALIBRATING	CGI READING (% LEL)	OXYGEN READING	TOX IN PPM	REMARKS

NOTE: METER READING x CONVERSION FACTOR = LEL OF ATMOSPHERE
(Conversion factor can be found in instrument manual)



OHM Corporation

REAL TIME AIR MONITORING LOG

PROJECT # _____

DATE: _____
DAY: _____
BACKGROUND: _____
PID: _____
MINI-RAM: _____

TEMPERATURE: _____
REL. HUMIDITY: _____

PID NO. _____
CGI/O₂ #: _____
MONITOX #: _____
RAM #: _____
OTHER: _____

INSTRUMENT USED	TIME OF DAY	METER READING	SAMPLING DURATION	LOCATION	PPE	TASK PERFORMED

PERFORMED BY: _____

SIGNATURE _____

NOTES:



OHM Corporation

PERSONAL SAMPLING DATA SHEET

PROJECT # _____

DATE: _____

PERFORMED BY: _____

DAY: _____

TITLE: _____

SAMPLE NO.	NAME	TASK PERFORMED	ANALYSIS METHOD	SAMPLING MEDIA	FLOW RATE (L/MIN)			TIME		TOTAL TIME(MIN)
					PRE	POST	TOTAL VOL.(L)	START	STOP	

REMARKS:



OHM Corporation

HEALTH & SAFETY PROCEDURES

RESPIRATORY PROTECTION

PROCEDURE NUMBER 18

Page 1 of 8

LAST REVISED 12/92 APPROVED BY: JFK/FHH

1. OBJECTIVE

No individual will enter an area where the use of respiratory protective equipment is required unless the person has been trained in the selection, use, care and limitations of the respirators, and the proper respirator has been selected for the task and fit tested.

2. PURPOSE

The purpose of this procedure is to provide information and guidelines for the selection, use, and care of respiratory protective equipment for all OHM Remediation Services Corp. (OHM) and contractor personnel. This procedure complies with the requirements of 29 CFR 1910.134.

3. GENERAL

- 3.1 The use of engineering controls should be the primary respiratory hazards method to limit employee exposure to respiratory hazards.
- 3.2 Respirators shall be worn when engineering controls are unsuccessful and:
 - When the PEL (Permissible Exposure Limit), TLV (threshold limit value), or ceiling limit for the material exposure is approached or exceeded, as measured by sampling.
 - As deemed appropriate by the regional health and safety manager.
- 3.3 Respirators can only be worn by individuals who have been properly trained and fit tested.
- 3.4 The regional health and safety manager will evaluate annually the effectiveness of the respirator program and report his findings to the vice president of health and safety.
- 3.5 The respirator program coordinator for each region will be the regional health and safety manager.

- 3.6 Only respirators approved by the National Institute for Occupational Safety and Health (NIOSH) and the Mine Safety and Health Administration (MSHA) which are appropriate for the potential hazard shall be worn.

4. SELECTION OF RESPIRATORS

- 4.1 Engineering controls should always be the primary control of contaminated air (i.e. elimination of source of contamination, ventilation equipment, barriers, etc).

- 4.2 Once the need for respirators has been established, the respirators shall be selected on the basis of the hazards to which the worker is exposed.

4.1.1 Selection criteria should include:

- The concentration of the contaminant.
- Whether the contaminant may be sufficiently toxic to be immediately dangerous to life or health (IDLH).
- The possibility of oxygen deficiency.
- The useful life of the respirator or cartridge.
- The escape routes available.
- Whether the equipment is intended for emergency use, for periodic use, or for stand-by purposes.

- 4.3 Characterization of the hazard and proper respirator data will be performed to determine what type respirator will be used.

5. MEDICAL SCREENING

- 5.1 Prior to assigning personnel tasks requiring the use of respirators, the employee shall be medically evaluated in compliance of requirements of 29 CFR 1910.134(a)(10).
- 5.2 Employees not physically and psychologically capable of wearing respirators shall not be assigned to such work.
- 5.3 The medical status of each employee is to be reviewed as outlined in Procedure 10 and as may be deemed necessary if the physical status of the employee changes.

6. FIT TESTING

- 6.1 Fit testing will be performed in accordance with accepted fit test procedures by the regional health and safety manager or their designated employee who has been trained and qualified to do so.
- 6.2 Records of fit testing shall be maintained by the employee's division office and/or corporate human resources.

7. RESPIRATOR USE INSTRUCTIONS

- 7.1 Respirators must be used only by those employees who have been properly trained and qualified on the specific type of respirator to be worn.
- 7.2 All employees whose job assignment requires the use of respirators shall be given respirator training at the time of fit testing before being assigned to the job. Retraining must be performed annually on each type of respirator worn by the individual. Training records must be kept.
- 7.3 Only respirators and cartridges approved for the hazardous atmosphere to be encountered will be used.
- 7.4 Only NIOSH/MSHA approved, respirators will be worn by an individual.
- 7.5 CAUTION: Full face piece or one-half face piece air-purifying respirators are not to be used where there is an oxygen deficiency. Only air-supplied full-face respirators with an emergency escape cylinder or self-contained breathing apparatus will be worn when an oxygen deficiency exists.
- 7.6 CAUTION: A respirator does not protect against excessive heat or against hazardous substance that can attack the body through the skin.
- 7.7 Contact lenses shall not be worn with full-face respirators.
- 7.8 A person wearing a respirator must be clean-shaven in the area of the face piece seal. Long hair, sideburns, and skull caps that extend under the seal are not allowed. Glasses with temple pieces extending under the seal are not allowed. Persons with facial conditions that prevent a proper seal are not allowed to wear a full-face piece respirator until the condition is corrected. Facial conditions which may cause a seal problem include missing dentures, scars, severe acne, etc.

8. RESPIRATOR INSPECTION

8.1 Respirators shall be inspected by the user before and after each day's use and those not used routinely shall be inspected once a month.

8.2 Inspection procedure air purifying respirators (full-face piece and one half-face piece cartridge/canister respirators)

8.2.1 Examine the face piece for:

- Excessive dirt
- Cracks, tears, holes, or distortion from improper storage.
- Inflexibility
- Cracked or badly scratched lenses.
- Incorrectly mounted lens or broken or missing mounting clips.
- Cracked or broken air purifying element holder, badly worn threads, or missing gaskets.

8.2.2 Examine the head straps or head harness for:

- Breaks or cracks
- Broken or malfunctioning buckles. Excessively worn serrations on the head harness which may permit slippage.

8.2.3 Examine exhalation valve for the following after removing cover:

- Foreign material
- Cracks, tears, or distortion in the valve material.
- Improper insertion of the valve body in the face piece.
- Cracks, breaks, or chips in the valve body, particularly in the sealing surface.
- Missing or defective valve cover.
- Improper installation of the valve in the valve body.

8.2.4 Examine the air purifying elements for:

- Missing cartridge adapter gasket
- Incorrect cartridge/canister, or filter for the hazard.
- Incorrect installation, loose connections, missing or worn gaskets, or cross threading in the holder.
- Cracks or dents in outside case or threads of filter or cartridge/canister.

8.2.5 If the device has a corrugated breathing tube, examine it for:

- Broken or missing end connections.
- Missing or loose hose clamps.
- Deterioration, determined by stretching the tube and looking for cracks.

8.3 Inspection procedure air-supplied respirators (full-face piece air line respirators and self contained breathing apparatus (SCBA)) should be inspected as follows:

8.3.1 If the device has a tight-fitting face piece, use the procedures outlined for air purifying respirators will be followed, except those pertaining to the air purifying elements.

8.3.2 The inspection of air-supplied respirators should include checks on the following items:

- Tightness of connections
- Condition of all rubber parts
- Air cylinder (SCBA & egress) must be fully charged and the hydrotest certification must be current (SCBA cylinders-3 years/egress cylinders 5 years).
- Regulators and warning devices function properly.
- Does each unit (SCBA & egress) have a distinct identification number permanently affixed or engraved on the regulator?

- 8.4 A record of respirator inspections including date and inspectors initials and maintenance will be maintained for all pieces of respiratory protective equipment designated for emergency response. The SCBA inspection form follows this procedure.

9. CLEANING OF RESPIRATORS

- 9.1 Respirators assigned and worn by one individual must be cleaned after each day's use. Visitors's or multi-assigned respirators must be cleaned and disinfected after each use.
- 9.2 Extreme caution must be exercised to prevent damage from rough handling during the cleaning procedure.
- 9.3 After cleaning, respirators must be reassembled.
- 9.4 A respirator spray disinfectant is approved as disinfectant between continuous use but not for cleaning and sanitizing after each day's use.
- 9.5 Cleaning Procedure for Individually assigned Respirators
- 9.5.1 Washing: The respirator must be disassembled and washed with a mild liquid detergent in warm water. A brush should be used. To avoid damaging the rubber and plastic in respirator face pieces, use a soft bristle brush and a cleaner/water solution between 90 and 100°F.
- 9.5.2 Rinsing: The respirator should be rinsed thoroughly in clean water (140°F maximum) to remove all traces of detergent. This is very important to prevent dermatitis.
- 9.5.3 Drying: The following drying methods may be used: draining and drying on a clean surface; draining and drying when hung from racks (take care to prevent damage); towel drying with soft clothes or paper towels.
- 9.6 Cleaning Procedure for Visitor or Multi-Assigned Respirators
- 9.6.1 Washing: The respirator must be disassembled and washed with a brush in a cleaning solution in warm water. To avoid damaging the rubber and plastic in respirator face pieces, use a soft bristle brush and a cleaner/water solution between 90 and 100°F.

- 9.6.2 Rinsing: The respirator must be immersed in a disinfectant solutions noted below for at least 2 minutes and then rinsed in clean water at 140°F maximum.
- 9.6.3 Disinfection: 50 ppm of chlorine in a hypochloride solution made from household bleach (2 ml. to one liter of water).
- 9.6.4 Drying: The following drying methods may be used: draining and drying on a clean surface; draining and drying when hung from racks (take care to prevent damage); and drying in steel storage cabinets with built-in circulation fans. (Solid shelves should be replaced with steel mesh).

10. MAINTENANCE OF RESPIRATORS

- 10.1 Respirator maintenance shall only be performed by qualified personnel, for example site supervisors and site safety officers.
- 10.2 Approved replacement parts must be used. Substitution of parts from a different brand or type of respirator invalidates the technical approval of the respirator.
- 10.3 Maintenance performed on a self-contained breathing apparatus shall be done only by an individual who has been certified by the manufacturer.

11. STORAGE OF RESPIRATORS

- 11.1 When not in use, respirators must be stored to protect them from dust, sunlight, heat, extreme cold, excessive moisture, damaging chemicals, and physical damage.
- 11.2 Respirators must be stored in reusable plastic bags between shifts.
- 11.3 The respirator storage environment must be clean, dry and away from direct sunlight. Upright cabinets and wall-mounted cases are suggested.

12. BREATHING AIR

Breathing air shall meet at least the requirements of the specification for Grade D breathing air or better (D, E, or G not A, K, or L) as described in the American National Standard Commodity Specification for Air ANSI/CGA G-71-1989.

13. COLOR CODE

NIOSH recognizes the following standard color codes for respirator cartridges. The color codes can be used as a general guideline, however, personnel should refer to the NIOSH technical certification (TC) to verify adequate protection.

Acid gases	White
Organic vapors	Black
Ammonia gas	Green
Acid gases and organic vapors	Yellow
High Efficiency Particulate Air (HEPA)	
Dust, fumes, and mists (including asbestos and radioactive materials)	Magenta (Purple)
Dusts, fumes, and mists (other than asbestos and radioactive materials)	Orange



OHM Corporation

RESPIRATOR FIT TEST RECORD

Name: _____

Employee Number: _____

Date of Test: _____

Expiration Date: _____

Type of Fit Test: Quantitative
Protective Factor _____

Qualitative

TESTING AGENT:

Isoamyl Acetate
(Banana Oil)

Irritant Smoke

Saccharin

RESPIRATOR DESCRIPTION

Manufacturer: _____

Model: _____

Size: _____

Test Conducted by: _____
(Please print)

Signature of Conductor: _____

I certify that I have been trained on the proper use, instructed on maintenance procedures, and have passed a respirator fit test as described above.

SIGNATURE OF EMPLOYEE: _____

COPY TO: Employee Home Division
Corporate Personnel Office (FAX Number: 419-425-6069)



OHM Corporation

SCBA MONTHLY INSPECTION CHECKLIST

SCBA ID NO. _____

YEAR _____

ITEM INSPECTED	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Connections are tight												
Face-piece in good condition												
Rubber parts pliable												
Regulator functions properly												
Alarm bell functions properly												
Cylinder fully charged												
Cylinder hydrotest current (within 3 years)												
Unit is clean												
Emergency bypass functions properly												
Inspectors initials and employee number												

DEFICIENCIES IN ABOVE ITEMS REQUIRE UNIT TO BE TAGGED AND REMOVED FROM SERVICE.



OHM Corporation

HEALTH & SAFETY PROCEDURES

HEAT STRESS

PROCEDURE NUMBER 22

Page 1 of 3

LAST REVISED 12/92 APPROVED BY: JFK/FHH

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.



OHM Corporation

HEALTH & SAFETY PROCEDURES

EXCAVATION

PROCEDURE NUMBER 28

Page 1 of 8

LAST REVISED 12/92 APPROVED BY: JFK/FHH

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 on 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 hazard to employees been removed or supported, as necessary, to safeguard employees? YES ___ NO ___ N/A ___

UNDERGROUND INSTALLATIONS

- 1. Have the estimated locations of all underground 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:	_____ % O ₂ (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

- 1. 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)



OHM Corporation

HEALTH & SAFETY PROCEDURES

PERSONAL LIFTING SAFETY

PROCEDURE NUMBER 33

Page 1 of 2

LAST REVISED 12/92 APPROVED BY: JFK/FHH

1. OBJECTIVE

All OHM Remediation Services Corp. (OHM) employees will use the proper lifting techniques and will utilize mechanical means when an objects' weight or bulk cannot be safely lifted by manual means.

2. PURPOSE

This procedure provides the proper lifting technique to be used by OHM employees. By utilizing proper technique, OHM employees can avoid debilitating lower back injuries.

3. REQUIREMENTS

- 3.1 Use mechanical material handling equipment whenever practical; however, mechanical lifting equipment shall be used only by qualified personnel.
- 3.2 If the material must be lifted manually, the following procedures apply:
 - 3.2.1 Make certain that the load lifted can be safely handled. Consider the size, weight, and shape of the load. If necessary, get help.
 - 3.2.2 Warm up for the lift by bending, stretching, and turning.
 - 3.2.3 Do not attempt to lift more than 60 pounds.
 - 3.2.4 Ensure proper lifting technique as follows.
 - Place feet about shoulder width apart.
 - Place one foot alongside the object being lifted and the other foot in front of the object.
 - Bend at the knees to grasp the load.
 - Maintain slight arch in the back when positioning over load.
 - Draw the load close to the body, keeping the arms and elbows tucked into the side of the body.

- Take a firm hold on the load with the palms of the hands, not just the fingers.
- Maintain same slight arch in the back.
- Lift gradually, using your leg muscles. Make sure you draw the load close to your body.
- Do not twist the body when lifting. If you have to change direction, turn with your feet, not your trunk.
- Carry the object close to the body and watch where you are going. Do not carry objects in a manner that obstructs your vision.
- Avoid throwing or dropping objects. When lowering, maintain a firm grip. Watch out for pinching of the fingers. Use your leg muscles to lower the object by bending at the knees and keeping your back straight.



OHM Corporation

HEALTH & SAFETY PROCEDURES

VEHICLE SAFETY

PROCEDURE NUMBER 45

Page 1 of 6

LAST REVISED 12/92 APPROVED BY: JFK/FHH

1. OBJECTIVE

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

2. PURPOSE

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

3. RESPONSIBILITIES

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

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

3.2 The regional health and safety manager or site safety officer (SSO) is responsible for the following:

- Ensuring that all vehicle accident reports are processed and the required number of copies submitted to local, state, and federal agencies, to the resource manager and to the insurance carrier.
- Assuring that appropriate individuals, including the corporate vice president of health and safety are notified by telephone of accidents that involve fatalities or multiple serious injuries.

- Assuring that all accidents are documented and investigated. The investigation should be of sufficient depth to determine the cause and action required to prevent recurrence. Copies of all motor vehicle investigations shall be forwarded to the regional resource manager.
- Ensuring that during the selection process for leased or purchased vehicles, consideration is given to obtaining vehicles with essential safety devices. Such devices include anti-locking brakes, air bags, both front and rear seat shoulder harnesses, and all season traction tires. Each motor vehicle must be equipped with safety kits. Shoulder safety belts must not be attached to doors.

4. SEAT BELTS

OSHA has determined that the use of seat belts in motor vehicles can significantly reduce the number and seriousness of occupational motor vehicle accidents, including crashes, by requiring employers to ensure that each employee uses occupant safety belts. Accordingly, all OHM employees driving motor vehicles on company business (including rental cars, pick-up trucks, personal vehicles which are used for company compensated business travel, etc.) shall ensure that all occupants use seat belts at all times.

5. STATE AND LOCAL LAWS

- 5.1 All drivers shall drive OHM vehicles in accordance with the law.
- 5.2 Drivers shall not operate OHM vehicles which are known to be defective or not in compliance with the law.
- 5.3 Drivers of OHM vehicles are personally liable and responsible for the consequences of state and community violations.
- 5.4 The use of devices designed to identify active police speed detection systems (i.e. radar detectors) is prohibited in all OHM owned, leased and rented vehicles and in personal vehicles used for company compensated business travel.

6. SAFE DRIVING PRACTICES

- 6.1 Personnel shall operate vehicles in a defensive manner, i.e., being always on the alert and trying to anticipate what might occur under the existing conditions and driving in such a manner as to avoid hazards.

- 6.2 Personnel operating vehicles shall be considerate of, and courteous to, the traveling public and/or pedestrians and should yield the right-of-way to avoid accidents.
- 6.3 Personnel shall drive at speeds consistent with posted speed limits and prevailing conditions, such as weather, traffic and road conditions.
- 6.4 Personnel shall drive at all times with sufficient space around the vehicle to provide time to see conflicts arising, to react quickly, and to stop. The five keys to defensive driving will help accomplish a good space cushion.
- Aim high in steering.
 - Get the big picture.
 - Keep your eyes moving.
 - Leave yourself an out.
 - Make sure they see you.

7. GENERAL SAFETY RULES

- 7.1 Blind Curves - Slow down and sound horn when approaching a blind curve.
- 7.1 Driver's License - Operation of a vehicle without a valid operator's license is prohibited. Personnel operating vehicles regulated by the United States Department of Transportation (DOT) shall have a current commercial drivers license (CDL).
- 7.3 School Buses - Obey school bus laws. Slow down and prepare to stop when approaching school buses, children on foot or on bicycles.
- 7.4 Emergency Vehicles - Give ambulances, fire fighting equipment and other vehicles the right-of-way during emergencies and lend assistance if required.
- 7.5 Gasoline - Gasoline and other flammable/combustible liquids shall not be carried in or on vehicles other than in permanent gas tanks or in approved safety cans. Approved safety containers must be properly secured when being carried in the back of pick-up trucks.
- 7.6 Laws and Regulations - Learn and obey all local, state, and federal laws.

- 7.7 Parking - Equipment and vehicles shall be parked off roads and highways whenever possible. When it is not possible, the vehicle shall be marked by red lights or flares at night and red flags during the day. Wheels should be blocked or chocked.
- 7.8 Passing - Do not pass when visibility is restricted for any reason.
- 7.9 Pedestrians - Be constantly alert for pedestrians. Remember they have the right-of-way.
- 7.10 Slow Down - Slow down and use caution at blind intersections and crossings when visibility is limited or when passing work crews.
- 7.11 Smoking - Smoking is prohibited in all OHM owned, leased or rented vehicles.
- 7.12 Speeding - Speeding is strictly prohibited.
- 7.13 Thumbs Up - Keep thumbs up when driving. Do not grasp the steering wheel with thumbs inside the spokes.
- 7.14 Visibility - Make sure all windshields, side and rear windows, mirrors and lights are clean before moving vehicles.
- 7.15 Warning Signs and Traffic Signals - Be alert for and strictly obey all directional and warning signs and signals.
- 7.16 Seat Belts - If unit is equipped with seat belts, operator and passengers must keep seat belts fastened at all times during operations.

8. DOT REGULATED VEHICLES

- 8.1 All OHM personnel operating a DOT regulated vehicle must hold a valid CDL from their state of residence.
- 8.2 Air Hose and Couplings - Periodically check air hoses and couplings and compressor hoses for worn or damaged parts. Do not crimp air hose to disconnect couplings; shut off air at the valve.
- 8.3 Backing Up - Never start or back up equipment or vehicles until you are sure the way is clear. If necessary, have another person guide you safely. Back up alarms, when required, must be working and audible over the surrounding noise.

- 8.4 Ear Protection - Ear plugs or other approved ear protection shall be worn when necessary. Use of ear plugs in cars or trucks on public highways may be against local laws.
- 8.5 Fueling and Repair - No fueling or repair shall be made to equipment while it is in operation. The motor shall be turned off and the bucket, blade, gate or boom shall be lowered to the ground or blocks.
- 8.6 Housekeeping - Operators should keep deckplates, steps, rung and hand rails on equipment free of grease, oil, ice, and mud. The inside of the cabs shall also be kept clean and free of flammable items.
- 8.7 Inspections - Equipment and vehicles shall not be used until known defects or discrepancies are corrected. Inspections shall be made at the start of each shift and defects or discrepancies shall be reported to the supervisor immediately.
- 8.8 Jumping - Jumping on or off equipment is prohibited. When climbing on or off equipment or vehicles, face the unit and use secure hand and foot holds to prevent slips and falls. Always look where you are stepping.
- 8.9 Know your Equipment or Vehicle - It is your responsibility to be thoroughly familiar with all features and manuals and if you are in doubt as to correct operating techniques or safety features, ask your supervisor at once.
- 8.10 Overloading - Avoid overloading vehicle beds and equipment buckets and beds. Excessive material can damage the unit and falling material can cause serious injury.
- 8.11 Power Lines - When operating trucks, cranes, shovels or other units, always use caution around power lines and maintain a minimum safe clearance of 10 feet or more depending upon the voltage.
- 8.12 Riders - Only authorized persons will be permitted to ride in equipment or vehicles.
- 8.13 Securing Loads - The operator of the vehicle is responsible for ensuring that their load is secure and will not shift during transport.
- 8.14 Long Hauls - On long hauls, binders should be checked periodically (at least during each rest or service stop) to make sure they are still secure and tight.

- 8.15 Overhanging and Oversize Loads - When it is necessary to transport overhanging or oversize loads, the appropriate signs and red flags and red lights will be used. When necessary, use flag cars.
- 8.16 Safety Chains - Safety chains of sufficient size and strength shall be installed on all trailers being towed.
- 8.17 Safety Hooks - Use safety hooks with latches on all winch truck cables.
- 8.18 Side Roads and Railroad Tracks - Stop and look both ways before crossing railroad tracks or before driving onto a highway from a side road.
- 8.19 Stopping - Do not stop vehicles in the middle of the road to talk to occupants in another vehicle. Always pull to the side or off the road to maintain a clear, safe road.
- 8.20 Turn signals - Always use turn signals, emergency and other signals as appropriate when turning, stopping, passing, or performing other vehicle operations.
- 8.21 Vehicle Maintenance - It is the driver's responsibility to see that his vehicle is in good mechanical condition before and during operation. Special emphasis should be placed on ensuring the brakes, lights, horn, windshield wiper, tires and steering assembly are in good order. Defects must be reported and corrected immediately.

**METHODS OF COMPLIANCE WITH
STANDARD SAFETY PROCEDURES**



METHODS OF COMPLIANCE WITH STANDARD SAFETY PROCEDURES

Any potential hazard associated with a job task can be minimized or eliminated by using the appropriate combination of engineering controls, work practices, and personal protective equipment. This basic safety rule applies to all occupational hazards, whether they are routine work hazards (such as slips or falls), chemical hazards, or contact hazards associated with potentially infectious materials. This chapter of the Exposure Control Plan focuses on how OHM protects employees who may be exposed to biological hazards while performing their work tasks.

This section describes the engineering controls and personal protective equipment at OHM for employees who may come in contact with blood, blood products, or other potentially infectious materials. This section also delineates specific safe work practices which must be followed by every employee who may be exposed to infectious agents.

UNIVERSAL PRECAUTIONS

The principle of **Universal Precautions** is a conservative approach to infection control. Simply stated, the concept behind **Universal Precautions** is that:

ALL HUMAN BLOOD AND BODY FLUIDS ARE TREATED AS IF THEY ARE KNOWN TO CONTAIN HEPATITIS B VIRUS, HUMAN IMMUNODEFICIENCY VIRUS, OR OTHER BLOODBORNE PATHOGENS.

This approach must be used by OHM employees whenever they handle blood, bodily fluids, or other potentially infectious materials. By making this assumption, employees will stringently avoid all contact with potentially contaminated items by following standard safety precautions, use of proper safety controls, and wearing the appropriate personal protective equipment.

The advantages in this approach are obvious. Employees who come in contact with people or who handle blood, blood products, or other bodily fluids often have no idea whether they may be exposed to Hepatitis B Virus, Human Immunodeficiency Virus, or other bloodborne viruses. For example, source individuals may show no

obvious symptom of carrying the virus. Unconscious accident victims will not be able to inform first-aid providers of their medical status. Waste containers may hold broken glass, needles, personal hygiene items, contaminated wastes from laboratories which may be engaged in work with infectious agents. Using **Universal Precautions** takes the guesswork out of how to respond to potential exposure situations safely.

ENGINEERING AND WORK PRACTICE CONTROLS

It is the policy of OHM to use engineering controls and work practices whenever possible to eliminate or minimize employee exposures to bloodborne pathogens. Personal protective equipment will be worn when the potential for occupational exposures remain after these controls have been implemented. The following sections describe the engineering controls and work practices currently in place at this facility.

ENGINEERING CONTROLS

Engineering controls are those devices which isolate or remove the bloodborne pathogen hazard from the work place. These engineering controls are routinely examined as part of a stringent inspection program. Table 3 lists the engineering controls which have been implemented, where appropriate, to protect employees from potential exposure situations.

TABLE 3

Engineering Controls and Inspection Schedule

ENGINEERING CONTROL	INSPECTION PERIOD	COMMENT
Hand-washing Facilities	Once every six months	Daily cleaning.
Dust Pans	After Use	Decontamination required after each use
Shovels	After Use	Decontamination required after each use

HAND-WASHING FACILITIES

Hand-washing facilities which are readily accessible will be made available to all employees, in accordance with the Federal standard. Employees must wash their hands at these facilities every time they come in contact with items containing or contaminated with potentially infectious agents.

Where the construction of hand-washing facilities is not feasible, OHM provides an antiseptic hand cleanser. Employees must wash their hands with running water as soon as possible after using these antiseptic cleansers.

WORK PRACTICES

Work practices are defined as those procedures which have been developed by OHM to reduce or eliminate employee exposures to bloodborne pathogens during the execution of their work tasks. In terms of basic safety during potential exposure situations, the chief safety policy of OHM is to eliminate all exposures. Employees must understand these procedures fully, and they must implement these practices when appropriate.

The Importance of Avoiding Routine Exposures

A majority of biological contaminations are the result of small sprays, splashes, or mists. Most of these contaminations don't cause an immediate, adverse health effect. Therefore, many workers do not fully appreciate the hazards they face during the completion of certain work tasks. Employees must realize that one accidental exposure to bloodborne pathogens can result in serious health effects. All the procedures described in this Exposure Control Plan and associated training program must be strictly followed by employees.

Basic Hygiene

The following basic hygiene procedures are mandatory under the Bloodborne Pathogen Standard, 29 CFR 1910.1030. These procedures have been implemented by OHM and must be followed by employees who are potentially exposed to bloodborne pathogens.

All procedures involving blood or other potentially infectious materials shall be performed in such a manner to prevent or minimize splashing, spraying, spattering, and generation of droplets of these substances. Employees must wash their hands immediately after removal of gloves or other personal protective equipment (or as soon as feasibly possible).

If accidental skin contamination occurs, the area will be washed with copious amounts of soap and water for 15 minutes. If the eyes or mucous membranes are accidentally contaminated, they should be flushed with water for at least 15 minutes. All accidental exposures must be immediately reported to the site supervisor or site safety officer.

Additional Safe-Work Procedures

The following procedures are prudent practices and are not mandated by the Federal standard. However, these procedures are nonetheless required by OHM. Horseplay and other behavior which might confuse, startle, or distract workers, will not be tolerated.

All areas of potentially exposed skin shall be washed before leaving the work area. Water and a mild soap, or an antiseptic cleanser, should be used for skin cleansing. Solvents are not to be used as skin cleansers. They remove the natural protective oils from the skin and can cause irritation and inflammation. Employees with acne, dermatitis, open wounds, or other skin problems should be extremely cautious when involved in potential exposure situations. Employees with skin problems will review safe work procedures with regional or corporate health and safety.

Contaminated Needles and Other Sharps Handling Procedures

In instances where contaminated sharps are encountered, the following sharps-handling procedures are mandatory under the Bloodborne Pathogen Standard, 29 CFR 1910.1030. These procedures have been implemented by OHM and must be followed by employees who are potentially exposed to bloodborne pathogens. Contaminated, sharps will be placed in appropriate containers. These containers must be puncture resistant, labeled (and/or color coded) in accordance with the Federal standard. For further information, refer to the section entitled "Label Requirements" in this document. All sharps containers must be leak-proof on the sides and bottom.

Actions Prohibited in Work Areas

The following work area policies are mandatory under the Bloodborne Pathogen Standard, 29 CFR 1910.1030. These procedures have been implemented by OHM and must be followed by employees who are potentially exposed to bloodborne pathogens.

Eating, drinking, smoking, and applying cosmetics is forbidden in areas where there is a reasonable possibility of occupational exposure to potentially infectious materials. Food and beverages must not be kept in refrigerators, freezers, shelves, cabinets, or on bench-tops where blood or other potentially infectious materials are present. Mouth pipetting or suctioning of blood or other potentially infectious materials is prohibited.

CONTAINERIZATION PROCEDURES

The following containerization procedures are mandatory under the Bloodborne Pathogen Standard, 29 CFR 1910.1030. These procedures have been implemented by OHM and must be followed by employees who are potentially exposed to bloodborne pathogens.

If encountered, specimens of blood or other potentially infectious materials shall be placed in a containers which prevent leakage during collection, handling, processing, storage, transport, or shipping. These containers must be closed prior to being stored, transported, or shipped. Containers for storage, transport, or shipping will be labeled in accordance with the standard and the procedures described in the chapter on labels in this document.

If outside contamination of the primary container occurs (or if specimens contained within the primary container could puncture that container), the primary container will be placed within a secondary container which prevents leakage during handling, processing, storage, transport, or shipping. The secondary container has to be puncture-resistant and labeled/color-coded under the requirements of the standard and the section entitled "Label Requirements" in this document.

EQUIPMENT-HANDLING PROCEDURES

The following equipment-handling procedures are mandatory under the Bloodborne Pathogen Standard, 29 CFR 1910.1030. These procedures have been

implemented by OHM and must be followed by employees who are potentially exposed to bloodborne pathogens.

Equipment which may become contaminated with blood or other potentially infectious materials will be examined prior to servicing or shipping and will be decontaminated, when necessary. A label prepared in accordance with the Federal standard and the section on labels in this document will be attached (if necessary) to the equipment, stating which portions remain contaminated. Designated employees of OHM will ensure that appropriate hazard information is conveyed to all affected employees, as well to servicing and repair representatives.

Special Procedures for Glassware

The following procedures are prudent practices and are not mandated by the Federal standard. Nonetheless, they are required by OHM.

Accidents involving glassware are a significant cause of injuries in laboratories and related facilities. Glassware should be handled carefully and stored properly. Damaged items need to be repaired or discarded. Hand protection must be worn when inserting rubber stoppers or corks into glassware, or when placing rubber tubing on glass hose connections.

Proper instruction on the use of specialized glassware must be obtained. Equipment must be used only for its intended purpose. Employees should ask their supervisors if they are unsure how to handle equipment or if they feel items are not being used properly.

WORKING ALONE AND UNATTENDED OPERATIONS

The following procedures are prudent practices and are not mandated by the Federal standard. Nonetheless, they are implemented by OHM.

Employees should not work alone in a laboratory if the procedures being conducted are hazardous. If employees must work alone, due to the constraints of an experiment or analysis, they should:

- Review the operations with their supervisor to determine if the operations can be conducted alone safely.
- Arrange to have security personnel or another employee check them on a regularly scheduled basis when they work alone.

If a reaction or other operation is to be unattended for any length of time, employees must:

- Leave on the lights in the work place.
- Place an appropriate sign on the door; and
- Provide for containment of the materials being used, should an event such as a power failure occur.

PERSONAL PROTECTIVE EQUIPMENT

OHM provides, at no cost to the employee, appropriate personal protective equipment for personnel who may be exposed to bloodborne pathogens. Table 4, on the following page, lists the personnel protective clothing available at this facility at how to obtain these supplies. Table 4 should be completed by a designated Company employee by entering the appropriate information.

If protective clothing is penetrated by blood or potentially infectious materials, these items must be removed immediately (or as soon as feasible). All personal protective equipment will be removed prior to leaving the work area. Laundering, disposal, repair and replacement of this equipment will be done at no cost to the employee.

TABLE 4
Personal Protective Clothing for Use During
Incidents Involving Potentially Infectious Materials

ITEM	COMMENT
Single-Use Gloves	Check for leaks, tears, punctures before each use. Use gloves only one time. Dispose in appropriate waste container. Gloves should be worn whenever an incident victim is handled.
Other Gloves (Nitrile, monkey grips)	Check for leaks, tears, punctures before each use. Dispose in appropriate waste container.
Protective Suits (Tyvek coveralls)	Check the condition of suit before each use. Do not wear suits which are obviously soiled, torn, or in poor condition. Follow standard disposal procedures for suits, as appropriate. Suits should be worn when there is the potential for contact with large quantities of blood, bodily fluids or other potentially infectious materials.
Safety Goggles/ Safety Glasses	Always wear eye protection during emergency mitigation procedures involving blood, blood products, or other potentially infectious materials. Clean with appropriate antiseptic agents. Dispose of these items in appropriate containers.
Face Shields	Wear face shields whenever there is an opportunity for exposure to large quantities of blood, blood products, or other potentially infectious materials. Wear face shields whenever there is a likelihood of splash, sprays, mists, or the production of respirable droplets. Clean with appropriate antiseptic agents. Dispose of these items in appropriate containers.
Hoods	Check for leaks, tears, punctures before each use. Dispose in appropriate waste container. Responders with long hair should wear these items whenever there is the potential for contact with large quantities of blood, bodily fluids, or other potentially infectious materials.
Shoe Covers, Boots	These items should be worn when gross contamination with potentially infectious materials is anticipated.
Respiratory Protective Equipment (Self Contained Breathing Apparatus, Air-Purifying Respirators)	Respiratory Protection is selected after review of the incident (hazardous materials involved, quantity of the substance, location of the emergency, opportunity for contact with bloodborne pathogens). Emergency Response Team members should check the condition of all respiratory protective equipment before use during an incident response.

GLOVES

The routine use of gloves is one of the most basic safety procedures used to protect employees from the hazards associated with infectious agents. Gloves must be worn whenever there is an opportunity for hand-contact with blood, blood products, mucous membranes, non-intact skin, and other potentially infectious materials or contaminated items and surfaces.

Disposable Gloves

Disposable gloves (sample gloves) should be replaced promptly if they are torn, punctured, or their ability to function as a protective barrier is compromised in any way. Disposable gloves will not be washed or decontaminated for re-use.

Gloves that are Re-Used

Utility gloves (nitrile and PVC monkey grips) may be decontaminated for re-use if the integrity of the glove is not compromised. Prior to use, to ensure that these gloves have no leaks, employees should blow air into the glove; seal the glove at the neck; and, determine if there is an release of air from holes in the glove. Utility gloves must be discarded if they are cracked, peeling, torn, punctured, or exhibit other signs of deterioration.

Hypoallergenic Gloves

Hypoallergenic gloves, glove liners, powderless gloves, or other similar protective gear are available to employees who are allergic to the gloves normally provided. Employees who require such items should contact their supervisor or members of health and safety.

OTHER PROTECTIVE APPAREL

Tyvek coveralls, lab coats, or other similar outer garments may be worn in occupational exposure situations. The type of garment will be selected based on the degree of anticipated exposure. Employees should contact their supervisor or members of the health and safety department if they have any questions concerning the type of personal protective apparel appropriate for certain job tasks.

Tyvek coveralls and PVC booties shall be worn in instances when gross contamination can be reasonably anticipated (i.e. clean-up of a significant release of potentially infectious materials).

OTHER SAFETY EQUIPMENT

Other safety equipment which is found in work areas in which employees may be exposed to potentially infectious materials include:

- An easily accessible drench-type safety shower;

- A fire extinguisher;
- An eyewash fountain;
- A fire alarm, located nearby; and
- An easily accessible telephone for emergency use.

HOUSEKEEPING PROCEDURES



HOUSEKEEPING PROCEDURES

Effective housekeeping is essential to minimize all occupational hazards. Good housekeeping is so important to protect workers from the hazards associated with potentially infectious agents that this section is dedicated to describing the pertinent housekeeping procedures at this facility.

OHM strives to maintain its work sites in a clean and sanitary condition.

HOUSEKEEPING PROCEDURES FOR EQUIPMENT

The following housekeeping procedures for equipment are mandatory under the Bloodborne Pathogen Standard, 29 CFR 1910.1030. These procedures have been implemented by OHM and must be followed by employees who are potentially exposed to bloodborne pathogens.

Decontamination of Equipment

All equipment and working surfaces will be decontaminated after contact with blood or other potentially infectious materials. Work surfaces will be washed with disinfectant after completion of procedures which lead to contamination of these surfaces.

HOUSEKEEPING PROCEDURES FOR SHARPS

The following housekeeping procedures for sharps are mandatory under the Bloodborne Pathogen Standard, 29 CFR 1910.1030. These procedures have been implemented by OHM and must be followed by employees who are potentially exposed to bloodborne pathogens.

Broken glassware which may be contaminated, will never be picked up directly with the hands. A brush and dustpan, tongs, or forceps will be used to clean-up this broken glassware. Employees must wear gloves every time they clean-up broken glassware.

HOUSEKEEPING PROCEDURES FOR WASTE MATERIALS

The following housekeeping procedures for waste materials are mandatory under the Bloodborne Pathogen Standard, 29 CFR 1910.1030. These procedures have been

implemented by OHM and must be followed by employees who are potentially exposed to bloodborne pathogens.

Waste Sharps

Contaminated sharps must be discarded immediately after use. Containers for waste sharps shall be:

- Closable.
- Puncture Resistant.
- Leak-proof on sides and bottom.
- Labeled/color-coded according to the Federal standard and the chapter on labels in this document.
- Easily accessible to personnel (i.e. found close to the work areas where potentially infectious materials are handled).
- Maintained upright throughout use.
- Replaced routinely and not allowed to be overfilled.

When moving containers of contaminated sharps from the area of use, the containers will be closed immediately prior to removal to prevent the accidental release of contents or placed in a secondary container if leakage is possible. This secondary container must be closable, constructed to contain all contents and prevent leakage during handling, storage, transport, or shipping and, labeled/color-coded according to the Federal standard and the section designated "Label Requirements" in this document.

Containers for Other Potentially Infectious Wastes

Containers for other potentially infectious wastes generated during operations conducted at OHM facilities must be:

- Closable;
- Constructed to contain all contents and prevent leakage of fluids during handling, storage, transport, or shipping;

- Labeled/color-coded according to the Federal standard and the section entitled "Label requirements" in this document; and
- Closed prior to removal to prevent the accidental release of materials.

If outside contamination of the waste container occurs, the primary container will be placed in a secondary container. This secondary container must be closable, constructed to contain all contents and prevent leakage during handling, storage, transport, or shipping, labeled/color-coded according to the Federal standard and the section designated "Label Requirements" in this document, and closed prior to removal to prevent the accidental release of materials.

ADDITIONAL HOUSEKEEPING PROCEDURES

The following procedures are prudent practices, not mandated by the Federal standard but nonetheless implemented by OHM. Floors need to be cleaned regularly. Accumulated dust and other solid particulates may pose respiratory hazards. Stairways and hallways cannot be used for storage. Access to exits and emergency equipment should never be blocked.

**EMPLOYEE EXPOSURE SITUATIONS AND
SAFE WORK PRACTICES**



EMPLOYEE EXPOSURE SITUATIONS AND SAFE WORK PRACTICES

The previous chapters describe strategies for "Employee Exposure Determinations" (these procedures identify employees who are most likely to experience occupational exposures to bloodborne pathogens) and "Methods of Compliance" (procedures which ensure employee protection from occupational exposures to bloodborne pathogens). This chapter combines these two issues to describe typical employee exposure situations and how to address exposure hazards through specific safe work practices.

Job classifications and work tasks for occupations impacted by the standard are provided in a series of tables. Following every table is a description of safe work practices for each group. The aim of safe work practices is to eliminate or reduce the exposure hazards which are associated with the work tasks listed in each table. These procedures are based in the recommendations of the Center for Disease Control.⁵

UNIVERSAL PRECAUTIONS IN SAFE WORK PRACTICES

Since medical history and examinations cannot reliably identify all persons infected with bloodborne pathogens, precautions must be used by employees to prevent any contact with blood and bodily fluids. This approach, which is recommended by the Center for Disease Control, is referred to as "Universal Blood and Bodily Fluid Precautions" or "Universal Precautions".

The following safe work practices for potentially exposed workers are advocated by the Center for Disease Control. When the term Universal Precautions is given in the remainder of this chapter, it will refer to the following set of work practices.

1. All potentially exposed workers will use appropriate barrier precautions to prevent skin and mucous membrane exposure when contact with blood or bodily fluids is anticipated.

⁵ "Recommendations for the Prevention of HIV Transmission in Health Care Settings", *Morbidity and Mortality Weekly Report*, Center for Disease Control, August 21, 1987.

2. Gloves must be worn when touching blood, bodily fluids, mucous membranes, or non-intact skin.
3. Gloves must be worn when handling items or surfaces contaminated with blood or bodily fluids.
4. Protective eyewear or face shields should be worn during incidents that are likely to generate droplets of blood or other bodily fluids in order to prevent exposures of the mucous membranes of the mouth, nose, and eyes.
5. Protective clothing should be worn during responses that are likely to generate splashes of blood or other bodily fluids.
6. Hands and other skin surfaces should be washed immediately and thoroughly with water and antiseptic cleanser if contaminated with blood or other bodily fluids.
7. Hands should be immediately washed after gloves are removed.
8. Employees must take precautions to prevent injuries caused by needles, broken glass, and other sharp instruments or devices during or after first-aid response or during the clean up of potentially infectious material.
9. To prevent needle-stick injuries, needles should not be recapped, purposely bent or broken by hand, removed from disposable syringes, or otherwise manipulated by hand.
10. During clean-up of medical wastes, disposable syringes, needles, scalpel blades, and other sharp items must be placed in puncture-resistant containers for disposal.
11. Mouthpieces, resuscitation bags, or other ventilation devices should be available for use in areas in which the need for resuscitation procedures is reasonably anticipated.
12. First-aid providers and clean-up workers who have exudative lesions or weeping dermatitis must refrain from providing first-aid and medical waste clean-up operations until the condition is resolved.

POTENTIAL EXPOSURE SITUATIONS FOR MEDICAL STAFF OHM FINDLAY FACILITY

The following descriptions are geared toward the general duties associated with nursing, first aid, and other medical activities which occur at the Corporate Health and Safety department office.

JOB CLASSIFICATION	WORK TASK	EXPOSURE SITUATION
Occupational Health Supervisor	Handling patients.	Contact with blood and other bodily fluids.
	Handling syringes, needles.	Accidental self-inoculation, needle-sticks.
	Handling vials, other containers of blood and bodily fluids.	Breakage of containers may lead to contact with blood and other bodily fluids.
	Working with equipment containing blood or bodily fluids.	Accidental contact with potentially infectious materials from spills, splashes, and routine equipment-handling procedures.
	Collecting specimens of blood and other bodily fluids.	Accidental self-injection. Spillage of fluids. Aerosol droplet contamination.
	Preparing samples of blood or other bodily fluids for microscopic examination.	Cutting finger on sharp edges of slide/cover slip. Exposure through non-intact skin.
	Testing specimens of blood, other bodily fluids.	Accidental self-injection. Spillage of fluids. Aerosol droplet contamination.
	Pulmonary function test administration.	Aerosol droplet contamination.
	Administration of Cardio-Pulmonary Resuscitation.	Contact with saliva, open wounds of the mouth, aerosol droplets.
	Handling scalpels, other hand pieces used in medical activities.	Cuts and pricks from equipment. Contact with contaminated equipment.

Safe Work Practices For Occupational Health Supervisor

The following safe work practices apply to the general duties associated with nursing, first aid, and other activities the Corporate Health and Safety Department.

1. Follow Universal Precautions at all times.
2. Protective eyewear or face shield should be worn for invasive procedures that commonly result in the generation of droplets, splashing of blood, other bodily fluids.
3. Gowns or aprons should be worn during procedures that are likely to result in the splashing of blood or other bodily fluids.
4. If a glove is torn, the glove must be removed and replaced promptly.
5. If needle-stick or other instrument-related injury occurs, the needle or instrument involved in the incident should be removed from the immediate area of the patient.

POTENTIAL EXPOSURE SITUATIONS FOR DESIGNATED FIRST AID/CPR RESPONDERS

The following descriptions are geared toward the general duties associated with individuals tasked by their companies to be Designated First Aid/CPR Responders.

JOB CLASSIFICATION	WORK TASK	EXPOSURE SITUATION
Designated First Aid\CPR Responders	First-aid on accident victims or those experiencing medical difficulties.	Contact with blood, other bodily fluids.
	Performing Cardio-Pulmonary Resuscitation on patients.	Contact with saliva, open sores in and around mouth, and other bodily fluids.

Safe Work Practices For Designated First Aid/CPR Responders

The following safe work practices apply to the general duties associated with first aid and CPR practices. Practices which should be implemented during specific situations may not be fully represented.

1. Gloves must be worn by Designated First Aid/CPR Responders whenever they anticipate touching blood, bodily fluids, mucous membranes, or non-intact skin while they provide first aid or CPR procedure.
2. Gloves must be worn when handling items or surfaces obviously contaminated with blood or bodily fluids.
3. Hands and other skin surfaces should be washed immediately and thoroughly with water and antiseptic cleanser if contaminated with blood or other bodily fluids.
4. Hands should be immediately washed after gloves are removed.
5. Employees must take precautions to prevent injuries caused by needles, syringes and other sharp objects.
6. Mouthpieces, resuscitation bags, or other ventilation devices should be available to those employees who may reasonably be expected to perform CPR.
7. Clothing which becomes contaminated with blood or other bodily fluids during responses should be removed immediately (or as soon as possible) and separated from other clothing until properly laundered.
8. Areas and equipment which become contaminated with blood or other bodily fluids should be cleaned immediately with a bleach solution (1:10 to 1:100 dilution of household bleach).
9. Pregnant employees should review safe work procedures with Safety and Health Department personnel.

POTENTIAL EXPOSURE SITUATIONS FOR EMPLOYEES PERFORMING CUSTODIAL SERVICES

The following descriptions are geared toward the general duties associated with custodial services. Procedures specific to certain operations may not be fully described.

JOB CLASSIFICATION	WORK TASK	POTENTIAL EXPOSURE SITUATION
Custodial Services	Cleaning sinks, toilets, other bathroom fixtures.	Contact with blood and other bodily fluids.
	Clean-up of vomit, other bodily fluids.	Contact with potentially infectious fluids and materials.
	Removal of waste.	Contact with feminine sanitary items and other potentially contaminated materials. Handling potentially contaminated sharps.
	General site clean-up.	Contact with disposed personal items, and other potentially infectious materials.

Safe Work Practices For Performing Custodial Services

The following safe work practices apply to the general duties associated with custodial services. Practices which should be implemented during specific situations may not be fully represented.

1. Gloves must be worn by employees whenever they anticipate touching blood, bodily fluids, and mucous membranes while they conduct their operations.
2. Gloves must be worn when handling items or surfaces obviously contaminated with blood or bodily fluids.

3. Hands and other skin surfaces should be washed immediately and thoroughly with water and antiseptic cleanser if contaminated with blood or other bodily fluids.
4. Hands should be immediately washed after gloves are removed.
5. Employees should wear eye protection whenever they are cleaning toilets, sinks, or other facilities.
6. Employees must take precautions to prevent injuries caused by needles, syringes and other sharp objects.
7. Clothing which becomes contaminated with blood or other bodily fluids during custodial activities should be removed immediately (or as soon as possible) and separated from other clothing until properly laundered.
8. Areas and equipment which become contaminated with blood or other bodily fluids should be cleaned immediately with a bleach solution (1:10 to 1:100 dilution of household bleach).
9. Pregnant employees should review safe work procedures with Safety and Health Department personnel.

POTENTIAL EXPOSURE SITUATIONS FOR EMPLOYEES OF WASTE DISPOSAL SERVICES

The following descriptions are geared toward the general duties associated with potentially infectious waste cleanup and disposal services.

JOB CLASSIFICATION	WORK TASK	EXPOSURE SITUATION
Hazardous/infectious waste clean-up worker	Recontainerizing materials.	Accidental stick and cuts from improperly discarded needles, syringes, and other sharps.
	Handling waste materials labeled with "Biohazard" symbol.	Contact with blood, bodily fluids, other potentially infectious materials.
	Handling waste containers.	Contact with potentially infectious materials contaminating the outside of the container.

Safe Work Practices For Hazardous Waste Clean-up Employees

The following safe work practices apply to the general duties associated with potentially infectious waste clean-up and disposal. Practices which should be implemented during specific situations may not be fully represented.

1. Gloves must be worn by employees whenever they anticipate touching wastes marked with a "Biohazard" symbol, or wastes from medical, dental, or biotechnology facilities.
2. Gloves must be worn when handling items or surfaces obviously contaminated with blood or bodily fluids.
3. Hands and other skin surfaces should be washed immediately and thoroughly with water and antiseptic cleanser if contaminated with blood or other bodily fluids.
4. Hands should be immediately washed after gloves are removed.
5. Employees should wear eye protection whenever they are handle waste containers.
6. Employees must take precautions to prevent injuries caused by needles, syringes and other sharp objects.

7. Clothing which becomes contaminated with blood or other bodily fluids during waste disposal operations should be removed immediately (or as soon as possible) and separated from other clothing until properly laundered.
8. Areas and equipment which become contaminated with blood or other bodily fluids should be cleaned immediately with a bleach solution (1:10 to 1:100 dilution of household bleach).
9. Pregnant employees should review safe work procedures with Safety and Health Department personnel.

APPENDIX C

SAFETY PLAN ACKNOWLEDGEMENT

APPENDIX D

ACCIDENT/INJURY/ILLNESS REPORT FORMS



ACCIDENT/INJURY/ILLNESS REPORT FORM

H & S Dept.
6/91

OHM Corporation

Accident
 Injury
 Illness
 Property Damage
 Yes
 No
 Vehicle Involved
 Yes
 No

Health & Safety Use Only	
Case #	_____
<input type="checkbox"/> First Aid Only	
<input type="checkbox"/> Medical Treatment	
<input type="checkbox"/> Lost Workdays - Restricted Activity	
<input type="checkbox"/> Lost Workdays - Away from Work	
<input type="checkbox"/> Fatality	

Incident 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)

Describe the Injury/Illness in Detail; indicate Part of Body Affected _____

Name of Object/Substance Which Directly Injured Employee _____

Was 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

YES: Regular Work Work with Restricted Activities

Restriction _____

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 _____

Are You Reporting This Incident as an Industrial Injury/Illness? Yes No

Signature _____ (Employee) Date _____

Signature _____ (Supvr/Manager) Date _____

Signature _____ (Safety Officer) Date _____

Signature _____ (Proj. Manager) Date _____

This Report does Not Constitute Certification of an Industrial Claim

DISTRIBUTION

Original To: Division Secretary at Employee's Home Office

Copy To: Corporate Health & Safety
 Project Manager

Regional Health & Safety Manager
 Site Safety File

INJURY/ILLNESS STATUS REPORT

Employee Name _____ Social Security No. _____

Home Address _____ Phone _____

Job Title _____ Home Division _____

Date/Time of Injury/Illness _____ a.m. Location: OHM Facility Project Site
_____ p.m. Other _____

Description of Injury/Illness _____

AUTHORIZATION TO RELEASE INFORMATION

I hereby authorize all physicians, hospitals, clinics and all persons to discuss with, and release to OHM Corporation and its authorized agents, any information or copies thereof acquired in the course of my examination or treatment for the injury identified above. This authorization shall not extend to any other medical condition, past or present, unless the same is causally or historically relevant or related to the injury referred to above.

Employee Signature _____ Date _____

PHYSICIANS OR MEDICAL PERSONNEL TO COMPLETE REMAINDER OF FORM

WORK STATUS

Patient may return to work with no limitations

_____ Date
Patient may return to work on _____ Date

with limitations indicated. These restrictions are in effect until _____ or until Reevaluation Date

on _____ Date

Patient may work _____ hours in a work day.

Patient is totally incapacitated at this time. Patient

will be reevaluated on _____ Date

DEGREE

Sedentary Work. Lifting 10 pounds maximum and occasionally lifting and/or carrying such articles as dockets, ledgers, and small tools. Although a sedentary job is defined as one which involves sitting, a certain amount of walking and standing is often necessary in carrying out job duties. Jobs are sedentary if walking and standing are required only occasionally and other sedentary criteria are met.

Light Work. Lifting 20 pounds maximum with frequent lifting and/or carrying of objects weighing up to 10 pounds. Even though the weight lifted may be only a negligible amount, a job is in this category when it requires walking or standing to a significant degree or when it involves sitting most of the time with a degree of pushing and pulling of arm and/or leg controls.

Medium Work. Lifting 50 pounds maximum with frequent lifting and/or carrying of objects weighing up to 25 pounds.

Heavy Work. Lifting 100 pounds maximum with frequent lifting and/or carrying of objects weighing up to 50 pounds.

Very Heavy Work. Lifting objects in excess of 100 pounds with frequent lifting and/or carrying of objects weighing 50 pounds or more.

LIMITATIONS

1. The patient may:

a. Stand/walk
 None 1-4 hours
 4-6 hours 6-8 hours

b. Sit
 1-3 hours 3-5 hours
 5-8 hours

c. Drive
 1-3 hours 3-5 hours
 5-8 hours

2. Patient may use hands for repetitive:

Single grasping Pushing & pulling
 Fine manipulation

3. Patient may use feet for repetitive movement as in operating foot controls:

Yes No

4. Patient is able to:

	Frequency	Occasionally	Not at All
a. Bend	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Squat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Climb	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

PHYSICIANS REPORT

Diagnosis _____

Prognosis _____

Other _____

Referred to company physician
 Patient referred/admitted:

To Whom _____

Address _____

Phone _____

Date _____ Time _____

Date of this Report _____ Physician's Signature _____

Address _____ Phone _____